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ISO/DIS 10303-232

Product data representation and exchange: Application protocol: Technical data packaging core information and exchange

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ABSTRACT: This application protocol defines the structure to package/relate groups of product information so that configuration controlled exchanges can be achieved among Product Data Management (PDM) Systems. The emphasis will be on the information that is typically utilized for representing design disclosure of an item. The goal of this application protocol is to provide an information structure where product information can be electronically captured and managed from both a document based perspective and a product item perspective.

KEYWORDS: TDP,Technical Data Package, AP, Application Protocol, Parts List, Data List, Index List, Drawing, Product Data Set, PDM, Product Data Management

COMMENTS TO READER: This document has been reviewed using the internal review checklist (see N956) and the project leader's checklist (see N957). This document has been developed using the DIS versions of ISO10303-41 (TC184/SC4/WG12 N305), 42 (TC184/SC4/WG12 N341), 43 (TC184/SC4/WG12 N294), 44 (TC184/SC4/WG12 N279). Review of this document from the perspective of how technical data is exchanged and shared among product data management (PDM) systems is very crucial.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10303 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10303-232 was prepared by ny Technical Committee ISO TC 184/SC4, *Industrial automation systems and integration*, Subcommittee 4 *Industrial data*.

This International Standard is organized as a series of parts, each published separately. The structure of this standard is described in ISO 10303-1. The numbering of the parts of this International Standard reflects its structure:

— Parts 11 to 14 specify the description methods;

— Parts 21 to 29 specify the implementation methods;

— Parts 31 to 35 specify the conformance testing methodology and framework;

— Parts 41 to 50 specify the integrated generic resources;

— Parts 101 to 107 specify the integrated application resources;

— Parts 201 to 237 specify the application protocols;

— Parts 301 to 337 specify the abstract test suites;

— Parts 501 to 520 specify the application interpreted constructs.

A complete list of parts of ISO 10303 is available from the Internet:

`<http://www.nist.gov/sc4/editing/step/titles/>`

Should further parts of ISO 10303 be published, they will follow the same numbering pattern.

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Annexes A, B, C, D and E form a normative part of this part of ISO 10303. Annexes F, G, H, J and K are for information only.

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Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their lifecycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and as a basis for archiving.

This part of ISO 10303 is a member of the application protocol series. This part of ISO 10303 specifies an application protocol (AP) for packaging product data so that configuration controlled access and data exchanges can be achieved among Product Data Management (PDM) systems.

This part of ISO 10303 identifies specific groupings of product information for the access or exchange of data, such as part lists and drawings. An integrated packing list of these product information groups can be captured by this part of ISO 10303 which satisfies data accountability requirements during data access or a data exchange. The actual format of the data being accessed or exchanged may be through ISO 10303 applications protocols (including this part of ISO 10303), through other ISO standards that define computer file formats, or any other computer file format that is agreed to by parties involved in the data access or data exchange agreement. This capability will satisfy the industrial need to communicate and share the total design definition of a product from an overall product data configuration structure perspective among organizations, partners, vendors, and customers. Portions of product data can be exchanged with the knowledge of where that portion belongs in the overall product data configuration structure. The goal of this part of ISO 10303 is to provide an information structure wherein product information can be electronically captured and managed from both a product information item perspective and a document based perspective, such as in PDM systems.

Current PDM systems being installed in industry manage documents from a product view point. No ISO 10303 Application Protocol addresses a document configuration for product data structures. This part of ISO 10303 addresses this document configuration structure void. Enterprises and industries that have large infrastructures that rely on document based management systems will utilize this part of ISO 10303 to migrate from their current implementations into a configuration control of product data from a product item perspective.

There are two aspects to this part of ISO 10303. The first is the packaging of product data for exchange or access. The second is to provide the exchange requirements of individual product data groupings focusing on associated list information such as data list, index list, indentured data list, and parts list.

The packaging aspect provides the requirements for collecting, organizing, and managing the exchange of a complex set of data files or database views representing the different product data groupings that identify and define a product. These packaging aspects reside in a PDM's underlying metadata. A product data grouping defines a particular view of product information and may be identified and managed as a document, or a product data set or a unique view within a database. Drawings, Associated Lists, and Reference Documents are considered product data groupings. The practice of packaging product data into groupings is called an Engineering Data Package or a Technical Data Package (TDP). As a result of this packaging, this part of ISO 10303 defines the interoperation of other parts of ISO 10303 (e.g., ISO 10303-203 and ISO 10303-202) and the managed inclusion of a mixed set of standards for representation of the various TDP elements, i.e., product data groupings.

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Figure 1 is the high level functions of a PDM system. The areas enclosed in Figure 1 identify the information this part of ISO 10303 will support.

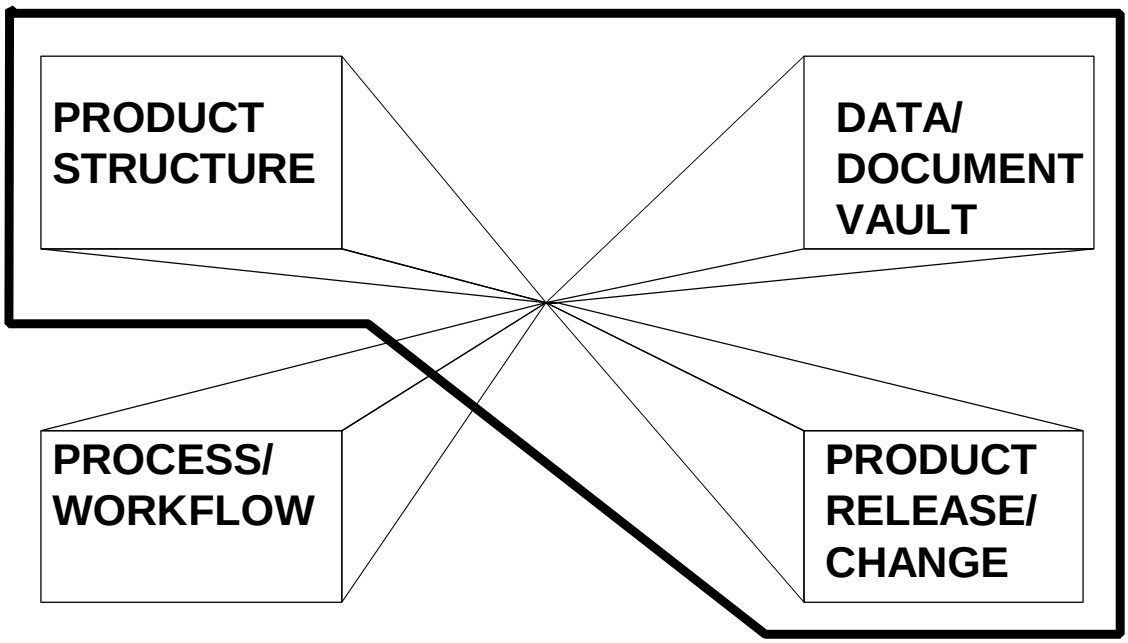

Figure 1 - PDM information area ISO 10303-232 addresses

Figure 2 is a high level planning model that describes some of the basic information concepts and their relationships contained in this part of ISO 10303. These concepts and relationships include the following:

— identification of a product and the relationship of that product to its constituents;

— identification of the TDP elements and the relationship of those TDP elements to each other;

— identification of the relationship between a product and its TDP element or the relationship among products and their TDP elements;

— the documentation of formal change level and release status of product information and the TDP elements for the product information;

— the definition and presentation of associated list information;

— the packaging of the TDP elements for access or exchange.

NOTE 1 Annex K provides comprehensive descriptions for many of the capabilities this part of ISO 10303 provides.

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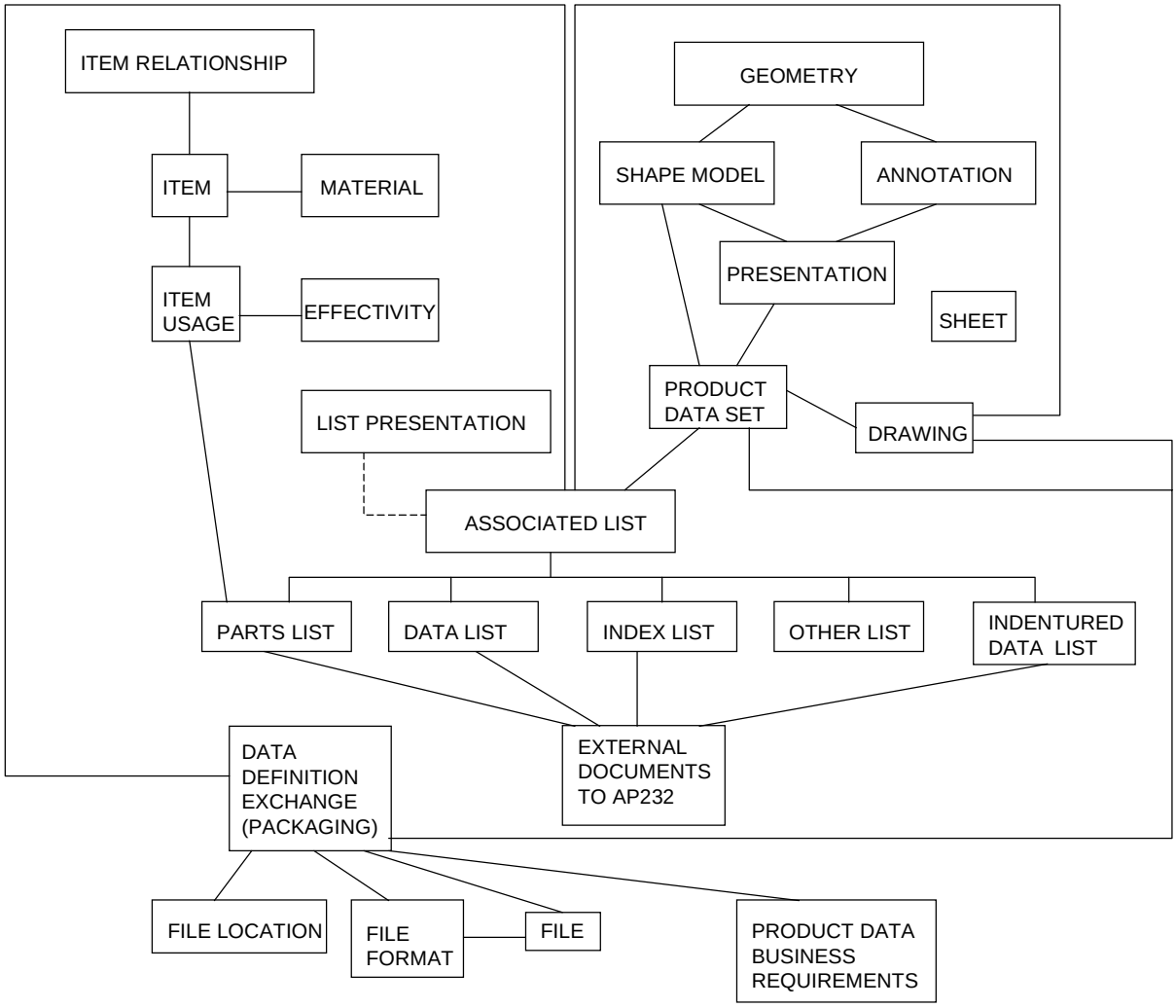

Figure 2 - High level planning model

This application protocol defines the context, scope, and information requirements for the content and exchange of technical data packages and specifies the integrated resources necessary to satisfy these requirements.

NOTE 2 Technical data packages may define products, component parts, assemblies, and their related documentation. TDPs are not confined to mechanical definitions of a product, but may define TDPs that define functionality of a product, TDPs that define concepts for a product, or TDPs that define form and fit of a product.

NOTE 3 This part of ISO 10303 may define interoperation of other ISO 10303 APs within a TDP.

NOTE 4 This part of ISO 10303 may identify the co-existence of ISO 10303 APs with different data representations for the same product information.

NOTE 5 This part of ISO 10303 may identify product data stored in other computer data file formats and the relationship of the data contained in the file with other product data contained in other computer data files.

Application protocols provide the basis for developing implementations of ISO 10303 and abstract test suites for the conformance testing of AP implementations.

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Clause 1 defines the scope of the application protocol and summarizes the functionality and data covered by the AP. Clause 3 lists the words defined in this part of ISO 10303 and gives pointers to words defined elsewhere. An application activity model that is the basis for the definition of the scope is provided in annex F. The information requirements of the application are specified in clause 4 using terminology appropriate to the application. A graphical representation of the information requirements, referred to as the application reference model, is given in annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation, given in 5.1, shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources and is given in 5.2. Note that the definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are not imported into the AIM. The expanded listing given in annex A contains the complete EXPRESS for the AIM without annotation. A graphical representation of the AIM is given in annex H. Additional requirements for specific implementation methods are given in annex C.

NOTE 6 ISO 10303 standards are referenced throughout the documentation of the requirements of this part of ISO 10303. This part utilizes ISO 10303 standards through the use of application interpreted constructs.

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Industrial automation systems and integration — Product data representation and exchange — Part 232: Application protocol: Technical data packaging core information and exchange

1 Scope

This part of ISO 10303 specifies the use of the integrated resources necessary for the scope and information requirements for Technical Data Packages (TDPs) (see 3.5.28) to be exchanged among product data management systems.

Each enterprise uses content, format, and the level of configuration control as parameters when establishing its product exchange or access requirements among business partners. Because of the diverse set of products, product data, and lifecycle processes PDM systems support, this part of ISO 10303 allows many combinations of these parameters.

Using a defined set of these parameters, the disclosure of product information needs to be sufficient to satisfy the business purpose of the TDP.

NOTE 1 TDPs may be prepared to a level where the product information is sufficient to evaluate a product definition concept. Or a TDP may be prepared to a level where the product information is sufficient to enable full design disclosure (see 3.5.9).

Requirements for this part of ISO 10303 were derived from functions that create and use TDPs and reside throughout the product's life cycle. The key informational aspects addressed in this part of ISO 10303 are shared and exchanged throughout the product's life cycle.

NOTE 2 Within a product's life cycle, there are many functions that create and use the technical information about a product. Figure 3 illustrates the functional usage of technical data within each life cycle phase of a product. The largest percentage of the technical data is developed in the concept development, concept and validation, and product and process development lifecycle phases. The operations and support lifecycle phase, for most products or commodities, is the longest and is impacted the greatest by the quality and usability of the TDP information. The production lifecycle phase typically has the second largest usage of the information contained within the TDP. In the production and product process development lifecycle phase, TDP data is used to build and deliver the product.

NOTE 3 The application activity model in annex F provides a graphical representation of the processes and information flows that are the basis for the definition of the scope of this part of ISO 10303.

EXAMPLE 1 The following represent different types of Technical Data Packages through a product's life cycle:

— Conceptual Design Drawings and Associated Lists;

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— Developmental Design Drawings and Associated Lists;

— Product Drawings and Associated Lists;

— Commercial Drawings and Associated Lists;

— Special Inspection Equipment Drawings and Associated Lists;

— Special Tooling Drawings and Associated Lists.

NOTE 4 Definitions for the preceding types of TDPs are given in Clause 3.5.

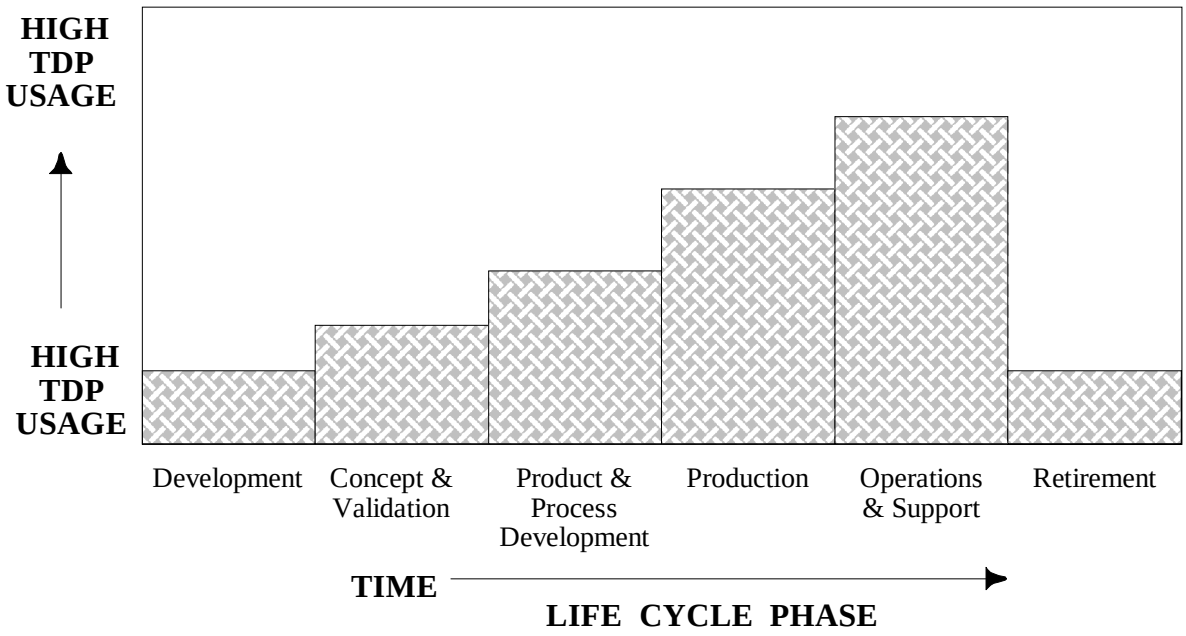

Figure 3 - Functional usage of technical data

The content, form, and format of the data are critical to the core information content for exchange or access of the TDP. The following are within the scope of this part of ISO 10303:

— All products and their commodity types;

NOTE 5 This part of ISO 10303 is defined independently of product or commodity.

— Product definition data and product configuration control data pertaining to the concept development, concept and validation, product and process development, production, operations and support, and retirement phases of a product (herein called the product life cycle);

NOTE 6 ISO 10303 standards are referenced throughout the documentation of the requirements of this part of ISO 10303. This part utilizes ISO 10303 standards through the use of application interpreted constructs.

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— Relationship of the product to a technical data package element (see 3.5.27);

— Identification of drawings related to the product that require configuration control, exchange, or access;

— The data content requirements for parts lists, data lists, index lists, indentured data lists, and other associated lists that are associated to a drawing or a product data set (see 3.5 for definitions);

— The data content requirements for product data set that represent geometric product shape;

— Identification of alternate geometric representations of the product definition data by different disciplines during the product life cycle;

— Identification of any group of technical data related to the product that needs configuration control exchange or access;

EXAMPLE 2 A finite element analysis (models, controls, and results) and testing reports are each a group of technical data.

— Identification of specifications and standards that define or describe the product or product unique processes;

— Identification of documentation that define or describe change activity to the product or product related documentation;

EXAMPLE 3 Change activity is documented in the form of Drawing Revision Notices, Engineering Change Notices, and Drawing Change Notices.

— The Identification of standard parts (see 3.5.26) for the purpose of their inclusion in a product's design;

— The visual presentation for human understanding of the associated list data and the product data set;

— The data requirements for configuration control exchange of Technical Data Packages;

NOTE 7 Identification of document version will be defined by this part of ISO 10303.

— The identification and relationship of Technical Data Package elements within a TDP exchange;

— The identification of file and file format for Technical Data Package elements;

NOTE 8 File and file format information may be defined by this part of ISO 10303, another part of ISO 10303, National Standards or through mutual agreement between the sending and receiving parties of the TDP elements.

— The identification of digital and non-digital media for specific technical data package elements.

EXAMPLE 4 Digital media could include floppy disk, diskette, compact disk, and 9-track tape.

EXAMPLE 5 Non-digital media could include paper, mylar, aperture card, and vellum.

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The following are outside the scope of this part of ISO 10303:

— Data content requirements for technological data used in, or resulting from, the analysis or test of a design that is used as evidence for consideration of a change to a design;

NOTE 9 A product data set may contain analysis or test data in a format other than this part of ISO 10303.

— Data content requirements for technological data that results in changes to the design during the initial design evolution prior to release;

NOTE 10 Changes prior to release are considered informal change activity.

NOTE 11 ISO 10303-209 defines requirements for informal change activity prior to engineering release.

— Data content requirements for business management data for a design project;

EXAMPLE 6 Business data could include schedule, cost, time standards, risk, and related management information.

— Data content requirements for alternate representations of the data by different disciplines outside of that required to define, manufacture, or procure the product;

— Data content requirements for definition of digital or non-digital media for a TDP exchange;

— Data content requirements for definition of procedures to record the digital TDP files to digital media.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 31:1994, *Quantities and Units*.

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units.*

ISO 8824-1:1995, *Information Technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of basic notation.*

ISO 10303-1:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 1: Overview and fundamental principles.*

ISO 10303-11:1994 *Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual.*

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ISO 10303-21:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 21: Implementation methods: Clear text encoding of the exchange structure.*

ISO 10303-31:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 31: Conformance testing methodology and framework: General concepts.*

ISO 10303-41:—[1)], *Industrial automation systems and integration - Product data representation and exchange - Part 41: Integrated generic resource: Fundamentals of product description and support.*

ISO 10303-42:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 42: Integrated generic resource: Geometric and topological representation.*

ISO/DIS 10303-43:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 43: Integrated generic resource: Representation structures.*

ISO/DIS 10303-44:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 44: Integrated generic resource: Product structure configuration.*

ISO 10303-45:1998, *Industrial automation systems and integration - Product data representation and exchange - Part 45: Integrated generic resource: Materials.*

ISO 10303-46:1995, *Industrial automation systems and integration - Product data representation and exchange - Part 46: Integrated generic resources: Visual presentation.*

ISO 10303-101:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 101: Integrated application resources: Draughting.*

ISO 10303-201:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 201: Application protocol: Explicit draughting.*

ISO 10303-202:1996, *Industrial automation systems and integration - Product data representation and exchange - Part 202: Application protocol: Associative draughting.*

ISO 10303-203:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 203: Application protocol: Configuration controlled design.*

ISO/DIS 10303-209:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 209: Application protocol: Composite & Metallic Analysis & Related Design*

ISO 10303-501:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 501: Application interpreted construct: Edge-based wireframe.*

ISO 10303-502:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 502: Application interpreted construct: Shell-based wireframe.*

[1)] To be published (Revision of ISO 10303-41:1994)

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ISO 10303-503:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 503: Application interpreted construct: Geometrically bounded 2D wireframe.*

ISO 10303-505:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 505: Application interpreted construct: Drawing structure and administration.*

ISO 10303-507:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 507: Application interpreted construct: Geometrically bounded surface.*

ISO 10303-508[2)], *Industrial automation systems and integration - Product data representation and exchange - Part 508: Application interpreted construct: Non-manifold surface.*

ISO 10303-509[3)], *Industrial automation systems and integration - Product data representation and exchange - Part 509: Application interpreted construct: Manifold surface.*

ISO 10303-510:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 510: Application interpreted construct: Geometrically bounded wireframe.*

ISO 10303-511:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 511: Application interpreted construct: Topologically bounded surface.*

ISO 10303-512:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 512: Application interpreted construct: Faceted boundary representation.*

ISO 10303-513[4)], *Industrial automation systems and integration - Product data representation and exchange - Part 513: Application interpreted construct: Elementary boundary representation.*

ISO 10303-514:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 514: Application interpreted construct: Advanced boundary representation.*

ISO 10303-515:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 515: Application interpreted construct: Constructive solid geometry.*

ISO 10303-517:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 517: Application interpreted construct: Mechanical design geometric presentation.*

ISO 10303-518[5)], *Industrial automation systems and integration - Product data representation and exchange - Part 518: Application interpreted construct: Mechanical design shaded presentation.*

[2)] To be published.

[3)] To be published.

[4)] To be published.

[5)] To be published.

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3 Terms, definitions, and abbreviations

3.1 Terms defined in ISO 10303-1

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-1 apply:

— abstract test suite;

— application;

— application activity model;

— application context;

— application interpreted model;

— application object;

— application protocol;

— application reference model;

— assembly;

— component;

— conformance class;

— conformance requirement;

— data;

— data exchange;

— implementation method;

— information;

— integrated resource;

— interpretation;

— PICS proforma;

— product;

— product data;

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— protocol implementation conformance statement;

— structure;

— unit of functionality.

3.2 Terms defined in ISO 10303-31

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-31 apply:

— conformance testing;

— preprocessor;

— postprocessor.

3.3 Terms defined in ISO 10303-42

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-42 apply:

— arcwise connected;

— axi-symmetric;

— bounds;

— boundary;

— boundary representation solid model;

— closed curve;

— closed surface;

— connected;

— connected component;

— curve;

— cycle;

— dimensionality;

— *d*-manifold with boundary;

— domain;

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— extent;

— finite;

— geometric coordinate system;

— graph;

— handle;

— homomorphic;

— list;

— open curve;

— open surface;

— orientable;

— overlap;

— parameter range;

— parameter space;

— placement coordinate system;

— self-intersect;

— self-loop;

— set;

— space dimensionality;

— surface;

— topological sense.

3.4 Terms defined in ISO 10303-203

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-203 apply:

— boundary representation model;

— design phase;

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— mechanical part;

— solid model;

— sub-assembly;

— wireframe model.

3.5 Other terms and definitions

For the purposes of this part of ISO 10303, the following terms and definitions apply:

3.5.1
associated list
a tabulation of pertinent engineering information pertaining to an item depicted on an engineering drawing, on a set of engineering drawings, a product data set, in a product data set, or a combination thereof

EXAMPLE Examples of an associated list are Parts List, Data List, Indentured Data List, and Index List.

3.5.2
commercial drawings
engineering and design disclosure information in support of end items that are commercially developed items, or off-the-shelf items

3.5.3
computer interpretable data
data that is in a specific context and format and can be read and stored in a computer system such that action may be taken based on the content of the data

EXAMPLE A properly formatted floppy disk contains a file in a standard file format. One of the parameters of the data in the file is release information, which is one of the following: "released", "not released", or "unknown". If the release information for this file is "not released". The software application reading this file places this information in a working area, rather than the release area.

3.5.4
computer processable data
data that is in a format that can be read and stored by a computer

EXAMPLE A personal note written in a commercial word processor format on a properly formatted floppy disk can be read by a personal computer (PC) with the appropriate software. The data can also be displayed and stored on that PC according to the formatting instructions, regardless of the note content. However, a hand written note is not computer processable.

3.5.5
conceptual design drawings
design concepts in defined graphic form, and including appropriate textual information required for analysis and evaluation of those concepts

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3.5.6
data definition exchange (DDE)
a listing that identifies and records the total number of TDP elements required to support the given product data for an item, assembly, or detail being exchanged or available for access

3.5.7
data list
a tabulation of all engineering drawings, associated lists, specifications, standards, product data sets and subordinate data lists pertaining to the item that applies to the data list

3.5.8
design activity standard
a standard that is used by an organization for design activities

NOTE 1 The standard may be developed by the organization that is doing the design.

NOTE 2 The standard may be developed by an industrial organization (e.g., ISO) that is concerned with standards development. The design activity may adopt the standard without modification or the organization may modify the standard for their purpose.

3.5.9
design disclosure
engineering definition sufficiently complete to enable a competent manufacturer to produce and maintain quality control of item(s) to the degree that physical and performance characteristics interchangeable with those of the original design are obtained without resorting to additional product design effort, additional design data, or recourse to the original design activity

3.5.10
developmental design drawings
data provided to support the analysis of a specific design approach and the fabrication of product prototype for test or experimentation

3.5.11
drawing types
one of two types: industry standard and government peculiar, and can be typed according to the format of the data.

3.5.12
government peculiar drawings
drawings whose specific data content is defined by a specific Government program or Government entity

EXAMPLE Different government peculiar drawing types: inseparable assembly drawing, envelope drawing, and package content drawing.

3.5.13
in-house documents
documents that are owned and controlled within an enterprise

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3.5.14
indentured data list
a structured tabulation of all engineering drawings, associated lists, specifications, standards, product data sets, and subordinate data lists pertaining to the item to which the data list applies and essential in-house documents (see 3.5.13) necessary to meet the technical design disclosure requirements of a project

NOTE The indentured data list can be viewed as a tabulation listed in a top-down breakdown (generation tree) order using parts or documents as its top-down breakdown order.

3.5.15
index list
a tabulation of data lists and possible subordinate index lists pertaining to a business requirement

3.5.16
industry standard drawing
drawing types that are recognized by a standards body such as ISO

EXAMPLE Different industry standard drawing types are detailed drawing, assembly drawing, and installation drawing.

3.5.17
intelligent data format
a format that captures product data in more than a presentation perspective

EXAMPLE Standard exchange for product model data.

3.5.18
parts list
a tabulation of identified parts, bulk materials, and possible reference documents used in an Item

NOTE Other terms used to describe a parts list are the following:

— list of materials;

— bill of materials;

— stock list;

— item list.

3.5.19
path information
a computer interpretable or human interpretable string of text that allows a software application or person enough knowledge to follow a trail over a computer network

3.5.20
product data set
a computer interpretable file of Product model data

EXAMPLE 3D models, and configuration data such as release, security, and/or contract information.

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3.5.21
product drawings and associated lists
the necessary design, engineering, manufacturing, and quality assurance requirements information necessary to enable the procurement or manufacture of an interchangeable item that duplicates the physical and performance characteristics of the original product, without additional design engineering effort or recourse to the original design activity

3.5.22
product information
recorded facts, concepts, or instructions about a product

3.5.23
reference document
any design activity standard (see 3.5.8), drawing, or other document that is specified on a drawing or a list.

3.5.24
special inspection equipment drawings and associated lists
the data required to permit the limited production of special inspection equipment that duplicates the physical and performance characteristics of any previously built special inspection equipment

3.5.25
special tooling drawings and associated lists
the data necessary to enable a manufacturer to produce an item that duplicates the physicial and performance characteristics identical to those of the original tooling

3.5.26
standard parts
parts that an enterprise identifies as being utilized multiple times within the enterprise's business domain

3.5.27
TDP element
a piece of product information that would be exchanged or shared between two parties

EXAMPLE Such as engineering drawings, associated lists, referenced documents, or other data.

3.5.28
Technical Data Package
a collection of related information about a product being exchanged among PDM systems

EXAMPLE The following examples of TDP types identify requirements for TDP elements:

— Conceptual design drawings and associated lists;

— Developmental design drawings and associated lists;

— Product drawings and associated lists;

— Commercial drawings and associated lists;

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— Specifications;

— Special inspection equipment and associated lists;

— Special tooling drawings and associated lists;

— Software and software documentation.

3.6 Abbreviations

For the purposes of this part of ISO 10303, the following abbreviations apply:

AAM application activity model

AIC application interpreted construct

AIM application interpreted model

AP application protocol

ARM application reference model

BOM bill-of-material

CAD computer aided design

CDRL contract data requirements list

CID commercial item description

CM configuration management

DAG directed acyclic graph

DDE Data Definition Exchange

DID data item description

DL Data List

DWG drawing

ICAM integrated computer-aided manufacturing

ID identification

IDEF0 ICAM definition language 0

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IDL Indentured Data List

IGES Initial Graphics Exchange Specification

IL Index List

OL Other List

PDM Product Data Management

PDS Product Data Set

PICS Protocol information and conformance statement

PL Parts List

PRES presentation

RD Reference Document

TDP Technical Data Package

UoF Units of Functionality

4 Information requirements

This clause specifies the information required for technical data packaging core information and exchange.

The information requirements are specified as a set of units of functionality, application objects, and application assertions. These assertions pertain to individual application objects and to relationships between application objects. The information requirements are defined using the terminology of the subject area of this application protocol.

NOTE 1 A graphical representation of the information requirements is given in annex G.

NOTE 2 The information requirements correspond to those of the activities identified as being in the scope of this application protocol are in annex F.

NOTE 3 The mapping table is specified in 5.1 that shows how the information requirements are met using the integrated resources of this International Standard. The use of the integrated resources introduces additional requirements that are common to application protocols.

NOTE 4 The information requirements were captured using the EXPRESS language defined in ISO 10303-11. The EXPRESS language construces of entity, type, select, and enumeration are used to define an application object. A unit of functionality consists of a subset of application objects.

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The following are high-level information requirements:

— any exchange requiring exchange document accountability shall contain at least one Data Definition Exchange (DDE) element;

— the DDE shall reference TDP elements for the information of interest;

— the TDP elements are drawings, product data sets, reference documents, associated lists, and any other piece of product information that would be exchanged or shared between two parties.

4.1 Units of functionality

This subclause specifies the units of functionality for the technical data packaging core information and exchange application protocol. This part of ISO 10303 specifies the following units of functionality:

— data_definition_exchange;

— data_list;

— drawing;

— indentured_data_list;

— index_list;

— other_list;

— parts_list;

— presentation;

— product_data_set;

— reference_document.

NOTE 1 The following ISO 10303-203 UoFs are considered to be a portion of this part of ISO 10303: authorization, bill_of_material, design_information, effectivity, end_item_identification, part_identification, and source_control

The units of functionality and a description of the functions that each UoF supports are given in 4.1.1 through 4.1.11. Table 1 and Table 2 provide the applicability of the EXPRESS constructs, selects, enumerations, types, and entities, to the units of functionality. The application objects included in the UoFs are defined in 4.2. The application objects that are used by each UoF are given in Table 2.

NOTE 2 The objects in Table 1 reflect the selects and enumerations from the ARM EXPRESS-G diagram in annex G. The objects in Table 2 reflect entities and types from the ARM EXPRESS-G. Clauses 4.1.1 thru 4.1.11 reflect the same object list as in Table 2 with the same order. Clause 4.2 incorporates all types, selects, and enumerations into the using entity's definition resulting in more robust objects.

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NOTE 3 Abbreviations used in the column headings for Table 1 and Table 2 are found in 3.6.

Table 1 - Applicability of selects and enumerations to units of functionality

Objects	Units of functionality									
Select, Enumeration	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
change_type	X	X	X	X	X	X	X	X		X
component_list_type_enumeration	X									
component_list_type_select	X									
data_definition_entry_select					X					
data_definition_exchange_list_-method					X					
data_definition_file_entry					X					
drawing_or_product_data_set	X	X	X	X		X				X
entry_format_select					X					
exchange_reason					X					
graphics_parameters									X	
identification_select				X	X					
indentured_list_method				X	X					
item_identifying_number_select	X	X		X	X	X	X			
item_list_applies_to_select	X									
item_or_element				X	X					
list_entry_select			X	X						
quantity_accuracy_enumeration	X		X	X				X		
quantity_accuracy_select	X			X	X			X		
quantity_type_select	X			X	X					
retrofit_state	X									
revision_authorization_select	X	X	X	X	X	X	X	X		X
source_identification		X		X	X					
stock_size_classification	X									

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Table 1 - Applicability of selects and enumerations to units of functionality (concluded)

Objects	Units of functionality									
Select, Enumeration	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
stock_size_cross_section	X									
usage_condition	X									
usage_context	X			X	X					
weight_derivation	X									

Table 2 - Applicability of types and entities to the units of functionality

Objects	Units of functionality									
Entity	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
a_number	X	X	X	X	X	X	X	X	X	X
a_real	X	X	X	X	X	X	X	X	X	X
accessed_file					X					
alternate_element_identification	X	X	X	X	X	X	X	X		X
alternate_identification_of_item	X	X		X	X	X	X			
alternate_item	X			X	X					
an_integer	X	X	X	X	X	X	X	X	X	X
annotation						X	X			
approval	X	X	X	X	X	X	X			X
assembly	X									
associated_list	X	X	X	X						X
body_presentation									X	
change_identification	X	X	X	X	X	X	X	X		X
column_header									X	
columnar_data_content_holder									X	

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Table 2 - Applicability of types and entities to the units of functionality (continued)

Objects	Units of functionality									
Entity	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
company	X	X	X	X	X	X	X	X		X
company_code	X	X	X	X	X	X	X	X		X
configuration	X	X	X	X	X	X	X			X
contract	X	X	X	X	X	X	X			X
contract_submission		X		X	X					
data_definition_entry_item					X					
data_definition_entry_tdp_-element					X					
data_definition_exchange					X					
data_definition_exchange_body					X					
data_definition_exchange_header					X					
data_definition_exchange_-simple_entry					X					
data_definition_indentured_entry					X					
data_definition_indentured_list_method					X					
data_list		X	X							
data_list_body		X								
data_list_entry		X								
data_list_header		X	X							
data_list_tabulation		X								
date	X	X	X	X	X	X	X	X	X	X
date_effectivity	X			X	X					
delivery_accounting					X					
design_authority	X	X	X	X	X	X	X	X		X
distribution_notice	X	X	X	X	X	X	X			X

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on									X
			Units of functionality						
	PL		**DL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
			X						
X									

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Table 2 - Applicability of types and entities to the units of functionality (continued)

Objects	Units of functionality									
Entity	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
header_block									X	
header_configuration_with_-element_identification	X	X	X	X	X	X	X			X
header_presentation									X	
identifier	X	X	X	X	X	X	X	X	X	X
indentured_data_list				X						
indentured_data_list_body				X						
indentured_data_list_entry				X						
indentured_data_list_header			X	X						
indentured_data_list_tabulation				X						
indentured_list_by_document				X	X					
indentured_list_by_part				X	X					
indentured_list_by_part_with_-document_references_to_parts				X	X					
index_list			X							
index_list_body			X							
index_list_entry			X							
index_list_header			X							
item	X	X	X	X	X	X	X	X		X
item_identification	X	X	X	X	X	X	X	X		X
item_list	X									
item_list_drawing	X									
item_parent_to_item_child_-relationship				X	X					
item_parent_to_tdp_element_-child_relationship				X	X					

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Table 2 - Applicability of types and entities to the units of functionality (continued)

Objects	Units of functionality									
Entity	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
item_type	X	X		X	X	X	X			
item_usage	X									
label	X	X	X	X	X	X	X	X	X	X
list_item_usage	X									
list_presentation									X	
load_point									X	
locally_defined_item	X									
lot_effectivity	X			X	X					
made_from_stock_material	X									
make_from_an_item	X									
measure	X			X	X				X	
notation	X	X	X	X	X					X
number_with_units	X			X	X					
other_list		X								X
other_list_body										X
other_list_body_table										X
other_list_header		X								X
other_reference_document	X	X	X	X	X	X	X	X		X
page_parameters									X	
page_presentation									X	
parts_list	X	X								
parts_list_body	X									
parts_list_header	X	X								
person	X	X	X	X	X	X	X	X		X
person_and_organization	X	X	X	X	X	X	X			X

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Table 2 - Applicability of types and entities to the units of functionality (continued)

Objects	Units of functionality									
Entity	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
product_configuration	X	X	X	X	X	X	X	X		X
product_data_set	X	X		X		X				X
product_data_set_with_format	X	X		X		X				X
product_data_set_with_shading	X	X		X		X				X
product_data_set_without_format	X	X		X		X				X
product_model	X	X	X	X	X	X	X			X
product_presentation						X	X			
quantity	X			X	X					
reason					X					
reference_document	X	X	X	X	X	X	X	X		X
reference_document_usage	X					X		X		
release_authentication	X	X	X	X	X	X	X			X
retrofit_usage	X									
revision	X	X	X	X	X					X
security_classification	X	X	X	X	X	X	X			X
sequence_effectivity	X			X	X					
shaded_shape_model						X				
shape_model						X	X			
sheet	X	X		X	X	X	X			X
simple_list_of_elements					X					
simple_list_of_files					X					
single_document_list		X	X							
size_characteristics	X	X	X	X	X	X	X			X
size_characteristics_full_size	X	X	X	X	X	X	X			X

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Table 2 - Applicability of types and entities to the units of functionality (continued)

Objects	Units of functionality									
Entity	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
size_characteristics_internal_-divisions					X	X				
size_characteristics_sheet_-across_file					X	X				
source_file						X				
source_information_type	X			X	X					
special_condition	X	X		X	X	X				
specification_document	X	X		X	X			X		
standard_document	X	X		X	X			X		
status	X	X	X	X	X	X	X	X		X
stock_material	X									
stock_size	X									
stock_size_parameters	X									
string_location_definition									X	
system_declaration					X	X				
system_destination					X					
tabulation									X	
tabulation_entry										X
tabulation_header									X	
tdp_element	X	X	X	X	X	X	X	X		X
tdp_element_and_item_association	X	X	X	X	X	X	X	X		X
tdp_element_list_item	X									
tdp_element_parent_to_item_-child_relationship				X	X					
tdp_element_parent_to_tdp_-element_child_relationship				X	X					

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Table 2 - Applicability of types and entities to the units of functionality (concluded)

Objects	Units of functionality									
Entity	**PL**	**DL**	**IL**	**IDL**	**DDE**	**PDS**	**DWG**	**RD**	**PRES**	**OL**
tdp_indentured_item				X	X					
tdp_indentured_item_tdp_element				X	X					
text	X	X	X	X	X	X	X	X	X	X
time	X	X	X	X	X	X	X	X	X	X
volume	X			X	X					
weight	X			X	X					
yes_no					X					

NOTE 4 - Table 1 and table 2 are a cross reference of the UoFs of this part of ISO 10303 and the application objects defined in 4.2.

4.1.1 data_definition_exchange

The data_definition_exchange UoF captures the shipping and packaging information required to identify and relate the product data and documentation being exchanged, in whole or in part, between two enterprises or between two systems.

The following application objects are used by the data_definition_exchange UoF:

— A_number;

— A_real;

— Accessed_file;

— Alternate_element_identification;

— Alternate_identification_of_item;

— Alternate_item;

— An_integer;

— Approval;

— Change_identification;

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— Company;

— Company_code;

— Configuration;

— Contract;

— Contract_submission;

— Data_definition_entry_item;

— Data_definition_entry_tdp_element;

— Data_definition_exchange;

— Data_definition_exchange_body;

— Data_definition_exchange_header;

— Data_definition_exchange_simple_entry;

— Data_definition_indentured_entry;

— Data_definition_indentured_list_method;

— Date;

— Date_effectivity;

— Delivery_accounting;

— Design_authority;

— Distribution_notice;

— Document_usage_parameter;

— Drawing_suffix_number_combination;

— Effectivity;

— Element_identification;

— Element_type;

— Exchange_file;

— File;

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— File_format;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Indentured_list_by_document;

— Indentured_list_by_part;

— Indentured_list_by_part_with_document_references_to_parts;

— Item;

— Item_identification;

— Item_parent_to_item_child_relationship;

— Item_parent_to_tdp_element_child_relationship;

— Item_type

— Label;

— Lot_effectivity;

— Measure;

— Notation;

— Number_with_units;

— Other_reference_document;

— Person;

— Person_and_organization;

— Product_configuration;

— Product_model;

— Quantity;

— Reason;

— Reference_document;

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— Release_authentication;

— Revision;

— Security_classification;

— Sequence_effectivity;

— Sheet;

— Simple_list_of_elements;

— Simple_list_of_files;

— Size_characteristics;

— Size_characteristics_full_size;

— Size_characteristics_internal_divisions;

— Size_characteristics_sheet_across_file;

— Source_information_type;

— Special_condition;

— Specification_document;

— Standard_document;

— Status;

— System_declaration;

— System_destination;

— Tdp_element;

— Tdp_element_and_item_association;

— Tdp_element_parent_to_item_child_relationship;

— Tdp_element_parent_to_tdp_element_child_relationship;

— Tdp_indentured_item;

— Tdp_indentured_tdp_element;

— Text;

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— Time;

— Volume;

— Weight;

— Yes_no.

4.1.2 data_list

The data_list UoF contains the information that is formulated into a tabulation of drawings, reference documents, subordinate data list, associated parts list, and other lists pertaining to some Item.

The following application objects are used by the data_list UoF:

— A_number;

— A_real;

— Alternate_element_identification;

— Alternate_identification_of_item;

— An_integer;

— Approval;

— Associated list;

— Change_identification;

— Company;

— Company_code;

— Configuration;

— Contract;

— Contract_submission;

— Data_list;

— Data_list_body;

— Data_list_entry;

— Data_list_header;

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— Data_list_tabulation;

— Date;

— Design_authority;

— Distribution_notice;

— Document_list;

— Drawing;

— Drawing_suffix_number_combination;

— Element_identification;

— Element_type;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Item;

— Item_identification;

— Item_type;

— Label;

— Notation;

— Other_list;

— Other_list_header;

— Other_reference_document;

— Parts_list;

— Parts_list_header;

— Person;

— Person_and_organization;

— Product_configuration;

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— Product_data_set;

— Product_data_set_with_format;

— Product_data_set_with_shading;

— Product_data_set_without_format;

— Product_model;

— Reference_document;

— Release_authentication;

— Revision;

— Security_classification;

— Sheet;

— Single_document_list;

— Size_characteristics;

— Size_characteristics_full_size;

— Special_condition;

— Specification_document;

— Standard_document;

— Status;

— Tdp_element;

— Tdp_element_and_item_association;

— Text;

— Time.

4.1.3 drawing

The drawing UoF contains the information which describes the presentation of product data in a human interpretable form wherein the physical or functional requirements for that product are presented pictorially, textually, or both.

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The following application objects are used by the drawing UoF:

— A_number;

— A_real;

— Alternate_element_identification;

— Alternate_identification_of_item;

— An_integer;

— Annotation;

— Approval;

— Change_identification;

— Company;

— Company_code;

— Configuration;

— Contract;

— Date;

— Design_authority;

— Distribution_notice;

— Drawing;

— Drawing_suffix_number_combination;

— Element_identification;

— Element_type;

— Geometry;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Item;

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— Item_identification

— Item_type;

— Label;

— Other_reference_document;

— Person;

— Person_and_organization;

— Product_configuration;

— Product_model;

— Product_presentation;

— Reference_document;

— Release_authentication;

— Security_classification;

— Shape_model;

— Sheet;

— Size_characteristics;

— Size_characteristics_full_size;

— Status;

— Tdp_element;

— Tdp_element_and_item_association;

— Text;

— Time.

4.1.4 indentured_data_list

The indentured_data_list UoF contains the information that provides a configuration-controlled, hierarchical structure of product information, i.e., "top-down-break-down" order. Information may be made up of parts, documents, and parts plus documents.

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The following application objects are used by the indentured_data_list UoF:

— A_number;

— A_real;

— Alternate_element_identification;

— Alternate_identification_of_item;

— Alternate_item;

— An_integer;

— Approval;

— Associated_list;

— Change_identification;

— Company;

— Company_code;

— Configuration;

— Contract;

— Contract_submission;

— Date;

— Date_effectivity;

— Design_authority;

— Distribution_notice;

— Document_list;

— Document_usage_parameter;

— Drawing;

— Drawing_suffix_number_combination;

— Effectivity;

— Element_identfication;

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— Element_type;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Indentured_data_list;

— Indentured_data_list_body;

— Indentured_data_list_entry;

— Indentured_data_list_header;

— Indentured_data_list_tabulation;

— Indentured_list_by_document;

— Indentured_list_by_part;

— Indentured_list_by_part_with_document_references_to_parts;

— Item;

— Item_identification;

— Item_parent_to_item_child_relationship;

— Item_parent_to_tdp_element_child_relationship;

— Item_type;

— Label;

— Lot_effectivity;

— Measure;

— Notation;

— Number_with_units;

— Other_reference_documents;

— Person;

— Person_and_organization;

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— Product_configuration;

— Product_data_set;

— Product_data_set_with_format;

— Product_data_set_with_shading;

— Product_data_set_without_format;

— Product_model;

— Quantity;

— Reference_document;

— Release_authentication;

— Revision;

— Security_classification;

— Sequence_effectivity;

— Sheet;

— Size_characteristics;

— Size_characteristics_full_size;

— Source_information_type;

— Special_condition;

— Specification_document;

— Standard_document;

— Status;

— Tdp_element;

— Tdp_element_and_item_association;

— Tdp_element_parent_to_item_child_relationship;

— Tdp_element_parent_to_tdp_element_child_relationship;

— Tdp_indentured_item;

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— Tdp_indentured_tdp_element;

— Text;

— Time;

— Volume;

— Weight.

4.1.5 index_list

The index_list UoF contains the information that provides a simple tabulation of data lists and subordinate index lists pertaining to some Item.

The following application objects are used by the index_list UoF:

— A_number;

— A_real;

— Alternate_element_identification;

— An_integer;

— Approval;

— Associated_list;

— Change_identification;

— Company;

— Company_code;

— Configuration;

— Contract;

— Data_list;

— Data_list_header;

— Date;

— Design_authority;

— Distribution_notice;

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— Document_list;

— Drawing;

— Element_identification;

— Element_type;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Indentured_data_list;

— Index_list;

— Index_list_body;

— Index_list_entry;

— Index_list_header;

— Item;

— Item_identification;

— Label;

— Notation;

— Other_reference_document;

— Person;

— Person_and_organization;

— Product_configuration;

— Product_model;

— Reference_document;

— Release_authentication;

— Revision;

— Security_classification;

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— Single_document_list;

— Size_characteristics;

— Size_characteristics_full_size;

— Status;

— Tdp_element;

— Tdp_element_and_item_association;

— Text;

— Time.

4.1.6 other_list

The other_list UoF contains the information that provides a general structure for simple lists of product information.

The following application objects are used by the other_list UoF:

— A_number;

— A_real;

— Alternate_element_identification;

— An_integer;

— Approval;

— Associated_list;

— Change_identification;

— Company;

— Company_code;

— Configuration;

— Contract;

— Date;

— Design_authority;

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— Distribution_notice;

— Drawing;

— Element_identification;

— Element_type;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Item;

— Item_identification;

— Label;

— Notation;

— Other_list;

— Other_list_body;

— Other_list_body_table;

— Other_list_header;

— Other_reference_document;

— Person;

— Person_and_organization;

— Product_configuration;

— Product_data_set;

— Product_data_set_with_format;

— Product_data_set_with_shading;

— Product_data_set_without_format;

— Product_model;

— Reference_document;

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— Release_authentication;

— Revision;

— Security_classification;

— Sheet;

— Size_characteristics;

— Size_characteristics_full_size;

— Status;

— Tabulation_entry;

— Tdp_element;

— Tdp_element_and_item_association;

— Text;

— Time.

4.1.7 parts_list

The parts_list UoF contains the information that describes a configuration controlled tabulation of all parts and bulk materials consumed within an item. Referenced documents that support the items being describe may also be included in the tabulation.

The following application objects are used by the parts_list UoF:

— A_number;

— A_real;

— Alternate_element_identification;

— Alternate_identification_of_item;

— Alternate_item;

— An_integer;

— Approval;

— Assembly;

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— Associated_list;

— Change_identification;

— Company;

— Company_code;

— Configuration;

— Contract;

— Date;

— Date_effectivity;

— Design_authority;

— Distribution_notice;

— Document_usage_parameter;

— Drawing;

— Drawing_suffix_number_combination;

— Effectivity;

— Element_identification;

— Element_type;

— Foreign_defined_item;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Item;

— Item_identification;

— Item_list;

— Item_list_drawing;

— Item_type;

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— Item_usage;

— Label;

— List_item_usage;

— Locally_defined_item;

— Lot_effectivity;

— Made_from_stock_material;

— Make_from_an_item;

— Measure;

— Notation;

— Number_with_units;

— Other_reference_document;

— Parts_list;

— Parts_list_body;

— Parts_list_header;

— Person;

— Person_and_organization;

— Product_configuration;

— Product_data_set;

— Product_data_set_with_format;

— Product_data_set_with_shading;

— Product_data_set_without_format;

— Product_model;

— Quantity;

— Reference_document;

— Reference_document_usage;

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— Release_authentication;

— Retrofit_usage;

— Revision;

— Security_classification;

— Sequence_effectivity;

— Sheet;

— Size_characteristics;

— Size_characteristics_full_size;

— Source_information_type;

— Special_condition;

— Specification_document;

— Standard_document;

— Status;

— Stock_material;

— Stock_size;

— Stock_size_parameters;

— Tdp_element;

— Tdp_element_and_item_association;

— Tdp_element_list_item;

— Text;

— Time;

— Volume;

— Weight.

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4.1.8 presentation

The presentation UoF specifies the presentation of geometry and text with attributes. The association of these attributes to the geometry or text is defined either directly or through a context.

EXAMPLE Colour, line thickness or weight, line font are attribute examples.

NOTE 1 Visual presentation can be for data content defined within this part of ISO 10303 or for additional data that is not explicitly specified in this part of ISO 10303.

NOTE 2 ISO 8879 Standard Generalized Markup Language (SGML), ISO 10744 HyTime, and ISO 10179 Document Style Semantics and Specification Language, satisfy presentation of associated lists with relationships into this part of ISO 10303.

The following application objects are used by the presentation UoF:

— A_number;

— A_real;

— An_integer;

— Body_presentation;

— Column_header;

— Columnar_data_content_holder;

— Date;

— Explicit_graphics;

— External_graphics_file;

— Field_content_holder;

— Field_content_holder_singular;

— Field_content_holder_tabulation;

— Field_location;

— Field_location_definition;

— Field_title;

— File;

— File_format;

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— Geometry;

— Group_parent_column_header;

— Group_parent_content_holder;

— Group_parent_header;

— Header_block;

— Header_presentation;

— Identifier;

— Label;

— List_presentation;

— Load_point;

— Measure;

— Page_parameters;

— Page_presentation;

— String_location_definition;

— Tabulation;

— Tabulation_header;

— Text;

— Time.

4.1.9 product_data_set

The product_data_set UoF contains the information that describes a group of related product information about an item.

EXAMPLE Shape model, NC programs and FEA models are examples.

The following application objects are used by the product_data_set UoF:

— A_number;

— A_real;

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— Alternate_element_identification;

— Alternate_identification_of_item;

— An_integer;

— Annotation;

— Approval;

— Change_identification;

— Company;

— Company_code;

— Configuration;

— Contract;

— Date;

— Design_authority;

— Distribution_notice;

— Document_usage_parameter

— Drawing;

— Drawing_suffix_number_combination;

— Element_identification;

— Element_type;

— File;

— File_format;

— Geometry;

— Header;

— Header_configuration_with_element_identification;

— Identifier;

— Item;

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— Item_identification;

— Item_type;

— Label;

— Other_reference_document:

— Person;

— Person_and_organization;

— Product_configuration;

— Product_data_set;

— Product_data_set_with_format;

— Product_data_set_with_shading;

— Product_data_set_without_format;

— Product_model;

— Product_presentation;

— Reference_document;

— Reference_document_usage

— Release_authentication;

— Security_classsification;

— Shaded_shape_model;

— Shape_model;

— Sheet;

— Size_characteristics;

— Size_characteristics_full_size;

— Size_characteristics_internal_divisions;

— Size_characteristics_sheet_across_file;

— Source_file;

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— Special_condition

— Status;

— System_declaration;

— Tdp_element;

— Tdp_element_and_item_association;

— Text;

— Time.

4.1.10 reference_document

The Reference_document UoF identifies documents and their usages that are required as portions of the information set related to the product.

The following application objects are used by the reference_document UoF:

— A_number;

— A_real;

— Alternate_element_identification;

— An_integer;

— Change_identifier;

— Company;

— Company_code;

— Date;

— Design_authority;

— Document_usage_parameter;

— Element_identification;

— Element_type;

— Identifier;

— Item;

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— Item_identification;

— Label;

— Other_reference_document;

— Person;

— Product_configuration;

— Reference_document;

— Reference_document_usage;

— Specification_document;

— Standard_document;

— Status;

— Tdp_element;

— Tdp_element_and_item_association;

— Text;

— Time.

4.2 Application objects

This subclause specifies the application objects for the technical data packaging core information and exchange application protocol. Each application object is an atomic element that embodies a unique application concept and contains attributes specifying the data elements of the object. The application objects and their definitions are given below.

NOTE Application Object EXPRESS:

```
*)
SCHEMA AP232_ARM;
(*
```

4.2.1 A_number

A_number is a numeric value that quantifies something.

EXAMPLE 1 110 is a number that specifies the voltage of an electric motor.

EXAMPLE 2 2.5 is a number that represents the size diameter of a bar of stock.

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NOTE Application Object EXPRESS:

```
*)
TYPE a_number = NUMBER;
END_TYPE;
(*
```

4.2.2 A_real

An A_real is a numeric value that quantifies something. The A_real domain is all rational, irrational and scientific real numbers.

NOTE Application Object EXPRESS:

```
*)
TYPE a_real = REAL;
END_TYPE;
(*
```

4.2.3 Accessed_file

An Accessed_file is a type of File (see 4.2.55) that specifies the information needed to locate a digital file in a remote location, where at least one of the data elements for Accessed_file shall exist.

NOTE 1 This form of exchanging or delivering data is referred to as "delivery of access" where TDP data is not physically exchanged, but rather information on where to locate the data is exchanged.

The data associated with an Accessed_file are the following:

— path_information;

— storage_node_identification.

NOTE 2 Application Object EXPRESS:

```
*)
ENTITY accessed_file
SUBTYPE OF (file);
  storage_node_identification : OPTIONAL text;
  path_information : OPTIONAL text;
WHERE
  WR1: EXISTS (storage_node_identification) or
  EXISTS (path_information);
END_ENTITY;
(*
```

4.2.3.1 path_information

The path_information specifies the appropriate drive, directory, node or other location information required for the operating system software application environment within the network node or device. The path_-information need not be specified for a particular Accessed_file.

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4.2.3.2 storage_node_identification

The storage_node_identification specifies the network protocol address of the network node or device. The storage_node_identification need not be specified for a particular Accessed_file.

4.2.4 Alternate_element_identification

The Alternate_element_identification is an additional identification for a specific group of product information. An Alternate_element_identification may be used to identify a specific group of product information instead of using an Element_identification (see 4.2.44). Additional configuration control identification information may be associated with the Alternate_element_identification.

NOTE 1 A specific group of product information may be a TDP element, or an other product information grouping defined outside this standard. A specific group of product information may be configuration controlled as a paper document, a single file, multiple files, or within a data base.

The data associated with an Alternate_element_identification are the following:

— change_status;

— design_activity;

— element_classifications;

— identifying_number;

— outstanding_changes;

— title.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY alternate_element_identification;
  change_status : OPTIONAL change_identification;
  design_activity : OPTIONAL design_authority;
  element_classifications: OPTIONAL LIST [1:?] OF element_type;
  identifying_number : identifier;
  outstanding_changes : OPTIONAL LIST [1:?] OF other_reference_document;
  title : OPTIONAL text;
END_ENTITY;
(*
```

4.2.4.1 change_status

The change_status specifies the identification of the most recent change information that is recorded for the Alternate_element_identification of interest. The change_status need not be specified for a particular Alternate_element_identification.

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4.2.4.2 design_activity

The design_activity specifies the organization, company, business, or industry responsible for the Alternate_element_identification. The design_activity need not be specified for a particular Alternate_-element_identification.

NOTE If the design_activity is not specified for the alternate_element_identification, then it is assumed that the design_activity is the same as for the associated Element_identification (see 4.2.44) identified through the alternate_identifier_for attribute.

4.2.4.3 element_classifications

The element_classifications specifies a classification code for the specific group of product information of interest. The classification code is utilized for data management of the specific group of product information of interest. The element_classifications need not be specified for a particular Alterante_-element_identification. There may be more than one element_classifications for an Alternate_element_-identification.

EXAMPLE "PL" is an element_classification for a Parts list.

4.2.4.4 identifying_number

The identifying_number specifies an identification number for the specific group of product information of interest as issued by the design_activity.

NOTE The identifying_number may be an alphanumeric.

4.2.4.5 outstanding_changes

The outstanding_changes specifies the identification of one or more changes to a specific group of product information of interest that have not been incorporated. The outstanding_changes need not be specified for a particular Alterante_element_identification. There may be more than one outstanding_changes for an Alternate_element_identification.

4.2.4.6 title

The title specifies the formal designation of the specific group of product information of interest. The title need not be specified for a particular Alternate_element_identification.

NOTE The document title may be an abbreviated form of the title or may have abbreviations of selected words within the title.

4.2.5 Alternate_identification_of_item

An Alternate_identification_of_item is an additional identification of an Item (see 4.2.79) for purposes of configuration control. An Alternate_identification_of_item may be used to identify an Item instead of an Item_identification (see 4.2.80). The data associated with an Alternate_identification_of_item are the following:

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— change_status;

— classifications;

— design_activity;

— identifying_number;

— nomenclature_or_name;

— source_information.

NOTE Application object EXPRESS:

```
*)
ENTITY alternate_identification_of_item;
  change_status : OPTIONAL change_identification;
  classifications : OPTIONAL LIST [1:?] of label;
  design_activity : design_authority;
  identifying_number : item_identifying_number_select;
  nomenclature_or_name : OPTIONAL label;
  source_information : OPTIONAL source_information_type;
END_ENTITY;
(*
```

4.2.5.1 change_status

The change_status specifies the current level of change activity that an Item_identification has undergone. The change_status need not be specified for a particular Alternate_identification_of_item.

NOTE If the change_status is not specified, then the item is at the original release or issue.

4.2.5.2 classifications

The classifications specifies a set of product types or categories for an item. The classifications need not be specified for a particular Alternate_identification_of_item. There may be more than one classifications for an Alternate_identification_of_item.

4.2.5.3 design_activity

The design_activity specifies the design authority responsible for the Item.

4.2.5.4 identifying_number

The identifying_number specifies an Identifier (see 4.2.66) or a Drawing_suffix_number_combination (see 4.2.42) that is an identifier that defines the identification number for the Item as issued by the design_-activity of the component.

NOTE 1 Industrial practices employ a practice of concatenating a dash and an alphanumeric to a drawing number to identify an Item. Each Item receiving a unique alphanumeric for that drawing.

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NOTE 2 Application object EXPRESS:

```
*)
TYPE item_identifying_number_select = SELECT
  (identifier,
  drawing_suffix_number_combination);
END_TYPE;
(*
```

4.2.5.5 nomenclature_or_name

The nomenclature_or_name specifies the name, noun phrase, or abbreviated name of the Item. The nomenclature_or_name need not be specified for a particular Alternate_identification_of_item.

4.2.5.6 source_information

The source_information specifies the method for item procurement. The source_information need not be specified for a particular Alternate_identification_of_item.

4.2.6 Alternate_item

An Alternate_item is an Item that can be used in lieu of the original Item. An Alternate_item is interchangeable with another Item with respect to form, fit, and function defined by the original Item within the context of the usage conditions defined by the Alternate_item. The data associated with an Alternate_-item are the following:

— interchange_item;

— type_of_alternate;

— usage_conditions.

NOTE Application Object EXPRESS:

```
*)
ENTITY alternate_item;
  interchange_item: usage_context;
  type_of_alternate: OPTIONAL label;
  usage_conditions: OPTIONAL LIST [1:?]OF usage_condition;
END_ENTITY;
(*
```

4.2.6.1 interchange_item

The interchange_item specifies the Item that can be used in lieu of the original_item. The substitutability of the interchange_item may be constrained by its usage. The usage context of the interchange_item provides the ability to apply usage parameter through an Item_usage (see 4.2.86)

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NOTE Application object EXPRESS:

```
*)
TYPE usage_context = SELECT
  (item,
  item_usage);
END_TYPE;
(*
```

4.2.6.2 type_of_alternate

The type_of_alternate specifies the term used for the category, class, or type of alternate. The type_of_-alternate need not be specified for a particular Alternate_item.

NOTE A type_of_alternate may be an acceptable replacement or substitute of the original item.

4.2.6.3 usage_conditions

The usage_conditions specifies An_integer (see 4.2.7) or Text (see 4.2.159) when the conditions or parameters under which the Alternate_item is used. The usage_conditions are defined in terms of order of preference in the usage of the Alternate_item (relative to another Alternate_item) or in terms of a specific usage of the Alternate_item in the context of the original Item. The usage_conditions need not be specified for a particular Alternate_item. There may be more than one usage_condition for an Alternate_item.

NOTE Application object EXPRESS:

```
*)
TYPE usage_condition = SELECT
  (text,
  an_integer);
END_TYPE;
(*
```

4.2.7 An_integer

An_integer is a numeric value that quantifies something. The An_integer domain is all positive integer numbers.

NOTE Application object EXPRESS:

```
*)
TYPE an_integer = INTEGER;
END_TYPE;
(*
```

4.2.8 Annotation

The Annotation is the text, geometry, or symbology that is applied to product information for human interpretation. The data associated with an Annotation are the following:

— annotation_geometry.

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NOTE Application object EXPRESS:

```
*)
ENTITY annotation;
  annotation_geometry : OPTIONAL geometry;
END_ENTITY;
(*
```

4.2.8.1 annotation_geometry

Annotation_geometry specifies placement, orientation, location, and size of geometry for the Annotation. The annotation_geometry need not be specified for a particular Annotation.

EXAMPLE 1 Borders for columns and rows of tables.

EXAMPLE 2 Surface finish symbols.

4.2.9 Approval

An Approval is the indication, within an organization, of concurrence with a piece of data. The data associated with an Approval are the following:

— approval_date;

— person_organization;

— purpose_of.

NOTE Application object EXPRESS:

```
*)
ENTITY approval;
  approval_date : date;
  purpose_of : text;
  person_organization : OPTIONAL person_and_organization;
END_ENTITY;
(*
```

4.2.9.1 approval_date

The approval_date specifies when the Approval is effective.

4.2.9.2 person_organization

The person_organization specifies the person and organization that has granted the Approval. The person_organization need not be specified for a particular Approval.

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4.2.9.3 purpose_of

The purpose_of specifies the reason for the Approval.

4.2.10 Assembly

An Assembly is a type of Locally_defined_item (see 4.2.91) that is a collection of other Item(s). The different collection of Item(s) in the Assembly are connected, fastened, joined, coupled, bound, or associated for purposes of identification. An assembly is one of the states an item can be while it plays the role of a component during a particular Item_usage (see 4.2.86).

NOTE 1 The collection of items that make up an assembly is captured through the Item_list entity.

NOTE 2 The collection of components may be a mechanical assembly, an electrical assembly, or a single component that is being re-identified for purposes of configuration control.

NOTE 3 Application object EXPRESS:

```
*)
ENTITY assembly
  SUBTYPE OF (locally_defined_item);
END_ENTITY;
(*
```

4.2.11 Associated_list

An Associated_list is a type of Tdp_element (see 4.2.152) that is a configuration controlled tabulation of pertinent engineering information pertaining to an item or a tdp element. Each Associated_list is either a Document_list (see 4.2.39), a Parts_list (see 4.2.105), or an Other_list (see 4.2.98). The item may be depicted on a drawing or in a set of drawings and the presentation information required to graphically present the information to a person may be included.

NOTE 1 Engineering information consist of parts lists, list of materials, list of drawings, list of reference documents, product data sets, and other subordinate data that pertains to the Item to which the TDP element applies.

The data associated with an Associated_list are the following:

— presentation;

— related_to.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY associated_list
  ABSTRACT SUPERTYPE OF (ONEOF(document_list,parts_list,other_list))
  SUBTYPE OF (tdp_element);
  presentation : OPTIONAL list_presentation;
```

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```
  related_to : OPTIONAL drawing_or_product_data_set;
END_ENTITY;
(*
```

4.2.11.1 presentation

The presentation specifies the graphical information utilized to facilitate human interpretation of the Associated_list. The presentation need not be specified for a particular Associated_list.

4.2.11.2 related_to

The related_to specifies a Drawing (see 4.2.41) or a Product_data_set (see 4.2.112) to which the Associated_list is associated. The related_to need not be specified for a particular associated_list.

NOTE Application object EXPRESS:

```
*)
TYPE drawing_or_product_data_set = SELECT
  (drawing,
   product_data_set);
END_TYPE;
(*
```

4.2.12 Body_presentation

The Body_presentation is the viewable form of the main part of the document. It contains the information necessary to format the data in the main part of the document. There may be two sets of body information - one for the first page and one for each remaining page of the document. The data associated with a Body_presentation are the following:

— body_tabulation_presentation.

NOTE Application object EXPRESS:

```
*)
ENTITY body_presentation;
  body_tabulation_presentation : LIST [1:?] OF tabulation;
END_ENTITY;
(*
```

4.2.12.1 body_tabulation_presentation

The body_tabulation_presentation specifies the table layout information for the data contained in the body of the document. There may be more than one body_tabulation_presentation for a Body_presentation.

NOTE All body data is considered tabular.

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4.2.13 Change_identification

The Change_identification is the specified information for the current level of incorporated changes for a TDP element. The data associated with a Change_identification are the following:

— action_status;

— change_code;

— change_date;

— change_description;

— change_level;

— issue_date;

— issue_level;

— revision_authorization_identifications;

— revision_date;

— revision_description;

— revision_level.

NOTE Application object EXPRESS:

```
*)
ENTITY change_identification;
     action_status : OPTIONAL status;
     change_code : OPTIONAL change_type;
     change_date : OPTIONAL date;
     change_description : OPTIONAL text;
     change_level : OPTIONAL text;
     issue_date : OPTIONAL date;
     issue_level : OPTIONAL text;
     revision_authorization_identifications : OPTIONAL SET [1:?] OF
     revision_authorization_select;
     revision_date : OPTIONAL date;
     revision_description : OPTIONAL text;
     revision_level : OPTIONAL text;
WHERE
     WR1:       EXISTS (revision_level) OR
       EXISTS (revision_date) OR EXISTS (change_date) OR
       EXISTS (change_level) OR
       EXISTS (issue_level) OR EXISTS (issue_date);
END_ENTITY;
(*
```

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4.2.13.1 action_status

The action_status specifies the life cycle stage or the working process stage of the TDP element being identified. The action_status need not be specified for a particular Change_identification.

NOTE 1 Action_status is the identification of the process stage the TDP element is in during the life cycle of creating and supporting product information.

NOTE 2 Table 2 is the relationship of Change_identification attributes for typical TDP industrial practices.

EXAMPLE In-work; Complete, In-review, and Final, are examples of action_status.

Table 3 - Change_identification attribute relationships

Change_-identification. change_code	Meaning	Change_-identification. revision_level	Change_-identification. change_level
Original	The file, item, or TDP element is the original.	Not defined or 0	Not defined or 0
Orginal_with_change	The file, item, or TDP element is the original with changes incorporated.	Not defined or 0	Highest level change included
Revision	The file, item, or TDP element is a complete revision to a document or product data.	Indicates current revision level	Not defined or 0
Revision_with_change	The file, item, or TDP element is a complete revision of a file, item, or TDP element with changes incorporated.	Indicates current revision level	Highest level change included
Change	The file, item, or TDP element is change material to an original, revision, or supplement.	Not defined or 0	Highest level change included
Other	Used when none of the above change types apply	Not defined or 0	Not defined or 0

4.2.13.2 change_code

The change_code specifies the type of change identified by the revision_level and the incorporated changes at that change_level. The change_code need not be specified for a particular Change_identification.

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The value of the change_code shall be one of the following:

— change;

— original;

— original with change;

— other;

— revision;

— revision with change.

NOTE 1 See 4.2.13.2.1.1 - 4.2.13.2.6 for the definition of each allowable value of change_code.

NOTE 2 Application object EXPRESS:

```
*)
TYPE change_type = ENUMERATION OF
  (change,
  original,
  original_with_change,
  other,
  revision,
  revision_with_change);
END_TYPE;
(*
```

4.2.13.2.1 change: the change_identification is a File, Item, or TDP element that modifies an original, revision, or **supplement.**

NOTE Revision level is typically not defined for an original or is defined as zero. The change level is the highest level change included.

4.2.13.2.2 original: the File, Item, or TDP element that is the original release.

4.2.13.2.3 original with change: the File, Item, or TDP element that is the original with changes incorporated.

NOTE Revision level is typically not defined for an original or is defined as zero. The change level is highest change included.

4.2.13.2.4 other: a modification where none of the other Change_codes apply.

4.2.13.2.5 revision: the File, Item, or TDP element that is a complete revision to a File, Item, or TDP element.

NOTE Revision_level indicates current revision level. Change_level is typically zero for a complete revision.

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4.2.13.2.6 revision with change: the File, Item, or TDP element that is a complete revision of a document or product data set with changes incorporated.

NOTE Revision_level is current revision level. Change_level is highest change included.

4.2.13.3 change_date

The change_date specifies either the date and time that the change_level was advanced or the date and time of the change. The change_date need not be specified for a particular Change_identification.

EXAMPLE Figure 4 illustrates the format style for change_date.

YYYYMMDD/HHHH:SS

YYYY	- Year
MM	- Month
DD	- Day
HHHH	- Hour
SS	- Second

Figure 4 - Format style for date

4.2.13.4 change_description

The change_description specifies the text that characterizes the change to the item, document, or TDP element. The change_description need not be specified for a particular Change_identification.

EXAMPLE A radius filler's dimension value was increased to increase manufacturability.

4.2.13.5 change_level

The change_level specifies the latest alteration made to a File, Item, or TDP element as part of a revision. The change_level need not be specified for a particular Change_identification.

EXAMPLE An incorporated change from Drawing Change Notice identified as change level "C".

4.2.13.6 issue_date

The issue_date specifies the date and time at which the activity issued the File, Item, or TDP element. The issue_date need not be specified for a particular Change_identification.

EXAMPLE Figure 4 illustrates the format style for issue_date.

4.2.13.7 issue_level

The issue_level specifies the issue number of the File, Item, or TDP element. The issue_level need not be specified for a particular Change_identification.

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NOTE 1 Changes to documents are normally tracked by revisions and engineering change notices. However, in cases where changes to the document do not affect technical content, a new issue of the document may be provided for which no revision or engineering change notice level is advanced.

NOTE 2 In product data management systems a sequence number identification is some times generated for each check-in and check-out of a managed item in the system. This unique sequence number is an other type of issue_-level.

4.2.13.8 revision_authorization_identifications

The revision_authorization_identifications specifies an Identifier (see 4.2.66) or an Other_reference_-document (see 4.2.102) that is the identification of the revision authorization document. The revision_-authorization_ identifications need not be specified for a particular Change_identification.

NOTE 1 In industrial practices, a revision authorization document is used in lieu of a revision description or a revision record.

NOTE 2 The revision authorization document may describe the revision history of the file, item, or TDP element since the original release of the File, Item, or TDP element.

NOTE 3 The revision authorization document may describe a single revision of the File, Item, or TDP element.

NOTE 4 The Other_reference_document specifies that the Revision_authorization_select is a Reference_ document that defines the rationale for the Change_identification.

NOTE 5 The identifier specifies that the Revision_authorization_select is other than a Other_ reference_-document and identifies the authorizing article.

NOTE 6 Application object EXPRESS:

```
*)
TYPE revision_authorization_select = SELECT
  (identifier,
  other_reference_document);
END_TYPE;
(*
```

4.2.13.9 revision_date

The revision_date specifies either the date and time that the revision_level was advanced or the date and time of the revision. The revision_date need not be specified for a particular Change_identification.

EXAMPLE Figure 4 illustrates the format style for revision_date.

4.2.13.10 revision_description

The revision_description specifies the text that characterizes the revision to the item, document, or TDP element. The revision_description need not be specified for a particular Change_identification.

EXAMPLE The part’s complex surface shape changed due to analysis relsults.

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4.2.13.11 revision_level

The revision_level specifies the version of the File, Item, or TDP element from its original release or issue. Revisions reflect changes made to the original after authorized release or issue that require the revision level to be advanced. The revision_level need not be specified for a particular Change_identification.

4.2.14 Column_header

The Column_header is the information to define the table's column header text, style, and placement location. Each table on the document may have one or more column headers. The data associated with a Column_header are the following:

— single_column_header_titles.

NOTE Application object EXPRESS:

```
*)
ENTITY column_header;
  single_column_header_titles : LIST [1:?] OF field_title;
END_ENTITY;
(*
```

4.2.14.1 single_column_header_titles

The single_column_header_titles specifies the title text for the Column_header, which specifies the formatting and placement information. There may be more than one single_column_header_title for a particular column_header.

4.2.15 Columnar_data_content_holder

The Columnar_data_content_holder is the information necessary to place the data contained in the column on the document and identification of the data contents for that column.

NOTE 1 The data to be instantiated in the columns will be defined elsewhere in this part of ISO 10303.

The data associated with a Columnar_data_content_holder are the following:

— column_content_presentation.

NOTE Application object EXPRESS:

```
*)
ENTITY columnar_data_content_holder;
  column_content_presentation : field_content_holder_tabulation;
END_ENTITY;
(*
```

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4.2.15.1 column_content_presentation

The column_content_presentation specifies the data content from the list information and the formatting and placement information necessary for instantiation.

4.2.16 Company

A Company is an association of persons that together have a relationship for the operation of a commercial or industrial enterprise. A company shall be identifiable by a name or name and location.

NOTE Application object EXPRESS:

```
*)
ENTITY company;
  address: OPTIONAL text;
  name: LABEL;
END_ENTITY;
(*
```

4.2.16.1 address

The address specifies the electronic or physical location where the company can be interfaced with. The address need not be specified for a particular Company.

EXAMPLE An example of an address may be a mailing address such as the following:

ABC Corporation
523 East Street
Fall City, Missouri 63102
USA

4.2.16.2 name

The name specifies the textual label the company is known by.

4.2.17 Company_code

The Company_code is the identification of the company in computer interpretable form. The Company_-code is a method of identification. The data associated with a Company_code are the following:

— code;

— code_administrator;

— type_of_code.

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NOTE Application object EXPRESS:

```
*)
ENTITY company_code;
  code : identifier;
  code_administrator : OPTIONAL company;
  type_of_code : text;
END_ENTITY;
(*
```

4.2.17.1 code

The code specifies the Company referenced within the context of a company identification coding scheme.

NOTE The code is typically unique within the context of a company identification coding scheme.

4.2.17.2 code_administrator

A code_administrator is an organization that defines and issues codes for different companies within an industry.

4.2.17.3 type_of_code

The type_of_code specifies the name of the company identification coding scheme. The value of the type_-of_code shall be either a human_interpretable string of characters or a computer generated code administered by a code_administrator.

4.2.18 Configuration

A Configuration is the information pertinent to the control and management of an item, a TDP element, file, or a data exchange. The data associated with a Configuration are the following:

— data_usage_rights;

— distribution_authorizations;

— end_item_system_designation;

— preparing_contracts;

— release_authorizations;

— security_identifications.

NOTE Application object EXPRESS:

```
*)
ENTITY configuration;
     data_usage_rights : OPTIONAL label;
     distribution_authorizations : OPTIONAL LIST [1:?] OF
```

```
        distribution_notice;
      end_item_system_designation : OPTIONAL product_configuration;
      preparing_contracts : OPTIONAL LIST [1:?] OF contract;
      release_authorizations : OPTIONAL LIST [1:?] OF
        release_authentication;
      security_identifications : OPTIONAL LIST [1:?] OF
        security_classification;
WHERE
      WR1: EXISTS (preparing_contracts) OR
        EXISTS (end_item_system_designation) OR
        EXISTS (release_authorizations) OR
        EXISTS (security_identifications) OR
        EXISTS (distribution_authorizations) OR
        EXISTS (data_usage_rights);
END_ENTITY;
(*
```

4.2.18.1 data_usage_rights

The data_usage_rights specifies if the user of the data has legal rights to use the configuration data as the user sees fit. The data_usage_rights need not be specified for a particular Configuration.

NOTE 1 Limited rights indicates the user has to obtain legal rights from the originating data source to use the data. Unlimited rights indicate the user does not have to obtain legal rights to use the data.

NOTE 2 In industrial practices, data rights (and data rights codes) are specified within the context of the contract that the data was prepared for.

4.2.18.2 distribution_authorizations

The distribution_authorizations specifies the allowable circulation of information that is applicable to the Configuration. The distribution_authorizations need not be specified for a particular Configuration. There may be more than one distribution_authorizations for a Configuration.

4.2.18.3 end_item_system_designation

The end_item_system_designation specifies the product that is applicable to the Configuration. The end_-item_system_designation need not be specified for a particular Configuration.

4.2.18.4 preparing_contracts

The preparing_contracts specifies the contracts authorizing the developing of the Configuration of interest. The preparing_contracts need not be specified for a particular Configuration. There may be more than one preparing_contracts for a configuration.

4.2.18.5 release_authorizations

The release_authorizations specifies the originating system sources that have authenticated the Configuration contents for the purposes of release. The release_authorizations need not be specified for a particular Configuration. There may be more than one release_authorizations for a Configuration.

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4.2.18.6 security_identifications

The security_identifications specifies the security or sensitivity of the Configuration and its contents. The security_identification need not be specified for a particular Configuration. There may be more than one security_identifications for a Configuration.

EXAMPLE 1 Security_identifications are TOP SECRET, SECRET, CLASSIFIED, UNCLASSIFIED.

EXAMPLE 2 Company security_identifications are PRIVATE, COMPETITION SENSITIVE, or PROPRIETARY.

4.2.19 Contract

A Contract is information pertinent to a formal agreement between two or more parties. The data associated with a Contract are the following:

— contract_data_requirements_list;

— contract_number;

— data_item_description_identification;

NOTE Application object EXPRESS:

```
*)
ENTITY contract;
  contract_data_requirements_list : OPTIONAL identifier;
  contract_number : identifier;
  data_item_description_identification : OPTIONAL identifier;
END_ENTITY;
(*
```

4.2.19.1 contract_data_requirements_list

The contract_data_requirements_list specifies the contract data requirement list clause or contract work listing number that authorizes, specifies, and regulates the formal agreement between two or more parties. The contract data requirements list is part of the Contract. The contract_data_requirements_list need not be specified for a particular Contract.

4.2.19.2 contract_number

The contract_number specifies the contract number used to reference the Contract.

NOTE The contract number may be an alphanumeric identification.

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4.2.19.3 data_item_description_identification

The data_item_description_identification specifies a specific set of data or system products that are referenced within a contract. The data_item_description_identification need not be specified for a particular Contract.

4.2.20 Contract_submission

Contract_submission is the identification of when and where a File, Item, or TDP element was submitted on a Contract (see 4.2.19). The data associated with a Contract_submission are the following:

— date_of_submission;

— delivered_contract;

— location.

NOTE Application object EXPRESS:

```
*)
ENTITY contract_submission;
  date_of_submission : date;
  delivered_contract : contract;
  location : text;
END_ENTITY;
(*
```

4.2.20.1 date_of_submission

The date_of_submission specifies the date that the File, Item, or TDP element was submitted to the location.

4.2.20.2 delivered_contract

The delivered_contract specifies the Contract that the File, Item, or TDP element was submitted under.

NOTE The delivery contract for a File, Item, or TDP element may or may not be the contract that the File, Item, or TDP element was prepared under.

4.2.20.3 location

The location specifies the mailing address, network node, or other identification information required to identify the location where the File, Item, or TDP element was submitted to.

4.2.21 Data_definition_entry_item

The Data_definition_entry_item is a collection of characteristics about an item in a data exchange.

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NOTE 1 The collection of characteristics are typical characteristics about the data that is maintained within Product Data Management or Configuration Control systems. The characteristics are employed to manage the use and distribution of the File, Item, or TDP element.

The data associated with a data_definition_entry_item are the following:

— available_from;

— delivery_accounting_reference;

— entry_files;

— entry_item_change_level;

— entry_notes;

— special_conditions;

— superseded_entry.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY data_definition_entry_item;
  available_from : OPTIONAL LIST [1:?] OF source_identification;
  delivery_accounting_references : OPTIONAL SET [1:?] OF
    delivery_accounting;
  entry_files : OPTIONAL LIST [1:?] OF data_definition_file_entry;
  entry_item_change_level : OPTIONAL LIST [1:?] OF identifier;
  entry_notes : OPTIONAL LIST [1:?] OF notation;
  special_conditions : OPTIONAL LIST [1:?] OF special_condition;
  superseded_entry : OPTIONAL element_identification;
WHERE
  WR1:EXISTS(available_from)
  OR EXISTS(delivery_accounting_references)
  OR EXISTS(entry_files)
  OR EXISTS(entry_item_change_level)
  OR EXISTS(entry_notes)
  OR EXISTS(special_conditions)
  OR EXISTS(superseded_entry);
END_ENTITY;
(*
```

4.2.21.1 available_from

The available_from specifies a Contract_submission (see 4.2.20) or a Referenced_document (see 4.2.120) that the Data_defintion_entry_item information can be obtained from. Available_from need not be specified for a particular Data_definition_entry_item. There may be more than one available_from for a Data_definition_entry_item.

EXAMPLE When documents available from the International Standards Organization (ISO) are utilized in the preparation of a TDP, the documents are not delivered but are referenced for the receiving organization to acquire through ISO.

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NOTE Application object EXPRESS:

```
*)
TYPE source_identification = SELECT
  (contract_submission,
  reference_document);
END_TYPE;
(*
```

4.2.21.2 delivery_accounting_references

The delivery_accounting_references specifies the rationale and a reference identification for the data exchange. The rationale and identification provide traceability for configuration control of the collection of data being exchanged. Delivery_accounting_references need not be specified for a particular Data_-definition_entry_item. There may be more than one delivery_accounting_references for a Data_-definition_entry_item.

EXAMPLE 1 A letter of transmittal is a delivery_accounting_reference.

EXAMPLE 2 A material receiving inspection form is a delivery_accounting_reference.

4.2.21.3 entry_files

The entry_files specifies an Exchange_file (see 4.2.46) or Accessed_file (see 4.2.3) for the Data_-defintion_entry_item. Entry_files need not be specified for a particular Data_definition_entry_item. There may be more than one entry_files for a Data_definition_entry_item.

EXAMPLE File “ABC.WPD” is at node 124.27.6.4 on the Internet.

NOTE Application object EXPRESS:

```
*)
TYPE data_definition_file_entry = SELECT
  (accessed_file,
  exchange_file);
END_TYPE;
(*
```

4.2.21.4 entry_item_change_level

The entry_item_change_level specifies the revision, change, or issue level that the Data_definition_entry_-item was modified. The order in the listing is chronological. Entry_item_change_level need not be specified for a particular Data_definition_entry_item. There may be more than one entry_item_change_-level for a Data_definition_entry_item.

NOTE The entry_item_change_level would not be utilized for the first use or original collection of data in a particular Data_definition_exchange.

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4.2.21.5 entry_notes

The entry_notes specify textual information of interest relative to the Data_defintion_entry_item. The textual information is an explanatory remark or notation regarding the Data_definition_entry_item. The entry_notes need not be specified for a particular Data_definition_entry_item. There may be more than one entry_notes for a Data_definition_entry_item.

4.2.21.6 special_conditions

The special_conditions specify mutually agreed to conditions that apply to the Data_defintion_entry_item. The mutually agreed to conditions relate to codes or designations for Files, or Items. Special_conditions need not be specified for a particular Data_definition_entry_item. There may be more than one special_-conditions for a Data_definition_entry_item.

4.2.21.7 superseded_entry

The superseded_entry specifies the identification of a File, or Item that was superseded by the current Data_definition_entry_item. Superseded_entry need not be specified for a particular Data_definition_-entry_item.

EXAMPLE ISO 10303-203:2001 supersedes ISO 10303-203:1995.

4.2.22 Data_definition_entry_tdp_element

The Data_definition_entry_tdp_element is a collection of characteristics about a TDP element in a data exchange.

NOTE 1 The collection of characteristics are typical characteristics about the data that is maintained within Product Data Management or Configuration Control systems. The characteristics are employed to manage the use and distribution of the File, Item, or TDP element.

The data associated with a Data_definition_entry_tdp_element are the following:

— actual_inclusion_in_data_exchange;

— available_from;

— data_usage_rights;

— delivery_accounting_references;

— entry_files;

— entry_format;

— entry_item_change_level;

— entry_notes;

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— master_file;

— size;

— special_conditions;

— superseded_entry.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY data_definition_entry_tdp_element;
  actual_inclusion_in_data_exchange : OPTIONAL label;
  available_from : OPTIONAL LIST [1:?] OF source_identification;
  data_usage_rights : OPTIONAL label;
  delivery_accounting_references :
      OPTIONAL SET [1:?] OF delivery_accounting;
  entry_files : OPTIONAL LIST [1:?] OF data_definition_file_entry;
  entry_format : OPTIONAL entry_format_select;
  entry_item_change_level : OPTIONAL LIST [1:?] OF identifier;
  entry_notes : OPTIONAL LIST [1:?] OF notation;
  master_file : OPTIONAL yes_no;
  size : OPTIONAL size_characteristics;
  special_conditions : OPTIONAL LIST [1:?] OF special_condition;
  superseded_entry : OPTIONAL element_identification;
WHERE
  WR1: EXISTS(actual_inclusion_in_data_exchange)
  OR EXISTS(available_from) OR EXISTS(data_usage_rights) OR
  EXISTS(delivery_accounting_references) OR EXISTS(entry_files)
  OR EXISTS(entry_format) OR EXISTS(entry_item_change_level)
  OR EXISTS(entry_notes) OR EXISTS(master_file) OR EXISTS(size)
  OR EXISTS(special_conditions) OR EXISTS(superseded_entry);
END_ENTITY;
(*
```

4.2.22.1 actual_inclusion_in_data_exchange

The actual_inclusion_in_data_exchange specifies whether or not the file, or TDP element is included or furnished as a part of this exchange. The value of the actual_inclusion_in_data_exchange shall be a user defined text string or one of the following:

— already delivered;

— available for access;

— fully included;

— not deliverable;

— not delivered yet;

— not received;

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— partially included;

— receipt accepted;

— receipt acknowledged;

— receipt partially rejected;

— receipt rejected;

— resubmission.

NOTE See 4.2.22.1.1 - 4.2.22.1.12, 4.2.46.2.12 for the definition of each allowable value of actual_inclusion_-in_data_exchange.

4.2.22.1.1 already delivered: already delivered specifies the TDP element data is not in the exchange because it was exchanged previously.

4.2.22.1.2 available for access: available for access specifies the TDP element data is available for the receiving system to access remotely the data. The TDP element data is not in the exchange.

4.2.22.1.3 fully included: fully included specifies that the TDP element data and all of data files are in the exchange.

4.2.22.1.4 not deliverable: not deliverable specifies that the TDP element data are not in the exchange. The TDP element data are not deliverable or planned for delivery.

4.2.22.1.5 not delivered yet: not delivered yet specifies that the TDP element data are not in the current exchange. The data will be exchanged in a future exchange.

4.2.22.1.6 not received: not received specifies that the TDP element data were not received in a referenced exchange or shipment.

4.2.22.1.7 partially included: partially included specifies that components of the TDP element data are exchanged. Some of the data files comprising the TDP element are exchanged.

4.2.22.1.8 receipt_accepted: receipt accepted specifies that the TDP element data received in the referenced exchange were successfully received and accepted as approved by the receiver.

4.2.22.1.9 receipt acknowledgement: receipt acknowledgement specifies that the TDP element data received in the referenced exchange or shipment were successfully received.

NOTE The receipt acknowledgement does not imply acceptance by the receiver.

4.2.22.1.10 receipt partially rejected: receipt partially rejected specifies that the TDP element data received in the referenced exchange or shipment were partially rejected due to non-compliance with exchange or delivery requirements.

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4.2.22.1.11 receipt rejected: receipt rejected specifies that the TDP element data received in the referenced exchange or shipment were rejected due to non-compliance with the exchange or delivery requirements.

4.2.22.1.12 resubmission: resubmission specifies that the TDP element data are in the exchange as a resubmission or resend.

4.2.22.2 available_from

The available_from specifies a Contract_submission (see 4.2.20) or a Referenced_document (see 4.2.120) that the Data_defintion_entry_tdp_element information can be obtained from. Available_from need not be specified for a particular Data_definition_entry_tdp_element. There may be more than one available_-from for a Data_definition_entry_tdp_element.

EXAMPLE When documents available from the International Standards Organization (ISO) are utilized in the preparation of a TDP, the documents are not delivered but are referenced for the receiving organization to acquire through ISO.

NOTE Application object EXPRESS:

```
TYPE source_identification = SELECT
  (contract_submission,
  reference_document);
END_TYPE;
```

4.2.22.3 data_usage_rights

The data_usage_rights specifies the user of the data designated in the Data_definition_entry_tdp_element has legal rights to use the data. The data_usage_rights need not be specified for a particular Data_-definition_entry_tdp_element.

NOTE The source design activity or source system responsible for development of the data of interest may have certain legal rights to limit the use of the data by the activity that is receiving the data of interest. The data_-usage_rights designates the limit of these rights.

EXAMPLE The source design activity responsible for the development of the file, item, or TDP element specifies that the rights of the destination user are stipulated to be “Limited”.

4.2.22.4 delivery_accounting_references

The delivery_accounting_references specifies the rationale and a reference identification for the data exchange. The rationale and identification provide traceability for configuration control of the collection of data being exchanged. Delivery_accounting_references need not be specified for a particular Data_ definition_entry_tdp_element. There may be more than one delivery_accounting_references for a Data_-definition_entry_tdp_element.

EXAMPLE 1 A letter of transmittal is a delivery_accounting_reference.

EXAMPLE 2 A material receiving inspection form is a delivery_accounting_reference.

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4.2.22.5 entry_files

The entry_files specifies an Exchange_file (see 4.2.46) or Accessed_file (see 4.2.3) for the Data_-defintion_entry_tdp_element. Entry_files need not be specified for a particular Data_definition_entry_-tdp_element. There may be more than one entry_files for a Data_definition_entry_tdp_element.

EXAMPLE File “ABC.WPD” is at node 124.27.6.4 on the Internet.

NOTE Application object EXPRESS:

```
TYPE data_definition_file_entry = SELECT
  (accessed_file,
  exchange_file);
END_TYPE;
```

4.2.22.6 entry_format

The entry_format specifies a File_format (see 4.2.56) or a human-interpretable string of characters that specifies the digital file format or the format for the physical hardcopy media that is used to exchange the data designated in the Data_definition_entry_tdp_element. The entry_format need not be specified for a particular Data_definition_entry_tdp_element.

NOTE 1 The digital file format is independent of the digital media that the file is transferred on.

NOTE 2 Application object EXPRESS:

```
*)
TYPE entry_format_select = SELECT
  (file_format,
  text);
END_TYPE;
(*
```

EXAMPLE 1 Physical hardcopy media is paper, mylar, film, or aperture cards.

EXAMPLE 2 Digital media is 9 track tape, floppy disk, diskette, or 8mm cartridge tape.

4.2.22.7 entry_item_change_level

The entry_item_change_level specifies the revision, change, or issue level that the Data_definition_entry_-tdp_element was modified. The order in the listing is chronological. Entry_item_change_level need not be specified for a particular Data_definition_entry_tdp_element. There may be more than one entry_item_-change_level for a Data_definition_entry_tdp_element.

NOTE The entry_item_change_level would not be utilized for the first use or original collection of data in a particular Data_definition_exchange.

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4.2.22.8 entry_notes

The entry_notes specify textual information of interest relative to the Data_defintion_entry_tdp_element. The textual information is an explanatory remark or notation regarding the Data_definition_entry_tdp_-element. The entry_notes need not be specified for a particular Data_definition_entry_tdp_element. There may be more than one entry_notes for a Data_definition_entry_tdp_element.

4.2.22.9 master_file

The master_file specifies whether or not the Data_definition_entry_tdp_element is considered the master representation for legal purposes. Master_file need not be specified for a particular Data_definition_-entry_tdp_element.

EXAMPLE A drawing is sent to a user in a raster and in an ISO 10303-202 representation using an ISO 10303-21 file format. The raster file is flagged as the master_file.

NOTE 1 There may be exist multiple digital representations of a File, Item, or TDP element. The master_file specifies which representation is used for legal purposes.

NOTE 2 When multiple representations exist of a File, Item, or TDP element, then each representation will be recorded as a separate Data_definition_entry_tdp_element.

NOTE 3 The yes_no is a logical flag stating something is, is not, or not known.

NOTE 4 Application object EXPRESS:

```
*)
TYPE yes_no = logical;
END_TYPE;
(*
```

4.2.22.10 size

The size specifies the non-digital information or digital file size for all Files, Items, or TDP elements that the Data_definition_entry_tdp_element represents. Size need not be specified for a particular Data_-definition_entry_tdp_element.

EXAMPLE 1 The files size is 63 megabytes.

EXAMPLE 2 The drawing consists of 36 aperture cards.

EXAMPLE 3 The drawing consists of 12 sheets.

4.2.22.11 special_conditions

The special_conditions specify mutually agreed to conditions that apply to the Data_defintion_entry_tdp_-element. The mutually agreed to conditions relate to codes or designations for Files, Items, or TDP elements. Special_conditions need not be specified for a particular Data_definition_entry_tdp_element. There may be more than one special_conditions for a Data_definition_entry_tdp_element.

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4.2.22.12 superseded_entry

The superseded_entry specifies the identification of a File, Item, or TDP element that was superseded by the current Data_definition_entry_tdp_element. Superseded_entry need not be specified for a particular Data_definition_entry_tdp_element.

EXAMPLE ISO 10303-203:2001 supersedes ISO 10303-203:1995.

4.2.23 Data_definition_exchange

Data_definition_exchange is a data exchange that is needed to satisfy a particular business purpose. The Data_definition_exchange defines sufficient configuration and data administration information to manage the data exchange. The business purpose may be a specific business data exchange or shipping transactions. The data identified in the Data_definition_exchange is the product definition data. The data associated with Data_definition_exchange are the following:

— list_body;

— list_header;

— presentation.

NOTE 1 The listing in the Data_definition_exchange may be in a “top-down-break-down” order.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY data_definition_exchange;
  list_body : data_definition_exchange_body;
  list_header : data_definition_exchange_header;
  presentation: OPTIONAL list_presentation;
END_ENTITY;
(*
```

4.2.23.1 list_body

The list_body specifies the data tabulations that are the constituents and subject of the Data_definition_-exchange.

4.2.23.2 list_header

The list_header specifies sufficient configuration control and data management information for a specific Data_definition_exchange.

4.2.23.3 presentation

The presentation specifies the human interpretable graphical display of the Data_definition_exchange information. Presentation need not be specified for a particular Data_definition_exchange.

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NOTE 1 The presentation of the Data_definition_exchange information is available for human interpretation of the information through a software application that can interpret and display the information for a human.

NOTE 2 In some judicial systems and in many contractual situations, the human interpretation of the digital data in the exchange is considered the binding legal instrument.

4.2.24 Data_definition_exchange_body

The Data_definition_exchange_body is the tabulation of information within the Data_definition_exchange. The tabulated information consists of sufficient identification of Items, Files, or TDP elements to allow the receiving user to manage and use the information that is contained in the exchange.

The data associated with a Data_definition_exchange_body are the following:

— list_method;

— notes_list;

— revision_history.

NOTE Application object EXPRESS:

```
*)
ENTITY data_definition_exchange_body;
  list_method : data_definition_exchange_list_method;
  notes_list : OPTIONAL LIST [1:?] OF notation;
  revision_history : OPTIONAL LIST [1:?] OF revision;
END_ENTITY;
(*
```

4.2.24.1 list_method

The list_method specifies a Simple_list_of_elements (see 4.2.130) Simple_list_of_files (see 4.2.131), or a Data_definition_indentured_list_method (see 4.2.28) that will used to collect and related the technical data package elements that are contained in Data_definition_exchange.

NOTE 1 The data_definition_indentured_list_method provides an indentured list of technical data package elements, using one of the three indentured methods, with or without their related data files. The three indentured methods are part based, document based, and part based with document references to parts.

NOTE 2 The simple_list_of_elements identifies just a simple list of technical data package elements to be exchanged (with or without their related data files).

NOTE 3 The simple_list_of_files identifies just a simple list of data files to be exchanged.

NOTE 4 Application object EXPRESS:

```
*)
TYPE data_definition_exchange_list_method = SELECT
  (data_definition_indentured_list_method,
  simple_list_of_elements,
```

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```
    simple_list_of_files);
  END_TYPE;
  (*
```

4.2.24.2 notes_list

The notes_list specifies notes that are applicable to the Data_definition_exchange (see 4.2.23). Some notes are referenced by the use of a note reference code in any section of the Data_definition_exchange. The notes describe explanatory remarks or notations that may be useful or informative regarding the subject that referenced the note. The notes_list need not be specified for a particular Data_definition_exchange_-body. There may be more than one notes_list for a Data_definition_exchange_body.

4.2.24.3 revision_history

The revision_history specifies a record of revisions of the Data_definition_exchange. The revision_history shall be constructed in a manner whereby the first entry in the tabulation is the first revision, the second entry is the second revision, and subsequent entries in the tabulation are subsequent revisions. The revision_history shall not contain an entry for the original release. The revision_history need not be specified for a particular Data_definition_exchange_body. There may be more than one revision_history for a Data_definition_ exchange_body.

4.2.25 Data_definition_exchange_header

The Data_definition_exchange_header is the configuration control, data management, and usage information necessary to manage and control the Data_definition_exchange. The data associated with Data_definition_exchange_header are the following:

— common_header;

— date_of_transfer;

— delivery_accounting_references;

— destinations;

— exchange_reason;

— procurement_references.

NOTE Application object EXPRESS:

```
  *)
  ENTITY data_definition_exchange_header;
    common_header : header;
    date_of_transfer : OPTIONAL date;
    delivery_accounting_references : OPTIONAL SET [1:?] OF
      delivery_accounting;
    destinations : OPTIONAL SET [1:?] OF system_destination;
    exchange_reason : reason;
    procurement_references: OPTIONAL LIST [1:?] OF identification_select;
```

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```
END_ENTITY;
(*
```

4.2.25.1 common_header

The common_header specifies the information required for administering the configuration control and use of the data in the Data_definition_exchange. The common_header need not be specified for a particular Data_definition_exchange_header.

4.2.25.2 date_of_transfer

The date_of_transfer specifies the date and time when the responsible activity initiated the transfer of the Data_definition_exchange. The date_of_transfer need not be specified for a particular Data_definition_-exchange_header.

4.2.25.3 delivery_accounting_references

The delivery_accounting_references specify the information required for the business rationale for the delivery of the Data_definition_exchange information. The delivery_accounting_references need not be specified for a particular Data_definition_exchange_header. There may be more than one delivery_-accounting_references for a Data_definition_exchange_header.

EXAMPLE Delivery accounting information is letters of transmittals, Purchase Orders, and Material Inspection Report Forms.

4.2.25.4 destinations

The destinations specify the target organizations where the Data_definition exchange is transmitted. The destinations need not be specified for a particular Data_definition_exchange_header. There may be more than one destinations for a Data_definition_exchange_header.

4.2.25.5 exchange_reason

The exchange_reason specifies the purpose for the Data_definition_exchange information exchange.

4.2.25.6 procurement_references

The procurement_references specifies an Item_identification (see 4.2.80) or an Element_identification (see 4.2.44) that are TDP elements, documents, files, or items that were used as justification for development of the Data_definition_exchange. The justification is a business purpose that identifies a TDP element, document, File, or Item that was provided by the organization procuring the data contained in the Data_-definition_exchange. The business purpose permits the association of different Data_definition_exchange files in a hierarchial or other business purpose defined method. The procurement_references need not be specified for a particular Data_definition_exchange_header. There may be more than one procurement_-references for a Data_definition_exchange_header.

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NOTE Application object EXPRESS:

```
*)
TYPE identification_select = SELECT
  (element_identification,
  item_identification);
END_TYPE;
(*
```

4.2.26 Data_definition_exchange_simple_entry

The Data_definition_exchange_simple_entry is an association between an identification of a TDP element and the exchange parameters of the TDP element. The association is defined by the business purpose of the exchange. The data associated with a Data_definition_exchange_simple_entry are the following:

— entry;

— simple_entry.

NOTE Application object EXPRESS:

```
*)
ENTITY data_definition_exchange_simple_entry;
  entry : data_definition_entry_tdp_element;
  simple_entry : element_identification;
END_ENTITY;
(*
```

4.2.26.1 entry

The entry specifies the characteristics about the simple_entry for the Data_definition_exchange_simple_-entry.

4.2.26.2 simple_entry

The simple_entry specifies the TDP element of interest for the Data_definition_exchange_simple_entry.

4.2.27 Data_definition_indentured_entry

The Data_definition_indentured_entry is an association between either the TDP element or Item in the indentured list and thier entry characteristics. The association is a one-to-one association between either the TDP element or Item and the characteristics about the TDP element or item. The TDP element or item of interest defines a relationship of either the TDP element or Item to the next higher assembly in the relationship tree, the next higher TDP element in the relationship tree, the top level TDP element, or the top level Item.

NOTE 1 The type of relationship tree (e.g., drawing, part) is defined in the Data_definition_indentured_list_ method.

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The data associated with a Data_definition_exchange_indentured_entry are the following:

— effective_on;

— entry_characteristics;

— indenture_level

— indentured_entry.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY data_definition_indentured_entry;
  effective_on : OPTIONAL effectivity;
  entry_characteristics : data_definition_entry_select;
  indentured_entry : list_entry_select;
  indenture_level: OPTIONAL label;
END_ENTITY;
(*
```

4.2.27.1 effective_on

The effective_on specifies parameters that governs the use of the Item (see 4.2.79). The effective_on need not be specified for a particular data_definition_indentured_entry.

4.2.27.2 entry_characteristics

The entry_characteristics specifies the aspects about the indentured_entry for the Data_definition_-indentured_entry.

NOTE 1 There is a different set of allowable entry characteristics for an item and a tdp_element

NOTE 2 Application object EXPRESS:

```
*)
TYPE data_definition_entry_select = SELECT
  (data_definition_entry_item,
   data_definition_entry_tdp_element);
END_TYPE;
(*
```

4.2.27.3 indenture_level

The indenture_level indicates the number of indents for the Data_definition_indentured_entry from the Item (see 4.2.79) or Tdp_element (see 4.2.152) identified in the indentured_entry (see 4.2.27.4). The level of indenture indicates a relative position between the top level item, or TDP element and the Data_definition_-indentured_entry that is specified in the indentured_entry. The indenture_level need not be specified for a particular Data_definition_indentured_entry.

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NOTE 1 The level of indenture is formulated based on the document tree or the item tree from the top level TDP element or item identified in the data_definition_indentured_entry.indentured_entry (see 4.2.27.4).

NOTE 2 Industrial practices have the TDP_element or Item as the first level of indenture, while the TDP_-elements or Items that are referenced from the top level TDP_element or Item are at the second level of indenture. Lower levels of indenture are specified relative to the top level TDP_element or Item.

4.2.27.4 indentured_entry

The indentured_entry specifies an Item_parent_to_item_child_relationship (see 4.2.83), a Tdp_element_-parent_ to_item_child_relationship (see 4.2.155), a Tdp_element_parent_to_tdp_element_child_-relationship (see 4.2.156), Tdp_indentured_tdp_element (see 4.2.158), an Item_parent_to_tdp_element_-child_relationship (see 4.2.84), or a Tdp_indentured_item (see 4.2.157) for the Data_definition_-indentured_entry and the relationship of the TDP element or item to other TDP elements or items.

NOTE 1 An Item_parent_to_item_child_relationship specifies that the row entry (child) is an Item and that the parent entry is an Item.

NOTE 2 A Tdp_element_parent_to_item_child_relationship specifies that the row entry (child) is an Item and that the parent entry is a TDP_element.

NOTE 3 A Tdp_element_parent_to_tdp_element_child_relationship specifies that the row entry (child) is a TDP_element and that the parent entry is a TDP_element.

NOTE 4 The Tdp_indentured_tdp_element specifies the top element of a TDP element based tree. This enables the listing of multiple document trees within the body of the list.

NOTE 5 An Item_parent_to_tdp_element_child_relationship specifies that the row entry (child) is a TDP_-element and that its parent entry is an Item.

NOTE 6 The Tdp_indentured_item specifies the top Items of an Item based tree. This enables the listing of multiple part-based document trees within the body of the list.

NOTE 7 Application object EXPRESS:

```
*)
TYPE list_entry_select = SELECT
  (item_parent_to_item_child_relationship,
   item_parent_to_tdp_element_child_relationship,
   tdp_element_parent_to_item_child_relationship,
   tdp_element_parent_to_tdp_element_child_relationship,
   tdp_indentured_item,
   tdp_indentured_tdp_element);
END_TYPE;
(*
```

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4.2.28 Data_definition_indentured_list_method

The data_definition_indentured_list_method is an ordered collection of TDP elements or Items defined by one of three indentured methods. The data associated with a Data_definition_indentured_list_method are the following:

— method_of_entry_tabulation;

— order_of.

NOTE Application object EXPRESS:

```
*)
ENTITY data_definition_indentured_list_method;
  method_of_entry_tabulation : indentured_list_method;
  order_of : LIST [1:?] OF data_definition_indentured_entry;
END_ENTITY;
(*
```

4.2.28.1 method_of_entry_tabulation

The method_of_entry_tabulation specifies an Indentured_list_by_part (see 4.2.73), an Indentured_list_by_-document (see 4.2.72), or an Indentured_list_by_part_with_document_references_to_parts (see 4.2.74) that specify how the entries in the order_of are specified for the Data_definition_exchange, or Indentured_-data_definition_list.

NOTE The three methods are defined by the Indentured_list_by_part, the Indentured_list_by_part_with_-document_references_to_parts, or the Indentured_list_by_document.

4.2.28.2 order_of

The order_of specifies the list of Data_definition_indentured_entry(s) for the Data_definition_exchange (see 4.2.23). The order in the listing is specified by the method_of_entry_tabulation. There may be more than one order_of for a data_definition_indentured_list_method.

4.2.29 Data_list

A Data_list is a type of Single_document_list (see 4.2.132) that contains a tabulation of all drawings, reference documents, subordinate data lists, associated lists, and other essential in-house documents required for design disclosure pertaining to the TDP element or item which the Data_list applies. The data associated with a Data_list are the following:

— body;

— list_header.

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NOTE Application object EXPRESS:

```
*)
ENTITY data_list
  SUBTYPE OF (single_document_list);
  body : data_list_body;
  list_header : data_list_header;
END_ENTITY;
(*
```

4.2.29.1 body

The body specifies the tabulations that are the constituents and subject of the Data_list.

4.2.29.2 list_header

The list_header specifies sufficient configuration control and data management information for a specific Data_list.

4.2.30 Data_list_body

The Data_list_body is the tabulation of information within the Data_list (see 4.2.29). The tabulated information consists of sufficient identification of related TDP element information to meet design disclosure requirements for the TDP element that is associated to the Data_list. The related TDP element information is identified within the context of the TDP element or item that is associated to the Data_list. The data associated with a Data_list_body are the following:

— data_list_notes;

— data_list_tabulations;

— revision_history.

NOTE Application object EXPRESS:

```
*)
ENTITY data_list_body;
  data_list_notes : OPTIONAL LIST [1:?] OF notation;
  data_list_tabulations : LIST [1:?] OF data_list_tabulation;
  revision_history : OPTIONAL LIST [1:?] OF revision;
END_ENTITY;
(*
```

4.2.30.1 data_list_notes

The data_list_notes specifies notes that are applicable to the Data_list. Some notes are referenced by the use of a note reference code in any section of the Data_list. The notes describe any explanatory remarks or notations that may be useful or informative regarding the subject that referenced the note. The data_-list_notes need not be specified for a particular Data_list_body. There may be more than one data_list_-notes for a Data_list_body.

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4.2.30.2 data_list_tabulations

The data_list tabulations specify a list of valid TDP element that are contained within the Data_list. There may be more than one data_list_tabulations for a Data_list_body.

NOTE When several tabulations are required, each tabulation is for a separate item.

4.2.30.3 revision_history

The revision_history specifies a record of revisions of the Data_list. The revision_history shall be constructed in a manner whereby the first entry in the tabulation is the first revision, the second entry is the second revision, and subsequent entries in the tabulation are subsequent revisions. The revision_history shall not contain an entry for the original release. The revision_history need not be specified for a particular Data_list_body. There may be more than one revision_history for a Data_list_body.

4.2.31 Data_list_entry

A Data_list_entry is an entry in a Data_list_tabulation (see 4.2.29.2). The data associated with a Data_-list_entry are the following:

— available_from;

— entry_item_change_level;

— entry_notes;

— list_entry;

— special_conditions.

NOTE Application object EXPRESS:

```
*)
ENTITY data_list_entry;
     available_from: OPTIONAL LIST [1:?] OF source_identification;
     entry_item_change_level : OPTIONAL identifier;
     entry_notes : OPTIONAL LIST [1:?] OF notation;
     list_entry : valid_tdp_elements_for_data_list;
     special_conditions: OPTIONAL LIST [1:?] OF special_condition;
END_ENTITY;
(*
```

4.2.31.1 available_from

The available_from specifies a Contract_submission (see 4.2.20) or a Referenced_document (see 4.2.120) where a list_entry is available. Available_from need not be specified for a particular Data_list_entry. There may be more than one available_from for a Data_list_entry.

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NOTE 1 Available_from identifies a company or organization that can provide the list_entry TDP element.

NOTE 2 In lieu of providing TDP elements that are used widely in Industrial practices, a design activity may identify where a TDP element can be obtained.

NOTE 3 Application object EXPRESS:

```
TYPE source_identification = SELECT
  (contract_submission,
  reference_document);
END_TYPE;
```

EXAMPLE A TDP element is ISO 9000. The TDP element is available_from the International Standards Organization (ISO).

4.2.31.2 entry_item_change_level

The entry_item_change_level specifies the current change level of the Data_list_entry. The entry_item_-change_level need not be specified for a particular Data_list_entry.

NOTE 1 Industrial practices utilize entry_item_change_level to notify users of a change to the line item of interest.

NOTE 2 Industrial practices identify the last change of the respective entry.

4.2.31.3 entry_notes

The entry_notes specifies notes that are applicable to the Data_list_entry. The entry_notes need not be specified for a particular Data_list_entry. There may be more than one entry_notes for a Data_list_entry.

4.2.31.4 list_entry

The list_entry specifies a Reference_document (see 4.2.120), Header (see 4.2.62) , or a Sheet (see 4.2.129) that specifies the allowable TDP element of interest.

NOTE 1 Header (see 4.2.62) provides a general identification for TDP elements such as data list, drawing, parts list, other list, and product data set.

NOTE 2 Application object EXPRESS:

```
*)
TYPE valid_tdp_elements_for_data_list = SELECT
     (header,
     sheet,
     reference_document);
END_TYPE;
(*
```

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4.2.31.5 special_conditions

The special_conditions specify mutually agreeable conditions that apply to the Data_list_entry. The mutually agreed to conditions relate to codes or designations for the TDP element. Special_conditions need not be specified for a particular Data_list_entry. There may be more than one special_conditions for a Data_list_entry.

4.2.32 Data_list_header

A Data_list_header is the configuration control and data management information necessary to manage and control the Data_list for an Item (see 4.2.79) or a TDP element (see 4.2.152). The data associated with a Data_list_header are the following:

— common_header.

NOTE Application object EXPRESS:

```
*)
ENTITY data_list_header;
  common_header : header;
END_ENTITY;
(*
```

4.2.32.1 common_header

The common_header specifies the information required for configuration control and administering the use of the data in the Data_list.

4.2.33 Data_list_tabulation

The Data_list_tabulation is a listing of valid TDP elements for the associated TDP element. The listing identifies the valid TDP elements for the item associated to the TDP element. The data associated with a Data_list_tabulation are the following:

— data_list_entries;

— for_item.

NOTE Application object EXPRESS:

```
*)
ENTITY data_list_tabulation;
  data_list_entries : OPTIONAL LIST [1:?] OF data_list_entry;
  for_item : OPTIONAL item_identification;
WHERE
  WR1: EXISTS (data_list_entries) OR EXISTS (for_item);
END_ENTITY;
(*
```

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4.2.33.1 data_list_entries

The data_list_entries specifies a listing of the TDP elements that are required for design disclosure of the TDP element that the Data_list is associated to. When a for_item is specified, the listing is for the item designated in the for_item. Data_list_entries need not be specified for a particular Data_list_tabulation. There may be more than one data_list_entries for a Data_list_tabulation.

4.2.33.2 for_item

The for_item specifies the Item associated to the data_list_entries. For_item need not be specified for a particular data_list_tabulation.

NOTE 1 For industrial practices of one item for one drawing (e.g., one part - one drawing), the for_item is assumed to be the item defined on the drawing.

NOTE 2 For industrial practices of multiple items defined on a drawing, the for_item may be different for each item.

4.2.34 Date

A date is the identification of the day, month, and year in history. The data associated with Date are the following:

— day;

— month;

— specific_time;

— week;

— year.

NOTE Application object EXPRESS:

```
*)
ENTITY date;
  day: OPTIONAL INTEGER;
  month: OPTIONAL INTEGER;
  specific_time: OPTIONAL time;
  week: OPTIONAL INTEGER;
  year: INTEGER;
END_ENTITY;
(*
```

4.2.34.1 day

The day specifies a specific period of time that the earth turn once on its axis. Approximately 365.25 days are in a year. The day need not be specified for a particular Date.

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4.2.34.2 month

The month specifies a specific period of time corresponding approximately to 28 days or four weeks or the divided 12 periods of a year (see 4.2.34.5) The month need not be specified for a particular Date.

4.2.34.3 specific_time

A specific_time specifies a moment of occurrence measured by hour, minute, and second. The specific_-time need not be specified for a particular Date.

4.2.34.4 week

The week specifies a specific period of time corresponding to 7 days (see 4.2.34.1). Approximately 52 weeks are in a year (see 4.2.34.5). The week need not be specified for a particular Date.

4.2.34.5 year

A year is the year as defined in the Gregorian Calendar.

NOTE ISO 8601 defines the Gregorian Calendar.

4.2.35 Date_effectivity

The Date_effectivity is a type of Effectivity (see 4.2.43) that specifies the expected or actual usage date of a component in a Product_model (see 4.2.116).

NOTE 1 The preceding definition is a broader definition that is defined for ISO 10303-203 for Planned_date_-effectivity.

The data associated with a Date_effectivity are the following:

— end_date;

— start_date.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY date_effectivity
  SUBTYPE OF (effectivity);
  end_date : OPTIONAL date;
  start_date : date;
END_ENTITY;
(*
```

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4.2.35.1 end_date

The end_date specifies the last date on which the component is to be used or was used in the Product_-configuration (see 4.2.111). No end_date at the time of exchange signifies that an end_date has not yet been defined. The end_date need not be specified for a particular Date_effectivity.

NOTE The preceding definition is a broader definition that is defined for ISO 10303-203 for Planned_-effectivity end_date.

4.2.35.2 start_date

The start_date specifies the first date on which the component is to be used or was used in the Product_-configuration (see 4.2.111).

NOTE The preceding definition is a broader definition that is defined for ISO 10303-203 for Planned_date_ effectivity. start_date.

4.2.36 Delivery_accounting

The Delivery_accounting is delivery information of the Item, File, TDP element. Delivery information identifies and describes the supporting business rationale for the delivery of the Item, File, TDP element, or document of interest. The data associated with a Delivery_accounting are the following:

— reference_identification;

— reference_identification_description.

NOTE Application object EXPRESS:

```
*)
ENTITY delivery_accounting;
  reference_identification : identifier;
  reference_identification_description : text;
END_ENTITY;
(*
```

4.2.36.1 reference_identification

The reference_identification specifies the delivery accounting instrument identification. The delivery accounting instrument is the business purpose of the data delivery.

4.2.36.2 reference_identification_description

The reference_identification_description specifies the title of the delivery accounting instrument.

EXAMPLE Letters of transmittals, Purchase Orders, and Material Inspection Report Forms.

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4.2.37 Design_authority

The Design_authority is the organization, company, business or industry responsible for a design. The data associated with a Design_authority are the following:

— design_activity_code;

— design_activity_identification;

— person_responsible;

— role.

NOTE Application object EXPRESS:

```
*)
ENTITY design_authority;
  design_activity_code : OPTIONAL company_code;
  design_activity_identification : company;
  person_responsible : OPTIONAL person;
  role : OPTIONAL label;
END_ENTITY;
(*
```

4.2.37.1 design_activity_code

The design_activity_code specifies a company identifier code for the Design_authority responsible for the design content. The design_activity_code need not be specified for a particular Design_authority.

NOTE Many industry associations and governments assign unique design_activity_codes to each company.

EXAMPLE Dunn & Bradstreet assigns a unique identifier to a requesting organization that identifies the corporation, division (if required), and organization (if required) called the DUNS number.

4.2.37.2 design_activity_identification

The design_activity_identification specifies the company responsible for the design content.

4.2.37.3 person_responsible

The person_responsible specifies the person responsible for the development of the design content within the Design_authority. The person_responsible need not be specified for a particular Design_authority.

4.2.37.4 role

The role specifies the purpose of the Design_authority. The role need not be specified for a particular Design_authority.

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4.2.38 Distribution_notice

A Distribution_notice is the allowable industrial or organizational circulation of information for the organization receiving the Item, File, TDP element, or document.

The data associated with a Distribution_notice are the following:

— distribution_authority;

— distribution_code;

— distribution_statement.

EXAMPLE A distribution notice indicating `Distribution is Unlimited`

NOTE Application object EXPRESS:

```
*)
ENTITY distribution_notice;
  distribution_authority : OPTIONAL person_and_organization;
  distribution_code : OPTIONAL label;
  distribution_statement : OPTIONAL text;
WHERE
  WR1: EXISTS (distribution_statement) OR
  EXISTS (distribution_authority) OR EXISTS (distribution_code);
END_ENTITY;
(*
```

4.2.38.1 distribution_authority

The distribution_authority specifies the Distribution_notice controlling authority for circulation. The distribution_authority need not be specified for a particular Distribution_notice.

4.2.38.2 distribution_code

The distribution_code specifies the Distribution_notice code that identifies the allowed distribution. The distribution_code need not be specified for a particular Distribution_notice.

NOTE Many companies and industries agree on different codes to depict different conditions for circulation.

EXAMPLE Distribution Code “A” indicates “Distribution is Unlimited.”

4.2.38.3 distribution_statement

The distribution_statement specifies the Distribution_notice statement of allowed circulation. The distribution_statement need not be specified for a particular Distribution_notice.

EXAMPLE “Distribution is Unlimited” is a Distribution_statement.

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4.2.39 Document_list

A Document_list is a type of Associated_list (see 4.2.11) that specifies all documents, or TDP elements that are required to fully document the design disclosure. Each Document_list is either an Indentured_-data_list (see 4.2.67) or a Single_document_list (see 4.2.132).

NOTE Application object EXPRESS:

```
*)
ENTITY document_list
  ABSTRACT
  SUPERTYPE OF (ONEOF(indentured_data_list,single_document_list))
  SUBTYPE OF (associated_list);
END_ENTITY;
(*
```

4.2.40 Document_usage_parameter

A Document_usage_parameter is the identification and description of a specific piece of information that is contained in a document. This provides a general capability to define parameters that can be applied to an item.

The data associated with a Document_usage_parameter are the following:

— subject;

— value_of.

EXAMPLE A material code with its value.

NOTE Application object EXPRESS:

```
*)
ENTITY document_usage_parameter;
  subject : label;
  value_of : text;
END_ENTITY;
(*
```

4.2.40.1 subject

The subject specifies the nomenclature for the value_of of the parameter.

4.2.40.2 value_of

The value_of specifies the specific parameter.

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4.2.41 Drawing

A Drawing is a type of Tdp_element (see 3.5.27) that is the presentation of product data in a human interpretable form wherein the physical and functional requirements for that product are presented pictorially and textually.

The data associated with a Drawing are the following:

— heading;

— pages.

NOTE Application object EXPRESS:

```
*)
ENTITY drawing
  SUBTYPE OF (tdp_element);
  heading : header;
  pages : LIST [1:?] OF sheet;
END_ENTITY;
(*
```

4.2.41.1 heading

The heading specifies the identification and configuration control information for the Drawing.

4.2.41.2 pages

The pages specifies the listing of sheets of a Drawing. The order of the listing is based on the sheet number of the respective sheet in the Drawing. There may be more than one pages for a drawing.

4.2.42 Drawing_suffix_number_combination

The Drawing_suffix_number_combination is the identifying number of an Item (see 4.2.79) when the Item is identified using drawing practices of combining the drawing number and a suffix on the face of the drawing. The data associated with an Drawing_suffix_number_combination are the following:

— drawing_number;

— suffix_identifier.

NOTE Application object EXPRESS:

```
*)
ENTITY drawing_suffix_number_combination;
  drawing_number : element_identification;
  suffix_identifier : identifier;
END_ENTITY;
(*
```

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4.2.42.1 drawing_number

The drawing_number specifies the identification of the Drawing that defines the Item.

4.2.42.2 suffix_identifier

The suffix_identifier specifies the suffix that is associated with the Item on the face of the drawing.

4.2.43 Effectivity

An Effectivity is the intended use of a component in a particular configuration of a product. Each Effectivity may be one of the following: a Sequence_effectivity (see 4.2.126), a Date_effectivity (see 4.2.35), or a Lot_effectivity (see 4.2.92). The data associated with an Effectivity are the following:

— description;

— effectivity_approvals;

— product.

NOTE Application object EXPRESS:

```
*)
ENTITY effectivity
  SUPERTYPE OF (ONEOF(sequence_effectivity,lot_effectivity,
      date_effectivity));
     description: OPTIONAL text;
     effectivity_approvals : OPTIONAL LIST [1:?] OF approval;
     product : product_configuration;
END_ENTITY;
(*
```

4.2.43.1 description

The description specifies the characterization of the Effectivity when the Effectivity is not defined by either: a Sequence_effectivity, a Lot_effectivity, or a Date_effectivity. The description need not be specified for a particular Effectivity.

4.2.43.2 effectivity_approvals

The effectivity_approvals specifies the valid approvals that authorize the use of the product for the required effectivity. There may be more than one effectivity_approvals for an Effectivity. The effectivity_-approvals need not be specified for a particular Effectivity.

NOTE The approvals are determined by the Design_authority.

4.2.43.3 product

The product specifies the physical unit that is valid for the Effectivity.

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4.2.44 Element_identification

The Element_identification is configuration control identification information for a specific group of product information of interest.

NOTE 1 A specific group of product information may be a TDP element, or an other product information grouping defined outside this standard. A specific group of product information may be configuration controlled as a paper document, a single file, multiple files, or within a data base.

The data associated with an Element_identification are the following:

— alternate_identifications;

— change_status;

— design_activities;

— element_classifications;

— identifying_number;

— outstanding_changes;

— title.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY element_identification;
  alternate_identifications : OPTIONAL SET [1:?] OF
     alternate_element_identification;
  change_status : OPTIONAL change_identification;
  design_activities : SET [1 : ?] OF design_authority;
  element_classifications: OPTIONAL LIST [1:?] OF element_type;
  identifying_number : identifier;
  outstanding_changes : OPTIONAL LIST [1:?] OF other_reference_document;
  title : OPTIONAL text;
END_ENTITY;
(*
```

4.2.44.1 alternate_identifications

The alternate_identifications specify additional ways that a tdp_element (see 4.2.152) may be identified. The alternate_identifications need not be specified for a particular element_identification

EXAMPLE If a company wants to rename a document they received from a supplier.

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4.2.44.2 change_status

The change_status specifies the identification of the most recent change information that is recorded for the Element_identification of interest. The change_status need not be specified for a particular Element_-identification.

4.2.44.3 design_activities

The design_activities specifies the organization, company, business, or industry responsible for the Element_identification. There may be more than one design_activities for an Element_identification.

4.2.44.4 element_classifications

The element_classifications specifies a classification code for the specific group of product information of interest. The classification code is utilized for data management of the specific group of product information of interest. The element_classifications need not be specified for a particular Element_-identification. There may be more than one element_classifications for an Element_identification.

EXAMPLE "PL" is an element_classifications for a Parts list.

4.2.44.5 identifying_number

The identifying_number specifies an identification number for the specific group of product information of interest as issued by the design_activity.

NOTE The identifying_number may be an alphanumeric.

4.2.44.6 outstanding_changes

The outstanding_changes specifies the identification of one or more changes to a specific group of product information of interest that have not been incorporated. The outstanding_changes need not be specified for a particular Element_identification. There may be more than one outstanding_changes for an Element_identification.

4.2.44.7 title

The title specifies the formal designation of the specific group of product information of interest. The title need not be specified for a particular Element_identification.

NOTE The document title may be an abbreviated form of the title or may have abbreviations of selected words within the title.

4.2.45 Element_type

The Element_type is a classification code utilized to classify the product data contents of an Element_-identification. The data associated with an Element_type are the following:

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— code_administrator;

— element_code;

— type_of_coding_scheme.

NOTE 1 Element_types are defined within different industries.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY element_type;
   code_administrator : OPTIONAL company;
     element_code : label;
     type_of_coding_scheme : OPTIONAL text;
END_ENTITY;
(*
```

4.2.45.1 code_administrator

The code_administrator specifies the organization that maintains the element type coding schema. The code_administrator need not be specified for a particular element_type.

4.2.45.2 element_code

The element_code specifies the classification code for a TDP element.

4.2.45.3 type_of_coding_scheme

The type_of_coding_scheme specifies industrial standards or a business transaction specific method to classify the Tdp_element (see 4.2.152) by the information content of the TDP element. The standards identify a coding scheme by which types of statements can be referenced. The type_of_coding_scheme need not be specified for a particular element_type.

EXAMPLE ISO 11179-6 defines a coding scheme that an industry may use.

4.2.46 Exchange_file

An Exchange_file is a type of File (see 4.2.55) that is either referenced or included in a data exchange. The data associated with an Exchange_file are the following:

— destination_system;

— included_in_exchange.

NOTE Application object EXPRESS:

```
*)
ENTITY exchange_file
     SUBTYPE OF (file);
```

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```
        destination_system : OPTIONAL system_declaration;
        included_in_exchange : label;
    END_ENTITY;
    (*
```

4.2.46.1 destination_system

The destination_system specifies the receiving computer system of a data exchange. The destination_-system need not be specified for a particular Exchange_file.

4.2.46.2 included_in_exchange

The included_in_exchange specifies if the Exchange_file is included in the data exchange. The value of the included_in_exchange shall be a user-defined text string or one of the following:

— already delivered;

— available for access;

— fully included;

— not deliverable;

— not delivered yet;

— not received;

— partially included;

— receipt accepted;

— receipt acknowledged;

— receipt partially rejected;

— receipt rejected;

— resubmission;

NOTE See 4.2.46.2.1 - 4.2.22.1.12, 4.2.46.2.12 for the definition of each allowable value for included_in_-exchange.

4.2.46.2.1 already delivered: the TDP element data that is not in the exchange because it was exchanged previously

4.2.46.2.2 available for access: the TDP element data that is available for the receiving system to remotely access the data

4.2.46.2.3 fully included: the TDP element data and all of data files that are in the exchange

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4.2.46.2.4 not deliverable: the TDP element data that are not in the exchange and are not deliverable or planned for delivery

4.2.46.2.5 not delivered yet: the TDP element data that are not in the current exchange and data that will be exchanged in a future exchange

4.2.46.2.6 not received: the TDP element data that were not received in a referenced exchange or shipment

4.2.46.2.7 partially included: components of the TDP element data that are exchanged

4.2.46.2.8 receipt accepted: the TDP element data received in the referenced exchange that were successfully received and accepted as approved by the receiver

4.2.46.2.9 receipt acknowledgement: the TDP element data received in the referenced exchange or shipment that were successfully received

NOTE The receipt_acknowledgement does not imply acceptance by the receiver.

4.2.46.2.10 receipt partially rejected: the TDP element data received in the referenced exchange or shipment that were partially rejected due to non-compliance with exchange or delivery requirements

4.2.46.2.11 receipt rejected: the TDP element data received in the referenced exchange or shipment that were rejected due to non-compliance with the exchange or delivery requirements

4.2.46.2.12 resubmission: the TDP element data that are in the exchange as a resubmission or resend

4.2.47 Explicit_graphics

The Explicit_graphics refers to the geometry that appear on the face of the document. The geometry will be captured in the list presentation description contained within this part of ISO 10303. The data associated with an Explicit_graphics is the following:

— table_geometry.

NOTE Application object EXPRESS:

```
*)
ENTITY explicit_graphics;
  table_geometry : geometry;
END_ENTITY;
(*
```

4.2.47.1 table_geometry

The table_geometry specifies the geometry required to aid in readability of the presentation of lists that are presented in list formats.

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4.2.48 External_graphics_file

The External_graphics_file is information concerning the type or data format of the external file, the external file name, and the location for loading the data from the external file.

NOTE 1 External_graphics_file may contain text as well as geometry.

The data associated with an External_graphics_file are the following:

— file_id.

— file_loadpoint_x;

— file_loadpoint_y.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY external_graphics_file;
    file_id : file;
    file_loadpoint_x : real;
    file_loadpoint_y : real;
END_ENTITY;
(*
```

4.2.48.1 file_id

The file_id specifies the external graphics file and the format.

4.2.48.2 file_loadpoint_x

The file_loadpoint_x specifies the horizontal position of the origin of the External_graphics_file.

EXAMPLE Assuming a page_origin of (0.5, 0.5) for an "A" size sheet, the loadpoint of (7.5, 10.0) would put the vertical position one-half inch from the right side of the page (one-half inch from the lower right corner of the paper).

4.2.48.3 file_loadpoint_y

The file_loadpoint_y specifies the vertical position of the origin of the External_graphics_file.

EXAMPLE Assuming a page_origin of (0.5, 0.5) for an "A" size sheet, the loadpoint of (7.5, 10.0) would put the vertical position one-half inch from the bottom of the page (one-half inch from the lower right corner of the paper).

4.2.49 Field_content_holder

The Field_content_holder is the data content for the document with the style. Each Field_content_holder is either a Field_content_holder_singular (see 4.2.50) or a Field_content_holder tabulation (see 4.2.51). The data associated with a Field_content holder are:

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— field_justification;

— location;

— text_style.

NOTE Aplication object EXPRESS:

```
*)
ENTITY field_content_holder
     ABSTRACT SUPERTYPE OF
     (ONEOF(field_content_holder_singular,
            field_content_holder_tabulation));
     field_justification : text;
     location : field_location;
     text_style : label;
END_ENTITY;
(*
```

4.2.49.1 field_justification

The field_justification specifies the definition of the justification which indicates the location of the text in the field provided.

EXAMPLE 1 Left justified.

EXAMPLE 2 Centered.

4.2.49.2 text_style

The text_style specifies the formatting information needed for proper instantiation on the associated list. Text_style provides the information necessary for font and printer control information.

EXAMPLE The following information may name a part:

'GASKET (small nozzle body)'
However, the data is required to appear on the parts list as:
GASKET
(small nozzle body)

4.2.49.3 location

The location specifies the location information for the data content.

4.2.50 Field_content_holder_singular

The Field_content_holder_singular is a type of Field_content_holder (see 4.2.49) that is the data content of the header fields. The data associated with a Field_content_holder_singular are the following:

— field_text.

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NOTE Application object EXPRESS:

```
*)
ENTITY field_content_holder_singular
  SUBTYPE OF (field_content_holder);
  field_text : text;
END_ENTITY;
(*
```

4.2.50.1 field_text

The field_text specifies Text (see 4.2.159) that is required for instantiation in the header of the associated list. The formatting information will be contained in the style parameter information acquired through the Field_content_holder.

4.2.51 Field_content_holder_tabulation

The Field_content_holder_tabulation is a type of Field_content_holder (see 4.2.49) that specifies the data content of the table fields (for both header and body data). The data associated with a Field_content_holder tabulation are the following:

— field_text.

NOTE Application object EXPRESS:

```
*)
ENTITY field_content_holder_tabulation
  SUBTYPE OF (field_content_holder);
  field_text : LIST [1:?] OF text;
END_ENTITY;
(*
```

4.2.51.1 field_text

The field_text specifies Text (see 4.2.159) that is required for instantiation on a table (in the header or body) of the associated list. The formatting information is contained in the style parameter information acquired through the Field_content_holder. There may be more than one field_text for a Field_content_-holder_tabulation.

4.2.52 Field_location

The Field_location is the location, justification, and boundaries of each of the field titles. Each Field_-location may be one of the following: a String_location_definition (see 4.2.146) or a Field_location_-definition (see 4.2.53).

NOTE Application object EXPRESS:

```
*)
ENTITY field_location
  SUPERTYPE OF
```

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```
  (ONEOF(string_location_definition,field_location_definition));
END_ENTITY;
(*
```

4.2.53 Field_location_definition

The Field_location_definition is a type of Field_location (see 4.2.52) that specifies the field size in which the text resides and the justification. The data associated with a Field_location_definition are the following:

— field_load_point.

NOTE Application object EXPRESS:

```
*)
ENTITY field_location_definition
  SUBTYPE OF (field_location);
  field_load_point : load_point;
END_ENTITY;
(*
```

4.2.53.1 field_load_point

The field_load_point specifies the load_point (see 4.2.90) that defines the location of the text field.

4.2.54 Field_title

The Field_title is the text and specific location information for the document header, table header, column header, group parent header, and the group parent column header. The data associated with a Field_title are the following:

— field_justification;

— field_text;

— location;

— field_style.

NOTE Application object EXPRESS:

```
*)
ENTITY field_title;
  field_justification : text;
  field_style : label;
  field_text : text;
  location : field_location;
END_ENTITY;
(*
```

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4.2.54.1 field_justification

The field_justification specifies the definition of the justification which indicates the location of the text in the field provided.

EXAMPLE 1 Left justified.

EXAMPLE 2 Centered.

4.2.54.2 field_style

The field_style specifies the text formatting information.

EXAMPLE An example of a field_style may be a font.

4.2.54.3 field_text

The field_text specifies the title data information.

4.2.54.4 location

The location specifies the text placement information for the titles or content data.

4.2.55 File

A File is a set of computerized digital data that has meaning based on a predefined digital file format standard. Each File shall be one of the following: a Source_file (see 4.2.137), an Accessed_file (see 4.2.3), or an Exchange_file (see 4.2.46). The data associated with a File are the following:

— change_status;

— context_file_format;

— context_file_name;

— distribution_authorizations;

— native_format_file_name;

— security_identifications;

— size;

— source_system;

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NOTE 1 Application object EXPRESS:

```
*)
ENTITY file
  SUPERTYPE OF (ONEOF (accessed_file, exchange_file, source_file));
      change_status : OPTIONAL change_identification;
      context_file_format : OPTIONAL file_format;
      context_file_name : OPTIONAL identifier;
      distribution_authorizations : OPTIONAL LIST [1:?] OF
     distribution_notice;
      native_format_file_name : OPTIONAL identifier;
      security_identifications : OPTIONAL LIST [1:?] OF
        security_classification;
      size : OPTIONAL size_characteristics;
      source_system : OPTIONAL system_declaration;
WHERE
  WR1: EXISTS(context_file_name) OR EXISTS(native_format_file_name)
       OR ('AP232_ARM.ACCESSED_FILE' IN TYPEOF(self));
END_ENTITY;
(*
```

NOTE 2 WHERE Rule states that a file must have a context_file_name, or native_format_file_name, or be an accessed_file.

4.2.55.1 change_status

The change_status specifies the latest alteration made to the File. The change_status need not be specified for a particular File.

4.2.55.2 context_file_format

The context_file_format specifies the computer system file format for the context_file_name.

NOTE The context_file_format is typically either an industry standard file format for data exchange or a mutually agreed to format for data exchange within a business relationship.

EXAMPLE The context_file_format is ISO 10303-21.

4.2.55.3 context_file_name

The context_file_name specifies the computer system file identification for the File.

NOTE When a file is being exchanged, the context_file_name is the file's identification.

4.2.55.4 distribution_authorizations

The distribution_authorizations specifies the industrial or organizational circulation of the information contained in the File. The distribution_authorizations need not be specified for a particular File. There may be more than one distribution_authorizations for a file.

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4.2.55.5 native_format_file_name

The native_format_file_name specifies the originating computer system application file identification for the File. The native_format_file_name need not be specified for a particular File.

NOTE The originating computer system file identification is generally referred to as the native file name or the native application file name.

EXAMPLE The native CAX system file name is ‘Fred Drawing for 16PR006'.

4.2.55.6 security_identifications

The security_identifications specifies the business, organizational, or government security or sensitivity of the File and its contents. The security_identifications need not be specified for a particular File. There may be more than on security_identifications for a file.

4.2.55.7 size

The size specifies statistics related to the computer system representation of the file. The size need not be specified for a particular File.

4.2.55.8 source_system

The source_system is the identification of the computer system that generated the File. The source_system need not be specified for a particular File.

4.2.56 File_format

The File_format is the configuration definition of the digital data in the file. The format defines the industry or business relationship defined methodology for transcribing the data to the File. The data associated with a File_format are the following:

— change_level;

— format_code;

— format_standard;

— release_date;

— revision_level.

NOTE 1 This format is defined by an industry standard or other agreed to format.

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NOTE 2 Application object EXPRESS:

```
*)
ENTITY file_format;
  change_level : OPTIONAL identifier;
  format_code : OPTIONAL identifier;
  format_standard : OPTIONAL text;
  release_date : OPTIONAL date;
  revision_level : OPTIONAL identifier;
WHERE
    WR1: EXISTS (format_code) OR EXISTS (format_standard)
    OR EXISTS (revision_level) OR EXISTS (change_level)
    OR EXISTS (release_date);
END_ENTITY;
(*
```

4.2.56.1 change_level

The change_level specifies a specific alteration made to the format_standard that has been adopted as part of the format standard, but not fully incorporated as part of the format_standard documentation. The change_level need not be specified for a particular file_format.

NOTE For format standards, a change level may be the same as an addendum or amendment.

4.2.56.2 format_code

The format_code specifies a file character encoding. The format_code need not be specified for a particular file_format.

NOTE Industrial practices utilize industry, government, or international standards for data exchange.

EXAMPLE ‘ASCII’, ‘ISO646IRV’, ‘ISO8859-1', ‘EBCDIC’, or ‘BINARY’ are examples of format_code.

4.2.56.3 format_standard

The format_standard specifies the file structure encoding that defines the methodology for transcribing the data to the File. The format_standard need not be specified for a particular file_format.

EXAMPLE ‘ISO10303-21’, ‘JPEG’, ‘TIFF', ‘RTF’, or ‘HTML’ are examples of format_standard.

4.2.56.4 release_date

The release_date specifies the date the version of format_standard was released or issued. The format_-standard need not be specified for a particular file_format.

EXAMPLE Figure 4 illustrates the format style for release_date.

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4.2.56.5 revision_level

The revision_level specifies the version of the format_standard from its original release or issue. The revision_level need not be specified for a particular file_format.

NOTE Revisions reflect changes made to the original standard requiring the revision level to advance. For format standards, a revision level may be the same as a version level.

4.2.57 Foreign_defined_item

A Foreign_defined_item is a type of Item_usage (see 4.2.86) that defines the usage of an Item (see 4.2.159) that is used within the context of a drawing and related parts list. The Item that the Foreign_defined_item is describing is defined on a drawing other than the one describing the Foreign_defined_item usage.

NOTE Application object EXPRESS:

```
*)
ENTITY foreign_defined_item
  SUBTYPE OF (item_usage);
END_ENTITY;
(*
```

4.2.58 Geometry

The Geometry is the mathematical representation of shape for a product or annotation.

NOTE Application object EXPRESS:

```
*)
ENTITY geometry;
END_ENTITY;
(*
```

4.2.59 Group_parent_column_header

The Group_parent_column_header is the text information, style, and location of the origin of the header data for a specific group of columns.

The data associated with a Group_parent_column_header are the following:

— single_group_parent_column_header_titles.

NOTE Application object EXPRESS:

```
*)
ENTITY group_parent_column_header;
  single_group_parent_column_header_titles : LIST [1:?] OF field_title;
END_ENTITY;
(*
```

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4.2.59.1 single_group_parent_column_header_titles

The single_group_parent_column_header_titles specifies the title data for the group parent columns. There may be more than one single_group_parent_column_header_titles for a Group_parent_column_-header.

4.2.60 Group_parent_content_holder

The Group_parent_content_holder is the information needed to place the group parent data content on the document (pointers to the placement location and data to be instantiated). The data associated with a Group_parent_content_holder are the following:

— group_parent_content_presentation.

NOTE Application object EXPRESS:

```
*)
ENTITY group_parent_content_holder;
  group_parent_content_presentation : field_content_holder_tabulation;
END_ENTITY;
(*
```

4.2.60.1 group_parent_content_presentation

The group_parent_content_presentation specifies the data content from the list information and the formatting and placement information necessary for instantation.

4.2.61 Group_parent_header

The Group_parent_header is the text information, style, and location for the titles in the group header data. Group data is a special class of data in which the header data may not be able to be instantiated at once.

The data associated with a Group_parent_header are the following:

— single_group_parent_header_titles.

EXAMPLE A parts listing where there are only columns for four parts numbers when ten might be required.

NOTE Application object EXPRESS:

```
*)
ENTITY group_parent_header;
  single_group_parent_header_titles : LIST [1:?] OF field_title;
END_ENTITY;
(*
```

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4.2.61.1 single_group_parent_header_titles

The single_group_parent_header_titles specifies the text title data and specifies the formatting and placement information. There may be more than one single_group_parent_header_titles for a Group_-parent_header.

4.2.62 Header

The Header is the configuration management and data management information required for documents and TDP elements. The data associated with a Header are the following:

— document_abstract;

— document_keywords;

— header_configuration;

— language;

— sheet_count;

— size_of_sheet.

NOTE Application object EXPRESS:

```
*)
ENTITY header;
  document_abstract : OPTIONAL text;
  document_keywords : OPTIONAL SET [1:?] OF text;
  header_configuration :
       header_configuration_with_element_identification;
  languages: OPTIONAL SET [1:?] OF label;
  sheet_count : OPTIONAL an_integer;
  size_of_sheet : OPTIONAL size_characteristics_full_size;
END_ENTITY;
(*
```

4.2.62.1 document_abstract

The document_abstract specifies a brief overview of the document or TDP element. The document_-abstract need not be specified for a particular Header.

4.2.62.2 document_keywords

The document_keywords specifies words that describe the main thought or topic of a document or TDP element. The document_keywords need not be specified for a particular Header. There may be more than one keywords for a Header.

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4.2.62.3 header_configuration

The header_configuration specifies both the configuration control and data management characteristics required for documents and TDP elements.

4.2.62.4 languages

The languages specifies the type of vocabulary nomenclatures used in the document or TDP element text. The langauges need not be specified for a particular Header. There may be more than one languages for a Header.

4.2.62.5 sheet_count

The sheet_count specifies the total number of sheets contained within a document or TDP element that is page oriented. The sheet_count need not be specified for a particular Header.

NOTE 1 The sheet_count is maintained for status accounting of Associated_lists by sheet and to indicate the general size of the Associated_list.

NOTE 2 Where the presentation form of the data is not defined or exchanged, the sheet_count is optional.

4.2.62.6 size_of_sheet

The size_of_sheet specifies the presentation size of a document page or sheet. The size_of_sheet need not be specified for a particular Header.

NOTE 1 The size_of_sheet is maintained to indicate the general physical size of the TDP element's presentation.

NOTE 2 Where the presentation form of the data is not defined or exchanged, the size_of_sheet is optional.

4.2.63 Header_block

The Header_block is the placement location, header text, and style information for the header blocks. The Header_block is instantiated separately for each individual block in the Header.

NOTE 1 Only the header data is in block form - the contents are in tables.

The data associated with a Header_block are the following:

— single_block_content_presentation;

— single_block_titles.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY header_block;
     single_block_content_presentation : OPTIONAL LIST [1:?] OF
     field_content_holder_singular;
```

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```
    single_block_titles : OPTIONAL LIST [1:?] OF field_title;
WHERE
    WR1: EXISTS (single_block_content_presentation) OR EXISTS
    (single_block_titles);
END_ENTITY;
(*
```

4.2.63.1 single_block_content_presentation

The single_block_content_presentation specifies the text, style, and placement information for the list data. There may be more than one single_block_content_presentation for a Header_block.

4.2.63.2 single_block_titles

The single_block_titles specifies the text, style, and placement information for the form or constant information in a header block. The single_block_titles need not be specified for a particular Header_block. There may be more than one single_block_titles for a Header_block.

4.2.64 Header_configuration_with_element_identification

The Header_configuration_with_element_identification is both the configuration control identification and the data management characteristics for an Item, document, TDP element, or File. The data associated with a Header_configuration_with_element_identification are the following:

— data_configuration;

— identification.

NOTE Application object EXPRESS:

```
*)
ENTITY header_configuration_with_element_identification;
  data_configuration : OPTIONAL configuration;
  identification : element_identification;
END_ENTITY;
(*
```

4.2.64.1 data_configuration

The data_configuration specifies data management information required to manage and utilized an Item, document, TDP element, or File. There may be more than one data_configuration for a header_-configuration_with_element_identification.

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4.2.64.2 identification

The identification specifies the configuration control identification of an Item, document, TDP element or File.

NOTE For Associated_lists, this identifies the list number, list title, and change activity against the associated list.

4.2.65 Header_presentation

The Header_presentation is the presentation information necessary to format the header data. The presentation information is content, text, and location. The data associated with a Header_presentation are the following:

— header_blocks_presentation;

— header_tabulation_presentation.

NOTE 1 There may be two sets of header information - one for the first page and one for the remainder of the document.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY header_presentation;
  header_blocks_presentation : LIST [1:?] OF header_block;
  header_tabulation_presentation : OPTIONAL LIST [1:?] OF tabulation;
END_ENTITY;
(*
```

4.2.65.1 header_blocks_presentation

The header_blocks_presentation specifies the text, style, and placement information for the data contained in a given header block. There may be more than one header_blocks_presentation for a Header_-presentation.

4.2.65.2 header_tabulation_presentation

The header_tabulation_presentation specifies information for tables in the header portion of the document. The header_tabulation_presentation need not be specified for a particular Header_presentation. There may be more than one header_tabulation_presentation for a Header_presentation.

4.2.66 Identifier

An Identifier is an alphanumeric string that designates something to be identified. It may not provide natural-language meaning.

NOTE 1 An identifier need not always be unique.

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EXAMPLE Revision-A, NOTE 22, or PDQR00145 are identifiers.

NOTE 2 Application object EXPRESS:

```
*)
TYPE identifier = STRING;
END_TYPE;
(*
```

4.2.67 Indentured_data_list

An Indentured_data_list is a type of Document_list (see 4.2.39) that has the contents of the data organized in a hierarchical structure. The hierarchial structure is defined as a “top-down or breakdown” order. An Indentured_data_list is a tabulation of all drawings, referenced documents, associated lists, and other essential in-house documents required for design disclosure pertaining to the TDP element or Item to which Indentured_data_list applies. The data associated with an Indentured_data_list are the following:

— body;

— header.

NOTE Application object EXPRESS:

```
*)
ENTITY indentured_data_list
  SUBTYPE OF (document_list);
  body : indentured_data_list_body;
  header : indentured_data_list_header;
END_ENTITY;
(*
```

4.2.67.1 body

The body specifies the tabulations that are the constituents and subject of the Indentured_data_list.

4.2.67.2 header

The header specifies sufficient configuration control and data management information for a specific Indentured_data_list.

4.2.68 Indentured_data_list_body

The Indentured_data_list_body is the tabulation of information within an Indentured_data_list. The tabulated information consists of sufficient identification of related TDP element information to meet design disclosure requirements for the TDP element that the Indentured_data_list is associated to. The related TDP element information is identified within the context of the TDP element that the Indentured_data_list is associated to.

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The data associated with an Indentured_data_list_body are the following:

— indentured_tabulation;

— notes_list;

— revision_history;

— standardization_documents_list.

NOTE Application object EXPRESS:

```
*)
ENTITY indentured_data_list_body;
  indentured_tabulation : indentured_data_list_tabulation;
  notes_list : OPTIONAL LIST [1:?] OF notation;
  revision_history : OPTIONAL LIST [1:?] OF revision;
  standardization_documents_list : OPTIONAL LIST [1:?] OF
  element_identification;
END_ENTITY;
(*
```

4.2.68.1 indentured_tabulation

The indentured_tabulation specifies the hierarchically defined listing of TDP elements. The indentured method indirectly references the document tabulation for the Indentured_data_list.

4.2.68.2 notes_list

The notes_list specifies a listing of notes that are applicable to the Indentured_data_list. The notes may be referenced by the use of a note reference code in any section of the Indentured_data_list. The notes describe any explanatory remarks or notations that may be useful or informative regarding the subject that referenced the note. The notes_list need not be specified for a particular Indentured_data_list_body. There may be more than one notes_list for an Indentured_data_list_body.

4.2.68.3 revision_history

The revision_history specifies a record of revisions of the Indentured_data_list. The revision_history shall be constructed in a manner whereby the first entry in the tabulation is the first revision, the second entry is the second revision, and subsequent entries in the tabulation are subsequent revisions. The revision_-history shall not contain an entry for the original release. The revision_history need not be specified for a particular Indentured_data_list_body. There may be more than one revision_history for an Indentured_-data_list_body.

4.2.68.4 standardization_documents_list

The standardization_documents_list specifies a tabulation of standardization documents used, referenced, or cited by entries in the Indentured_data_list. The standardization_documents_list need not be specified

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for a particular Indentured_data_list_body. There may be more than one standardization_documents_list for an Indentured_data_list_body.

4.2.69 Indentured_data_list_entry

The Indentured_data_list_entry is an entry in the Indentured_data_list_tabulation (see 4.2.71).

NOTE 1 The entry is a TDP element or an Item (i.e., part component) within a Indentured_data_list_tabulation. The entry will have a relationship to a document which references it and will have associated information characterizing the entry which would comprise the columnar information in an indentured data list tabulation.

The data associated with an Indentured_data_list_entry are the following:

— available_from;

— effective_on;

— entry;

— entry_configuration;

— entry_item_change_level;

— entry_notes;

— indenture_level;

— special_conditions;

— superseded_entry.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY indentured_data_list_entry;
  available_from: OPTIONAL LIST [1:?] OF source_identification;
  effective_on : OPTIONAL effectivity;
  entry : list_entry_select;
  entry_configuration: OPTIONAL configuration;
  entry_item_change_level : OPTIONAL identifier;
  entry_notes : OPTIONAL LIST [1:?] OF notation;
  indenture_level : OPTIONAL label;
  special_conditions:   OPTIONAL LIST [1:?] OF special_condition;
  superseded_entry: OPTIONAL element_identification;
END_ENTITY;
(*
```

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4.2.69.1 available_from

The available_from specifies a Contract_submission (see 4.2.20) or a Referenced_document (see 4.2.120) that procurement source information can be obtained from for the Indentured_data_list_entry. The available_from need not be specified for a particular Indentured_data_list_entry. There may be more than one available_from for an Indentured_data_list_entry.

EXAMPLE When documents available from the International Standards Organization (ISO) are utilized in the preparation of a TDP, the documents are not delivered but are referenced for the receiving organization to acquire through ISO.

NOTE Application object EXPRESS:

```
TYPE source_identification = SELECT
  (contract_submission,
  reference_document);
END_TYPE;
```

4.2.69.2 effective_on

The effective_on specifies the effectivity that governs the use of the Item. The effective_on need not be specified for a particular Indentured_data_list_entry.

4.2.69.3 entry

The entry specifies an Item_parent_to_item_child_relationship (see 4.2.83), a Tdp_element_parent_ to_-item_child_relationship (see 4.2.155), a Tdp_element_parent_to_tdp_element_child_relationship (see 4.2.156), a Tdp_indentured_tdp_element (see 3.5.27), an Item_parent_to_tdp_element_ child_relationship (see 4.2.84), or a Tdp_indentured_item (see 4.2.157) that is the subject of the Indentured_data_list_entry.

NOTE 1 An Item_parent_to_item_child_relationship specifies that the row entry (child) is an Item and that the parent entry is an Item.

NOTE 2 An Item_parent_to_tdp_element_child_relationship specifies that the row entry (child) is a TDP_ element and that its parent entry is an Item.

NOTE 3 A Tdp_element_parent_to_item_child_relationship specifies that the row entry (child) is an Item and that the parent entry is a TDP_element.

NOTE 4 The Tdp_indentured_item specifies the Tdp Items of an Item-based tree. This enables the listing of multiple part-based document trees within the body of the list.

NOTE 5 A Tdp_element_parent_to_tdp_element_child_relationship specifies that the row entry (child) is a TDP_element and that the parent entry is a TDP_element.

NOTE 6 The Tdp_indentured_tdp_element specifies the tdp element of a TDP element-based tree. This enables the listing of multiple document trees within the body of the list.

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NOTE 7 Application object EXPRESS:

```
TYPE list_entry_select = SELECT
  (item_parent_to_item_child_relationship,
   item_parent_to_tdp_element_child_relationship,
   tdp_element_parent_to_item_child_relationship,
   tdp_element_parent_to_tdp_element_child_relationship,
   tdp_indentured_item,
   tdp_indentured_tdp_element);
END_TYPE;
```

4.2.69.4 entry_configuration

The entry_configuration specifies the data management characteristics about the TDP element or Item in the Indentured_data_list_entry. The entry_configuration need not be specified for a particular Indentured_-data_list_entry.

4.2.69.5 entry_item_change_level

The entry_item_change_level specifies the revision, change, or issue level that the Indentured_data_list_-entry was last modified. Entry_item_change_level need not be specified for a particular Indentured_data_-list_entry.

NOTE 1 The entry_item_change_level would not be utilized for the original collection of data in a particular Indentured_data_list.

NOTE 2 The entry_item_change_level may be expanded to accommodate a notation specifying that an entry is new or modified for the current version of the Indentured Data List (e.g., a "new this issue" flag).

4.2.69.6 entry_notes

The entry_notes specifies textual information of interest relative to the Indentured_data_list_entry. The textual information is an explanatory remark or notation regarding the Indentured_data_list_entry. The entry_notes need not be specified for a particular Indentured_data_list_entry. There may be more than one entry_notes for an Indentured_data_list_entry.

4.2.69.7 indenture_level

The indenture_level specifies the level of indentured of the Indentured_data_list_entry from the Item (see 4.2.79) or Tdp_element (see 4.2.152) identified as the first object in the Indentured_data_list_tabulation_-tabulation_of_entries. The level of indenture indicates a relative position between the Indentured_data_-list_entry and the top level item or TDP element that is identified in the tabulation_of_entries (see 4.2.71.2). The indenture_level need not be specified for a particular Indentured_data_list_entry.

NOTE 1 The level of indenture is formulated based on the document tree or the item tree from the top level TDP element or item identified in the Indentured_data_list_entry.tabulation_of_entries.

NOTE 2 Industrial practices have the TDP_element or Item as the first level of indenture, while the TDP_-elements or Item that are referenced from the top level TDP_element or Item are at the second level of indenture. Lower levels of indenture are specified relative to the top level TDP_element or Item.

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4.2.69.8 special_conditions

The special_conditions specifies mutually agreed to conditions that apply to the Indentured_data_list_entry. The mutually agreed to conditions relate to codes or designations for Items or TDP elements. Special_-conditions need not be specified for a particular Indentured_data_list_entry. There may be more than one special_conditions for an Indentured_data_list_entry.

4.2.69.9 superseded_entry

The superseded_entry specifies the identification of an Item or TDP element that was superseded by the current Indentured_data_list_entry. Superseded_entry need not be specified for a particular Indentured_-data_list_entry.

EXAMPLE ISO 10303-203:2001 supersedes ISO 10303-203:1995.

4.2.70 Indentured_data_list_header

An Indentured_data_list_header is the configuration control and data management information necessary to manage and control the Indentured_data_list. The data associated with an Indentured_data_list_header are the following:

— common_header;

— procurement_references.

NOTE Application object EXPRESS:

```
*)
ENTITY indentured_data_list_header;
  common_header : header;
  procurement_references: OPTIONAL LIST [1:?] OF identification_select;
END_ENTITY;
(*
```

4.2.70.1 common_header

The common_header specifies the information required for configuration control and administering the use of the data in the Indentured_data_list.

4.2.70.2 procurement_references

The procurement_references specify an Element_identification (see 4.2.44) or an Item_identification (see 4.2.80) that are TDP elements, documents, or Items that were used as justification for development of the Indentured_data_list. The justification is a business purpose that identifies a TDP element, document, or Item that was provided by the organization procuring the data contained in the Indentured_data_list. The business purpose permits the association of different Indentured_data_lists in a hierarchial or other

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business purpose defined method. The procurement_references need not be specified for a particular Indentured_data_list. There may be more than one procurement_reference for an Indentured_data_list_-header.

NOTE Application object EXPRESS:

```
TYPE identification_select = SELECT
  (element_identification,
  item_identification);
END_TYPE;
```

4.2.71 Indentured_data_list_tabulation

The Indentured_data_list_tabulation is a listing of valid TDP elements within the Indentured_data_list. The listing identifies the valid TDP elements in a hierarchial order that is dependent on the business purpose for the TDP elements.

The data associated with an Indentured_data_list_tabulation are the following:

— method_of_entry_tabulation;

— tabulation_of_entries.

NOTE Application object EXPRESS:

```
*)
ENTITY indentured_data_list_tabulation;
  method_of_entry_tabulation : indentured_list_method;
  tabulation_of_entries : LIST [1:?] OF indentured_data_list_entry;
END_ENTITY;
(*
```

4.2.71.1 method_of_entry_tabulation

The method_of_entry_tabulation specifies an Indentured_list_by_part (see 4.2.73), an Indentured_list_by_-document (see 4.2.72), an Indentured_list_by_part_with_document_references_to_parts (see 4.2.74) that specify how the entries in the tabulation_of_entries are referenced by defining the relationship between the tabulation_of_entries.

NOTE 1 The method_of_entry_tabulation identifies how indentured list entries comprising a document tree, part tree, or combination thereof will be structured and listed.

NOTE 2 The method_of_entry_tabulation is presented as a separate entity from Indentured_data_ list_tabulation to provide a path for the Data_definition_exchange to reference a common set of indenture methods.

NOTE 3 An indentured_list_by_part specifies that the primary method of indenture will be by part (part to part) and all subordinate indentures will be from a part perspective (part to document, and document to referenced document).

NOTE 4 An indentured_list_by_document specifies that the only entry in the indentured list will be documents (document to document).

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NOTE 5 An indentured_list_by_part_with_document_references_to_parts specifies that the primary method of indenture will be by part (part to part) but all other types of subordinate indentures will be allowable (part to document, document to document, and document to part).

NOTE 6 Application object EXPRESS:

```
*)
TYPE indentured_list_method = SELECT
  (indentured_list_by_document,
   indentured_list_by_part,
   indentured_list_by_part_with_document_references_to_parts);
END_TYPE;
(*
```

4.2.71.2 tabulation_of_entries

The tabulation_of_entries specifies the list of entries using the method defined in the method_of_entry_tabulation. There may be more than one tabulation_of_entries for an Indentured_data_list_tabulation.

4.2.72 Indentured_list_by_document

The Indentured_list_by_document is an ordered listing of related documents or TDP elements. The ordered list is an indentured tabulation of TDP elements that are defined by a document tree. The ordered list is a document-based document tree where allowed parent-child relationships include only document-to-referenced document relationships. The data associated with an Indentured_list_by_document are the following:

— top_indentured_tdp_elements.

EXAMPLE A listing of a document based document tree:

System or End Item Drawing or Documentation
.Documentation applicable to only the system or end items
.Assembly drawing X
..Documentation applicable to assembly drawing X
..Subassembly drawing Y referenced on assembly drawing X
...Documentation applicable only to subassembly drawing Y
...Detail documentation for parts referenced on drawing Y
.Assembly drawing Z
(Same breakdown as drawing X above.)

NOTE Application object EXPRESS:

```
*)
ENTITY indentured_list_by_document;
  top_indentured_tdp_elements :
          LIST [1:?] OF tdp_indentured_tdp_element;
END_ENTITY;
(*
```

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4.2.72.1 top_indentured_tdp_elements

The top_indentured_tdp_element specifies a list of the TDP elements which head or start a document-based document tree. Each top_indentured_tdp_element is the listing of multiple document trees within the Indentured_data_list. There may be more than one top_indentured_tdp_element for an Indentured_list_-by_document.

4.2.73 Indentured_list_by_part

The Indentured_list_by_part is an ordered listing of related Items. The ordered list is an indentured tabulation of referenced documents of TDP elements that are ordered by the parts that comprise the top assembly Item. The sequence or order of the list captures the assembly relationship between parts. The ordered list is a part-based document tree where allowed parent-child relationships include part to referenced document, part to part, and document to referenced document relationships.

EXAMPLE 1 A listing of a part-based document tree:

System or End Item
. Assembly X
.. Documentation applicable to Assembly X
.. Assembly Y which is a sub-assembly of X
... Documentation applicable to Assembly Y
... Detail parts utilized within Assembly Y
.... Documentation applicable to Detail Parts
.... Stock material that is used to fabricate the Detail Parts
..... Documentation applicable to the Stock Material
. Assembly R
.. (Same breakdown as Assembly X above.)

EXAMPLE 2 Top level documents are deliverable or exchangeable product functional requirements; training specifications; engineering instructions for operations, maintenance, repair, inspection; and drawing or design interpretation standard.

NOTE 1 Where top level documents apply to the entire product or system as opposed to a specific version(s) of a product identified by a part number(s), these top level documents may be listed first as a top level indenture entry prior to the listing of the first top level indenture part number or drawing.

The data associated with an Indentured_list_by_part are the following:

— top_indentured_items.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY indentured_list_by_part;
  top_indentured_items : LIST [1:?] OF tdp_indentured_item;
END_ENTITY;
(*
```

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4.2.73.1 top_indentured_items

The top_indentured_items specifies a list of the top elements which head or start a parts-based document tree. There may be more than one top_indentured_items for an Indentured_list_by_part.

NOTE The top_indentured_items enables the listing of multiple document trees within an Indentured_data_-list.

4.2.74 Indentured_list_by_part_with_document_references_to_parts

The Indentured_list_by_part_with_document_references_to_parts is an ordered listing of related items. The ordered list is defined as relating items in an ordered list of indentured entries in a tabulation of referenced documents that are defined by a parts-based document tree. The sequence or order of listed entries identifies the assembly relationships between parts, but also allows for referenced components from a TDP element to be identified including vendor supplied parts and components shown on the TDP element to denote assembly constraints but which are fully disclosed on other TDP elements (e.g., "For Reference Only" drawings). This indenture method requires a TDP element to be defined as a single list entry followed by denoted parts as subsequent list entries which are in turn followed by list entries of the referenced TDP elements related to each denoted part.

EXAMPLE A listing of document based document tree internally decomposed by parts:

System or End Item
.Documentation applicable to only the system or end item
. Document or Drawing for Assembly X
.. Assembly X
... Documentation applicable to Assembly X
... Document or Drawing for sub-assembly Y
.... Assembly Y which is a sub-assembly of X
..... Documentation applicable to Assembly Y
..... Document or Drawing of Detail part Z utilized within Assembly Y
..... Detail part Z
..... Documentation applicable to Detail Part Z
..... Stock material that is used to fabricate the Detail Parts
..... Documentation applicable to the Stock Material
... Document or Drawing for Sub-Assembly R
.... Assembly R which is a Sub-Assembly of X
..... (same breakdown as shown above).

NOTE 1 Where top level documents apply to the entire product or system as opposed to a specific version(s) of a product identified by a part number(s), these top level documents may be listed first as a top level indenture entry prior to the listing of the first top level indenture part number or drawing. Examples of top level documents include deliverable or exchangeable product functional requirements; training specifications; engineering instructions for operations, maintenance, repair, inspection, etc.; and drawing or design interpretation standard.

The data associated with an Indentured_list_by_part_with_document_references_to_parts are the following:

— top_indentured.

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NOTE 2 Application object EXPRESS:

```
*)
ENTITY indentured_list_by_part_with_document_references_to_parts;
  top_indentured: LIST [1:?] OF item_or_element;
END_ENTITY;
(*
```

4.2.74.1 top_indentured

The top_indentured specifies the item or element that is defined to be the top Item or TDP element in the ordered list. There may be more than one top_indentured for an Indentured_list_by_part_with_document_-references_to_parts.

NOTE Application object EXPRESS:

```
*)
TYPE item_or_element = SELECT
  (tdp_indentured_item,
  tdp_indentured_tdp_element);
END_TYPE;
(*
```

4.2.75 Index_list

An Index_list is a type of Single_document_list (see 4.2.132) that is a tabulation of Data_lists (see 4.2.29)and subordinate Index_lists pertaining to the Item or TDP element to which the Index_list applies. The data associated with a Index_list are the following:

— body;

— list_header.

NOTE Application object EXPRESS:

```
*)
ENTITY index_list
  SUBTYPE OF (single_document_list);
  body : index_list_body;
  list_header : index_list_header;
END_ENTITY;
(*
```

4.2.75.1 body

The body specifies the tabulations that are the constituents and subject of the Index_list.

4.2.75.2 list_header

The list_header specifies sufficient configuration control and data management information data for a specific Index_list.

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NOTE Data entries such as Company CODE, drawing size, document number, sheet number, revision or issue number, and nomenclature or description may be considered critical or mandatory information.

4.2.76 Index_list_body

The Index_list_body is the tabulation of information within the Index_list. The tabulated information consists of sufficient identification of related TDP element information to meet design disclosure requirements for the TDP element that is associated to the Index_list. The related TDP element information is identified within the context of the TDP element or Item that is associated to the Index_list. The data associated with a Index_list_body are the following:

— index_list_entries;

— index_list_notes;

— revision_history.

NOTE Application object EXPRESS:

```
*)
ENTITY index_list_body;
  index_list_entries : LIST [1:?] OF index_list_entry;
  index_list_notes: OPTIONAL LIST [1:?] OF notation;
  revision_history : OPTIONAL LIST [1:?] OF revision;
END_ENTITY;
(*
```

4.2.76.1 index_list_entries

The index_list_entries specify a list of valid TDP elements that are contained within the Index_list. There may be more than one index_list_entries for an Index_list_body.

4.2.76.2 index_list_notes

The index_list_notes specifies a listing of notes that are applicable to the Index_list. Some notes are referenced by the use of a note reference code in any section of the Index_list. The notes describe any explanatory remarks or notations that may be useful or informative regarding the subject that referenced the note. The index_list_notes need not be specified for a particular Index_list_body. There may be more than one index_list_notes for an Index_list_body.

4.2.76.3 revision_history

The revision_history specifies a record of revisions of the Index_list. The revision_history shall be constructed in a manner whereby the first entry in the tabulation is the first revision, the second entry is the second revision, and subsequent entries in the tabulation are subsequent revisions. The revision_history shall not contain an entry for the original release. The revision_history need not be specified for a particular Index_list_body. There may be more than one revision_history for an Index_list_body.

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4.2.77 Index_list_entry

An Index_list_entry is an entry in the Index_list_body (see 4.2.76). The data associated with an Index_-list_entry are the following:

— entry_item_change_level;

— entry_notes;

— list_entry.

NOTE Application object EXPRESS:

```
*)
ENTITY index_list_entry;
  entry_item_change_level : OPTIONAL identifier;
  entry_notes : OPTIONAL LIST [1:?] OF notation;
  list_entry : header;
END_ENTITY;
(*
```

4.2.77.1 entry_item_change_level

The entry_item_change_level specifies the current change level of the Index_list_entry. The entry_item_-change_level need not be specified for a particular Index_list_entry.

NOTE 1 Industrial practices utilize the entry_item_change_level to notify users of a change to the line item of interest.

NOTE 2 Industrial practices identify the last change of the respective entry.

4.2.77.2 entry_notes

The entry_notes specifies a list of notes that are applicable to the Index_list_entry. The entry_notes need not be specified for a particular Index_list_entry. There may be more than one entry_notes for an Index_-list_entry.

4.2.77.3 list_entry

The list_entry specifies a Header (see 4.2.62) that specifies the allowable TDP element of interest.

NOTE Header (see 4.2.62) provides an identification for TDP elements such as data list, indentured data list, and index list.

4.2.78 Index_list_header

An Index_list_header is the configuration management and data management information necessary to manage and control the Index_list. The data associated with a Index_list_header are the following:

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— common_header.

NOTE Application object EXPRESS:

```
*)
ENTITY index_list_header;
  common_header: header;
END_ENTITY;
(*
```

4.2.78.1 common_header

The common_header specifies the information required for configuration control and administering the use of the data in the Index_list.

4.2.79 Item

An Item is any unit or product including parts, assemblies, equipment, accessories, or attachments.

The data associated with an Item are the following:

— alternates;

— conditions_defined_through_constrained_document;

— conditions_defined_through_simple_reference;

— identification;

— item_configuration;

— item_contexts;

— item_weight;

— notes;

— special_conditions.

NOTE Application object EXPRESS:

```
*)
ENTITY item;
  alternates : OPTIONAL LIST [1:?] OF alternate_item;
  conditions_defined_through_constrained_document :
      OPTIONAL LIST [1:?] OF reference_document_usage;
  conditions_defined_through_simple_reference :
      OPTIONAL LIST [1:?] OF reference_document;
  identification : item_identification;
  item_configuration : OPTIONAL configuration;
  item_contexts : OPTIONAL LIST [1:?] OF label;
```

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```
    item_weight : OPTIONAL weight;
    notes : OPTIONAL LIST [1:?] OF notation;
    special_conditions: OPTIONAL LIST [1:?] OF special_condition;
  END_ENTITY;
  (*
```

4.2.79.1 alternates

The alternates specifies a list of substitute Items that meet the form, fit, and function of the design and may be use as an alternative to the original Item. The alternates need not be specified for a particular Item. There may be more than one alternates for an Item.

4.2.79.2 conditions_defined_through_constrained_document

The conditions_defined_through_constrained_document specifies any type of condition of an Item that can be obtained through the use of constraining the use of a document. Constraining parameters are used to aid in defining the condition of the Item. The conditions_defined_through_constrained_document need not be specified for a particular Item. There may be more than one conditions_defined_through_-constrained_document for an Item.

EXAMPLE 1 Final conditions such as final material or process characteristics.

EXAMPLE 2 Finish conditions such as surface finish or external characteristics (e.g. paint).

EXAMPLE 3 Design specifications.

4.2.79.3 conditions_defined_through_simple_reference

The conditions_defined_through_simple_reference specifies any type of condition of an Item that can be obtained through a simple reference to document. The conditions_defined_through_simple_reference need not be specified for a particular Item. There may be more than one conditions_defined_through_simple_-reference for an Item.

EXAMPLE 1 Final conditions such as final material or process characteristics.

EXAMPLE 2 Finish conditions such as surface finish or external characteristics (e.g. paint).

EXAMPLE 3 Design specifications.

4.2.79.4 identification

The identification specifies the configuration control information required to identify an Item from other Items.

4.2.79.5 item_configuration

The item_configuration specifies configuration control information pertaining to the Item. The item_-configuration need not be specified for a particular Item.

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4.2.79.6 item_contexts

The item_context specifies context information pertaining to the Item. The item_context need not be specified for a particular Item. There may be more than one item_contexts for an Item.

NOTE An item_contexts allows view identification of an Item..

EXAMPLE Engineering and Manufacturing are two different item_contexts.

4.2.79.7 item_weight

The item_weight specifies the heaviness of the Item. The item_weight need not be specified for a particular Item.

4.2.79.8 notes

The notes specifies additional human interpretable information that provides clarity and understanding of the information about the Item. The notes need not be specified for a particular Item. There may be more than one notes for an Item.

NOTE Notes may be identified by letters, codes, symbols, or numbers for a particular business purpose.

4.2.79.9 special_conditions

Special_conditions specifies mutually agreed to conditions that apply to the Item. The mutually agreed to conditions relate to codes or designations for the Item. Special_conditions need not be specified for a particular Item. There may be more than one special_conditions for an Item.

4.2.80 Item_identification

An Item_identification is the identification of an Item (see 4.2.79) for purposes of configuration control. The data associated with an Item_identification are the following:

— alternate_identifications;

— change_status;

— classifications;

— design_activity;

— identifying_number;

— nomenclature_or_name;

— source_information.

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NOTE Application object EXPRESS:

```
*)
ENTITY item_identification;
  alternate_identifications :
     OPTIONAL SET [1:?] OF alternate_identification_of_item;
  change_status : OPTIONAL change_identification;
  classifications : OPTIONAL LIST [1:?] OF label;
  design_activity : design_authority;
  identifying_number : item_identifying_number_select;
  nomenclature_or_name : OPTIONAL label;
  source_information : OPTIONAL source_information_type;
END_ENTITY;
(*
```

4.2.80.1 alternate_identifications

The alternate_identifications specify additional ways that an Item (see 4.2.79) may be identified. The alternate_identifications need not be specified for a particular Item_identification.

EXAMPLE If a company wants to rename a part they received from a supplier.

4.2.80.2 change_status

The change_status specifies the current level of change activity that an Item_identification has undergone. The change_status need not be specified for a particular Item_identification.

NOTE If the change_status is not specified, then the item is at the original release or issue.

4.2.80.3 classifications

The classifications specifies a set of product types or categories for an item. The classifications need not be specified for a particular Item_identification. There may be more than one classifications for an Item_-identification.

4.2.80.4 design_activity

The design_activity specifies the design authority responsible for the Item.

4.2.80.5 identifying_number

The identifying_number specifies an Identifier (see 4.2.66) or a Drawing_suffix_number_combination (see 4.2.42) that is an identifier that defines the identification number for the Item as issued by the design_-activity of the component.

NOTE 1 Industrial practices employ a practice of concatenating a dash and an alphanumeric to a drawing number to identify an Item. Each Item receiving a unique alphanumeric for that drawing.

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NOTE 2 Application object EXPRESS:

```
TYPE item_identifying_number_select = SELECT
  (identifier,
  drawing_suffix_number_combination);
END_TYPE;
```

4.2.80.6 nomenclature_or_name

The nomenclature_or_name specifies the name, noun phrase, or abbreviated name of the Item. The nomenclature_or_name need not be specified for a particular Item_identification.

4.2.80.7 source_information

The source_information specifies the method for item procurement. The source_information need not be specified for a particular Item_identification.

4.2.81 Item_list

The item_list is a list of item components for a specific usage. The Item_list specifies the usage context of the list. The data associated with an Item_list are the following:

— component_of;

— list_for;

— type_of_component_list.

NOTE Application object EXPRESS:

```
*)
ENTITY item_list;
  component_of : LIST[1:?] OF item_usage;
  list_for : item_list_applies_to_select;
  type_of_component_list : component_list_type_select;
END_ENTITY;
(*
```

4.2.81.1 component_of

The component_of specifies the list of Items that make up the Item_list for the content defined in the type_-of_component_list. There may be more than one component_of for an Item_list.

4.2.81.2 list_for

The list_for specifies an Item_identification (see 4.2.80) or the Item_list_drawing (see 4.2.82) that identifies the applicable TDP element or item.

EXAMPLE An assembly or a drawing.

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NOTE Application object EXPRESS:

```
*)
TYPE item_list_applies_to_select = SELECT
  (item_identification,
   item_list_drawing);
END_TYPE;
(*
```

4.2.81.3 type_of_component_list

The type_of_component_list specifies the context for the Item_list. The value of the type_of_component_-list shall be either a human_interpretable string of characters or shall be one of the following:

— assembly_defined_on_drawing_component_list;

— installation_drawing_component_list;

— item_not_defined_on_drawing_next_higher_assembly_component_list;

— made_from_component_list_of_one;

— net_change_list;

— synthetic_part_number_component_list.

NOTE 1 See for the definition of each allowable value for type_of_component_list.

NOTE 2 Application object EXPRESS:

```
*)
TYPE component_list_type_enumeration = ENUMERATION OF
  (assembly_defined_on_drawing_component_list,
  installation_drawing_component_list,
  item_not_defined_on_drawing_next_higher_assembly_component_list,
  made_from_component_list_of_one,
  net_change_list,
  synthetic_part_number_component_list);
END_TYPE;
(*
```

EXAMPLE One Item_list is to construct an applications list, one is to identify a make from detail part, one is to formulate the parts list for an installation drawing, and one determines the list of components that need to be consumed to define an assembly on a parts list.

4.2.81.3.1 assembly defined on drawing component list: the Item_list that has one or more components in the list and that if there is only one component in the list, its quantity must be greater than 1. In the context of a Parts_list, these components show up as entries on an assembly column with the column header being the resulting Locally_defined_item Assembly.

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4.2.81.3.2 installation drawing component list: the components within the Item_list that are all referenced to the drawing. It also specifies that an Item_list_drawing is utilized so that the drawing number which the list applies to will be captured.

4.2.81.3.3 item not defined on drawing next higher assembly component list: how items (usually top level items on a drawing) defined on a drawing are utilized on the next higher assembly. The next higher assembly being defined on a different drawing.

4.2.81.3.4 made from component list of one: the Item_list that has one component in the list and that component has a quantity of one. In the context of a Parts_list, this component may show up as an entry on an assembly column with the column header being the resulting Make_from_an_item.

4.2.81.3.5 net change list: the Item_list that contains the items that have been added, deleted, or modified. In the context of a Parts_list, this net change list can provide change visibility from one version of a Parts_-list to the next version.

4.2.81.3.6 synthetic part number component list: the item that the list applies to that is an Item_-identification which satisfies some process requirement.

NOTE 1 In industrial practices, an Item_identification that is not called out on a drawing is typically called a "synthetic part number".

NOTE 2 Application object EXPRESS:

```
*)
TYPE component_list_type_select = SELECT
  (component_list_type_enumeration,
   text);
END_TYPE;
(*
```

4.2.82 Item_list_drawing

An Item_list_drawing is a drawing or drawing sheet and may identify an item on the drawing for the Item_-list.

EXAMPLE The drawing is an installation drawing, where all parts are defined on other drawings but referenced on the installation drawing.

The data associated with an Item_list_drawing are the following:

— assembly_item_list_applies_to;

— drawing_number.

NOTE Application object EXPRESS:

```
*)
ENTITY item_list_drawing;
  assembly_item_list_applies_to : OPTIONAL item_identification;
```

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```
  drawing_number : element_identification;
END_ENTITY;
(*
```

4.2.82.1 assembly_item_list_applies_to

The assembly_item_list_applies_to specifies the identification of the item applicable to the Item_list. The Item shall appear on the drawing or specific drawing sheet identified in drawing_number. The assembly_-item_list_applies_to need not be specified for a particular Item_list_drawing.

4.2.82.2 drawing_number

The drawing_number specifies the drawing or drawing sheet applicable to the Item_list.

4.2.83 Item_parent_to_item_child_relationship

An Item_parent_to_item_child_relationship is the definition of a relationship between two Items (see 4.2.79). The relationship is a hierarchial relationship that defines the Item to Item assembly relationship. The data associated with an Item_parent_to_item_child_relationship are the following:

— child;

— parent.

NOTE Application object EXPRESS:

```
*)
ENTITY item_parent_to_item_child_relationship;
  child : item_identification;
  parent : item_identification;
END_ENTITY;
(*
```

4.2.83.1 child

The child specifies the identification of the Item of interest.

4.2.83.2 parent

The parent specifies the related parent Item of the child.

4.2.84 Item_parent_to_tdp_element_child_relationship

An Item_parent_to_tdp_element_child_relationship is the definition of a relationship between an Item and a TDP element. The relationship is a hierarchial relationship that defines the Item to TDP element relationship. The data associated with an Item_parent_to_tdp_element_child_relationship are the following.

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— child;

— parent.

NOTE Application object EXPRESS:

```
*)
ENTITY item_parent_to_tdp_element_child_relationship;
  child : element_identification;
  parent : item_identification;
END_ENTITY;
(*
```

4.2.84.1 child

The child specifies the identification of the Tdp_element (see 3.5.27) of interest.

4.2.84.2 parent

The parent specifies the related parent Item (see 4.2.79) of the child.

4.2.85 Item_type

The Item_type is a classification code utilized to classify the product data contents of an Item_-identification. The data associated with an Item_type are the following:

— code_administrator;

— item_code;

— type_of_coding_scheme.

NOTE 1 Item_types are defined within different industries.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY item_type;
   code_administrator : OPTIONAL company;
     item_code : label;
     type_of_coding_scheme : OPTIONAL text;
END_ENTITY;
(*
```

4.2.85.1 code_administrator

The code_administrator specifies the organization that maintains the item type coding schema. The code_-administrator need not be specified for a particular item_type.

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4.2.85.2 item_code

The item_code specifies the classification code for an Item_identification (see 4.2.80).

4.2.85.3 type_of_coding_scheme

The type_of_coding_scheme specifies industrial standards or a business transaction specific method to classify the Item_identification by the information content of the Item (see 4.2.79). The standards identify a coding scheme by which types of statements can be referenced. The type_of_coding_scheme need not be specified for a particular item_type.

EXAMPLE ISO 11179-6 defines a coding scheme that an industry may use.

4.2.86 Item_usage

An Item_usage is a particular usage and context of the usage of an Item (see 4.2.79). An Item_usage may be one of the following: a Foreign_defined_item (see 4.2.57) or a Locally_defined_item (see 4.2.91). The data associated with an Item_usage are the following:

— being_defined_for;

— effective_on;

— list_item;

— quantity_used_in_next_higher_assembly;

— retrofit;

— special_conditions.

NOTE 1 In the context of a Parts_list presentation, Item_usage represents a row entry. An Item_usage describes the use of an Item relative to the perspective of a drawing or a part.

NOTE 2 An Item may have many Item_usage(s).

NOTE 3 Each Item_usage for an Item may depict a different effectivity range. Each Item_usage for an Item may reflect its role as a component in an assembly, an Item in an installation, or a stock material in a Make_from_an_-item.

NOTE 4 The quantity of an Item for a particular assembly or effectivity are defined.

NOTE 5 Parameters that relate an Item to the Drawing are defined with Item_usage.

NOTE6 Application object EXPRESS:

```
*)
ENTITY item_usage
 SUPERTYPE OF (ONEOF(locally_defined_item,foreign_defined_item));
  being_defined_for : item;
```

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```
    effective_on : OPTIONAL effectivity;
    list_item : OPTIONAL list_item_usage;
    quantity_used_in_next_higher_assembly : OPTIONAL quantity;
    retrofit: OPTIONAL retrofit_usage;
    special_conditions: OPTIONAL LIST [1:?] OF special_condition;
  END_ENTITY;
  (*
```

4.2.86.1 being_defined_for

The being_defined_for specifies the Item for the applicable Item_usage.

4.2.86.2 effective_on

The effective_on specifies the effectivity that governs the use of the Item in the context of the Item_usage. The effective_on need not be specified for a particular Item_usage.

4.2.86.3 list_item

The list_item specifies drawing and configuration control parameters for use of the Item in the context of the Item_usage. The list_item need not be specified for a particular Item_usage.

NOTE List_item information primarily consists of information utilized in Industrial drawing practices.

EXAMPLE Drawing zone and find number.

4.2.86.4 quantity_used_in_next_higher_assembly

The quantity_used_in_next_higher_assembly specifies a Number (see 4.2.1), a Weight (see 4.2.162), Volume (see 4.2.161), or a human_interpretable text string that is the quantity for the next highest assembly of an Item in the context of an Item_usage.

NOTE 1 This quantity is typically identified in an applications list.

NOTE 2 Each quantity defines the amount of material or components that is required for a particular usage.

NOTE 3 Number specifies the integer quantity of components that is required for an Assembly or Make_from_-an_item. The number will be one for Make_from_an_item.

NOTE 4 Text specifies a non-number value and may represent a quantity of components, a volume, or a weight. Text may reflect notes such as A/R (as-required).

NOTE 5 Volume specifies the volumetric value of an Item that is used as a component. Real values such as ounces and liters can be denoted.

NOTE 6 Weight specifies how heavy an Item is when used as a component. Real values such as pounds, and grams can be denoted.

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NOTE 7 Application object EXPRESS:

```
*)
TYPE quantity_type_select = SELECT
  (text,
  weight,
  volume,
  a_number);
END_TYPE;
(*
```

4.2.86.5 retrofit

The retrofit specifies the definition and disposition of the Item (see 4.2.79) that is replacing another item. A retrofit need not be specified for a particular Item_usage.

4.2.86.6 special_conditions

The special_conditions specifies a characteristic of the Item_usage that is mutually agreed to between parties for a business purpose. Special_conditions need not be specified for a particular Item_usage. There may be more than one special_conditions for an Item_usage.

4.2.87 Label

A Label is the term by which something may be referred to. A Label is a text string that represents the human-interpretable name of something and shall have a natural-language meaning that is computer processable.

NOTE 1 A Label may be a name, and acronym, or any set of text that have a specific meaning among industry experts.

EXAMPLE 1 REV is a label to represent the term "revision".

EXAMPLE 2 NOTE or SECRET is a label.

NOTE 2 Application object EXPRESS:

```
*)
TYPE label = STRING;
END_TYPE;
(*
```

4.2.88 List_item_usage

The List_item_usage is drawing and configuration information about an Item (see 4.2.79) typically used in Industrial drawing practices. The data associated with a List_item_usage are the following:

— drawing_zones;

— entry_item_change_level;

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— entry_notes;

— find_number;

— item_type;

— reference_designators.

NOTE Application object EXPRESS:

```
*)
ENTITY list_item_usage;
  drawing_zones : OPTIONAL LIST [1:?] OF identifier;
  entry_notes: OPTIONAL LIST [1:?] OF notation;
  entry_item_change_level : OPTIONAL identifier;
  find_number : OPTIONAL identifier;
  item_type : OPTIONAL label;
  reference_designators: OPTIONAL LIST [1:?] OF identifier;
WHERE
  WR1: EXISTS (reference_designators) OR EXISTS (entry_notes) OR  EXISTS
  (entry_item_change_level)
  OR EXISTS (drawing_zones) OR EXISTS (item_type) OR
  EXISTS (find_number);
END_ENTITY;
(*
```

4.2.88.1 drawing_zones

The drawing_zones specifies the locations of the Item on a drawing in the context of the Item_usage. The drawing_zones need not be specified for a particular List_item_usage. There may be more than one drawing_zones for a List_item_usage.

4.2.88.2 entry_item_change_level

The entry_item_change_level specifies the current change level of an Item used in a specific Item_usage context. The entry_item_change_level need not be specified for a particular List_item_usage.

4.2.88.3 entry_notes

The entry_notes specifies a list of notes that are applicable to the List_item_usage context. The entry_-notes need not be specified for a particular List_item_usage. There may be more than one entry_notes for an List_item_usage.

4.2.88.4 find_number

The find_number specifies an identifying number that is used in lieu of the number on the field of a drawing for the Item in the context of the Item_usage. The find_number need not be specified for a particular List_-item_usage.

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4.2.88.5 item_type

The item_type specifies a label that identifies the classification of the Item of interest during a particular use of the Item. The item_type need not be specified for a particular List_item_usage.

NOTE 1 The item_type may be utilized to identify if the item is an Assembly, Sub-assembly, Detail part, or Composite, Casting, Forging, Machined, or any other type of classification.

NOTE 2 The Item_type may be utilized in conjunction with the Item_identification attribute nomenclature_or_-name to classify an item.

4.2.88.6 reference_designators

The reference_designators specifies a designation on the face of a drawing for an Item in the context of the Item_usage. Reference_designators need not be specified for a particular List_item_usage. There may be more than one references_designators for a List_item_usage.

NOTE Reference_designators are typically used in Industrial practices for electrical and electronic equipment.

4.2.89 List_presentation

A List_presentation is the graphical information required to present product data to a human. The graphical information consists of tabulated listings, blocks of data, and single items of data. The data associated with a List_presentation are the following:

— body_page1_format;

— body_pagen_format;

— header_page1_format;

— header_pagen_format;

— page_format;

— unit_of_length.

NOTE Application object EXPRESS:

```
*)
ENTITY list_presentation;
  body_page1_format : body_presentation;
  body_pagen_format : OPTIONAL LIST [1:?] OF body_presentation;
  header_page1_format : header_presentation;
  header_pagen_format : OPTIONAL LIST [1:?] OF header_presentation;
  page_format : page_presentation;
  unit_of_length : measure;
END_ENTITY;
(*
```

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4.2.89.1 body_page1_format

The body_page1_format specifies the information required for placement of body data on the first page.

4.2.89.2 body_pagen_format

The body_pagen_format specifies the information required for placement of body data on the remaining pages. The body_pagen_format need not be specified for a particular List_presentation. There may be more than one body_pagen_format for a List_presentation.

4.2.89.3 header_page1_format

The header_page1_format specifies the information required for placement of header data on the first page.

4.2.89.4 header_pagen_format

The header_pagen_format specifies the information required for placement of header data on the remaining pages. The header_pagen_format need not be specified for a particular list_presentation. There may be more than one header_pagen_format for a List_presentation.

4.2.89.5 page_format

The page_format specifies the information required for page placement on a sheet. The sheet size and geometry utilized are also specified.

4.2.89.6 unit_of_length

The unit_of_length specifies the type of units length measurement that are recorded for all List_-presentation parameters.

4.2.90 Load_point

The Load_point is the x and y load point location for the text or the field. The data associated with a Load_point are the following:

— load_point_x;

— load_point_y.

NOTE Application object EXPRESS:

```
*)
ENTITY load_point;
  load_point_x : a_real;
  load_point_y : a_real;
END_ENTITY;
(*
```

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4.2.90.1 load_point_x

The load_point_x specifies the numeric x value indicating the horizontal position of the text.

4.2.90.2 load_point_y

The load_point_y specifies the numeric y value indicating the vertical position of the text.

4.2.91 Locally_defined_item

A Locally_defined_item is a type of Item_usage (see 4.2.86) that represents an Item (see 4.2.79) that is used and defined within the context of the Item_list_drawing. Each Locally_defined_item may be one of the following: a Make_from_an_item (see 4.2.94), an Assembly (see 4.2.10) , or a Made_from_stock_-material (see 4.2.93).

NOTE 1 The context of usage of an Item in an Item_usage may be a drawing or a product data set.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY locally_defined_item
  SUPERTYPE OF (ONEOF(
          make_from_an_item,assembly,made_from_stock_material))
  SUBTYPE OF (item_usage);
END_ENTITY;
(*
```

4.2.92 Lot_effectivity

A Lot_effectivity is a type of Effectivity (see 4.2.43) that is the use of an Item (see 4.2.79) in a Product_-configuration (see 4.2.111) where the Item is produced as one of an identifiable group. Lots are used when the Items are produced in batches or when important characteristics might vary between production runs.

NOTE 1 The preceding definition is the paraphrased definition that is defined in ISO 10303-203 for Lot_-effectivity.

The data associated with a Lot_effectivity are the following:

— lot_identification;

— lot_size;

— lot_unit_of_measure.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY lot_effectivity
  SUBTYPE OF (effectivity);
  lot_identification : identifier;
```

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```
  lot_size : a_number;
  lot_unit_of_measure : measure;
END_ENTITY;
(*
```

4.2.92.1 lot_identification

The lot_identification specifies the identification of the group of Items that compose a lot.

NOTE The preceding definition is the paraphrased definition from ISO 10303-203 for lot_number.

4.2.92.2 lot_size

The lot_size specifies the quantity of Items within the lot.

NOTE The preceding definition is the paraphrased definition from ISO 10303-203 for lot_size.

4.2.92.3 lot_unit_of_measure

The lot_unit_of_measure specifies the fixed quantity amount in terms of which the lot_size is expressed.

NOTE The preceding definition is the paraphrased definition from ISO 10303-203 for lot_size_unit_of_-measure.

4.2.93 Made_from_stock_material

A Made_from_stock_material is a type of Locally_defined_item (see 4.2.91) that is being made from Stock_material. A Made_from_stock_material is defined within the context of the Item_usage. The data associated with a Made_from_stock_material are the following:

— quantity_of_item_made_from_stock;

— size;

— specified_by;

— stock.

NOTE Application object EXPRESS:

```
*)
ENTITY made_from_stock_material
  SUBTYPE OF (locally_defined_item);
  quantity_of_item_made_from_stock : OPTIONAL number;
  size : OPTIONAL stock_size;
  specified_by : OPTIONAL LIST [1:?] OF reference_document_usage;
  stock : OPTIONAL stock_material;
END_ENTITY;
(*
```

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4.2.93.1 quantity_of_item_made_from_stock

The quantity_of_item_made_from_stock specifies the number of items that can be made out of one piece of stock material. The quantity_of_item_made_from_stock need not be specified for a particular Made_-from_stock_material.

4.2.93.2 size

The size specifies the usage of the stock material. The size need not be specified for a particular Made_-from_stock_material.

4.2.93.3 specified_by

The specified_by specifies the documentation that identifies the material or process used for the definition of the material stock. There may be more than one specified_by for a made_from_stock_material. The specified_by need not be specified for a particular Made_from_stock_material.

4.2.93.4 stock

The stock specifies the material available in an inventory. The stock need not be specified for a particular Made_from_stock_material.

NOTE Material stock is standard size material that is stocked for usage with Industry.

4.2.94 Make_from_an_item

The make_from_an_item is a type of Locally_defined_item (see 4.2.91) that is being made from another Item (see 4.2.79). A Make_from_an _item are the following:

— item_that_is_acting_as_stock;

— quantity_of_item_made_from_other_item.

NOTE Application object EXPRESS:

```
*)
ENTITY make_from_an_item
  SUBTYPE OF (locally_defined_item);
  item_that_is_acting_as_stock : item;
  quantity_of_item_made_from_other_item : OPTIONAL number;
END_ENTITY;
(*
```

4.2.94.1 item_that_is_acting_as_stock

An item_that_is_acting_as_stock specifies the Item that is defined in the context of the Item_usage. The item_that_is_acting_as_stock is used to create the Make_from_an_item.

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NOTE The context may be a drawing or a product data set.

4.2.94.2 quantity_of_item_made_from_other_item

The quantity_of_item_made_from_other_item specifies the number of Items that can be made out of the Item acting as stock material. The quantity_of_item_made_from_other_item need not be specified for a particular Make_from_an_item.

4.2.95 Measure

A Measure is a standard measure units specification.

EXAMPLE inch, gram, minute, volt are different types of measure.

NOTE Application object EXPRESS:

```
*)
TYPE measure = STRING;
END_TYPE;
(*
```

4.2.96 Notation

The notation is textual information of interest. The textual information is human interpretable. The data associated with a Notation are the following:

— note;

— note_parameter;

— note_title;

— reference_code;

— referenced_document_in_note;

— type_of_notation.

NOTE Application object EXPRESS:

```
*)
ENTITY notation;
  note : text;
  note_parameter : OPTIONAL LIST [1:?] OF text;
  note_title: label;
  reference_code : OPTIONAL identifier;
```

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```
    referenced_document_in_note : OPTIONAL SET [1:?] OF
                                  element_identification;
    type_of_notation : OPTIONAL SET [1:?] OF label;
  END_ENTITY;
  (*
```

4.2.96.1 note

The note specifies the explanatory remarks or notations that may be useful or informative to a human.

4.2.96.2 note_parameter

The note_parameter specifies a variable with in the body of the note. The note_parameter can be numeric or textual. A note_parameter can be used with a note that requires additional information to complete its semantic meaning. A note_parameter can be another note that is referenced by the base note. There may be more than one note_parameter for a Notation. The note_parameter need not be specified for a particular Notation.

4.2.96.3 note_title

The note_title specifies the heading or title of the note. The note_title need not be specified for a particular Notation.

4.2.96.4 reference_code

The reference_code specifies an identifier that is associated with the note. The identifier is utilized to associate the note with a note listed on the face of the drawing (for which an Associated_list pertains), a note listed and explained in another part of the body, or another listing source where detailing of notes are described. The reference_code may then be defined or explained in another part of the body, or other specified listing source where detailing of notes are described. The reference_code need not be specified for a particular Notation.

NOTE The reference_code may be used as a referencing method in lieu of describing a complete explanatory remark or notation directly. This may be done to compress output requirements for presentation purposes or because of potentially repeating explanatory remarks and notations frequently. If the reference_code is used as a referencing method, then another Notation must exist that has the note attribute defined with the identical reference_code.

4.2.96.5 referenced_document_in_note

The referenced_document_in_note specifies a document that is referenced in the text of the note. There may be more than one referenced_document_in_note for a Notation. The referenced_document_in_note need not be specified for a particular Notation.

EXAMPLE The referenced_document_in_note may be a material or process specification that is identified in the text of the note.

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4.2.96.6 type_of_notation

The type_of_notation specifies the type of notation. The type of notation is a characteristic of a note that identifies how, what, or where a notation is used. There may be more than one type_of_notation for a Notation. The type_of_notation need not be specified for a particular Notation.

EXAMPLE 1 component: A component specifies that a note is referenced to a component.

EXAMPLE 2 drawing: A drawing specifies that a note is referenced to a drawing.

EXAMPLE 3 drawing effectivity flag note: A drawing effectivity flag note specifies that the note is flagged to reference effectivity notations.

EXAMPLE 4 drawing flag note: A drawing flag note specifies the note as a flagged note indicating that it is located in the design area of a drawing specific to one or more parts. Industrial practices utilize flag notes to flag data on the face of the drawing that are not considered in the note listing (i.e., General note) on the face of the drawing.

EXAMPLE 5 drawing general note: A drawing general note specifies that the note is a general note from the face of a drawing.

EXAMPLE 6 remark: A remark specifies that the note is a remark to the reference of interest.

EXAMPLE7 custom note: A note that is specific to an individual design element instance.

EXAMPLE8 standard note: A note that can be applied to many design element instances.

EXAMPLE9 recursive note: A note that refers to other notes or documents.

EXAMPLE10 usage note: A note that applies to an assembly usage relationship.

4.2.97 Number_with_units

The Number_with_units is a numerical value and a unit of measure standard for the numerical value. The data associated with Number_with_units are the following:

— units_of;

— value_of.

EXAMPLE 1 36 Liters

EXAMPLE 2 45 Meters

NOTE Application object EXPRESS:

```
*)
ENTITY number_with_units;
  units_of : measure;
```

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```
    value_of : a_real;
END_ENTITY;
(*
```

4.2.97.1 units_of

The units_of specifies the measure standard that is used with the value_of.

4.2.97.2 value_of

The value _of specifies the qualitative characteristic within the context of the designated measure standard.

4.2.98 Other_list

The Other_list is a type of Associated_list (see 4.2.11) that defines list information that is defined for a particular business exchange. The data associated with an Other_list are the following:

— list_body;

— list_header.

NOTE 1 The definition of content in an Other_list is defined between two parties exchanging data and is not given sufficient context within this part of ISO 10303.

EXAMPLE 1 A notes list could be a type of other_list.

EXAMPLE 2 Net list, wire list, application list, or note list.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY other_list
  SUBTYPE OF (associated_list);
  list_body : other_list_body;
  list_header : other_list_header;
END_ENTITY;
(*
```

4.2.98.1 list_body

The list_body specifies the tabulations that are the constituents and subject of the Other_list.

4.2.98.2 list_header

The list_header specifies sufficient configuration control and data management information for a specific Other_list.

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4.2.99 Other_list_body

An Other_list_body is the tabulation of information within the Other_list (see 4.2.98). The tabulated information consists of sufficient information to meet design disclosure requirements for the TDP element that is associated to the Other_list. The related TDP information is identified within the context of the TDP element that is associated to the Other_list. The data associated with an Other_list_body are the following:

— list_body_tables;

— notes;

— revision_history.

NOTE Application object EXPRESS:

```
*)
ENTITY other_list_body;
  list_body_tables : OPTIONAL LIST [1:?] OF other_list_body_table;
  notes: OPTIONAL LIST [1:?] OF notation;
  revision_history : OPTIONAL LIST [1:?] OF revision;
WHERE
  WR1: EXISTS (list_body_tables) OR EXISTS (notes);
END_ENTITY;
(*
```

4.2.99.1 list_body_tables

The list_body_tables specify the primary tabulations of the Other_list that have been agreed upon for the business exchange. There may be more that one list_body_tables for an Other_list_body. The list_body_-tables need not be specified for a particular other_list_body.

4.2.99.2 notes

The notes specifies a listing of notes that are applicable to the Other_list. Some notes are referenced by the use of a note reference code in any section of the Other_list. The notes describe any explanatory remarks or notations that maybe useful or information regarding the subject that referenced the note. The notes need not be specified for a particular Other_list_body. There may be more than one note for an Other_list_body.

4.2.99.3 revision_history

The revision_history specifies a record of revisions of the Other_list. The revision_history shall be constructed in an manner whereby the first entry in the tabulation is the first revision, the second entry is the second revision, and subsequent entries in the tabulation are subsequent revisions. The revision_history shall not contain an entry for the original release. The revision_history need not be specified for a particular Other_list_body. There may be more than one revision_history for an Other_list_body.

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4.2.100 Other_list_body_table

The Other_list_body_table is a business exchange agreed to table for exchanging data for the specific business exchange. The data associated with an Other_list_body_table are the following:

— description_of_tabulation;

— tabulation_column_descriptions;

— tabulation_rows.

NOTE Application object EXPRESS:

```
*)
ENTITY other_list_body_table;
  description_of_tabulation : OPTIONAL label;
  tabulation_column_descriptions : OPTIONAL LIST [1:?] OF label;
  tabulation_rows : LIST [1:?] OF tabulation_entry;
END_ENTITY;
(*
```

4.2.100.1 description_of_tabulation

The description_of_tabulation specifies a computer interpretable definition of the Other_list_body_table. The description_of_tabulation need not be specified for a particular Other_list_body_table.

4.2.100.2 tabulation_column_descriptions

The tabulation_column_descriptions specify the agreed upon business exchange content for the respective tabulation_rows. The relationship to the row is defined by ordinal location in the tabulation_entry tabulation_row. The tabulation_column_descriptions need not be specified for a particular Other_list_-body_table. There may be more than one tabulation_column_descriptions for an Other_list_body_table.

4.2.100.3 tabulation_rows

The tabulation_rows specifies a list of rows in the Other_list_body_table. There may be more than one tabulation_rows for an Other_list_body_table.

4.2.101 Other_list_header

The Other_list_header is the configuration control and data management information necessary to manage and control the Other_list. The data associated with an Other_list_header are the following:

— common_header.

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NOTE Application object EXPRESS:

```
*)
ENTITY other_list_header;
  common_header : header;
END_ENTITY;
(*
```

4.2.101.1 common_header

The common_header specifies the information required for configuration control and administering the use of the data in the Other_list.

4.2.102 Other_reference_document

The Other_reference_document is a type of Reference_document (see 4.2.120) that specifies references to a critical document that may be used for design disclosure and is not a Standard_document (see 4.2.141) or a Specification_document (see 4.2.140).

NOTE Application object EXPRESS:

```
*)
ENTITY other_reference_document
  SUBTYPE OF (reference_document);
END_ENTITY;
(*
```

4.2.103 Page_parameters

The page_parameters is the overall location parameters for the page. References may be made to page size standard, a sheet size, or an external file to assist in the page definition.

The data associated with a Page_parameters are the following:

— graphics_declaration;

— page_anchor_x;

— page_anchor_y;

— paper_size;

— page_size_code.

NOTE Application object EXPRESS:

```
*)
ENTITY page_parameters;
  page_size_code : OPTIONAL text;
  paper_size : OPTIONAL text;
  page_anchor_x : a_real;
```

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```
    page_anchor_y : a_real;
    graphics_declaration : OPTIONAL graphics_parameters;
  WHERE
    WR1: EXISTS(page_size_code) OR EXISTS(paper_size);
  END_ENTITY;
  (*
```

4.2.103.1 graphics_declaration

The graphics_declaration specifies the Explicit_graphics (see 4.2.47) or the External_graphics_file (see 4.2.48) as the source of the geometry to be used on the associated list. The graphics information could be defined explicitly within the context of the part of ISO 10303 or it could be an external file. The graphics_declaration need not be specified for a particular Page_parameters.

EXAMPLE 1 The graphics and the lines that form the border and outline for rows, columns, and headers of associated lists.

EXAMPLE 2 Figure 5 is a graphic_declaration for a tabulated listing.

Figure 5 - Graphics utilized in presenting a tabulated listing

NOTE 1 The graphics may or may not be in ISO 10303 format.

NOTE 2 Application object EXPRESS:

```
  *)
  TYPE graphics_parameters = SELECT
    (explicit_graphics,
     external_graphics_file);
  END_TYPE;
  (*
```

4.2.103.2 page_anchor_x

The page_anchor_x specifies the horizontal offset from the upper left hand corner of the physical page. The anchor point of (0,0) would be the upper left hand corner of the page (see Figure 6).

NOTE When page_anchor_x is non-zero.

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4.2.103.3 page_anchor_y

The page_anchor_y specifies the vertical offset from the upper left had corner of the physical page. The anchor point of (0,0) would be the upper left hand corner of the page (see Figure 6).

4.2.103.4 page_size_code

The page_size_code specifies the page size standard the paper_size (see 4.2.103.5) is defined within. The page_size_code is used to represent a set of controlling length and width page size parameters. The page_-size_code need not be specified for a particular Page_parameters.

EXAMPLE ISO_5457_1980 is a page_size_code.

4.2.103.5 paper_size

The paper_size specifies the size of the length and width of paper to be used in terms of actual linear dimensions. This may be specified when a recognized page standard is not used or when a special sized computer form is used in conjunction with a recognized page size. The paper_size need not be specified for a particular Page_parameters.

4.2.104 Page_presentation

The Page_presentation is the generic page definitions that will set up the location of the data on each page. There is a set of master parameters, specific parameters for the first page, and parameters for the remaining pages. Page1_parameters and pagen_parameters override page_master_parameters. The data associated with a Page_presentation are the following:

— page_master_parameters;

— page1_parameters;

— pagen_parameters.

NOTE Application object EXPRESS:

```
*)
ENTITY page_presentation;
  page_master_parameters : page_parameters;
  page1_parameters : OPTIONAL page_parameters;
  pagen_parameters : OPTIONAL LIST [1:?] OF page_parameters;
END_ENTITY;
(*
```

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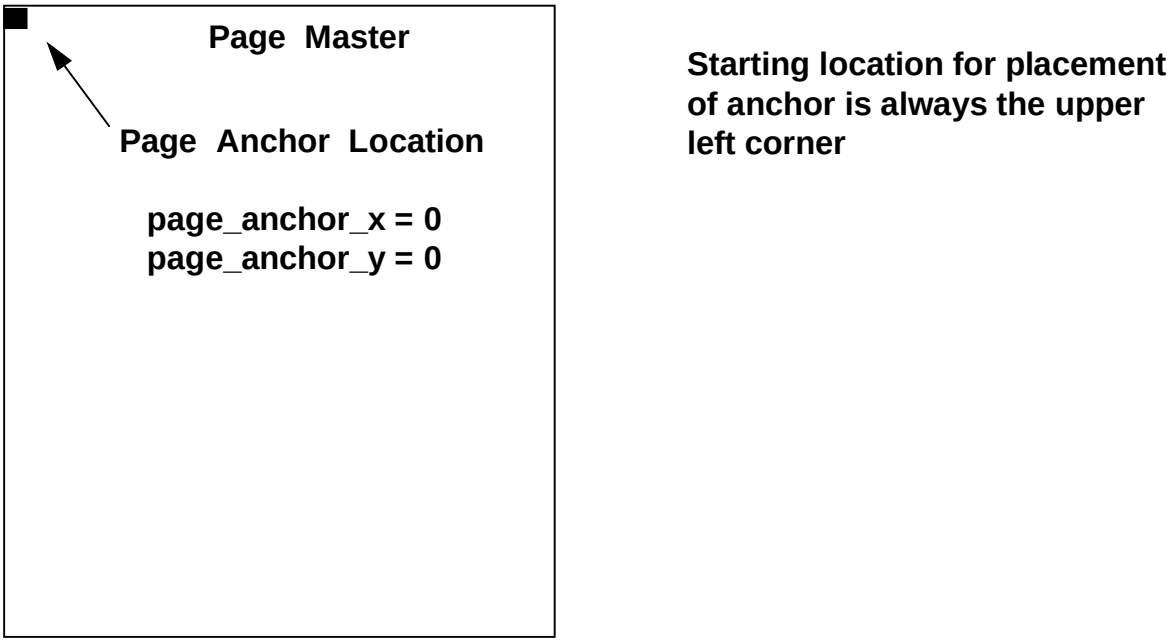

Figure 6 - Page anchor location

4.2.104.1 page_master_parameters

The page_master_parameters specifies the master placement information needed for the entire document.

4.2.104.2 page1_parameters

The page1_parameters specifies the unique placement information needed for the first page. This is optional, as all pages may have the same format information. The page1_parameters need not be specified for a particular Page_presentation.

4.2.104.3 pagen_parameters

The pagen_parameters specifies the placement information needed for page two through the remaining pages of the document. This is optional, as all pages may have the same placement information, or there is only one page. The pagen_parameters need not be specified for a particular Page_presentation. There may be more than one pagen_parameters for a Page_presentation.

4.2.105 Parts_list

A Parts_list is a type of Associated_list (see 4.2.11) that is a configuration controlled tabulation of all parts and bulk materials (except those materials that support a process) used in the Item. Referenced documents may also be tabulated on parts lists. The data associated with a Parts_list are the following:

— list_body;

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— list_header.

NOTE 1 Items listed in subordinate assembly parts lists or specified in a referenced document are not repeated in using the assembly-parts list unless it is necessary to limit operations permitted by the subordinate document. In-house documents, for in-house usage only, may be referenced parenthetically.

NOTE 2 Other designations used to describe a parts list are: list of materials, bill of materials, stock list, and item list.

NOTE 3 Application object EXPRESS:

```
*)
ENTITY parts_list
  SUBTYPE OF (associated_list);
  list_body : parts_list_body;
  list_header : parts_list_header;
END_ENTITY;
(*
```

4.2.105.1 list_body

The list_body specifies the tabulations that are the constituents and subject of the Parts_list.

4.2.105.2 list_header

The list_header specifies sufficient configuration control and data management information for a Parts_list.

4.2.106 Parts_list_body

The Parts_list_body is the tabulations of information within a Parts_list (see 4.2.105). The tabulated information consists of sufficient identification of Items and related information to meet design disclosure requirements for the Item or TDP element defined in the Parts_list. The data associated with a Parts_list_-body are the following:

— list_notes;

— parts_tabulations;

— revision_history;

— referenced_tdp_elements.

NOTE Application object EXPRESS:

```
*)
ENTITY parts_list_body;
  list_notes : OPTIONAL LIST [1:?] OF notation;
  revision_history : OPTIONAL LIST [1:?] OF revision;
  parts_tabulations : LIST [1:?] OF item_list;
  referenced_tdp_elements :
```

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```
    OPTIONAL LIST [1:?] OF tdp_element_list_item;
END_ENTITY;
(*
```

4.2.106.1 list_notes

The list_notes specifies a listing of notes that are applicable to the Part_list. Some notes are referenced by the use of a note reference code in any section of the Parts_list. The notes describe any explanatory remarks or notations that may be useful or informative regarding the subject that referenced the note. Some notes listed are referenced from the Parts_list or from the drawing that the Parts_list pertains. The list_notes need not be specified for a particular Parts_list_body. There may be more than one list_notes for a Parts_list_body.

NOTE 1 Notes that are applicable to a specific item, component, or assembly are associated to that specific item, component, or assembly.

NOTE 2 The listing of notes is generally done in a sequential order with respect to the codification scheme (or codification schemes) used. A grouping of Parts_list notes and drawing notes should be maintained, along with the order of the listed notes within each referencing scheme.

4.2.106.2 parts_tabulations

The parts_tabulations specify a listing of all parts and bulk materials (except those materials that support a process) used in the item. There may be more than one parts_tabulations for a Parts_list_body.

4.2.106.3 referenced_tdp_elements

The referenced_tdp_elements specifies a listing of the TDP elements that are applicable to the Parts_list, the associated drawing, or the associated product data set. The referenced_tdp_elements need not be specified for a particular Parts_list_body. There may be more than one referenced_tdp_elements for a Parts_list_body.

4.2.106.4 revision_history

The revision_history specifies a record of revisions of the Parts_list. The revision_history shall be constructed in a manner whereby the first entry in the tabulation is the first revision, the second entry is the second revision, and subsequent entries in the tabulation are subsequent revisions. The revision_history shall not contain an entry for the original release. The revision_history need not be specified for a particular Parts_list_body. There may be more than one revision_history for a Parts_list_body.

4.2.107 Parts_list_header

A Parts_list_header is the configuration control and data management information necessary to manage and control the Parts_list (see 4.2.105). The data associated with a Parts_list_header are the following:

— common_header.

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NOTE Application object EXPRESS:

```
*)
ENTITY parts_list_header;
  common_header : header;
END_ENTITY;
(*
```

4.2.107.1 common_header

The common_header specifies the information required for configuration control and administering the use of the data in the Parts_list.

4.2.108 Person

A Person is an individual with legal rights and duties. A person shall be uniquely identified for purposes of a data exchange. A person may have a first name, a last name, and a title. The data associated with Person are the following:

— first_name;

— last_name;

— middle_name;

— title;

— unique_identifier.

NOTE Application object EXPRESS:

```
*)
ENTITY person;
  first_name : OPTIONAL identifier;
  middle_name : OPTIONAL identifier;
  last_name : OPTIONAL identifier;
  title : OPTIONAL text;
  unique_identifier : identifier;
END_ENTITY;
(*
```

4.2.108.1 first_name

The first_name specifies the first element of the given name of a person. The first_name need not be specified for a particular Person.

4.2.108.2 last_name

The last_name specifies the surname of a person. The last_name need not be specified for a particular Person.

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4.2.109 middle_name

The middle_name specifies the second given name of a person. The middle_name need not be specified for a particular Person.

4.2.109.1 title

The title specifies the social or professional standing of the person. The title need not be specified for a particular Person.

4.2.109.2 unique_identifier

The unique_identifier specifies a means that may be used to identify a person.

4.2.110 Person_and_organization

A Person_and_organization is an identification of an individual within a Company (see 4.2.16). The data associated with Person_and_organization are the following:

— organization;

— person_address;

— person_identification.

NOTE Application object EXPRESS:

```
*)
ENTITY person_and_organization;
  organization : OPTIONAL company;
  person_identification : OPTIONAL person;
  person_address : OPTIONAL text;
WHERE
  WR1: EXISTS (organization) OR EXISTS (person_identification);
END_ENTITY;
(*
```

4.2.110.1 organization

The organization specifies the organization of a company of interest. The organization need not be specified for a particular Person_and_organization.

4.2.110.2 person_address

The person_address specifies the electronic or physical location where the person at the organizarion can be interfaced with. The person_address need not be specified for a particular Person_and_organization.

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4.2.110.3 person_identification

The person_identification identifies the individual of interest within the organization of a Company. The person_identification need not be specified for a particular Person_and_organization.

4.2.111 Product_configuration

A Product_configuration is a variation of a Product_model (see 4.2.116). Configuration management is based on the variation of the Product_model. The data associated with a Product_configuration are the following:

— approval_of_configuration;

— configuration_id;

— product_name.

EXAMPLE A Product_configuration for the F14 military aircraft is the D configuration of the F14. The organization has defined four configurations of the F14, A,B,C and D. D, in this instance, is the configuration. A single product model might have many different configurations in order for the organization to identify different variations of it.

NOTE 1 The preceding definition is a different definition from ISO 10303-203 for Product_configuration.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY product_configuration;
  configuration_id : identifier;
  product_name : product_model;
  approval_of_configuration : OPTIONAL LIST [1:?] OF approval;
END_ENTITY;
(*
```

4.2.111.1 approval_of_configuration

The approval_configuration specifies the list of approvals of the Product_configuration. The approval_-of_configuration need not be specified for a particular Product_configuration. There may be more than one approval_of_configuration for a Product_configuration.

4.2.111.2 configuration_id

The configuration_id specifies the unique identification of a variation of the Product_model.

NOTE The preceding definition is a different definition from ISO 10303-203 for item_id.

4.2.111.3 product_name

The product_name specifies the name of the Product_model that is under configuration management.

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4.2.112 Product_data_set

The Product_data_set is a type of Tdp_element (see 4.2.152) that is a computer data model that represents a design disclosure representation view of the product Item (see 4.2.79) for the TDP element of interest. Each Product_data_set is either a Product_data_set_with_format (see 4.2.113), a Product_data_set_with_-shading (see 4.2.114) or a Product_data_set_without_format (see 4.2.115). The data set defines a characteristic of the product that is of importance to the defining discipline. The data associated with a Product_data_set are the following:

— file_configuration;

— related.

EXAMPLE Geometric shape or associated information.

NOTE Application object EXPRESS:

```
*)
ENTITY product_data_set
  ABSTRACT SUPERTYPE OF
   (ONEOF(product_data_set_with_format,product_data_set_without_format,
      product_data_set_with_shading))SUBTYPE OF (tdp_element);
  related : OPTIONAL LIST [1:?] OF drawing_or_product_data_set;
  file_configuration : OPTIONAL LIST [1:?] OF source_file;
END_ENTITY;
(*
```

4.2.112.1 file_configuration

The file_configuration specifies the list of files that composes the Product_data_set. The file_-configuration need not be specified for a particular Product_data_set. There may be more than one file_-configuration for a Product_data_set.

4.2.112.2 related

The related specifies a Drawing (see 4.2.41) or a Product_data_set (see 4.2.112) that this model is associated to. This represents information that defines the relationship for design disclosure. The related need not be specified for a particular Product_data_set. There may be more than one related for a Product_data_set.

NOTE Application object EXPRESS:

```
TYPE drawing_or_product_data_set = SELECT
  (drawing,
  product_data_set);
END_TYPE;
```

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4.2.113 Product_data_set_with_format

A Product_data_set_with_format is a type of Product_data_set (see 4.2.112) that is a computer interpretable data model with information defined for a human-viewable presentation. The data associated with a Product_data_set_with_format are the following:

— presentation_of_product_data_set;

— product_header.

NOTE Application object EXPRESS:

```
*)
ENTITY product_data_set_with_format
  SUBTYPE OF (product_data_set);
  presentation_of_product_data_set : OPTIONAL LIST [1:?] OF
     product_presentation;
  product_header : header;
END_ENTITY;
(*
```

4.2.113.1 presentation_of_product_data_set

The presentation_of_product_data_set is the data set and the presentation of this data set. The presentation_of_product_data_set need not be specified for a particular Product_data_set_with_format.

4.2.113.2 product_header

The product_header specifies the information required for configuration control and administering the use of the data in the Product_data_set_with_format.

NOTE product_header may include sheet or page count information.

4.2.114 Product_data_set_with_shading

The Product_data_set_with_shading is a type of Product_data_set (see 4.2.112) that is a computer model with shading information for the presentation of the product data. The data associated with a Product_-data_set_with_shading are the following:

— a_shaded_model;

— data_configuration.

NOTE Application object EXPRESS:

```
*)
ENTITY product_data_set_with_shading
  SUBTYPE OF (product_data_set);
  a_shaded_model : shaded_shape_model;
```

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```
    data_configuration : header_configuration_with_element_identification;
  END_ENTITY;
  (*
```

4.2.114.1 a_shaded_model

A_shaded_model specifies the shape information in a human viewable format that allows shading of the geometric information that is the Product_data_set.

4.2.114.2 data_configuration

The data_configuration specifies the information required for configuration control and administering the use of the data in the Product_data_set_with_shading.

NOTE Data_configuration does not include sheet or page count information.

4.2.115 Product_data_set_without_format

A Product_data_set_without_format is a type of Product_data_set (see 4.2.112) that is a computer data model without presentation information. The data associated with a Product_data_set_without_format are the following:

— a_model;

— data_configuration.

NOTE Application object EXPRESS:

```
  *)
  ENTITY product_data_set_without_format
    SUBTYPE OF (product_data_set);
    a_model : OPTIONAL shape_model;
    data_configuration : header_configuration_with_element_identification;
  END_ENTITY;
  (*
```

4.2.115.1 a_model

The a_model specifies the shape information that is the Product_data_set. The a_model need not be specified for a particular Product_data_set_without_format.

4.2.115.2 data_configuration

The data_configuration specifies the information required for configuration control and administering the use of the data in the Product_data_set_without_format.

NOTE Data_cofiguration does not include sheet or page count information.

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4.2.116 Product_model

A Product_model is the product that the organization provides to its customers. The Product_model is identified for planning purposes in the design stage of a product. The data associated with a Product_-model are the following:

— model_name.

NOTE 1 The preceding definition is the definition from ISO 10303-203 for Product_model.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY product_model;
  model_name : label;
END_ENTITY;
(*
```

4.2.116.1 model_name

The model_name specifies the unique identification assigned by an organization to a product that the organization provides to its customers.

NOTE The preceding definition is the definition from ISO 10303-203 for Product_model.

4.2.117 Product_presentation

The Product_presentation is the shape description of the Product with descriptive annotation for human interpretation. The data associated with a Product_presentation are the following:

— annotation_presentation;

— part_shape_views.

NOTE Application object EXPRESS:

```
*)
ENTITY product_presentation;
  annotation_presentation : annotation;
  part_shape_views : OPTIONAL LIST [1:?] OF shape_model;
END_ENTITY;
(*
```

4.2.117.1 annotation_presentation

The annotation_presentation specifies text and non-shape geometry. It can be used in conjunction with product shape presentation.

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4.2.117.2 part_shape_views

The part_shape_views specify the viewing parameters for product shape presentation. The part_shape_-views need not be specified for a particular Product_presentation. There may be more than one part_-shape_views for a Product_presentation.

4.2.118 Quantity

A Quantity is the value of an amount with or without an accuracy parameter. The data associated with a Quantity are the following:

— quantity_accuracy;

— value_of.

NOTE Application object EXPRESS:

```
*)
ENTITY quantity;
  quantity_accuracy : OPTIONAL quantity_accuracy_select;
  value_of : quantity_type_select;
END_ENTITY;
(*
```

4.2.118.1 quantity_accuracy

The quantity_ accuracy specifies the exactness of the value of the quantity. The value of the quantity_-accuracy shall be either a human_interpretable string of characters or shall be one of the following:

— approximate;

— as required;

— exact.

The quantity_accuracy need not be specified for a particular Quantity.

NOTE 1 See 4.2.118.1.1 - 4.2.118.1.3 for the definition of each allowable value for base.

EXAMPLE Exact, as required, approximate.

NOTE 2 Application object EXPRESS:

```
*)
TYPE quantity_accuracy_select = SELECT
  (quantity_accuracy_enumeration,
  text);
END_TYPE;

TYPE quantity_accuracy_enumeration = ENUMERATION OF
  (approximate,
```

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```
    as_required,
    exact);
  END_TYPE;
  (*
```

4.2.118.1.1 approximate: qualifies that the value is a rough idea of how much might be required, but leaves it to the manufacturing process to apply as much as needed with the stipulation that a nonzero quantity of material must be applied. Approximate may be used for bulk material such as sealers and lubricants.

4.2.118.1.2 as required: qualifies that the manufacturing process can determine the exact quantity and that a zero is a valid quantity.

4.2.118.1.3 exact: qualifes that the value of the engineering specification of the Quantity is precise.

4.2.118.2 value_of

The value_of specifies A_number (see 4.2.1), a Weight (see 4.2.162), Volume (see 4.2.161), or a human_-interpretable text string that is the quantity for the next highest assembly of an Item in the context of an Item_usage.

NOTE 1 This quantity is typically identified in an applications list.

NOTE 2 Each quantity defines the amount of material or components that is required for a particular usage.

NOTE 3 A_number specifies the integer quantity of components that is required for an Assembly or Make_-from_an_item. The number will be one for Make_from_an_item.

NOTE 4 Text specifies a non-number value and may represent a quantity of components, a volume, or a weight. Text may reflect notes such as A/R (as-required).

NOTE 5 Volume specifies the volumetric value of an Item that is used as a component. Real values such as ounces and liters can be denoted.

NOTE 6 Weight specifies how heavy an Item is when used as a component. Real values such as pounds, and grams can be denoted.

NOTE 7 Application object EXPRESS:

```
  TYPE quantity_type_select = SELECT
    (text,
    weight,
    volume,
    a_number);
  END_TYPE;
```

4.2.119 Reason

A Reason is the rationale for a data exchange and the applicable item that the product information describes. The data associated with a Reason are the following:

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— applicable_to;

— base;

— exchange_purpose.

NOTE Application object EXPRESS:

```
*)
ENTITY reason;
  applicable_to : OPTIONAL LIST [1:?] OF item_identification;
  base : OPTIONAL exchange_reason;
  exchange_purpose : OPTIONAL text;
WHERE
  WR1: EXISTS (exchange_purpose) OR EXISTS (base);
END_ENTITY;
(*
```

4.2.119.1 applicable_to

The applicable_to specifies the Item that is pertinent to the exchange. The applicable_to need not be specified for a particular Reason. There may be more than one applicable_to for a Reason.

4.2.119.2 base

The base specifies a collection of reasons for a data exchange. The value of the base shall be one of the following:

— acknowledge receipt of delivery;

— engineering design analysis;

— interim engineering design review;

— final design review;

— initial data submittal;

— procurement design package;

— provisioning data submittal;

— request for proposal;

— request for quote;

— revision update data submittal;

— specification design package.

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The base need not be specified for a particular Reason.

NOTE 1 See 4.2.119.2.1 - 4.2.119.2.11 for the definition of each allowable value for base.

EXAMPLE Request for proposal, request for quote, data submittal.

NOTE 2 Application object EXPRESS:

```
*)
TYPE exchange_reason = ENUMERATION OF
  (acknowledge_receipt_of_delivery,
  engineering_design_analysis,
  interim_engineering_design_review,
  final_design_review,
  initial_data_submittal,
  procurement_design_package,
  provisioning_data_submittal,
  request_for_proposal,
  request_for_quote,
  revision_update_data_submittal,
  specification_design_package);
END_TYPE;
(*
```

4.2.119.2.1 acknowledge receipt of delivery: the exchange that is a correspondence from the receiver to the original sender acknowledging the receipt of the data provided by the sender.

4.2.119.2.2 engineering design analysis: the exchange that is a general purpose exchange of design information for general analysis and technical interchange. The exchange does not fulfill contractual obligations and is considered not formal.

EXAMPLE An exchange for concurrent engineering design analysis or comparisons is not a formal contractual obligation.

4.2.119.2.3 final design review: the exchange that is a formal exchange and is intended to fulfill contractual or other obligations. The receiver of the package is expected to conduct a formal review of the package and assess the final design, methods, and standards used in design. The receiver then provides an acceptance or rejection of the design in terms of technical engineering content (not acceptance or rejection of the design documentation as a deliverable).

4.2.119.2.4 initial data submittal: the exchange that is submitted in partial fulfillment of contractual obligations requiring the delivery of design data. The initial submittal is the first formal delivery of configuration managed design data which comprises the design “baseline”. The receiver of the package is expected to conduct a formal review of the package and assess the final design, methods, and standards used in design to ensure it meets specified requirements (e.g., the support of redesign, repair, remanufacture, or reprocurement). The receiver then provides a formal disposition of acceptance or rejection of the design in terms of both the technical engineering content and design documentation.

4.2.119.2.5 interim engineering design review: the exchange that is a formal exchange intended to fulfill contractual or other obligations. The receiver of the package is expected to assess the preliminary design concepts, methods, and standards and provide general feedback to the sender.

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4.2.119.2.6 procurement design package: the exchange that contains the formally released or managed technical design data required to perform a part procurement activity. The package includes a complete design package from which the receiver can manufacture or provide an item.

4.2.119.2.7 provisioning data submittal: the exchange that is submitted in partial fulfillment of contractual obligations requiring the sender to provide design data (at negotiated levels of design documentation completeness) which enables provisioning analysis on the part.

4.2.119.2.8 request for proposal: the exchange that is provided to support the development of a requested proposal involving the designed item.

4.2.119.2.9 request for quote: the exchange that is provided to support the development of an estimate involving the designed item.

4.2.119.2.10 revision update data submittal: the exchange that is submitted in partial fulfillment of contractual obligations requiring the delivery of design data. The revision update data submittal is a formal delivery of configuration managed design data (subsequent to the initial data submittal) which revises the design "baseline". The receiver of the package is expected to conduct a formal review of the package and assess the final design, methods, and standards used in the design to ensure it meets specified requirements (e.g., the support of redesign, repair, remanufacture, or reprocurement). The receiver then provides a formal disposition of acceptance or rejection of the design in terms of both the technical engineering content and design documentation.

4.2.119.2.11 specification design package: the exchange that contains the formally released-managed technical design data required to perform a design procurement activity. The package includes a complete set of design specifications (e.g., specification control drawings, associated lists, material and process specifications, etc.) from which the receiver can design the desired item.

4.2.119.3 exchange_purpose

The exchange_purpose specifies textual information where the reason for the exchange can be specified. The exchange_purpose need not be specified for a particular Reason.

4.2.120 Reference_document

A Reference_document is a type of Tdp_element (see 4.2.152) that is a specification, a standard, a directive, a guideline, or some other type of document that is required for full design disclosure reference. Each Reference_document is either a Specification_document (see 4.2.140), a Standard_document (see 4.2.141), or an Other_reference_document (see 4.2.102). The data associated with a Reference_document are the following:

— document_identification.

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NOTE Application object EXPRESS:

```
*)
ENTITY reference_document
  ABSTRACT SUPERTYPE OF (ONEOF(specification_document,
   standard_document,other_reference_document))
  SUBTYPE OF (tdp_element);
  document_identification : element_identification;
END_ENTITY;
(*
```

4.2.120.1 document_identification

The document_identification specifies the unique identification of the Reference_document.

4.2.121 Reference_document_usage

A Reference_document_usage is an identification of a constraint that is to be applied with the use of a Reference_document. The data associated with a Reference_document_usage are the following:

— document_referenced;

— location_in_document;

— usage_description;

— usage_code;

— usage_parameter..

NOTE Application object EXPRESS:

```
*)
ENTITY reference_document_usage;
  document_referenced : reference_document;
  location_in_document: OPTIONAL label;
  usage_code : OPTIONAL identifier;
  usage_description : OPTIONAL text;
  usage_parameter : OPTIONAL document_usage_parameter;
END_ENTITY;
(*
```

4.2.121.1 document_referenced

The document_referenced specifies the Referenced_document that is being constrained.

4.2.121.2 location_in_document

The location_in_document specifies a section, chapter, paragraph, or other delineation within the Reference_document that is of interest. The location_in_document need not be specified for a particular Reference_document_usage.

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4.2.121.3 usage_code

The usage_code specifies a unique code within the Reference_document that pertains to the usage of the Reference_document. The usage_code need not be specified for a particular Reference_document_usage.

EXAMPLE The usage_code subjects could be ‘class’, ‘composition’, ‘form’, ‘grade’, ‘type’, ‘color’,‘density’, or ‘condition’.

4.2.121.4 usage_description

The usage_description specifies a textual description of the use of the Reference_document within the context of the Reference_document_usage. The usage_description need not be specified for a particular Reference_document_usage.

4.2.121.5 usage_parameter

The usage_parameter specifies the identification and description of a specific piece of information that is contained in a document. The usage_parameter need not be specified for a particular Reference_-document_usage.

4.2.122 Release_authentication

The Release_authentication is the authentication of the release of the TDP element from the originating system. The data associated with the Release_authentication are the following:

— authentication;

— person_responsible;

— release_authority;

— release_authority_code;

— release_date.

NOTE Application object EXPRESS:

```
*)
ENTITY release_authentication;
  release_date : date;
  authentication : identifier;
  person_responsible : OPTIONAL person;
  release_authority : company;
  release_authority_code : OPTIONAL company_code;
END_ENTITY;
(*
```

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4.2.122.1 authentication

The authentication specifies the originating system identification of the authentication.

NOTE The authentication constitutes an electronic signature that assures the integrity of the TDP element's contents. This may be conducted by reviewing the TDP element's contents or by validating the automated data processing system procedures that constructed or manages the TDP element.

4.2.122.2 person_responsible

The person_responsible specifies the responsible person that has authenticated the TDP element contents for the purposes of release. The person_responsible need not be specified for a particular Release_-authentication.

NOTE In cases where a symbol is used instead of a signature, the authentication should define the symbol name. The graphical presentation form of the symbol is addressed under presentation entities.

4.2.122.3 release_authority

The release_authority specifies the name of the Company (see 4.2.16) responsible for the release of the TDP element.

4.2.122.4 release_authority_code

The release_authority_code specifies the Company_code (see 4.2.17) responsible for release of the TDP element. The release_authority_code need not be specified for a particular Release_authentication.

4.2.122.5 release_date

The release_date specifies the date and time at which the design release activity released the TDP element.

EXAMPLE Figure 4 illustrates the format style for release_date.

4.2.123 Retrofit_usage

The retrofit_usage specifies the definition and disposition of an Item that is replacing another Item that is a component of a product. The replacing Item may be the original Item that has been modified. The data associated with the Retrofit_usage are the following:

— defining_document;

— disposition_for;

— retrofit_description.

NOTE 1 Retrofit items typically change the form, fit, or function of the original item.

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NOTE 2 Application object EXPRESS:

```
*)
ENTITY retrofit_usage;
  retrofit_description : OPTIONAL notation;
  defining_document : OPTIONAL other_reference_document;
  disposition_for : retrofit_state;
END_ENTITY;
(*
```

4.2.123.1 retrofit_description

The retrofit_description specifies a characterization of the retrofit. The retrofit_description need not be specified for a particular Retrofit_usage.

4.2.123.2 defining_document

The defining_document specifies a document that defines the actions required for the retrofit. The defining_document need not be specified for a particular Retrofit_usage.

4.2.123.3 disposition_for

The disposition_for specifies the action to be taken with the original item. The value of the disposition_for shall be one of the following:

— add;

— delete;

— modify.

NOTE 1 See 4.2.123.3.1 - 4.2.123.3.3 for the definition of each allowable value for disposition_of.

NOTE 2 Application object EXPRESS:

```
*)
TYPE retrofit_state = ENUMERATION OF
  (add,
   delete,
   modify);
END_TYPE;
(*
```

4.2.123.3.1 add: add specifies that the Item (see 4.2.79) was added as a result of the retrofit.

4.2.123.3.2 delete: delete specifies that the Item (see 4.2.79) was deleted as a result of the retrofit.

4.2.123.3.3 modify: modify specifies that the Item (see 4.2.79) was modified as a result of the retrofit.

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4.2.124 Revision

The Revision identifies the current revision information of the Item or document of interest. The data associated with the Revision are the following:

— authorizing_documents;

— revision_approval;

— revision_date;

— revision_description;

— revision_level.

NOTE Application object EXPRESS:

```
*)
ENTITY revision;
  authorizing_documents :
     OPTIONAL LIST [1:?] OF other_reference_document;
  revision_approval : OPTIONAL person_and_organization;
  revision_date : OPTIONAL date;
  revision_description : OPTIONAL text;
  revision_level : identifier;
END_ENTITY;
(*
```

4.2.124.1 authorizing_documents

The authorizing_documents specifies the revision authorization documents when a revision description is not provided. The revision authorization documents may describe the revision history of the TDP element from its original release. The authorizing_documents may not be specified for a particular Revision. There may be more than one authorizing_documents for a Revision.

4.2.124.2 revision_approval

The revision_approval specifies the person and organization who are responsible for approving the revision. The revision_approval need not be specified for a particular Revision.

4.2.124.3 revision_date

The revision_date specifies the date and time that the revision_level was advanced. The revision_date need not be specified for a particular Revision.

EXAMPLE Figure 4 illustrates the format style for revision_date.

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4.2.124.4 revision_description

The revision_description specifies a textual explanation of the revision. The revision_description need not be specified for a particular Revision.

4.2.124.5 revision_level

The revision_level specifies the version of the document from its original release or issue. Revisions reflect changes made to the original document after authorized release or issue that require the revision level to be advanced.

4.2.125 Security_classification

The Security_classification is company or government security or sensitivity parameters of the TDP element and its contents. The data associated with the Security_classification are the following:

— classification_date;

— declassification_date;

— item_classification;

— title_security_classification.

NOTE Application object EXPRESS:

```
*)
ENTITY security_classification;
  classification_date: OPTIONAL date;
  declassification_date: OPTIONAL date;
  item_classification : label;
  title_security_classification : OPTIONAL label;
END_ENTITY;
(*
```

4.2.125.1 item_classification

The item_classification specifies the security level or sensitivity level of the TDP element. The security classification is assigned by the originator based on predetermined criteria.

4.2.125.2 title_security_classification

The title_security_classification specifies the security level or sensitivity of the title of the TDP element. The security classification is assigned by the originator based on predetermined Government or commercial criteria restricting the title or nomenclature used within the title. The title_security_classification need not be specified for a particular Security_classification.

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4.2.125.3 classification_date

The classification_date identifies the date the item was given the item_classification. The classification_-date need not be specified for a particular security_classification.

EXAMPLE A radar absorbing material specification is classified on the date the specification is created.

4.2.125.4 declassification_date

The declassification_date identifies the date the item was given the item_classification. The declassification_date need not be specified for a particular security_classification.

EXAMPLE The secret performance specifications to a retired fighter jet is declassified on this date.

4.2.126 Sequence_effectivity

The Sequence_effectivity is a type of Effectivity (see 4.2.43) the intended use by a design authority of a Component within a range of Product_configurations (see 4.2.111) identified by serial numbers.

NOTE 1 The preceding definition is a paraphrased definition from ISO 10303-203 for Planned_sequence_ effectivity.

The data associated with a Sequence_effectivity are the following:

— from_effectivity_id;

— quantity_unit_of_measure;

— thru_effectivity_id.

— total_component_quantity_in_product_configuration;

NOTE 2 Application object EXPRESS:

```
*)
ENTITY sequence_effectivity
  SUBTYPE OF (effectivity);
  from_effectivity_id : identifier;
  quantity_unit_of_measure : OPTIONAL measure;
  thru_effectivity_id : OPTIONAL identifier;
  total_component_quantity_in_product_configuration :
      OPTIONAL  quantity;
WHERE
  WR1: EXISTS (total_component_quantity_in_product_configuration)
    AND EXISTS (quantity_unit_of_measure);
END_ENTITY;
(*
```

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4.2.126.1 from_effectivity_id

The from_effectivity_id specifies the beginning serial number of the range for the Sequence_effectivity.

NOTE The preceding definition is a paraphrased definition from ISO 10303-203 for Planned_ sequence_ effectivity.from_effectivity_id.

4.2.126.2 quantity_unit_of_measure

This quantity_unit_of_measure specifies the measure in terms of which the total component_quantity_in_-product_configuration is expressed. The quantity_unit_of_measure need not be specified for a particular Sequence_effectivity.

NOTE The preceding definition is from ISO 10303-203 for quantity_unit_of_measure.

Quantity_unit_of_measure may be rolls, sheets, or bars.

4.2.126.3 thru_effectivity_id

The thru_effectivity_id specifies the ending serial number of the range for the Sequence_effectivity. The thru_effectivity_id need not be specified for a particular Sequence_effectivity.

NOTE The preceding definition is a paraphrased definition from ISO 10303-203 for Planned_ sequence_ effectivity.thru_effectivity_id.

4.2.126.4 total_component_quantity_in_product_configuration

The total_component_quantity_in_product_configuration specifies the number of units that are effective for a particular part in a configuration.

4.2.127 Shaded_shape_model

The Shaded_shape_model is a Shape_model (see 4.2.128) that has shading information applied to the model for presentation of the information. The data associated with a Shaded_shape_model are the following:

— part_shape_views.

NOTE Application object EXPRESS:

```
*)
ENTITY shaded_shape_model;
  part_shape_views : LIST [1:?] OF shape_model;
END_ENTITY;
(*
```

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4.2.127.1 part_shape_views

The part_shape_views specify the viewing parameters for product shape presentation. There may be more than one part_shape_views for a Shaded_shape_model.

4.2.128 Shape_model

The Shape_model specifies the 3D or 2D mathematical representation of shape of the product model. The data associated with a Shape_model are the following:

— part_shape_representation.

NOTE Application object EXPRESS:

```
*)
ENTITY shape_model;
  part_shape_representation : geometry;
END_ENTITY;
(*
```

4.2.128.1 part_shape_representation

The part_shape_representation specifies the underlying geometry that represents the Item (see 4.2.79) shape.

4.2.129 Sheet

The Sheet is a logical division of a Drawing (see 4.2.41) into a 2D area for the presentation of the product data. The divisions correspond to drawing size. A Sheet shall consist of at least one drawing view. The data associated with a Sheet are the following:

— presentation_format;

— sheet_configuration;

— sheet_identifier;

— sheet_size.

NOTE Application object EXPRESS:

```
*)
ENTITY sheet;
  presentation_format : OPTIONAL product_presentation;
  sheet_configuration: OPTIONAL configuration;
  sheet_identifier: OPTIONAL element_identification;
  sheet_size : OPTIONAL label;
WHERE
  WR1:EXISTS (sheet_configuration) OR EXISTS (sheet_identifier)
```

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```
    OR EXISTS (sheet_size) OR EXISTS (presentation_format);
END_ENTITY;
(*
```

4.2.129.1 presentation_format

A presentation_format specifies the organization and composition of the drawing sheet for human visualization. The presentation_format need not be specified for a particular Sheet.

4.2.129.2 sheet_configuration

The sheet_configuration specifies the configuration management and data management characteristics about the Sheet. The sheet_configuration need not be specified for a particular Sheet.

4.2.129.3 sheet_identifier

The sheet_identifier specifies configuration management characteristics about the sheet that identify the sheet as a TDP element. The sheet_identifier need not be specified for a particular Sheet.

4.2.129.4 sheet_size

The sheet_size specifies a textual description of the size parameters of the drawing Sheet. The sheet_size need not be specified for a particular Sheet.

4.2.130 Simple_list_of_elements

The Simple_list_of_elements is a list of technical data package elements to be exchanged. The data associated with a Simple_list_of_elements are the following:

— element_entries.

NOTE Application object EXPRESS:

```
*)
ENTITY simple_list_of_elements;
  element_entries : LIST [1:?] OF data_definition_exchange_simple_entry;
END_ENTITY;
(*
```

4.2.130.1 element_entries

The element_entries specifies a list of Data_definition_simple_entry(s). There may be more than one element_entries for a Simple_list_of_elements.

4.2.131 Simple_list_of_files

The Simple_list_of_files is an ordered list of files exchanged. The data associated with a Simple_list_of_-files are the following:

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— file_entries.

NOTE Application object EXPRESS:

```
*)
ENTITY simple_list_of_files;
  file_entries : LIST [1:?] OF data_definition_file_entry;
END_ENTITY;
(*
```

4.2.131.1 file_entries

The file_entries specifies an Accessed_file (see 4.2.3) or Exchange_file (see 4.2.46) that is exchanged. There may be more than one file_entries for a Simple_list_of_files.

EXAMPLE File “ABC.WPD” is at node 124.27.6.4 on the Internet.

NOTE Select type EXPRESS:

```
*)
TYPE data_defintion_file_entry = SELECT
  (accessed_file,
  exchange_file);
END_TYPE;
(*
```

4.2.132 Single_document_list

A Single_document_list is a type of Document_list (see 4.2.39) that is either a Data_list (see 4.2.29) or an Index_list (see 4.2.75). A Single_document_list is limited to a single level of definition. Any TDP elements referenced by sub-assemblies or component parts are not included.

NOTE 1 The Document_list shall contain a Data_list or an Index_list or both when the Indentured_ data_list is not available.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY single_document_list
  ABSTRACT SUPERTYPE OF (ONEOF(data_list,index_list))
  SUBTYPE OF (document_list);
END_ENTITY;
(*
```

4.2.133 Size_characteristics

The size_characteristics is a characterizing set of parameters about a TDP element or File. Each Size_-characteristics may be one of the following: Size_characteristics_sheet_across_file (see 4.2.136), Size_-characteristics_full_size (see 4.2.134), or Size_characteristics_internal_divisions (see 4.2.135).

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The data associated with a Size_characteristics are the following:

— byte_size;

— sheet_size.

NOTE Application object EXPRESS:

```
*)
ENTITY size_characteristics SUPERTYPE OF
     (ONEOF (size_characteristics_sheet_across_file,
      size_characteristics_full_size,
      size_characteristics_internal_divisions));
  byte_size : OPTIONAL an_integer;
  sheet_size : OPTIONAL label;
WHERE
  WR1: EXISTS (byte_size) OR
  EXISTS (sheet_size);
END_ENTITY;
(*
```

4.2.133.1 byte_size

The byte_size specifies either the sum of the computer disk space required for all the files of one representation of a TDP element, or the computer disk space required for a particular File. The byte_size need not be specified for a particular Size_characteristics.

4.2.133.2 sheet_size

The sheet_size specifies the presentation size of a document page or sheet. The sheet_size need not be specified for a particular Size_characteristics.

4.2.134 Size_characteristics_full_size

A Size_characteristic_full_size is a type of Size_characteristics (see 4.2.133) that specifies that no additional information is required to specify the size information.

NOTE Application object EXPRESS:

```
*)
ENTITY size_characteristics_full_size
  SUBTYPE OF (size_characteristics);
END_ENTITY;
(*
```

4.2.135 Size_characteristics_internal_divisions

A Size_characteristic_internal_divisions is a type of Size_characteristics (see 4.2.133) that specifies that the File, document, or TDP element has internal divisions that are sheets, views, pages or other internal division within the File, document, or TDP element.

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The data associated with a Size_characteristics_internal_divisions are the following:

— internal_division_count;

— internal_division_type.

NOTE 1 Internal divisions are typically sheet, page, or view.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY size_characteristics_internal_divisions
  SUBTYPE OF (size_characteristics);
  internal_division_count : OPTIONAL an_integer;
  internal_division_type : OPTIONAL label;
WHERE
  WR1: EXISTS (internal_division_type)
       OR EXISTS (internal_division_count);
END_ENTITY;
(*
```

4.2.135.1 internal_division_count

The internal_division_count specifies the number of divisions identified in the internal_division_type. The internal_division_count need not be specified for a particular Size_characterstics_internal_divisions.

4.2.135.2 internal_division_type

The internal_division_type specifies that the method of classifying the internal division of the File, document, or TDP element. The internal_division_type need not be specified for a particular Size_-characterstics_ internal_divisions.

4.2.136 Size_characteristics_sheet_across_file

A Size_characteristics_sheet_across_file is a type of Size_characteristics (see 4.2.133) that specifies that a single sheet of a TDP element is across one or more Files. The data associated with a Size_-characteristics_ sheet_across_file are the following:

— frame_number_comprising_this_file;

— number_of_frames_for_sheet.

NOTE 1 The industrial practice of rasterizing frames of a document across several aperture cards resulted in a single sheet being across frames. Therefore, all of the frames had to be identified before a complete sheet could be assembled.

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NOTE 2 Application object EXPRESS:

```
*)
ENTITY size_characteristics_sheet_across_file
  SUBTYPE OF (size_characteristics);
  frame_number_comprising_this_file : OPTIONAL an_integer;
  number_of_frames_for_sheet : OPTIONAL an_integer;
WHERE
  WR1: EXISTS (number_of_frames_for_sheet) OR
  EXISTS (frame_number_comprising_this_file);
END_ENTITY;
(*
```

4.2.136.1 frame_number_comprising_this_file

The frame_number_comprising_this_file specifies the ordinal number for assembling the Files for a single sheet or page. The frames_number_comprising_this_file need not be specified for a particular Size_-characteristics_ sheet_across_file.

4.2.136.2 number_of_frames_for_sheet

The number_of_frames_for_sheet specifies the total number of Files that is required to assemble a single sheet or page of a TDP element. The number_of_frames_for_sheet need not be specified for a particular Size_characteristics_sheet_across_file.

4.2.137 Source_file

A Source_file is a type of File (see 4.2.55) that specifies that the File containing the required TDP element or document.

NOTE Application object EXPRESS:

```
*)
ENTITY source_file
  SUBTYPE OF (file);
END_ENTITY;
(*
```

4.2.138 Source_information_type

A Source_information_type is identification of source of procurement for Items. The data associated with a Source_information_type are the following:

— source_code;

— source_description;

— type_of_coding_scheme.

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NOTE Application object EXPRESS:

```
*)
ENTITY source_information_type;
  source_code : OPTIONAL label;
  source_description : OPTIONAL text;
  type_of_coding_scheme : OPTIONAL text;
WHERE
  WR1: EXISTS (source_code) OR
       EXISTS (source_description);
END_ENTITY;
(*
```

4.2.138.1 source_code

The source_code specifies mutually agreeable source procurement designations that a particular code defines. The source_code need not be specified for a particular Source_information_type.

4.2.138.2 source_description

The source_description specifies the description of a source_code. The source_description need not be specified for a particular Source_information_type.

4.2.138.3 type_of_coding_scheme

The type_of_coding_scheme specifies the coding scheme that is used for the procurement source information. The source_code_type_scheme identifies where the Item can be produced. The type_of_-coding_scheme need not be specified for a particular Source_information_type. The value of the type_of_-coding_scheme shall be a human_interpretable string of characters.

4.2.139 Special_condition

A Special_condition is a characteristic of an Item or TDP element that is mutually agreed to between parties for a business purpose. The data associated with the Special_condition are the following:

— code;

— description;

— type_of_coding_scheme.

NOTE Application object EXPRESS:

```
*)
ENTITY special_condition;
  code : OPTIONAL label;
  description : OPTIONAL text;
  type_of_coding_scheme : OPTIONAL text;
WHERE
```

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```
  WR1: EXISTS (description) OR EXISTS (code);
END_ENTITY;
(*
```

4.2.139.1 code

The code specifies mutually agreeable special conditions characteristics that a particular code defines. The code need not be specified for a particular Special_condition.

4.2.139.2 description

The description specifies the description of the special condition. The description need not be specified for a particular Special_condition.

4.2.139.3 type_of_coding_scheme

The type_of_coding_scheme specifies the coding scheme that is used for the Special_conditions. The type_of_coding_scheme need not be specified for a particular Special_condition.

NOTE Many companies and industries agree on different codes to depict different conditions. These coding scheme agreements are sometimes contained in industry or government standards.

The value of the type_of_coding_scheme shall be a human-interpretable string of characters.

EXAMPLE ANSI ASME Y14.34M is an example of a United States standard that contains a special_condition coding scheme.

4.2.140 Specification_document

A Specification_document is a type of Reference_document (see 4.2.120) that is a company, industry, government, commercial, or other specification.

NOTE Application object EXPRESS:

```
*)
ENTITY specification_document
  SUBTYPE OF (reference_document);
END_ENTITY;
(*
```

4.2.141 Standard_document

A Standard_document is a type of Reference_document (see 4.2.120) that is a company, industry, government, commercial, or other standard.

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NOTE Application object EXPRESS:

```
*)
ENTITY standard_document
  SUBTYPE OF (reference_document);
END_ENTITY;
(*
```

4.2.142 Status

A Status is the identification of the process stage the information element is in during the life cycle of creating and supporting product information. The data associated with a Status are the following:

— status_code;

— status_code_basis.

EXAMPLE An action_status may be In-work, Complete, In-review, or Final.

NOTE Application object EXPRESS:

```
*)
ENTITY status;
  status_code : identifier;
  status_code_basis : OPTIONAL text;
END_ENTITY;
(*
```

4.2.142.1 status_code

The status_code specifies the process stage of the information.

NOTE Product Data Management (PDM) systems use this status to aid in identifying where in the life cycle an information element resides.

4.2.142.2 status_code_basis

The status_code_basis specifies the name of a particular set of process stages. The status_code_basis need not be specified for a particular Status.

NOTE A set of process stages may be standardized within a particular industry or among business partners.

4.2.143 Stock_material

A stock_material is raw material that material vendors supply for multiple uses. Stock_material usually comes in standard sizes based on material type. The data associated with a Stock_material are the following:

— material;

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— size.

NOTE Application object EXPRESS:

```
*)
ENTITY stock_material;
  material : OPTIONAL item;
  size : OPTIONAL stock_size;
WHERE
  WR1: EXISTS (material) OR EXISTS (size);
END_ENTITY;
(*
```

4.2.143.1 material

The material specifies the base substance of the Stock_material. The material need not be specified for a particular Stock_material.

4.2.143.2 size

The size specifies the physical dimensions of the Stock_material. The size need not be specified for a particular Stock_material.

4.2.144 Stock_size

The Stock_size is the specification of the size, shape, and classification of the Stock_material required for an Item. The data associated with a Stock_size are the following:

— catalog;

— cross_section;

— parameters_for.

NOTE Application object EXPRESS:

```
*)
ENTITY stock_size;
  parameters_for : stock_size_parameters;
  catalog : OPTIONAL stock_size_classification;
  cross_section : OPTIONAL stock_size_cross_section;
END_ENTITY;
(*
```

4.2.144.1 catalog

The catalog specifies the classification type for the Stock_size. The catalog need not be specified for a particular Stock_size. The value of the catalog shall be one of the following:

— bar;

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— block;

— pipe;

— plate;

— roll;

— sheet;

— sphere;

— tube.

NOTE 1 See 4.2.144.1.1 - 4.2.144.1.8 for the definition of each allowable value for catalog.

NOTE 2 Application object EXPRESS:

```
*)
TYPE stock_size_classification = ENUMERATION OF
  (bar, plate, sheet, pipe, tube, block, sphere, roll);
END_TYPE;
(*
```

4.2.144.1.1 bar - a relatively long, straight, rigid piece of any solid material.

4.2.144.1.2 block: a solid piece of material having one or more flat sides.

4.2.144.1.3 pipe: any hollow cylinder or tubular conveyance for a fluid or gas.

NOTE A pipe usually has thicker walls than something that is referred to as a tube.

4.2.144.1.4 plate: a smooth, flat, relatively thin, rigid body of uniform thickness.

4.2.144.1.5 roll: material rolled up in the form of a cylinder.

EXAMPLE A roll of tape

4.2.144.1.6 sheet: a broad, thin, usually rectangular, material. A sheet can be non-rigid.

NOTE A non-rigid sheet could be laid over a curved surface.

4.2.144.1.7 sphere: a material in which all points on its three-dimensional surface are equidistant from a fixed point.

4.2.144.1.8 tube: a hollow cylinder that conveys a fluid or functions as a passage.

NOTE A tube usually has thinner walls than something that is referred to as a pipe, A tube, because of its thinner walls, is something that is more likely to be bent to a specific functional shape from its stock shape.

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4.2.144.2 cross_section

The cross_section specifies the form of the Stock_size when cut at right angles to an axis. The cross_-section need not be specified for a particular Stock_size. The value of the cross_section shall be one of the following:

— angle;

— channel;

— hex;

— I_section;

— oval;

— rectangular;

— round;

— square;

— T_section.

NOTE 1 See 4.2.144.2.1 - 4.2.144.2.9 for the definition of each allowable value for cross_section.

NOTE 2 Application object EXPRESS:

```
*)
TYPE stock_size_cross_section = ENUMERATION OF
  (angle, channel, hex, I_s, oval, rectangular, round, square, T_s);
END_TYPE;
(*
```

4.2.144.2.1 angle: a cross section that represents a figure formed by two lines diverging from a common point that do not form a straight line.

4.2.144.2.2 channel: a cross section that represents a figure formed by three lines in a "U" shape.

4.2.144.2.3 hex: a cross section that represents a figure formed by six equal sides with all angles being equal.

4.2.144.2.4 I's: a cross section that represents a figure that looks like a capital "I".

4.2.144.2.5 oval: a cross section that represents a figure resembling an ellipse or formed by two half circles with two lines connecting the half circles at their end points tangentially.

4.2.144.2.6 rectangular: a cross section that represents a figure formed by a parallelogram with a right angle.

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4.2.144.2.7 round: a cross section that represents a figure formed by a circle.

4.2.144.2.8 square: a cross section that represents a figure formed by a parallelogram with a right angle and equal length sides.

4.2.144.2.9 T's: a cross section that represents a figure that looks like a capital "T".

4.2.144.3 parameters_for

The parameters_for specify the measurement characteristics of size for the Stock_size. There may be more than one parameters_for for a Stock_size.

4.2.145 Stock_size_parameters

The Stock_size_parameters is the size characteristics of the Stock_material required for an Item. The data associated with Stock_size are the following:

— a_length;

— diameter;

— height;

— name_of_parameter:

— numeric_parameter;

— radius;

— textual_parameter;

— wall_thickness;

— width.

NOTE 1 Figure 7 shows how these stock_size_parameters shall be applied to standard cross_sections (see 4.2.144.2). The key for figure 7 is:

— D for diameter;

— H for height;

— R for radius;

— T for wall thickness;

— W for width.

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NOTE 2 Application object EXPRESS:

```
*)
ENTITY stock_size_parameters;
  a_length : OPTIONAL number_with_units;
  diameter : OPTIONAL number_with_units;
  height: OPTIONAL number_with_units;
  name_of_parameter : OPTIONAL label;
  numeric_parameter : OPTIONAL number_with_units;
  radius : OPTIONAL number_with_units;
  textual_parameter : OPTIONAL text;
  wall_thickness : OPTIONAL number_with_units;
  width : OPTIONAL number_with_units;
WHERE
  WR1: EXISTS (textual_parameter) OR EXISTS (width) OR
       EXISTS (a_length) OR EXISTS (radius) OR EXISTS (height)
       OR EXISTS (diameter) OR EXISTS (wall_thickness)
       OR EXISTS (numeric_parameter);
END_ENTITY;
(*
```

4.2.145.1 a_length

The a_length specifies a measured distance or dimension for the extent of the stock. The diameter need not be specified for a particular Stock_size_parameters.

4.2.145.2 diameter

The diameter specifies the distances of a straight line through the center of a circular or spherical object. The diameter need not be specified for a particular Stock_size_parameters.

4.2.145.3 height

The height specifies the measured vertical extent of the stock. The height need not be specified for a particular Stock_size_parameters.

4.2.145.4 name_of_parameter

The name_of_parameter specifies a label for the stock size parameter. The name_of_parameter need not be specified for a particular Stock_size_parameter.

4.2.145.5 numeric_parameter

The numeric_parameter specifies a measured parameter of a stock material. The numeric_parameter need not be specified for a particular Stock_size_parameters.

NOTE The numeric_parameter allows business partners to determine additional stock size parameters.

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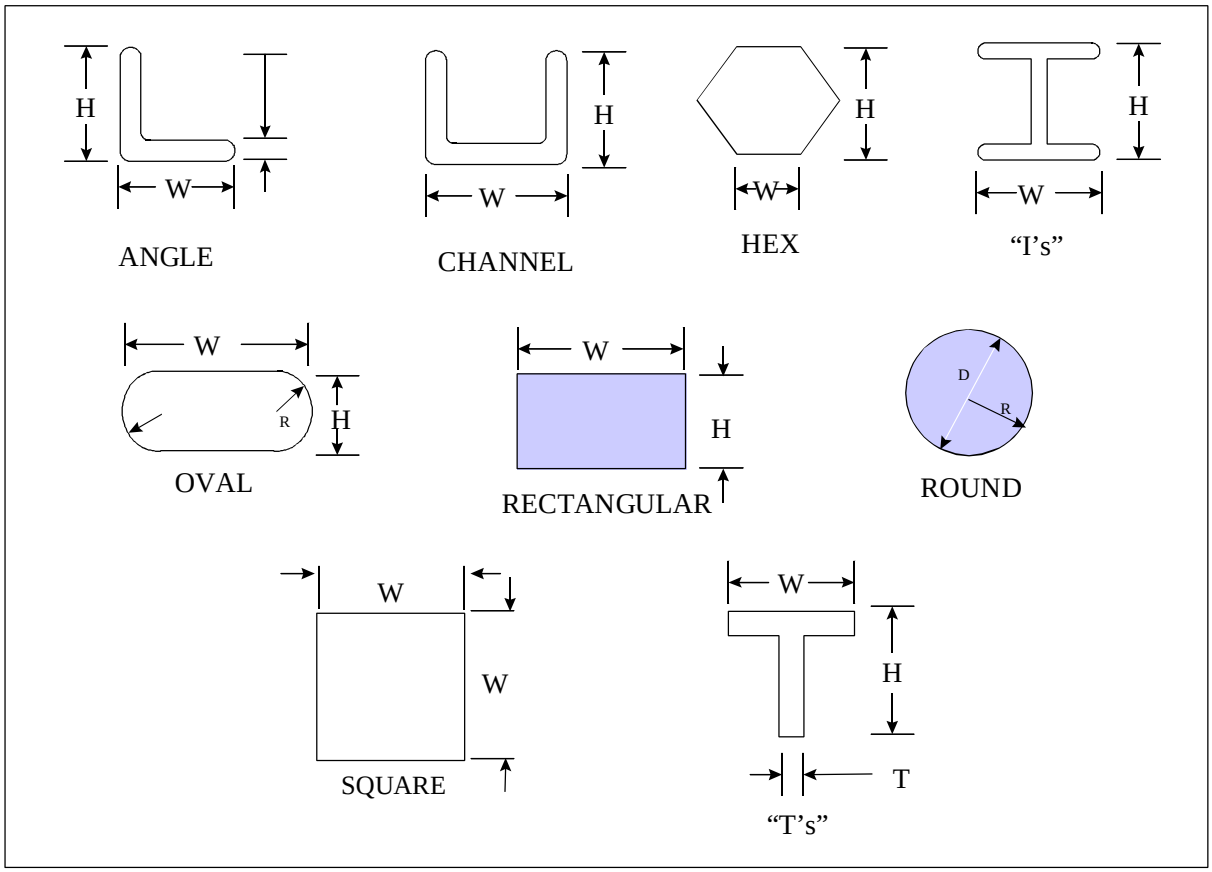

Figure 7 - Standard cross sections

4.2.145.6 radius

The radius specifies the measured distance or dimension of a straight line from the center of a circle or sphere to its circumference. The radius need not be specified for a particular Stock_size_parameters.

4.2.145.7 textual_parameter

The textual_parameter specifies the size characteristics of the Stock_material in a text string. The textual_parameter need not be specified for a particular Stock_size_parameters.

EXAMPLE 3" ID x 8 FT is the textual_parameters for a pipe used as Stock_material.

4.2.145.8 wall_thickness

The wall_thickness specifies the shortest measured distance or dimension between opposite surfaces. The wall_thickness need not be specified for a particular Stock_size_parameters.

NOTE The concept of thickness and height are considered equivalent.

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EXAMPLE Thickness of the wall of a tube or pipe.

4.2.145.9 width

The width specifies the measured distance or dimension from side to side of an object.

4.2.146 String_location_definition

The String_location_definition is a type of Field_location (see 4.2.52) for the text location information for the title and content information. The data associated with a String_location_definition are the following:

— string_load_point.

NOTE Application object EXPRESS:

```
*)
ENTITY string_location_definition
SUBTYPE OF (field_location);
  string_load_point : load_point;
END_ENTITY;
(*
```

4.2.146.1 string_load_point

The string_load_point specifies the text location information for the string data. The load_point (see 4.2.90) specifies the bottom left corner of the first character of the text string.

4.2.147 System_declaration

The System_declaration is the identification of a computer system and the TDP element, File, or document of interest for that computer system. The data associated with a System_declaration are the following:

— creating_interface;

— operating_system;

— system;

— system_element_identifier;

— system_related_element_identifier.

NOTE Application object EXPRESS:

```
*)
ENTITY system_declaration;
  creating_interface : OPTIONAL text;
  operating_system : OPTIONAL text;
  system_element_identifier : OPTIONAL identifier;
  system_related_element_identifier : OPTIONAL identifier;
```

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```
  system : OPTIONAL identifier;
WHERE
    WR1: EXISTS (system_element_identifier) OR
    EXISTS (system_related_element_identifier) OR
    EXISTS (system) OR EXISTS(creating_interface) OR
    EXISTS (operating_system);
END_ENTITY;
(*
```

4.2.147.1 creating_interface

The creating_interface specifies the computer software that created the context file from the native format file. The creating_interface need not be specified for a particular System_declaration.

EXAMPLE CATIGE V418, CADDS - Plot Postscript printer driver, CATIA -STL.

4.2.147.2 operating_system

The operating_system specifies the computer software that manages the overall basic computer functions. The operating_system need not be specified for a particular System_declaration.

EXAMPLE AIX 4.1.2, Solaaris 5.2.1 Windows 98.

4.2.147.3 system

The system specifies the computer system of interest in the System_declaration. The system need not be specified for a particular System_declaration.

4.2.147.4 system_element_identifier

The system_element_identifier specifies identification of the File, document, or TDP element of interest in the computer system. The system_element_identifier need not be specified for a particular System_-declaration.

4.2.147.5 system_related_element_identifier

The system_related_element_identifier specifies the File, document, or TDP element that the system_-element_identifier is related to. The system_related_element_identifier need not be specified for a particular System_declaration.

4.2.148 System_destination

The System_destination is the destination company. The data associated with a System_destination are the following:

— target_company;

— target_company_code;

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— target_person.

NOTE Application object EXPRESS:

```
*)
ENTITY system_destination;
  target_company : company;
  target_company_code : OPTIONAL company_code;
  target_person : OPTIONAL person;
END_ENTITY;
(*
```

4.2.148.1 target_company

The target_company specifies the company for the System_destination.

4.2.148.2 target_company_code

The target_company_code specifies the unique code of the destination company. The target_company_-code need not be specified for a particular System_destination.

4.2.148.3 target_person

The target_person specifies the destination person. The target_person need not be specified for a particular System_destination.

4.2.149 Tabulation

The tabulation is the table formatting information for table structures located in either the header or the body data. The data associated with a Tabulation are the following:

— group_parent_headings;

— parent_columns;

— tabulation_columnar_headings;

— tabulation_columns;

— tabulation_group_parent_headings;

— tabulation_headings.

NOTE Application object EXPRESS:

```
*)
ENTITY tabulation;
  group_parent_headings : OPTIONAL LIST [1:?] OF group_parent_header;
  parent_columns : OPTIONAL LIST [1:?] OF group_parent_content_holder;
  tabulation_columnar_headings : OPTIONAL LIST [1:?] OF column_header;
```

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```
  tabulation_columns : LIST [1:?] OF columnar_data_content_holder;
  tabulation_group_parent_headings : OPTIONAL LIST [1:?] OF
  group_parent_column_header;
  tabulation_headings : OPTIONAL LIST [1:?] OF tabulation_header;
END_ENTITY;
(*
```

4.2.149.1 group_parent_headings

The group_parent_headings specifies the title text and its formatting and placement information for the group parent data. The group_parent_headings need not be specified for a particular Tabulation. There may be more than one group_parent_headings for a Tabulation.

4.2.149.2 tabulation_columnar_headings

The tabulation_columnar_headings specifies data content text and its formatting and placement information for the column headings in the table. The tabulation_columnar_headings need not be specified for a particular Tabulation. There may be more than one tabulation_columnar_headings for a Tabulation.

4.2.149.3 tabulation_columns

The tabulation_columns specifies data content text and its formatting and placement information for data in the table columns. The tabulation_columns need not be specified for a particular Tabulation. There may be more than one tabulation_columns for a Tabulation.

4.2.149.4 tabulation_group_parent_headings

The tabulation_group_parent_headings specifies the title text and its formatting and placement information for the group parent column header data. The tabulation_group_parent_headings need not be specified for a particular Tabulation. There may be more than one tabulation_group_parent_headings for a Tabulation.

4.2.149.5 tabulation_headings

The tabulation_headings specifies header title information for the table. This includes text, formatting, and placement information. The tabulation_headings need not be specified for a particular Tabulation. There may be more than one tabulation_headings for a Tabulation.

4.2.149.6 parent_columns

The parent_columns specifies the group parent data content text and its formatting and placement information. The parent_columns need not be specified for a particular Tabulation. There may be more than one parent_columns for a Tabulation.

4.2.150 Tabulation_entry

The Tabulation_entry is a row entry in an Other_list (see 4.2.98). Each Tabulation_entry contains a list of columnar entries for the row. The data associated with a Tabulation_entry are the following:

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— column_information.

NOTE Application object EXPRESS:

```
*)
ENTITY tabulation_entry;
  column_information : LIST [1:?] OF text;
END_ENTITY;
(*
```

4.2.150.1 column_information

The column_information specifies the list of ordered text that pertains to each column in the tabulation for a specific row. There may be more than one column_information for a Tabulation_entry.

4.2.151 Tabulation_header

The tabulation_header is the information to define the table header text, style, and placement location of the title(s) for the table. The data associated with a Tabulation header are the following:

— single_tabulation_header_titles.

NOTE Application object EXPRESS:

```
*)
ENTITY tabulation_header;
  single_tabulation_header_titles : LIST [1:?] OF field_title;
END_ENTITY;
(*
```

4.2.151.1 single_tabulation_header_titles

The single_tabulation_header_titles specifies the title text which points to the formatting and placement information for the text. There may be more than one single_tabulation_header_titles for a Tabulation_-header.

4.2.152 Tdp_element

A Tdp_element is any specific group of product data. A Tdp_element may be used as a portion of a design disclosure package. Each Tdp_element is either a Drawing (see 4.2.41), an Associated_list (see 4.2.11), a Product_data_set (see 4.2.112), or a Reference_document (see 4.2.120).

NOTE 1 The term tdp_element used throughout this part of ISO 10303 identifies any specific group of product data over and above the four listed in the above definition.

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NOTE 2 Application object EXPRESS:

```
*)
ENTITY tdp_element
ABSTRACT SUPERTYPE OF (ONEOF(drawing,associated_list,
     product_data_set,reference_document));
END_ENTITY;
(*
```

4.2.153 Tdp_element_and_item_association

The Tdp_element_and_item_association is the relationship between an Item (see 4.2.79) and its Tdp_-element (see 3.5.27). The data associated with Tdp_element_and_item_association are the following:

— related_item;

— related_tdp_element.

NOTE Application object EXPRESS:

```
*)
ENTITY tdp_element_and_item_association;
  related_tdp_element : tdp_element;
  related_item : item;
END_ENTITY;
(*
```

4.2.153.1 related_item

The related_item specifies the Item that participates in the relationship.

4.2.153.2 related_TDP_element

The related_tdp_element specifies the TDP element that participates in the relationship.

4.2.154 Tdp_element_list_item

A Tdp_element_list_item is a TDP element identified in a parts_list (see 4.2.105). The data associated with a TDP_element_list_item are the following:

— reference_code;

— tdp_element_item.

NOTE 1 The type of list a tdp_element_list_item may apply to is a parts_list.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY tdp_element_list_item;
  reference_code : OPTIONAL identifier;
```

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```
  tdp_element_item : element_identification;
END_ENTITY;
(*
```

4.2.154.1 reference_code

The reference_code specifies an identifier that is associated with the TDP element. The identifier is utilized to associate the TDP element with a note listed on the face of the drawing (that a Parts_list pertains), or a note listed and explained in another part of the body, or another listing source where detailing of notes are described. The reference_code may then be defined or explained in another portion of the parts list body or other specified listing source where detailing of notes are described. The reference_code need not be specified for a particular TDP_element_list_item.

NOTE The reference_code may be used as a referencing method in lieu of describing a complete explanatory remark or notation directly. This may be done to compress output line requirements for presentation purposes or because of potentially repeating explanatory remarks and notations frequently. If the reference_code is used as a referencing method, then another Notation must exist that has the note attribute defined with the identical reference_code.

4.2.154.2 tdp_element_item

The tdp_element_item specifies the identification of the TDP element of interest.

4.2.155 Tdp_element_parent_to_item_child_relationship

A TDP_element_parent_to_item_child_relationship is a relationship that identifies that the child in the relationship is an Item and that its parent is a TDP element.

The data associated with a Tdp_element_parent_to_item_child_relationship are the following:

— child;

— parent.

NOTE Application object EXPRESS:

```
*)
ENTITY tdp_element_parent_to_item_child_relationship;
  child : item_identification;
  parent : element_identification;
END_ENTITY;
(*
```

4.2.155.1 child

The child specifies the identification of the item of interest.

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4.2.155.2 parent

The parent specifies the related parent TDP element of the child.

4.2.156 Tdp_element_parent_to_tdp_element_child_relationship

A Tdp_element_parent_to_tdp_element_child_relationship is a relationship that identifies that the child in the relationship is a TDP element and that its parent is a TDP element. The data associated with a Tdp_-element_parent_to_tdp_element_child_relationship are the following:

— child;

— parent.

NOTE Application object EXPRESS:

```
*)
ENTITY tdp_element_parent_to_tdp_element_child_relationship;
  child : element_identification;
  parent : element_identification;
END_ENTITY;
(*
```

4.2.156.1 child

The child specifies the identification of the TDP element of interest.

4.2.156.2 parent

The parent specifies the related parent TDP element.

4.2.157 Tdp_indentured_item

The Tdp_indentured_item is the identification of the top level Item which head or start a part based top-down break-down listing. The data associated with a Tdp_indentured_item are the following:

— top_indenture.

NOTE 1 This entity enables the listing of multiple part based trees within the body of the list.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY tdp_indentured_item;
  top_indenture : item_identification;
END_ENTITY;
(*
```

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4.2.157.1 top_indenture

The top_indenture specifies the top level Item in an indentured list.

4.2.158 Tdp_indentured_tdp_element

The Tdp_indentured_tdp_element is the identification of the top TDP elements which head or start a document based document tree. The data associated with a Tdp_indentured_tdp_element are the following:

— top_indenture.

NOTE 1 This enables the listing of multiple document trees within the body of the list.

NOTE 2 Application object EXPRESS:

```
*)
ENTITY tdp_indentured_tdp_element;
  top_indenture : element_identification;
END_ENTITY;
(*
```

4.2.158.1 top_indenture

The tdp_indenture specifies the top level Tdp_element in an indentured list.

4.2.159 Text

The text is an alphanumeric string of characters that is intended to be human interpretable. It is for information and description purposes only.

NOTE Application object EXPRESS:

```
*)
TYPE text = STRING;
END_TYPE;
(*
```

4.2.160 Time

A Time specifies a moment of occurrence measured by hour, minute, and second. The data associated with a Time are the following:

— hour;

— minute;

— second;

— zone;

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NOTE Application object EXPRESS:

```
*)
ENTITY time;
  hour: an_integer;
  minute: OPTIONAL an_integer;
  second: OPTIONAL a_real;
  zone: text;
END_ENTITY;
(*
```

4.2.160.1 hour

The hour specifies a specific period of time corresponding to one twenty-fourth of a day (see 4.2.34.1).

4.2.160.2 minute

The minute specifies a specific period of time corresponding to one sixtieth of a hour (see 4.2.160.1). The minute need not be specified for a particular Time.

4.2.160.3 second

The second specifies a specific period of time corresponding to one sixtieth of a minute (see 4.2.160.2). The second need not be specified for a particular Time.

4.2.160.4 zone

The zone specifies the relationship of the time to coordinated universal time.

4.2.161 Volume

The volume is the volumetric value of a component. Real numbers such as pounds and grams can be utilized for a volume. The data associated with Volume are the following:

— a_value.

NOTE Application object EXPRESS:

```
*)
ENTITY volume;
  a_value: number_with_units;
END_ENTITY;
(*
```

4.2.161.1 a_value

The a_value specifies the volumetric quantity as a number with a unit of measure.

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4.2.162 Weight

The Weight is the heaviness of the item. The data associated with Weight are the following:

— derivation_method;

— unit_of_measure;

— a_value.

NOTE Application object EXPRESS:

```
*)
ENTITY weight;
  derivation_method : OPTIONAL weight_derivation;
  a_value : a_real;
  unit_of_measure : measure;
END_ENTITY;
(*
```

4.2.162.1 a_value

The a_value specifies the numerical value of the weight of the item.

4.2.162.2 derivation_method

The derivation_method specifies the method that was utilized to determine the value of the weight. The derivation_method need not be specified for a particular Weight. The value of derivation_method shall be one of the following:

— calculated;

— estimated;

— weighed.

NOTE 1 See 4.2.162.2.1 - 4.2.162.2.3 for the definition of each allowable value for derivation_method.

NOTE 2 - Application object EXPRESS:

```
*)
TYPE weight_derivation = ENUMERATION OF
 (calculated,
  estimated,
  weighed);
END_TYPE;
(*
```

4.2.162.2.1 calculated: the weight was obtained using a numerical methodology.

4.2.162.2.2 estimated: the weight was obtained from best engineering estimate.

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4.2.162.2.3 weighed: the weight of the Item was obtained through a measuring device.

4.2.162.3 unit_of_measure

The unit_of_measure specifies the standard measure units for the value attribute.

NOTE Application Object EXPRESS:

```
*)
END_SCHEMA;
(*
```

4.3 Application assertions

4.3.1 Accessed_file to Text

Each Accessed_file has storage_node_identification defined by zero or one Text objects. Each Text defines storage_node_identification for zero, one, or more Accessed_file objects.

NOTE 1 There are rules related to the Accessed_file object that requires the existence of at least one of the attributes.

Each Accessed_file has path_information defined by zero or one Text objects. Each Text has path_-information defined by zero, one, or more Accessed_file objects.

NOTE 2 There are rules related to the Accessed_file object that requires the existence of at least one of the attributes.

4.3.2 Alternate_element_identification to Change_identification

Each Alternate_element_identification has change_status defined by zero or one Change_identification objects. Each Change_identification defines change_status for zero, one, or more Alternate_element_-identification objects.

4.3.3 Alternate_element_identification to Design_authority

Each Alternate_element_identification has design_activity defined by exactly one Design_authority object. Each Design_authority defines design_activity for zero, one, or more Alternate_element_identification objects.

4.3.4 Alternate_element_identification to Element_type

Each Alternate_element_identification has element_classifications defined by zero, one, or more Element_-type objects. Each Element_type defines element_classifications for zero, one, or more Alternate_-element_identification objects.

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4.3.5 Alternate_element_identification to Identifier

Each Alternate_element_identification has identifying_number defined by exactly one Identifier object. Each Identifer defines identifying_number for zero, one, or more Alternate_element_identification objects.

4.3.6 Alternate_element_identification to Other_reference_document

Each Alternate_element_identification has outstanding_changes defined by zero, one, or more Other_-reference_document objects. Each Other_reference_document defines outstanding_changes for zero, one, or more Alternate_element_identification objects.

4.3.7 Alternate_element_identification to Text

Each Alternate_element_identification has title defined by zero or one Text objects. Each Text defines title for zero, one, or more Alternate_element_identification objects.

4.3.8 Alternate_identification_of_item to Change_identification

Each Alternate_identification_of_item has change_status defined by zero or one Change_identification objects. Each Change_identification defines change_status for zero, one, or more Alternate_identification_-of_item objects.

4.3.9 Alternate_identification_of_item to Design_authority

Each Alternate_identification_of_item has design_activity defined by exactly one Design_authority object. Each Design_authority defines design_activity for zero, one, or many Alternate_identification_of_item object.

4.3.10 Alternate_identification_of_item to Drawing_suffix_number_-combination

Each Alternate_identification_of_item has identifying_number defined by zero or one Drawing_suffix_-number_combination objects. Each Drawing_suffix_number_combination defines identifying_number for zero, one, or more Alternate_identification_of_item objects.

NOTE This assertion is established through item_identifying_number_select.

4.3.11 Alternate_identification_of_item to Identifier

Each Alternate_identification_of_item has identifying_number defined by zero or one Identifier objects. Each Identifier defines identifying_number for zero, one, or more Alternate_identification_of_item objects.

NOTE This assertion is established through item_identifying_number_select.

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4.3.12 Alternate_identification_of_item to Label

Each Alternate_identification_of_item has classifications defined by zero, one, or more Label objects. Each Label defines classifications for zero, one, or more Alternate_identification_of_item objects.

Each Alternate_identification_of_item has nomenclature_or_name defined by zero or one Label objects. Each Label defines nomenclature_or_name for zero, one, or more Alternate_identification_of_item objects.

4.3.13 Alternate_identification_of_item to Source_information_type

Each Alternate_identification_of_item has source_information defined by zero or one Source_information_-type objects. Each Source_information_type defines nomenclature_or_name for zero, one, or more Alternate_identification_of_item objects.

4.3.14 Alternate_item to An_Integer

Each Alternate_item has usage_conditions defined by zero, one or more An_integer objects. Each An_-integer defines usage_conditions for zero, one, or more Alternate_item objects.

NOTE This assertion is established through Usage_condition.

4.3.15 Alternate_item to Item

Each Alternate_item has interchange_item defined by zero or one Item object. Each Item defines interchange_item for zero, one, or more Alternate_item objects.

NOTE This assertion is established through usage_context.

4.3.16 Alternate_item to Item_usage

Each Alternate_item has interchange_item defined by zero or one Item_usage object. Each Item_usage defines interchange_item for zero, one, or more Alternate_item objects.

4.3.17 Alternate_item to Label

Each Alternate_item has type_of_alternate defined by zero or one Label objects. Each Label defines type_-of_alternate for zero, one, or more Alternate_item objects.

4.3.18 Alternate_item to Text

Each Alternate_item has usage_conditions defined by zero, one or more Text objects. Each Text defines usage_conditions for zero, one, or more Alternate_item objects.

NOTE This assertion is established through Usage_condition.

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4.3.19 Annotation to Geometry

Each Annotation has annotation_geometry defined by zero or one Geometry objects. Each Geometry defines annotation_geometry for zero, one, or more Annotation objects.

4.3.20 Approval to Date

Each Approval has approval_date defined by exactly one Date object. Each Date defines date for zero, one, or more Approval objects.

4.3.21 Approval to Person_and_organization

Each Approval has person_organization defined by zero or one Person_and_organization objects. Each Person_and_organization defines person_organization for zero, one, or more Approval objects.

4.3.22 Approval to Text

Each Approval has purpose_of defined by exactly one Text object. Each Text defines purpose_of for zero, one, or more Approval objects.

4.3.23 Associated_list to Drawing

Each Associated_list has related_to defined by zero or one Drawing objects. Each Drawing defines related_to for zero, one, or more Associated_list objects.

4.3.24 Associated_list to Product_data_set

Each Associated_list has related_to defined by zero or one Product_data_set objects. Each Product_data_-set defines related_to for zero, one or more Associated_list objects.

4.3.25 Associated_list to List_presentation

Each Associated_list has presentation defined by zero or one List_presentation objects. Each List_-presentation defines presentation for zero, one, or more Associated_list objects.

4.3.26 Body_presentation to Tabulation

Each Body_presentation has body_tabulation_presentation defined by one or more Tabulation objects. Each Tabulation defines body_tabulation_presentation for zero, one, or more Body_presentation objects.

4.3.27 Change_identification to Date

Each Change_identification has revision_date defined by zero or one Date objects. Each Date defines revision_date for zero, one, or more Change_identification objects.

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NOTE 1 There are rules related to the Change_identification object that requires the existence of at least one of the attributes.

Each Change_identification has issue_date defined by zero or one Date objects. Each Date defines issue_-date for zero, one, or more Change_identification objects.

NOTE 2 There are rules related to the Change_identification object that requires the existence of at least one of the attributes.

Each Change_identification has change_date defined by zero or one Date objects. Each Date defines change_date for zero, one, or more Change_identification objects.

NOTE 3 There are rules related to the Change_identification object that requires the existence of at least one of the attributes.

4.3.28 Change_identification to Identifier

Each Change_identification has revision_authorization_identifications defined by zero, one, or more Identifier objects. Each Identifier defines revision_authorization_identifications for zero, one or more Change_identification objects.

NOTE 1 This assertion is established through revision_authorization_select.

Each Change_identification has revision_level defined by zero or one Identifier objects. Each Identifier defines revision_level for zero, one, or more Change_identification objects.

NOTE 2 There are rules related to the Change_identification object that requires the existence of at least one of the attributes.

Each Change_identification has change_level defined by zero or one Identifier objects. Each Identifier defines change_level for zero, one, or more Change_identification objects.

NOTE 3 There are rules related to the Change_identification object that requires the existence of at least one of the attributes.

Each Change_identification has issue_level defined by zero or one Identifier objects. Each Identifier defines issue_level for zero, one, or more Change_identification objects.

NOTE 4 There are rules related to the Change_identification object that requires the existence of at least one of the attributes.

4.3.29 Change_identification to Other_reference_document

Each Change_identification has revision_authorization_identifications defined by zero, one, or more Other_reference_document objects. Each Other_reference_document defines revision_authorization_identifications for zero, one, or more Change_identification objects.

NOTE This assertion is established through revision_authorization_select.

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4.3.30 Change_identification to Status

Each Change_identification has action_status defined by zero or one Status objects. Each Status defines action_status for zero, one, or more Change_identification objects.

4.3.31 Change_identification to Text

Each Change_identification has change_code defined by zero or one Text objects. Each Text defines change_code for zero, one, or more Change_identification objects.

NOTE There are rules related to the Change_identification object that requires the existence of at least one of the attributes.

4.3.32 Column_header to Field_title

Each Column_header has single_column_header_titles defined by one or more Field_title objects. Each Field_title defines single_column_header_titles for zero, one, or more Column_header objects.

4.3.33 Columnar_data_content_holder to Field_content_holder_tabulation

Each Columnar_data_content_holder has column_content_presentation defined by exactly one Field_-content_ holder_tabulation object. Each Field_content_holder_tabulation defines column_content_-presentation for zero, one, or more Columnar_data_content_holder objects.

4.3.34 Company to Label

Each Company has name defined by exactly one Label object. Each Label defines name for zero, one, or more Company objects.

4.3.35 Company to Text

Each Company has address defined by zero or one Text objects. Each Text defines address for zero, one, or more Company objects.

4.3.36 Company_code to Company

Each Company_code has code_administrator defined by zero or one Company objects. Each Company defines code_administrator for zero, one, or more Company_code objects.

4.3.37 Company_code to Identifier

Each Company_code has code defined by exactly one Identifier object. Each Identifier defines code for zero, one, or many Company_code objects.

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4.3.38 Company_code to Text

Each Company_code has type_of_code defined by exactly one Text object. Each Text defines type_of_-code for zero, one, or more Company_code objects.

4.3.39 Configuration to Contract

Each Configuration has preparing_contracts defined by zero, one, or more Contract objects. Each Contract defines preparing_contracts for zero, one, or more Configuration objects.

NOTE There are rules related to the Configuration object that requires the existence of at least one of the attributes.

4.3.40 Configuration to Distribution_notice

Each Configuration has distribution_authorizations defined by zero, one, or more Distribution_notice objects. Each Distribution_notice defines distribution_authorizations for zero, one, or more Configuration objects.

NOTE There are rules related to the Configuration object that requires the existence of at least one of the attributes.

4.3.41 Configuration to Label

Each configuration has data_usage_rights defined by zero, or one Label. Each Label defines data_usage_rights for zero, one, or more Configuration objects.

NOTE There are rules related to the Configuration object that requires the existence of at least one of the attributes.

4.3.42 Configuration to Product_configuration

Each Configuration has end_item_system_designation defined by zero or one Product_configuration objects. Each Product_configuration defines end_item_system_designation for zero, one, or more Configuration objects.

NOTE There are rules related to the Configuration object that requires the existence of at least one of the attributes.

4.3.43 Configuration to Release_authentication

Each Configuration has release_authorizations defined by zero, one, or more Release_ authentication objects. Each Release_authentication defines release_authorization for zero, one, or more Configuration objects.

NOTE There are rules related to the Configuration object that requires the existence of at least one of the attributes.

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4.3.44 Configuration to Security_classification

Each Configuration has security_identifications defined by zero, one, or more Security_classification objects. Each Security_classification defines security_identifications for zero, one, or more Configuration objects.

NOTE There are rules related to the Configuration object that requires the existence of at least one of the attributes.

4.3.45 Contract to Identifier

Each Contract has contract_number defined by exactly one Identifier object. Each Identifier defines contract_number for zero, one, or more Contract objects.

Each Contract has contract_data_requirements_list defined by zero or one Identifier objects. Each Identifier defines contract_data_requirements_list for zero, one, or more Contract objects.

Each Contract has data_item_description_identification defined by zero or one Identifier objects. Each Identifier defines data_item_description_identification for zero, one, or more Contract objects.

4.3.46 Contract_submission to Contract

Each Contract_submission has delivered_contract defined by exactly one Contract object. Each Contract defines delivered_contract for zero, one, or more Contract_submission objects.

4.3.47 Contract_submission to Date

Each Contract_submission has date_of_submission defined by exactly one Date object. Each Date defines date_of_submission for zero, one, or more Contract_submission objects.

4.3.48 Contract_submission to Text

Each Contract_submission has location defined by exactly one Text object. Each Text defines location for zero, one, or more Contract_submission objects.

4.3.49 Data_definition_entry_item to Accessed_file

Each Data_definition_entry_item has entry_files defined by zero, one, or more Accessed_file objects. Each Accessed_file defines entry_files for zero, one, or more Data_definition_entry_item objects.

NOTE This assertion is established through data_definition_file_entry.

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4.3.50 Data_definition_entry_item to Contract_submission

Each Data_definition_entry_item has available_from defined by zero, one or more Contract_submission objects. Each Contract_submission defines available_from for zero, one or more Data_definition_entry_-item objects.

NOTE This assertion is established through source_identification.

4.3.51 Data_definition_entry_item to Delivery_accounting

Each Data_definition_entry_item has delivery_accounting_references defined by zero, one or more Delivery_accounting objects. Each Delivery_accounting defines delivery_accounting_references for zero, one or more Data_definition_entry_item objects.

4.3.52 Data_definition_entry_item to Element_identification

Each Data_definition_entry_item has supersede_entry defined by zero or one Element_identification objects. Each Data_definition defines supersede_entry for zero, one, or more Data_definition_entry_item objects.

4.3.53 Data_definition_entry_item to Exchange_file

Each Data_definition_entry_item has entry_files defined by zero, one or more Exchange_file objects. Each Exchange_file defines entry_files for zero, one, or many Data_definition_entry_item objects.

NOTE This assertion is established through data_definition_file_entry.

4.3.54 Data_definition_entry_item to Identifier

Each Data_definition_entry_item has entry_item_change_level defined by zero, one, or more Identifier objects. Each Identifier defines entry_item_change_level for zero, one, or more Data_definition_entry_item objects.

4.3.55 Data_definition_entry_item to Notation

Each Data_definition_entry_item has entry_notes defined by zero, one, or more Notation objects. Each Notation defines entry_notes for zero, one, or more Data_definition_entry_item objects.

4.3.56 Data_definition_entry_item to Reference_document

Each Data_definition_entry_item has available_from defined by zero, one, or more Reference_document objects. Each Reference_document defines available_from for zero, one, or more Data_definition_entry_-item objects.

NOTE This assertion is established through source_identification.

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4.3.57 Data_definition_entry_item to Special_condition

Each Data_definition_entry_item has special_conditions defined by zero, one, or more Special_condition objects. Each Special_condition defines special_conditions for zero, one, or more Data_definition_entry_-item objects.

4.3.58 Data_definition_entry_tdp_element to Accessed_file

Each Data_definition_entry_tdp_element has entry_files defined by zero, one, or more Accessed_file objects. Each Accessed_file defines entry_files for zero, one, or more Data_definition_entry_tdp_element objects.

NOTE This assertion is established through data_definition_file_entry.

4.3.59 Data_definition_entry_tdp_element to Contract_submission

Each Data_definition_entry_tdp_element has available_from defined by zero, one or more Contract_-submission objects. Each Contract_submission defines available_from for zero, one or more Data_-definition_entry_tdp_element objects.

NOTE This assertion is established through source_identification.

4.3.60 Data_definition_entry_tdp_element to Delivery_accounting

Each Data_definition_entry_tdp_element has delivery_accounting_references defined by zero, one or more Delivery_accounting objects. Each Delivery_accounting defines delivery_accounting_references for zero, one or more Data_definition_entry_tdp_element objects.

4.3.61 Data_definition_entry_tdp_element to Element_identification

Each Data_definition_entry_tdp_element has supersede_entry defined by zero or one Element_identification objects. Each Data_definition defines supersede_entry for zero, one, or more Data_definition_entry_tdp_-element objects.

4.3.62 Data_definition_entry_tdp_element to Exchange_file

Each Data_definition_entry_tdp_element has entry_files defined by zero, one or more Exchange_file objects. Each Exchange_file defines entry_files for zero, one, or many Data_definition_entry_tdp_element objects.

NOTE This assertion is established through data_definition_file_entry.

4.3.63 Data_definition_entry_tdp_element to File_format

Each Data_definition_entry_tdp_element has entry_format defined by zero or one File_format objects. Each File_format defines entry_format for zero, one, or more Data_definition_entry_tdp_element objects.

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NOTE This assertion is established through entry_format_select.

4.3.64 Data_definition_entry_tdp_element to Identifier

Each Data_definition_entry_tdp_element has entry_item_change_level defined by zero, one, or more Identifier objects. Each Identifier defines entry_item_change_level for zero, one, or more Data_definition_-entry_tdp_element objects.

4.3.65 Data_definition_entry_tdp_element to Label

Each Data_definition_entry_tdp_element has actual_inclusion_in_data_exchange defined by zero, one, or more Label objects. Each Label defines actual_inclusion_in_data_exchange for zero, one, or more Data_-definition_entry_tdp_element objects. Each Data_definition_entry_tdp_element has data_usage_rights defined by zero or one Label objects. Each Label defines data_usage_rights for zero, one, or more Data_-definition_entry_tdp_element objects.

4.3.66 Data_definition_entry_tdp_element to Notation

Each Data_definition_entry_tdp_element has entry_notes defined by zero, one, or more Notation objects. Each Notation defines entry_notes for zero, one, or more Data_definition_entry_tdp_element objects.

4.3.67 Data_definition_entry_tdp_element to Size_characteristics

Each Data_definition_entry_tdp_element has size defined by zero or one Size_characteristics objects. Each Size_characteristics defines size for zero, one, or more Data_definition_entry_tdp_element objects.

4.3.68 Data_definition_entry_tdp_element to Reference_document

Each Data_definition_entry_tdp_element has available_from defined by zero, one, or more Reference_-document objects. Each Reference_document defines available_from for zero, one, or more Data_-definition_entry_tdp_element objects.

NOTE This assertion is established through source_identification.

4.3.69 Data_definition_entry_tdp_element to Special_condition

Each Data_definition_entry_tdp_element has special_conditions defined by zero, one, or more Special_-condition objects. Each Special_condition defines special_conditions for zero, one, or more Data_-definition_entry_tdp_element objects.

4.3.70 Data_definition_entry_tdp_element to Text

Each Data_definition_entry_tdp_element has entry_format defined by zero or one Text objects. Each Text defines entry_format for zero, one, or more Data_definition_entry_tdp_element objects.

NOTE This assertion is established through entry_format_select.

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Each Data_definition_entry_tdp_element has master_file defined by zero or one Text objects. Each Text defines master_file for zero, one, or more Data_definition_entry_tdp_element objects.

4.3.71 Data_definition_exchange to Data_definition_exchange_body

Each Data_definition_exchange has list_body defined by exactly one Data_definition_exchange_body object. Each Data_definition_exchange_body defines list_body for exactly one Data_definition_exchange objects.

4.3.72 Data_definition_exchange to Data_definition_exchange_header

Each Data_definition_exchange has list_header defined by exactly one Data_definition_exchange_header object. Each Data_definition_exchange_header defines list_header for exactly one Data_definition_-exchange objects.

4.3.73 Data_definition_exchange to List_presentation

Each Data_definition_exchange has presentation defined by zero or one List_presentation objects. Each List_presentation defines presentation for zero, one, or more Data_definition_exchange objects.

4.3.74 Data_definition_exchange_body to Data_definition_indentured_list_-method

Each Data_definition_exchange_body has list_method defined by exactly one Data_definition_indentured_-list_method object. Each Data_definition_indentured_list_method defines list_method for zero, one, or more Data_definition_exchange_body objects.

NOTE This assertion is established through data_definition_exchange_list_method.

4.3.75 Data_definition_exchange_body to Notation

Each Data_definition_exchange_body has notes_list defined by zero, one, or more Notation objects. Each Notation defines notes_list for zero, one, or more Data_definition_exchange_body objects.

4.3.76 Data_definition_exchange_body to Revision

Each Data_definition_exchange_body has revision_history defined by zero, one, or more Revision objects. Each Revision defines revision_history for by zero, one, or more Data_definition_exchange_body objects.

4.3.77 Data_definition_exchange_body to Simple_list_of_elements

Each Data_definition_exchange_body has list_method defined by exactly one Simple_list_of_elements object. Each Simple_list_of_elements defines list_method for zero, one, or more Data_definition_-exchange_body objects.

NOTE This assertion is established through data_definition_exchange_list_method.

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4.3.78 Data_definition_exchange_body to Simple_list_of_files

Each Data_definition_exchange_body has list_method defined by exactly one Simple_list_of_files object. Each Simple_list_of_files defines list_method for zero, one, or more Data_definition_exchange_body objects.

NOTE This assertion is established through data_definition_exchange_list_method.

4.3.79 Data_definition_exchange_header to Date

Each Data_definition_exchange_header has date_of_transfer defined by zero or one Date objects. Each Date defines date_of_transfer for zero, one, or many Data_definition_exchange_header objects.

4.3.80 Data_definition_exchange_header to Delivery_accounting

Each Data_definition_exchange_header has delivery_accounting_references defined by zero, one, or more Delivery_accounting objects. Each Delivery_accounting defines delivery_accounting_references for zero, one, or more Data_definition_exchange_header objects.

4.3.81 Data_definition_exchange_header to Element_identification

Each Data_definition_exchange_header has procurement_references defined by zero, one, or more Element_identification objects. Each Element_identification defines procurement_references for zero, one, or more Data_definition_exchange_header objects.

NOTE This assertion is established through identification_select.

4.3.82 Data_definition_exchange_header to Item_identification

Each Data_definition_exchange_header has procurement_references defined by zero, one, or more Item_-identification objects. Each Item_identification defines procurement_references for zero, one, or more Data_definition_exchange_header objects.

NOTE This assertion is established through identification_select.

4.3.83 Data_definition_exchange_header to Header

Each Data_definition_exchange_header has common_header defined by exactly one Header object. Each Header defines common_header for zero or one Data_definition_exchange_header objects.

4.3.84 Data_definition_exchange_header to Reason

Each Data_definition_exchange_header has exchange_reason defined by exactly one Reason object. Each Reason defines exchange_reason for zero, one, or more Data_definition_exchange_header objects.

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4.3.85 Data_definition_exchange_header to System_destination

Each Data_definition_exchange_header has destinations defined by zero, one, or more System_destination objects. Each System_destination defines destinations for zero, one, or more Data_definition_exchange_-header objects.

4.3.86 Data_definition_exchange_simple_entry to Data_definition_entry_tdp_-element

Each Data_definition_exchange_simple_entry has entry defined by exactly one Data_definition_entry_-tdp_element object. Each Data_definition_entry_tdp_element defines entry for zero, one, or more Data_-definition_exchange_simple_entry objects.

4.3.87 Data_definition_exchange_simple_entry to Element_identification

Each Data_definition_exchange_simple_entry has simple_entry defined by exactly one Element_-identification object. Each Element_identification defines simple_entry for zero, one, or more Data_-definition_exchange_simple_entry objects.

4.3.88 Data_definition_indentured_entry to Data_definition_entry_item

Each Data_definition_indentured_entry has entry_characteristics defined by exactly one Data_definition_-entry_item object. Each Data_definition_entry_item defines entry_characteristics for zero, one, or more Data_definition_indentured_entry objects.

NOTE This assertion is established through data_definition_entry_select.

4.3.89 Data_definition_indentured_entry to Data_definition_entry_tdp_-element

Each Data_definition_indentured_entry has entry_characteristics defined by exactly one Data_definition_-entry_tdp_element object. Each Data_definition_entry_tdp_element defines entry_characteristics for zero, one, or more Data_definition_indentured_entry objects.

NOTE This assertion is established through data_definition_entry_select.

4.3.90 Data_definition_indentured_entry to Effectivity

Each Data_definition_indentured_entry has effective_on defined by zero or one Effectivity objects. Each Effectiviy defines effective_on for zero, one, or more Data_definition_indentured_entry objects.

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4.3.91 Data_definition_indentured_entry to Item_parent_to_item_child_-relationship

Each Data_definition_indentured_entry has indentured_entry defined by exactly one item_parent_to_item_-child_relationship object. Each item_parent_to_item_child_relationship defines indentured_entry for zero, one, or more Data_definition_indentured_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.92 Data_definition_indentured_entry to Item_parent_to_tdp_element_-child_relationship

Each Data_definition_indentured_entry has indentured_entry defined by exactly one item_parent_to_tdp_-element_child_relationship object. Each item_parent_to_tdp_element_child_relationship defines indentured_entry for zero, one, or more Data_definition_indentured_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.93 Data_definition_indentured_entry to Label

Each Data_definition_indentured_entry has indenture_level defined by zero or one Label objects. Each Label defines indenture_level for zero, one, or more Data_definition_indentured_entry objects.

4.3.94 Data_definition_indentured_entry to Tdp_element_parent_to_item_-child_relationship

Each Data_definition_indentured_entry has indentured_entry defined by exactly one tdp_element_parent_-to_item_child_relationship object. Each tdp_element_parent_to_item_child_relationship defines indentured_entry for zero, one, or more Data_definition_indentured_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.95 Data_definition_indentured_entry to Tdp_element_parent_to_tdp_-element_child_relationship

Each Data_definition_indentured_entry has indentured_entry defined by exactly one tdp_element_parent_-to_tdp_element_child_relationship object. Each tdp_element_parent_to_tdp_element_child_relationship defines indentured_entry for zero, one, or more Data_definition_indentured_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.96 Data_definition_indentured_entry to Tdp_indentured_item

Each Data_definition_indentured_entry has indentured_entry defined by exactly one tdp_indentured_item object. Each tdp_indentured_item defines indentured_entry for zero, one, or more Data_definition_-indentured_entry objects.

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NOTE This assertion is established through list_entry_select.

4.3.97 Data_definition_indentured_entry to Tdp_indentured_tdp_element

Each Data_definition_indentured_entry has indentured_entry defined by exactly one tdp_indentured_tdp_-element object. Each tdp_indentured_tdp_element defines indentured_entry for zero, one, or more Data_-definition_indentured_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.98 Data_definition_indentured_list_method to Data_definition_-indentured_entry

Each Data_definition_indentured_list_method has order_of defined by one or more Data_definition_-indentured_entry objects. Each Data_definition_indentured_entry defines order_of defined by zero, one, or more Data_definition_indentured_list_method objects.

4.3.99 Data_definition_indentured_list_method to Indentured_list_by_-document

Each Data_definition_indentured_list_by_document has method_of_entry_tabulation defined by exactly one Indentured_list_method object. Each Indentured_list_method defines method_of_entry for zero, one, or more Data_definition_indentured_list_by_document objects.

NOTE This assertion is established through indentured_list_method.

4.3.100 Data_definition_indentured_list_method to Indentured_list_by_part

Each Data_definition_indentured_list_by_part has method_of_entry_tabulation defined by exactly one Indentured_list_method object. Each Indentured_list_method defines method_of_entry for zero, one, or more Data_definition_indentured_list_by_part objects.

NOTE This assertion is established through indentured_list_method.

4.3.101 Data_definition_indentured_list_method to Indentured_list_by_part_-with_document_references_to_parts

Each Data_definition_indentured_list_by_part_with_document_references_to_parts has method_of_entry_-tabulation defined by exactly one Indentured_list_method object. Each Indentured_list_method defines method_of_entry for zero, one, or more Data_definition_indentured_list_by_part_with_document_-references_to_parts objects.

NOTE This assertion is established through indentured_list_method.

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4.3.102 Data_list to Data_list_body

Each Data_list has body defined by exactly one Data_list_body object. Each Data_list_body defines body for exactly one Data_list objects.

4.3.103 Data_list to Data_list_header

Each Data_list has list_header defined by exactly one Data_list_header object. Each Data_list_header defines list_header for exactly one Data_list objects.

4.3.104 Data_list_body to Data_list_tabulation

Each Data_list_body has data_list_tabulations defined by one or more Data_list_tabulation objects. Each Data_list_tabulation objects defines data_list_tabulations for zero, one, or more Data_list_body objects.

4.3.105 Data_list_body to Notation

Each Data_list_body has data_list_notes defined by zero, one or more Notation objects. Each Notation defines data_list_notes for zero, one, or more Data_list_body objects.

4.3.106 Data_list_body to Revision

Each Data_list_body has revision_history defined by zero, one, or more Revision objects. Each Revision object defines revision_history for zero, one, or more Data_list_body objects.

4.3.107 Data_list_entry to Contract_submission

Each Data_list_entry has available_from defined by zero, one or more Contract_submission objects. Each Contract_submission defines available_from for zero, one or more Data_list_entry objects.

NOTE This assertion is established through source_identification.

4.3.108 Data_list_entry to Header

Each Data_list_entry has list_entry defined by zero or one Header objects. Each Header defines list_entry for zero, or one, Data_list_entry objects.

NOTE This assertion is established through valid_tdp_elements_for_data_list.

4.3.109 Data_list_entry to Identifier

Each Data_list_entry has entry_item_change_level defined by zero or one Identifier objects. Each Identifier defines entry_item_change_level for zero, one, or more Data_list_entry objects.

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4.3.110 Data_list_entry to Notation

Each Data_list_entry has entry_notes defined by zero, one, or more Notation objects. Each Notation defines entry_notes for zero, one, or more Data_list_entry objects.

4.3.111 Data_list_entry to Reference_document

Each Data_list_entry has list_entry defined by zero or one Reference_document objects. Each Reference_-document defines list_entry for zero, one, or more Data_list_entry objects.

NOTE This assertion is established through valid_tdp_elements_for_data_list.

Each Data_list_entry has available_from defined by zero, one or more Reference_document objects. Each Reference_document defines available_from for zero, one, or more Data_list_entry objects.

NOTE This assertion is established through source_identification.

4.3.112 Data_list_entry to Sheet

Each Data_list_entry has list_entry defined by zero or one Sheet objects. Each Sheet defines list_entry for zero, one, or more Data_list_entry objects.

NOTE This assertion is established through valid_tdp_elements_for_data_list.

4.3.113 Data_list_entry to Special_condition

Each Data_list_entry has special_conditions defined by zero, one, or more Special_condition objects. Each Special_condition defines special_conditions for zero, one, or more Data_list_entry objects.

4.3.114 Data_list_header to Header

Each Data_list_header has common_header defined by exactly one Header. Each Header defines common_header for zero or one Data_list_header objects.

4.3.115 Data_list_tabulation to Data_list_entry

Each Data_list_tabulation has data_list_entries defined by zero, one or more Data_list_entry objects. Each Data_list_entry defines data_list_entries for zero, one, or more Data_list_tabulation.

4.3.116 Data_list_tabulation to Item_identification

Each Data_list_tabulation has for_item defined by zero or one Item_identification objects. Each Item_-identification defines for_item for zero, one, or more Data_list_tabulation objects.

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4.3.117 Date to An_integer

Each Date has month defined by zero or one An_integer objects. Each An_integer defines month for zero, one, or more Date objects.

Each Date has day defined by zero or one An_integer objects. Each An_integer defines day for zero, one, or more Date objects.

Each Date has week defined by zero or one an_integer objects. Each An_integer defines week for zero, one, or more Date objects.

Each Date has year defined by exactly one An_integer object. Each An_integer defines year for zero, one, or more Date objects.

4.3.118 Date to Time

Each Date has specific_time defined by zero or one Time objects. Each Time defines specific_time for zero, one, or more Date objects.

4.3.119 Date_effectivity to Date

Each Date_effectivity has start_date defined by exactly one Date. Each Date defines start_date for zero, one, or more Date_effectivity objects.

Each Date_effectivity has end_date defined by zero or one Date objects. Each Date defines end_date for zero, one, or more Date_effectivity objects.

4.3.120 Delivery_accounting to Identifier

Each Delivery_accounting has reference_identification defined by exactly one Identifier object. Each Identifier defines reference_identification for zero, one, or more Delivery_accounting objects.

4.3.121 Delivery_accounting to Text

Each Delivery_accounting has reference_identification_description defined by exactly one Text object. Each Text defines reference_identification_description for zero, one, or more Delivery_accounting objects.

4.3.122 Design_authority to Company

Each Design_authority has design_activity_identification defined by exactly one Company object. Each Company defines design_activity_identification for zero, one, or more Design_authority objects.

4.3.123 Design_authority to Company_code

Each Design_authority has design_activity_code defined by zero or one Company_code objects. Each Company_code defines design_activity_code for zero, one, or more Design_authority objects.

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4.3.124 Design_authority to Label

Each Design_authority has role defined by zero or one Label object. Each Label defines role for zero, one, or more Design_authority objects.

4.3.125 Design_authority to Person

Each Design_authority has person_responsible defined by zero or one Person objects. Each Person defines person_responsible for zero, one, or more Design_authority objects.

4.3.126 Distribution_notice to Label

Each Distribution_notice has distribution_code defined by zero or one Label objects. Each Label defines distribution_code for zero, one, or more Distribution_notice objects.

NOTE There are rules related to the Distribution_notice object that requires the existence of at least one of the attributes.

4.3.127 Distribution_notice to Person_and_organization

Each Distribution_notice has distribution_authority defined by zero or one Person_and organization objects. Each Person_and_organization defines distribution_authority for zero, one, or more Distribution_-notice objects.

NOTE There are rules related to the Distribution_notice object that requires the existence of at least one of the attributes.

4.3.128 Distribution_notice to Text

Each Distribution_notice has distribution_statement defined by zero or one Text objects. Each Text defines distribution_statement for zero, one, or more Distribution_notice objects.

NOTE There are rules related to the Distribution_notice object that requires the existence of at least one of the attributes.

4.3.129 Document_usage_parameter to Label

Each Document_usage_parameter has subject defined by exactly one Label objecs. Each Label defines subject for zero, one, or more Document_usage_parameter objects.

4.3.130 Document_usage_parameter to Text

Each Document_usage_parameter has value_of defined by exactly one Text objecs. Each Text defines value_of for zero, one, or more Document_usage_parameter objects.

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4.3.131 Drawing to Header

Each Drawing has heading defined by exactly one Header object. Each Header defines heading for zero or one Drawing objects.

4.3.132 Drawing to Sheet

Each Drawing has pages defined by one or more Sheet objects. Each Sheet defines pages for zero, one, or more Drawing objects.

4.3.133 Drawing_suffix_number_combination to Element_identification

Each drawing_suffix_number_combination has drawing_number defined by exactly one Element_-identification object. Each Element_identification defines drawing_number for zero, one, or more Drawing_suffix_number_combination objects.

4.3.134 Drawing_suffix_number_combination to Identifier

Each Drawing_suffix_number_combination has suffix_identifier defined by exactly one Identifier object. Each Identifier defines suffix_identifier for zero, one, or more Drawing_suffix_number_combination objects.

4.3.135 Effectivity to Approval

Each Effectivity has effectivity_approvals defined by zero, one, or more Approval objects. Each Approval defines effectivity_approvals for zero, one, or more Effectivity objects.

4.3.136 Effectivity to Product_configuration

Each Effectivity has product defined by exactly one Product_configuration object. Each Product_-configuration defines product for zero, one, or more Effectivity objects.

4.3.137 Effectivity to Text

Each Effectivity has description defined by zero or one Text objects. Each Text defines description for zero, one, or more Effectivity objects.

4.3.138 Element_identification to Alternate_element_identification

Each Element_identification has alternate_identifications defined by zero, one, or more Alternate_element_-identification objects. Each Alternate_element_identification defines alternate_identifications for zero, one, or more Element_identification objects.

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4.3.139 Element_identification to Change_identification

Each Element_identification has change_status defined by zero or one Change_identification objects. Each Change_identification defines change_status for zero, one, or more Element_identification objects.

4.3.140 Element_identification to Design_authority

Each Element_identification has design_activities defined by one or more Design_authority object. Each Design_authority defines design_activities for zero, one, or more Element_identification objects.

4.3.141 Element_identification to Element_type

Each Element_identification has element_classifications defined by zero, one, or more Element_type objects. Each Element_type defines element_classifications for zero, one, or more Element_identification objects.

4.3.142 Element_identification to Identifier

Each Element_identification has identifying_number defined by exactly one Identifier object. Each Identifer defines identifying_number for zero, one, or more Element_identification objects.

4.3.143 Element_identification to Other_reference_document

Each Element_identification has outstanding_changes defined by zero, one, or more Other_reference_-document objects. Each Other_reference_document defines outstanding_changes for zero, one, or more Element_identification objects.

4.3.144 Element_identification to Text

Each Element_identification has title defined by zero or one Text objects. Each Text defines title for zero, one, or more Element_identification objects.

4.3.145 Element_type to Company

Each Element_type has code_administrator defined by zero or one Company object. Each Company defines code_administrator for zero, one, or more Element_type objects.

4.3.146 Element_type to Label

Each Element_type has element_code defined by exactly one Label object. Each Label defines element_-code for zero, one, or more Element_type objects.

4.3.147 Element_type to Text

Each Element_type has type_of_coding_scheme defined by zero or one Text. Each Text defines type_of_-coding_scheme for zero, one, or more Element_type objects.

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4.3.148 Exchange_file to Label

Each Exchange_file has included_in_exchange defined by exactly one Label object. Each Label object defines included_in_exchange for zero, one, or more Exchange_file objects.

4.3.149 Exchange_file to System_declaration

Each Exchange_file has destination_system defined by zero or one System_declaration objects. Each System_declaration defines destination_system for zero, one, or more Exchange_file objects.

4.3.150 Explicit_graphics to Geometry

Each Explicit_graphics has table_geometry defined by exactly one Geometry object. Each Geometry defines table_geometry for zero, one, or more Explicit_graphic objects.

4.3.151 External_graphics_file to A_real

Each External_graphics has file_loadpoint_x defined by exactly one A_real object. Each A_real defines file_loadpoint_y for zero, one, or more External_graphic objects.

Each External_graphics has file_loadpoint_y defined by exactly one A_real object. Each A_real defines file_loadpoint_x for zero, one, or more External_graphics objects.

4.3.152 External_graphics_file to File

Each External_graphics_file has file_id defined by exactly one File object. Each File defines file_id for zero, one, or more External_graphics objects.

4.3.153 Field_content_holder to Field_location

Each Field_content_holder has location defined by exactly one Field_location object. Each Field_location defines location for zero, one, or more Field_content_holder objects.

4.3.154 Field_content_holder to Label

Each Field_content_holder has text_style defined by exactly one Label object. Each Label defines text_-style for zero, one, or more Field_content_holder objects.

4.3.155 Field_content_holder to Text

Each Field_content_holder has field_justification defined by exactly one Text object. Each Text defines field_justification for zero, one, or more Field_content_holder objects.

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4.3.156 Field_content_holder_singular to Text

Each Field_content_holder_singular has field_text defined by exactly one Text object. Each Text defines field_text for zero, one, or more Field_content_holder_singular objects.

4.3.157 Field_content_holder_tabulation to Text

Each Field_content_holder_tabulation has field_text defined by one or more Text objects. Each Text defines field_text for zero, one or more Field_content_holder_tabulation objects.

4.3.158 Field_location_definition to Load_point

Each Field_location_definition has field_load_point defined by exactly one Load_point object. Each Load_point defines field_load_point for zero, one, or more Field_location_definition objects.

4.3.159 Field_title to Field_location

Each Field_title has location defined by exactly one Field_location object. Each Field_location defines location for zero, one, or more Field_title objects.

4.3.160 Field_title to Label

Each Field_title has field_style defined by exactly one Label object. Each Label defines field_style for zero, one, or more Field_title objects.

4.3.161 Field_title to Text

Each Field_title has field_justification defined by exactly one Text object. Each Text defines field_-justification for zero, one, or more Field_title objects.

Each Field_title has field_text defined by exactly one Text object. Each Text defines field_text for zero, one, or more Field_title objects.

4.3.162 File to Change_identification

Each File has change_status defined by zero or one Change_identification objects. Each Change_-identification defines change_status for zero, one, or more File objects.

4.3.163 File to Distribution_notice

Each File has distribution_authorizations defined by zero, one, or more Distribution_notice objects. Each Distribution_notice defines distribution_authorizations for zero, one, or more File objects.

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4.3.164 File to File_format

Each File has context_file_format defined by zero or one File_format objects. Each File_format defines context_file_formatfor zero, one, or more File objects.

4.3.165 File to Identifier

Each File has context_file_name defined by zero or one Identifer objects. Each Identifier defines context_-file_name for zero, one, or more File objects.

Each File has native_format_file_name defined by zero or one Identifier objects. Each Identifier defines native_format_file_name for zero, one, or more File objects.

4.3.166 File to Security_classification

Each File has security_identifications defined by zero, one, or more Security_classification objects. Each Security_classification defines security_identifications for zero, one, or more File objects.

4.3.167 File to Size_characteristics

Each File has size defined by zero or one Size_characteristic objects. Each Size_characteristics defines size for zero, one, or more File objects.

4.3.168 File to System_declaration

Each File has source_system defined by zero or one System_declaration objects. Each System_declaration defines source_system for zero, one, or more File objects.

4.3.169 File_format to Date

Each File_format has release_date defined by zero or one Date objects. Each Date defines release_date for zero, one, or more File_format objects.

NOTE There are rules related to the File_format object that requires the existence of at least one of the attributes.

4.3.170 File_format to Identifier

Each File_format has format_code defined by zero or one Identifier objects. Each Identifier defines format_code for zero, one, or more File_format objects.

NOTE1 There are rules related to the File_format object that requires the existence of at least one of the attributes.

Each File_format has revision_level defined by zero or one Identifier objects. Each Identifier defines revision_level for zero, one, or more File_format objects.

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NOTE2 There are rules related to the File_format object that requires the existence of at least one of the attributes.

Each File_format has change_level defined by zero or one Identifier objects. Each Identifier defines change_level for zero, one, or more File_format objects.

NOTE 3 There are rules related to the File_format object that requires the existence of at least one of the attributes.

4.3.171 File_format to Text

Each File_format has format_standard defined by zero or one Text objects. Each Text defines format_-standard for zero, one, or more File_format objects.

NOTE There are rules related to the File_format object that requires the existence of at least one of the attributes.

4.3.172 Group_parent_column_header to Field_title

Each Group_parent_column_header has single_group_parent_column_header_titles defined by one or more Field_title objects. Each Field_title defines single_group_parent_column_header_titles for zero, one, or more Group_parent_column_header objects.

4.3.173 Group_parent_content_holder to Field_content_holder_tabulation

Each Group_parent_content_holder has group_parent_content_presentation defined by exactly one field_-content_holder_tabulation object. Each Field_content_holder_tabulation defines group_parent_content_-presentation for zero, one, or more Group_parent_content_holder objects.

4.3.174 Group_parent_header to Field_title

Each Group_parent_header has single_group_parent_header_titles defined by one or more Field_title objects. Each Field_title defines single_group_parent_header_titles for zero, one, or more Group_parent_-header objects.

4.3.175 Header to An_integer

Each Header has sheet_count defined by zero or one An_integer objects. Each An_integer defines sheet_-count for zero, one, or more Header objects.

4.3.176 Header to Header_configuration_with_element_identification

Each Header has header_configuration defined by one Header_configuration_with_element_identification object. Each Header_configuration_with_element defines header_configuration for zero or one Header objects.

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4.3.177 Header to Label

Each Header has languages defined by zero, one, or more Label objects. Each Label defines languages for zero, one, or more Header objects.

4.3.178 Header to Size_characteristics_full_size

Each Header has size_of_sheet defined by zero or one Size_characteristics_full_size objects. Each Size_-characteristics_full_size defines size_of_sheet for zero, one, or more Header objects.

4.3.179 Header to Text

Each Header has document_keywords defined by zero, one or more Text objects. Each Text defines document_keywords for zero, one, or more Header objects.

Each Header has document_abstract defined by zero or one Text objects. Each Text defines document_-abstract for zero, one, or more Header objects.

4.3.180 Header_block to Field_content_holder_singular

Each Header_block has single_block_content_presentation defined by zero, one, or more Field_content_-holder_singular objects. Each Field_content_holder_singular defines single_block_content_presentation for zero, one, or more Header_block objects.

NOTE There are rules related to the Change identification object that requires the existence of at least one of the attributes.

4.3.181 Header_block to Field_title

Each Header_block has single_block_titles defined by zero, one, or more Field_title objects. Each Field_-title defines single_block_titles for zero, one, or more Header_block objects.

NOTE There are rules related to the Change identification object that requires the existence of at least one of the attributes.

4.3.182 Header_configuration_with_element_identification to Configuration

Each Header_configuration_with_element_identification has data_configuration defined by zero or one Configuration object. Each Configuration defines data_configuration for zero, one, or more Header_-configuration_with_element_identification objects.

4.3.183 Header_configuration_with_element_identification to Element_-identification

Each Header_configuration_with_element_identification has identification defined by exactly one Element_identification object. Each Element_identification defines identification for zero, one, or more Header_configuration objects.

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4.3.184 Header_presentation to Header_block

Each Header_presentation has header_blocks_presentation defined by one or more Header_block objects. Each Header_block defines header_blocks_presentation for zero, one, or more Header_presentation objects.

4.3.185 Header_presentation to Tabulation

Each Header_presentation has header_tabulation_presentation defined by zero, one, or more Tabulation objects. Each Tabulation defines header_tabulation_presentation for zero, one, or more Header_-presentation objects.

4.3.186 Indentured_data_list to Indentured_data_list_body

Each Indentured_data_list has body defined by exactly one Indentured_data_list_body object. Each Indentured_data_list_body defines body for exactly one Indentured_data_list objects.

4.3.187 Indentured_data_list to Indentured_data_list_header

Each Indentured_data_list has header defined by exactly one Indentured_data_list_header object. Each Indentured_data_list_header defines header for exactly one Indentured_data_list objects.

4.3.188 Indentured_data_list_body to Element_identification

Each Indentured_data_list_body has standardization_documents_list defined by zero, one, or more Element_identification objects. Each Element_identification defines standardization_documents_list for zero, one, or more Indentured_data_list_body objects.

4.3.189 Indentured_data_list_body to Indentured_data_list_tabulation

Each Indentured_data_list_body has indentured_tabulation defined by exactly one Indentured_data_list_-tabulation object. Each Indentured_data_list_tabulation defines indentured_tabulation for one Indentured_-data_list_body objects.

4.3.190 Indentured_data_list_body to Notation

Each Indentured_data_list_body has notes_list defined by zero, one, or more Notation objects. Each Notation defines notes_list for zero, one, or more Indentured_data_list_body objects.

4.3.191 Indentured_data_list_body to Revision

Each Indentured_data_list_body has revision_history defined by zero, one, or more Revision objects. Each Revision defines revision_history for zero, one, or more Indentured_data_list_body objects.

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4.3.192 Indentured_data_list_entry to Configuration

Each Indentured_data_list_entry has entry_configuration defined by zero or one Configuration objects. Each Configuration defines entry_configuration for zero, one, or more Indentured_data_list_entry objects.

4.3.193 Indentured_data_list_entry to Contract_submission

Each Indentured_data_list_entry has available_from defined by zero, one, or more Contract_submission objects. Each Contract_submission defines available_from for zero, one, or more Indentured_data_list_-entry objects.

NOTE This assertion is established through source_identification.

4.3.194 Indentured_data_list_entry to Effectivity

Each Indentured_data_list_entry has effective_on defined by zero or one Effectivity objects. Each Effectivity defines effective_on for zero, one, or more Indentured_data_list_entry objects.

4.3.195 Indentured_data_list_entry to Element_identification

Each Indentured_data_list_entry has superseded_entry defined by zero or one element_identification objects. Each Element_identification defines superseded_entry for zero, one, or more Indentured_data_-list_entry objects.

4.3.196 Indentured_data_list_entry to Identifier

Each Indentured_data_list_entry has entry_item_change_level defined by zero or one Identifier objects. Each Identifier defines entry_item_change_level for zero, one, or more Indentured_data_list_entry objects.

4.3.197 Indentured_data_list_entry to Item_parent_to_item_child_-relationship

Each Indentured_data_list_entry has entry defined by exactly one Item_parent_to_item_child_relationship object. Each Item_parent_to_item_child_relationship defines entry for zero, one, or more Indentured_-data_list_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.198 Indentured_data_list_entry to Item_parent_to_tdp_element_child_-relationship

Each Indentured_data_list_entry has entry defined by exactly one Item_parent_to_tdp_element_child_-relationship object. Each Item_parent_to_tdp_element_child_relationship defines entry for zero, one, or more Indentured_data_list_entry objects.

NOTE This assertion is established through list_entry_select.

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4.3.199 Indentured_data_list_entry to Label

Each Indentured_data_list_entry has indenture_level defined by zero or one Label objects. Each Label defines indenture_level for zero, one, or more Indenture_data_list_entry objects.

4.3.200 Indentured_data_list_entry to Notation

Each Indentured_data_list_entry has entry_notes defined by zero, one, or more Notation objects. Each Notation defines entry_notes for zero, one, or more Indentured_data_list_entry objects.

4.3.201 Indentured_data_list_entry to Reference_document

Each Indentured_data_list_entry has available_from defined by zero, one, or more Reference_document objects. Each Reference_document defines available_from for zero, one, or more Indentured_data_list_-entry objects.

NOTE This assertion is established through source_identification.

4.3.202 Indentured_data_list_entry to Special_condition

Each Indentured_data_list_entry has special_conditions defined by zero, one, or more Special_condition objects. Each Special_condition defines special_conditions for zero, one, or more Indentured_data_list_-entry objects.

4.3.203 Indentured_data_list_entry to Tdp_element_parent_to_item_child_-relationship

Each Indentured_data_list_entry has entry defined by exactly one Tdp_element_parent_to_item_child_-relationship object. Each Tdp_element_parent_to_item_child_relationship defines entry for zero, one, or more Indentured_data_list_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.204 Indentured_data_list_entry to Tdp_element_parent_to_tdp_element_-child_relationship

Each Indentured_data_list_entry has entry defined by exactly one Tdp_element_parent_to_tdp_element_child_relationship object. Each Tdp_element_parent_to_tdp_element_child_relationship defines entry for zero, one, or more Indentured_data_list_entry objects.

NOTE This assertion is established through list_entry_select.

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4.3.205 Indentured_data_list_entry to Tdp_indentured_item

Each Indentured_data_list_entry has entry defined by exactly one Tdp_indentured_item object. Each Tdp_indentured_item defines entry for zero, one, or more Indentured_data_list_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.206 Indentured_data_list_entry to Tdp_indentured_tdp_element

Each Indentured_data_list_entry has entry defined by exactly one Tdp_indentured_tdp_element object. Each Tdp_indentured_tdp_element defines entry for zero, one, or more Indentured_data_list_entry objects.

NOTE This assertion is established through list_entry_select.

4.3.207 Indentured_data_list_header to Element_identification

Each Indentured_data_list_header has procurement_references defined by zero, one, or more Element_-identification objects. Each Element_dentification has procurement_references defined by zero, one, or more Indentured_data_list_header objects.

NOTE This assertion is established through Identification_select.

4.3.208 Indentured_data_list_header to Header

Each Indentured_data_list_header has common_header defined by exactly one Header object. Each Header defines common_header for zero or one Indentured_data_list_header objects.

4.3.209 Indentured_data_list_header to Item_identification

Each Indentured_data_list_header has procurement_references defined by zero, one, or more Item_-identification objects. Each Item_dentification has procurement_references defined by zero, one, or more Indentured_data_list_header objects.

NOTE This assertion is established through Identification_select.

4.3.210 Indentured_data_list_tabulation to Indentured_data_list_entry

Each Indentured_data_list_tabulation has tabulation_of_entries defined by one or more Indentured_data_-list_entry objects. Each Indentured_data_list_entry defines tabulation_of _entries for zero, one, or more Indentured_data_list_tabulation objects.

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4.3.211 Indentured_data_list_tabulation to Indentured_list_by_document

Each Indentured_data_list_tabulation has method_of_entry_tabulation defined by one Indentured_list_by_-document object. Each Indentured_list_by_document defines method_of_entry_tabulation for zero, one, or more Indentured_data_list_tabulation objects.

NOTE This assertion is established through indentured_list_method.

4.3.212 Indentured_data_list_tabulation to Indentured_list_by_part

Each Indentured_data_list_tabulation has method_of_entry_tabulation defined by exactly one Indentured_-list_by_part object. Each Indentured_list_by_part defines method_of_entry_tabulation for zero, one, or more Indentured_data_list_tabulation objects.

NOTE This assertion is established through indentured_list_method.

4.3.213 Indentured_data_list_tabulation to Indentured_list_by_part_with_-document_references_to_parts

Each Indentured_data_list_tabulation has method_of_entry_tabulation defined by exactly one Indentured_-list_by_part_with_document_references_to_part object. Each Indentured_list_by_part_with_document_-references_to_parts defines method_of_entry_tabulation for zero, one, or more Indentured_data_list_-tabulation objects.

NOTE This assertion is established through indentured_list_method.

4.3.214 Indentured_list_by_document to Tdp_indentured_tdp_element

Each Indentured_list_by_document has top_indentured_tdp_elements defined by one or more Tdp_-indentured_tdp_element objects. Each Tdp_indentured_tdp_element object defines top_indentured_tdp_-element for zero, one, or more Indentured_list_by_document objects.

4.3.215 Indentured_list_by_part to Tdp_indentured_item

Each Indentured_list_by_part has top_indentured_items defined by one or more Tdp_indentured_item objects. Each Tdp_indentured_item defines top_indentured_items for zero, one, or more Indentured_list_-by_part objects.

4.3.216 Indentured_list_by_part_with_document_references_to_parts to Tdp_indentured_item

Each Indentured_list_by_part_with_document_reference_to_parts has top_indentured defined by zero, one or more Tdp_indentured_item objects. Each Tdp_indentured_item defines top_indentured_ for zero, one, or more Indentured_list_by_part_with_document_reference_to_parts objects.

NOTE This assertion is established through item_or_element.

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4.3.217 Indentured_list_by_part_with_document_references_to_parts to Tdp_indentured_tdp_element

Each Indentured_list_by_part_with_document_reference_to_parts has top_indentured defined by zero, one or more Tdp_indentured_tdp_element objects. Each Tdp_indentured_tdp_element defines top_indentured_ for zero, one, or more Indentured_list_by_part_with_document_reference_to_parts objects.

NOTE This assertion is established through item_or_element.

4.3.218 Index_list to Index_list_body

Each Index_list has body defined by exactly one Index_list_body object. Each Index_list_body defines body for one Index_list objects.

4.3.219 Index_list to Index_list_header

Each Index_list has list_header defined by exactly one Index_list_header object. Each Index_list_header defines list_header for exactly one Index_list object.

4.3.220 Index_list_body to Index_list_entry

Each Index_list_body has index_list_entries defined by one or more Index_list_entry objects. Each Index_-list_entry defines index_list_entries for zero, one, or more Index_list_body objects.

4.3.221 Index_list_body to Notation

Each Index_list_body has index_list_notes defined by zero, one, or more Notation objects. Each Notation defines index_list_notes for zero, one, or more Index_list_body objects.

4.3.222 Index_list_body to Revision

Each Index_list_body has revision_history defined by zero, one, or more Revision objects. Each Revision defines revision_history for zero, one, or more Index_list_body objects.

4.3.223 Index_list_entry to Header

Each Index_list_entry has list_entry defined by zero or one Header objects. Each Header defines list_entry for zero or one, Index_list_entry objects.

4.3.224 Index_list_entry to Identifier

Each Index_list_entry has entry_item_change_level defined by zero or one Identifier objects. Each Identifier defines entry_item_change_level for zero, one, or more Index_list_entry objects.

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4.3.225 Index_list_entry to Notation

Each Index_list_entry has entry_notes defined by zero, one or more Notation objects. Each Notation defines entry_notes for zero, one, or more Index_list_entry objects.

4.3.226 Index_list_header to Header

Each Index_list_header has common_header defined by exactly one Header object. Each Header defines common_header for zero or one Index_list_header objects.

4.3.227 Item to Alternate_item

Each Item has alternates define by zero, one, or more Alternate_item objects. Each Alternate_item defines alternates for zero, one, or more Item objects.

4.3.228 Item to Configuration

Each Item has item_configuration defined by zero or one Configuration objects. Each Configuration defines item_configuration for zero, one, or more Item objects.

4.3.229 Item to Item_identification

Each Item has identification defined by exactly one Item_identification object. Each Item_identification defines identification for zero, one, or more Item objects.

4.3.230 Item to Label

Each Item has item_contexts defined by zero, one, or more Label objects. Each Label defines item_-contexts for zero, one, or more Item objects.

4.3.231 Item to Notation

Each Item has notes defined by zero, one, or more Notation objects. Each Notation defines notes for zero, one, or more Item objects.

4.3.232 Item to Reference_document

Each Item has conditions_defined_through_simple_reference defined by zero, one, or more Reference_-document_objects. Each Reference_document defines conditions_defined_through_simple_reference for zero, one, or more Item objects.

4.3.233 Item to Reference_document_usage

Each Item has conditions_defined_through_constrained_document defined by zero, one, or more Reference_document_usage objects. Each Reference_document_usage defines conditions_defined_-through_constrained_document for zero, one, or more Item objects.

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4.3.234 Item to Special_condition

Each Item has special_conditions defined by zero, one or more Special_condition objects. Each Special_-condition defines special_conditions for zero, one, or more Item objects.

4.3.235 Item to Weight

Each Item has item_weight defined by zero or one Weight objects. Each Weight defines item_weight for zero, one, or more Item objects.

4.3.236 Item_identification to Change_identification

Each Item_identification has change_status defined by zero or one Change_identification objects. Each Change_identification defines change_status for zero, one, or more Item_identification objects.

4.3.237 Item_identification to Design_authority

Each Item_identification has design_activity defined by exactly one Design_authority object. Each Design_authority defines design_activity for zero, one, or many Item_identification object.

4.3.238 Item_identification to Drawing_suffix_number_combination

Each Item_identification has identifying_number defined by zero or one Drawing_suffix_number_-combination objects. Each Drawing_suffix_number_combination defines identifying_number for zero, one, or more Item_identification objects.

NOTE This assertion is established through item_identifying_number_select.

4.3.239 Item_identification to Identifier

Each Item_identification has identifying_number defined by zero or one Identifier objects. Each Identifier defines identifying_number for zero, one, or more Item_identification objects.

NOTE This assertion is established through item_identifying_number_select.

4.3.240 Item_identification to Label

Each Item_identification has classifications defined by zero, one, or more Label objects. Each Label defines classifications for zero, one, or more Item_identification objects.

Each Item_identification has nomenclature_or_name defined by zero or one Label objects. Each Label defines nomenclature_or_name for zero, one, or more Item_identification objects.

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4.3.241 Item_identification to Source_information_type

Each Item_identification has source_information defined by zero or one Source_information_type objects. Each Source_information_type defines nomenclature_or_name for zero, one, or more Item_identification objects.

4.3.242 Item_list to Item_identification

Each Item_list has list_for defined by zero or one Item_identification objects. Each Item_identification defines list_for for zero, one, or more Item_list objects.

NOTE This assertion is established through item_identifying_number_select.

4.3.243 Item_list to Item_list_drawing

Each Item_list has list_for defined by zero or one Item_list_drawing objects. Each Item_list_drawing defines list_for for zero, one, or more Item_list objects.

NOTE This assertion is established through item_list_applies_to_select.

4.3.244 Item_list to Item_usage

Each Item_list has component_of defined by one or more Item_usage objects. Each Item_usage defines component_of for one Item_list objects.

4.3.245 Item_list to Text

Each Item_list has type_of_component_list defined by exactly one Text object. Each Text defines type_-of_component_list for zero, one, or more Item_list object.

NOTE This assertion is established through component_list_type_select.

4.3.246 Item_list_drawing to Element_identification

Each Item_list_drawing has drawing_number defined by exactly one Element_identification object. Each Element_identification defines drawing_number for zero, one, or more Item_list_drawing objects.

4.3.247 Item_list_drawing to Item_identification

Each Item_list_drawing has assembly_item_list_applies_to defined by zero or one Item_identification objects. Each Item_identification defines assembly_item_list_applies_to for zero, one, or more Item_list_-drawing objects.

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4.3.248 Item_parent_to_item_child_relationship to Item_identification

Each Item_parent_to_item_child_relationship has parent defined by exactly one Item_identification object. Each Item_identification defines parent for zero, one, or more Item_parent_to_item_child_relationship objects.

Each Item_parent_to_item_child_relationship has child defined by exactly one Item_identification object. Each Item_identification defines child for zero, one, or more Item_parent_to_item_child_relationship objects.

4.3.249 Item_parent_to_tdp_element_child_relationship to Element_-identification

Each Item_parent_to_tdp_element_child_relationship has child defined by exactly one Element_-identification object. Each Element_identification defines child for zero, one, or more Item_parent_to_-tdp_element_child_relationship objects.

4.3.250 Item_parent_to_tdp_element_child_relationship to Item_identification

Each Item_parent_to_tdp_element_child_relationship has parent defined by exactly one Item_identification object. Each Item_identification defines parent for zero, one, or more Item_parent_to_tdp_element_child_-relationship objects.

4.3.251 Item_type to Company

Each Item_type has code_administrator defined by zero or one Company objects. Each Company defines code_administrator for zero, one, or more Item_type objects.

4.3.252 Item_type to Label

Each Item_type has type_code defined by exactly one Label object. Each Label defines type_code for zero, one, or more Item_type objects.

4.3.253 Item_type to Text

Each Item_type has type_of_coding_scheme defined by zero or one Text objects. Each Text defines type_-of_coding_scheme for zero, one, or more Item_type objects.

4.3.254 Item_usage to Effectivity

Each Item_usage has effective_on defined by zero or one Effectivity objects. Each Effectivity defines effective_on for zero, one, or more Item_usage objects.

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4.3.255 Item_usage to Item

Each Item_usage has being_defined_for defined by exactly one Item object. Each Item defines being_-defined_for for zero, one, or more Item_usage objects.

4.3.256 Item_usage to List_item_usage

Each Item has list_item defined by zero or one List_item_usage objects. Each List_item_usage defines list_item for one Item_usage objects.

4.3.257 Item_usage to Quantity

Each Item_usage has quantity_used_in_next_higher_assembly defined by zero or one Quantity objects. Each Quantity defines quantity_used_in_next_higher_assembly for zero, one, or more Item_usage objects.

4.3.258 Item_usage to Retrofit_usage

Each Item_usage has retrofit defined by zero or one Retrofit_usage objects. Each Retrofit_usage defines retrofit for zero, one, or more Item_usage objects.

4.3.259 Item_usage to Special_condition

Each Item_usage has special_conditions defined by zero, one or more Special_condition objects. Each Special_condition defines special_conditions for zero, one or more Item_usage objects.

4.3.260 List_item_usage to Identifier

Each List_item_usage has reference_designators defined by zero, one, or more Identifier objects. Each Identifier defines reference_designators for by zero, one, or more List_item_usage objects.

Each List_item_usage has entry_item_change_level defined by zero or one Identifier objects. Each Identifier defines entry_item_change_level for zero, one, or more List_item_usage objects.

Each List_item_usage has drawing_zones defined by zero, one, or more Identifier objects. Each Identifier defines drawing_zones for zero, one, or more List_item_usage objects.

Each List_item_usage has find_number defined by zero or one Identifier objects. Each Identifier defines find_number for zero, one, or more List_item_usage objects.

4.3.261 List_item_usage to Label

Each List_item_usage has item_type defined by zero or one Label objects. Each Label defines item_type for zero, one, or more List_item_usage objects.

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4.3.262 List_item_usage to Notation

Each List_item_usage has entry_notes defined by zero, one or more Notation objects. Each Notation defines entry_notes defined by zero, one, or more List_item_usage objects.

4.3.263 List_presentation to Body_presentation

Each List_presentation has body_page1_format defined by one Body_presentation object. Each Body_-presentation defines body_page1_format for zero, one, or more List_presentation objects.

Each List_presentation has body_pagen_format defined by zero, one, or more Body_presentation objects. Each Body_presentation defines body_pagen_format for zero, one, or more List_presentation objects.

4.3.264 List_presentation to Header_presentation

Each List_presentation has header_page1_format defined by exactly one Header_presentation object. Each Header_presentation defines header_pagen_format for zero, one, or more List_presentation objects.

Each List_presentation has header_pagen_format defined by zero, one, or more Header_presentation objects. Each Header_presentation defines header_pagen_format for zero, one, or more List_presentation objects.

4.3.265 List_presentation to Measure

Each List_presentation has unit_of_length defined by exactly one Measure object. Each Measure defines unit_of_length for zero, one, or more List_presentation objects.

4.3.266 List_presentation to Page_presentation

Each List_presentation has page_format defined by exactly one Page_presentation object. Each Page_-presentation defines page_format for zero, one, or more List_presentation objects.

4.3.267 Load_point to A_real

Each Load_point has load_point_x defined by exactly one A_real object. Each A_real defines load_point_-x for zero, one, or more Load_point objects.

Each Load_point has load_point_y defined by exactly one A_real object. Each A_real defines load_point_-y for zero, one, or more Load_point objects.

4.3.268 Lot_effectivity to A_number

Each Lot_effectivity has lot_size defined by exactly one A_number object. Each A_number defines lot_-size for zero, one, or more Lot_effectivity objects.

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4.3.269 Lot_effectivity to Identifier

Each Lot_effectivity has lot_identification defined by exactly one Identifier object. Each Identifier defines lot_identification for zero, one, or more Lot_effectivity objects.

4.3.270 Lot_effectivity to Measure

Each Lot_effectivity has lot_unit_of_measure defined by exactly one Measure object. Each Measure defines lot_unit_of_measure for zero, one, or more Lot_effectivity objects.

4.3.271 Made_from_stock_material to A_number

Each Made_from_stock_material has quantity_of_item_made_from_stock defined by zero or one A_-number objects. Each A_number object defines quantity_of_item_made_from_stock for zero, one, or more Made_from_stock_material objects.

4.3.272 Made_from_stock_material to Reference_document_usage

Each Made_from_stock_material has specified_by defined by zero, one, or more Reference_document_-usage objects. Each Reference_document_usage defines specified_by for zero, one, or more Made_from_-stock_material objects.

4.3.273 Made_from_stock_material to Stock_material

Each Made_from_stock_material has stock defined by zero or one Stock_material objects. Each Stock_-material defines stock for zero, one, or more Made_from_stock_material objects.

4.3.274 Make_from_stock_material to Stock_size

Each Make_from_stock_material has size defined by zero or one Stock_size objects. Each Stock_size defines size for zero, one, or more Made_from_stock_material object.

4.3.275 Make_from_an_item to A_number

Each Make_from_an_item has quantity_of_item_made_from_other_item defined by zero or one A_number objects. Each A_number defines quantity_of_item_made_from_other_item for zero, one, or more Make_-from_an_item objects.

4.3.276 Make_from_an_item to Item

Each Make_from_an_item has item_that_is_acting_as_stock defined by exactly one Item object. Each Item defines item_that_is_acting_as_stock for zero, one, or more Make_from_an_item objects.

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4.3.277 Notation to Element_identification

Each Notation has referenced_document_in_note defined by zero, one, or many Element_identification objects. Each Element_identification defines reference_code for zero, one, or more Notation objects.

4.3.278 Notation to Identifier

Each Notation has reference_code defined by zero or one Identifier objects. Each Identifier defines reference_code for zero, one, or more Notation objects.

4.3.279 Notation to Label

Each Notation has type_of_notation defined by zero or one Label objects. Each Label defines type_of_-notation for zero, one, or more Notation objects.

Each Notation has note_title defined by zero, or one Label object. Each Text defines note_title for zero, one or more Notation objects.

4.3.280 Notation to Text

Each Notation has note defined by exactly one Text object. Each Text defines note for zero, one, or more Notation objects.

Each Notation has note_parameter defined by zero, one, or more Text object. Each Text defines note_-parameter for zero, one, or more Notation objects.

4.3.281 Number_with_units to A_real

Each Number_with_units has value_of defined by exactly one A_real object. Each A_real defines value_of for zero, one, or more Number_with_units objects.

4.3.282 Number_with_units to Measure

Each Number_with_units has units_of defined by exactly one Measure object. Each Measure defines units_of for zero, one, or more Number_with_units object.

4.3.283 Other_list to Other_list_body

Each Other_list has list_body defined by exactly one Other_list_body object. Each Other_list_body defines list_body for exactly one Other_list objects.

4.3.284 Other_list to Other_list_header

Each Other_list has list_header defined by exactly one Other_list_header object. Each Other_list_header defines list_header for exactly one Other_list object.

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4.3.285 Other_list_body to Notation

Each Other_list_body has notes defined by zero, one, or more Notation objects. Each Notation defines notes for zero, one, or more Other_list_body objects.

NOTE There are rules related to the Other_list_body object that requires the existence of at least one of the attributes.

4.3.286 Other_list_body to Other_list_body_table

Each Other_list_body has list_body_tables defined by zero, one, or more Other_list_body_table objects. Each Other_list_body_table defines list_body_tables for zero, one, or more Other_list_body objects.

NOTE There are rules related to the Other_list_body object that requires the existence of at least one of the attributes.

4.3.287 Other_list_body to Revision

Each Other_list_body has revision_history defined by zero, one, or more Revision objects. Each Revision defines revision_history for zero, one, or more Other_list_body objects.

4.3.288 Other_list_body_table to Label

Each Other_list_body_table has tabulation_column_descriptions defined by zero, one, or more Label objects. Each Label defines tabulation_column_descriptions for zero, one, or more Other_list_body_table objects.

Each Other_list_body has description_of_tabulation defined by zero or one Label objects. Each Label defines description_of_tabulation for zero, one, or more Other_list_body objects.

4.3.289 Other_list_body_table to Tabulation_entry

Each Other_list_body_table has tabulation_rows defined by one or more Tabulation_entry objects. Each Tabulation_entry defines tabulation_rows for zero, one, or more Other_list_body_table objects.

4.3.290 Other_list_header to Header

Each Other_list_header has common_header defined by exactly one Header object. Each Header defines common_header for zero or one Other_list_header objects.

4.3.291 Page_parameters to A_real

Each Page_parameters has page_anchor_x defined by exactly one A_real object. Each A_real defines page_anchor_x for zero, one, or more Page_parameters objects.

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Each Page_parameters has page_anchor_y defined by exactly one A_real object. Each A_real defines page_anchor_y for zero, one, or more Page_parameters objects.

4.3.292 Page_parameters to Explicit_graphics

Each Page_parameters has graphics_declaration defined by zero or one Explicit_graphics objects. Each Explicit_graphics defines graphics_declaration for zero, one, or more Page_parameters objects.

NOTE This assertion is established through graphics_prarameters.

4.3.293 Page_parameters to External_graphics_file

Each Page_parameters has graphics_declaration defined by zero or one External_graphics_file objects. Each External_graphics_file defines graphics_declaration for zero, one, or more Page_parameters objects.

NOTE This assertion is established through graphics_prarameters.

4.3.294 Page_parameters to Text

Each Page_parameters has page_size_code defined by zero or one Text objects. Each Text defines page_-size_code for zero, one, or more Page_parameters objects.

Each Page_parameters has paper_size defined by zero or one Text objects. Each Text defines paper_size for zero, one, or more Page_parameters objects.

4.3.295 Page_presentation to Page_parameters

Each Page_presentation has page_master_parameters defined by exactly one Page_parameters object. Each Page_parameters defines page_master_parameters for zero, one, or more Page_presentation objects.

Each Page_presentation has page1_parameters defined by zero or one Page_parameters objects. Each Page_parameters defines page1_parameters for zero, one, or more Page_presentation objects.

Each Page_presentation has pagen_parameters defined by zero, one, or more Page_parameters objects. Each Page_parameters defines pagen_parameters for zero, one, or more Page_presentation objects.

4.3.296 Parts_list to Parts_list_body

Each Parts_list has list_body defined by exactly one Parts_list_body object. Each Parts_list_body defines list_body for exactly one Parts_list objects.

4.3.297 Parts_list to Parts_list_header

Each Parts_list has list_header defined by exactly one Parts_list_header object. Each Parts_list_header defines list_header for exactly one Parts_list objects.

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4.3.298 Parts_list_body to Item_list

Each Parts_list_body has parts_tabulations defined by exactly one or more Item_list objects. Each Item_-list defines parts_tabulations for zero, one, or more Parts_list_body objects.

4.3.299 Parts_list_body to Notation

Each Parts_list_body has list_notes defined by zero, one, or more Notation objects. Each Notation defines list_notes for zero, one, or more Parts_list_body objects.

4.3.300 Parts_list_body to Revision

Each Parts_list_body has revision_history defined by zero, one, or more Revision objects. Each Revision defines revision_history for zero, one, or more Parts_list_body objects.

4.3.301 Parts_list_body to Tdp_element_list_item

Each Parts_list_body has referenced_tdp_elements defined by zero, one, or more Tdp_element_list_item objects. Each Tdp_element_list_item defines referenced_tdp_elements for zero, one, or more Parts_list_-body objects.

4.3.302 Parts_list_header to Header

Each Parts_list_header has common_header defined by exactly one Header object. Each Header defines common_header for zero or one Parts_list_header objects.

4.3.303 Person to Identifier

Each Person has first_name defined by zero or one Identifier objects. Each Identifier defines first_name for zero, one, or more Person objects.

Each Person has middle_name defined by zero or one Identifier objects. Each Identifier defines middle_-name for zero, one, or more Person objects.

Each Person has last_name defined by zero or one Identifier objects. Each Identifier defines last_name for zero, one, or more Person objects.

Each Person has unique_identifier defined by exactly one Identifier object. Each Identifier defines unique_-identifier for zero, one, or more Person objects.

NOTE There are rules related to the person_and_organization object that require the existence of at least one of the attributes.

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4.3.304 Person to Text

Each Person has title defined by zero or one Text objects. Each Text defines title for zero, one, or more Person objects.

NOTE There are rules related to the person_and_organization object that require the existence of at least one of the attributes.

4.3.305 Person_and_organization to Company

Each Person_and_organization has organization defined by zero or one Company objects. Each Company defines organization for zero, one, or more Person_and_organization objects.

NOTE There are rules related to the person_and_organization object that require the existence of at least one of the attributes.

4.3.306 Person_and_organization to Person

Each Person_and_organization has person_identification defined by zero or one Person objects. Each Person defines person_identification for by zero, one, or more Person_and_organization objects.

NOTE There are rules related to the person_and_organization object that require the existence of at least one of the attributes.

4.3.307 Person_and_organization to Text

Each Person_and_organization has person_address defined by zero or one Text objects. Each Text defines person_address for zero, one, or more Person_and_organization objects.

4.3.308 Product_configuration to Approval

Each Product_configuration has approval_of_configuration defined by zero, one, or more Approval objects. Each Approval defines approval_of_configuration for zero, one, or more Product_configuration objects.

4.3.309 Product_configuration to Identifier

Each Product_configuration has configuration_id defined by exactly one Identifier object. Each Identifier defines configuration_id for zero, one, or more Product_configuration objects.

4.3.310 Product_configuration to Product_model

Each Product_configuration has product_name defined by exactly one Product_model object. Each Product_model defines product_name for zero, one, or more Product_configuration objects.

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4.3.311 Product_data_set to Drawing

Each Product_data_set has related defined by zero, one, or more Drawing objects. Each Drawing defines related for zero, one, or more Product_data_set objects.

NOTE This assertion is established through drawing_or_product_data_set.

4.3.312 Product_data_set to Product_data_set

Each Product_data_set has related defined by zero, one, or more Product_data_set objects. Each Product_-data_set defines related for zero, one, or more Product_data_set objects.

NOTE This assertion is established through drawing_or_product_data_set.

4.3.313 Product_data_set to Source_file

Each Product_data_set has file_configuration defined by zero, one, or more Source_file objects. Each Source_file defines file_configuration for zero, one, or more Product_data_set objects.

4.3.314 Product_data_set_with_format to Header

Each Product_data_set_with_format has product_header defined by exactly one Header object. Each Header defines product_header for zero or one Product_data_set_with_format objects.

4.3.315 Product_data_set_with_format to Product_presentation

Each Product_data_set_with_format has presentation_of_product_data_set defined by zero, one, or more Product_presentation objects. Each Product_presentation defines presentation_of_product_data_set for zero, one, or more Product_data_set_with_format objects.

4.3.316 Product_data_set_with_shading to Header_configuration_with_-element_identification

Each Product_data_set_with_shading has data_configuration defined by exactly one Header_-configuration_with_element_identification object. Each Header_configuration_with_element_identification defines data_configuration for zero or one Product_data_set_with_shading objects.

4.3.317 Product_data_set_with_shading to Shaded_shape_model

Each Product_data_set_with_shading has a_shaded_model defined by exactly one Shaded_shape_model object. Each Shaded_shape_model defines a_shaded_shape_model for zero, one, or more Product_data_-set_with_shading objects.

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4.3.318 Product_data_set_without_format to Header_configuration_with_-element_identification

Each Product_data_set_without_format has data_configuration defined by exactly one Header_-configuration_with_element_identification object. Each Header_configuration_with_element_identification defines data_configuration for zero or one Product_data_set_without_format objects.

4.3.319 Product_data_set_without_format to Shape_model

Each Product_data_set_without_format has a_model defined by zero or one Shape_model objects. Each Shape_model defines a_model for zero, one, or more Product_data_set_without_format objects.

4.3.320 Product_model to Label

Each Product_model has model_name defined by exactly one Label object. Each Label defines model_-name for zero, one, or more Product_model objects.

4.3.321 Product_presentation to Annotation

Each Product_presentation has annotation_presentation defined by exactly one Annotation object. Each Annotation defines annotation_presentation for zero, one, or more Product_presentation objects.

4.3.322 Product_presentation to Shape_model

Each Product_presentation has part_shape_views defined by zero, one, or more Shape_model objects. Each Shape_model defines part_shape_views for zero, one, or more Product_presentation objects.

4.3.323 Quantity to A_number

Each Quantity has value_of defined by zero or one A_number objects. Each A_number defines value_of for zero, one, or more Quantity objects.

NOTE This assertion is established through quantity_type_select.

4.3.324 Quantity to Text

Each Quantity has quantity_accuracy defined by zero or one Text objects. Each Text defines quantiy_-accuracy for zero, one, or more Quantity objects.

NOTE This assertion is established through quantity_accuracy_select.

Each Quantity has value_of defined by zero or one Text objects. Each Text defines value_of for zero, one, or more Quantity objects.

NOTE This assertion is established through quantity_type_select.

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4.3.325 Quantity to Volume

Each Quantity has value_of defined by zero or one Volume objects. Each Volume defines value_of for zero, one, or more Item_usage objects.

NOTE This assertion is established through quantity_type_select.

4.3.326 Quantity to Weight

Each Quantity has value_of defined by zero or one Weight objects. Each Weight defines value_of for zero, one, or more Quantity objects.

NOTE This assertion is established through quantity_type_select.

4.3.327 Reason to Item_identification

Each Reason has applicable_to defined by zero, one, or more Item_identification objects. Each Item_-identification defines applicable_to for zero, one, or more Reason objects.

4.3.328 Reason to Text

Each Reason has exchange_purpose defined by zero or one Text objects. Each Text defines exchange_-purpose for zero, one, or more Reason objects.

Each Reason has base defined by zero or one Text objects. Each Text defines base for zero, one, or more Reason objects.

NOTE There exist rules related to the reason object that require the existence of at least one of the attributes.

4.3.329 Reference_document to Element_identification

Each Reference_document has document_identification defined by exactly one Element_identification object. Each Element_identification defines document_identification for zero, one, or more Reference_-document objects.

4.3.330 Reference_document_usage to Document_usage_parameter

Each Reference_document_usage has usage_parameter defined by zero or one Document_usage_parameter objects. Each Document_usage_parameter defines usage_parameter for zero, one, or more Reference_-document_usage objects

4.3.331 Reference_document_usage to Identifier

Each Reference_document_usage has usage_code defined by zero or one Identifier objects. Each Identifier defines usage_code for zero, one, or more Reference_document_usage objects.

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4.3.332 Reference_document_usage to Label

Each Reference_document_usage has location_in_document defined by zero or one Label objects. Each Label defines location_in_document for zero, one, or more Reference_document_usage objects.

4.3.333 Reference_document_usage to Reference_document

Each Reference_document_usage has document_referenced defined by exactly one Reference_document object. Each Reference_document defines document_referenced for zero, one, or more Reference_-document_usage objects.

4.3.334 Reference_document_usage to Text

Each Reference_document_usage has usage_description defined by zero or one Text objects. Each Text defines usage_description for zero, one, or more Reference_document_usage objects.

4.3.335 Release_authentication to Company

Each Release_authentication has release_authority defined by exactly one Company object. Each Company defines release_authority for zero, one, or more Release_authentication objects.

4.3.336 Release_authentication to Company_code

Each Release_authentication has release_authority_code defined by zero or one Company_code objects. Each Company_code defines release_authority_code for zero, one, or more Release_authentication objects.

4.3.337 Release_authentication to Date

Each Release_authentication has release_date defined by exactly one Date object. Each Date defines release_date for zero, one, or more Release_authentication objects.

4.3.338 Release_authentication to Identifier

Each Release_authentication has authentication defined by exactly one Identifier object. Each Identifier defines authentication for zero, one, or more Release_authentication objects.

4.3.339 Release_authentication to Person

Each Release_authentication has person_responsible defined by zero or one Person objects. Each Person defines person_responsible for zero, one, or more Release_authentication objects.

4.3.340 Retrofit_usage to Notation

Each Retrofit_usage has retrofit_description defined by zero or one Notation objects. Each Notation defines retrofit_description for zero, one, or more Retrofit_usage objects.

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4.3.341 Retrofit_usage to Other_reference_document

Each Retrofit_usage has defining_document defined by zero or one Other_reference_document object. Each Other_reference_document defines defining_document for zero, one, or more Retrofit_usage objects.

4.3.342 Retrofit_usage to Text

Each Retrofit_usage has disposition_for defined by exactly one Text object. Each Text defines disposition_for for zero, one, or more Retrofit_usage objects.

NOTE Text values limited to “add,” Delete,” and “modify” by retrofit_state.

4.3.343 Revision to Date

Each Revision has revision_date defined by zero or one Date objects. Each Date defines revision_date for zero, one, or more Revision objects.

4.3.344 Revision to Identifier

Each Revision has revision_level defined by exactly one Identifier object. Each Identifier defines revision_-level for zero, one, or more Revision objects.

4.3.345 Revision to Other_reference_document

Each Revision has authorizing_documents defined by zero, one, or more Other_reference_document objects. Each Other_reference_document defines authorizing_documents for zero, one, or more Revision objects.

4.3.346 Revision to Person_and_Organization

Each Revision has revision_approval defined by zero or one Person_and_organization objects. Each Person_and_organization defines revision_approval for zero, one, or more Revision objects.

4.3.347 Revision to Text

Each Revision has revision_description defined by zero or one Text objects. Each Text defines revision_-description for zero, one, or more Revision objects.

4.3.348 Security_classification to Date

Each Security_classification has classification_date defined by zero or one Date objects. Each Date defines classification_date for zero, one, or more Security_classification objects.

Each Security_classification has declassification_date defined by zero or one Date objects. Each Date defines declassification_date for zero, one, or more Security_classification objects.

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4.3.349 Security_classification to Label

Each Security_classification has item_classification defined by exactly one Label object. Each Label defines item_classification for zero, one, or more Security_classification objects.

Each Security_classification has title_security_classification defined by zero or one Label objects. Each Label defines title_security_classification for zero, one, or more Security_classification objects.

4.3.350 Sequence_effectivity to Quantity

Each Sequence_effectivity has total_component_quantity_in_product_configuration defined by zero or one Quantity objects. Each Quantity has total_component_quantity_in_product_configuration defined by zero, one, or more Sequence_effectivity objects.

NOTE This assertion is established through quantity_type_select.

4.3.351 Sequence_effectivity to Identifier

Each Sequence_effectivity has from_effectivity_id defined by exactly one Identifier object. Each Identifier defines from_effectivity_id for zero, one, or more Sequence_effectivity object

Each Sequence_effectivity has thru_effectivity_id defined by zero or one Identifier objects. Each Identifier defines thru_effectivity_id for zero, one, or more Sequence_effectivity objects.

4.3.352 Sequence_effectivity to Measure

Each Sequence_effectivity has quantity_unit_of_measure defined by zero or one Measure objects. Each Measure defines quantity_unit_of_measure for zero, one, or more Sequence_effectivity objects.

4.3.353 Shape_model to Geometry

Each Shape_model has part_shape_representation defined by exactly one Geometry object. Each Geometry defines part_shape_views for zero, one, or more Shaded_shape_model objects.

4.3.354 Shaded_shape_model to Shape_model

Each Shaded_shape_model has part_shape_views defined by one or more Shape_model objects. Each Shape_model defines part_shape_representation for zero, one, or more Shape_model objects.

4.3.355 Sheet to Configuration

Each Sheet has sheet_configuration defined by zero or one Configuration objects. Each Configuration defines sheet_configuration for zero, one, or more Sheet objects.

NOTE There are rules related to the Sheet object that requires the existence of at least one of the attributes.

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4.3.356 Sheet to Element_identification

Each Sheet has sheet_identifier defined by zero or one Element_identification objects. Each Element_-identification defines sheet_identifier for zero, one, or more Sheet objects.

NOTE There are rules related to the Sheet object that requires the existence of at least one of the attributes.

4.3.357 Sheet to Label

Each Sheet has sheet_size defined by zero or one Label objects. Each Label defines sheet_size for zero, one, or more Sheet objects.

NOTE There are rules related to the Sheet object that requires the existence of at least one of the attributes.

4.3.358 Sheet to Product_presentation

Each Sheet has presentation_format defined by zero or one Product_presentation objects. Each Product_-presentation defines presentation_format for zero, one, or more Product_presentation objects.

NOTE There are rules related to the Sheet object that requires the existence of at least one of the attributes.

4.3.359 Simple_list_of_elements to Data_definition_exchange_simple_entry

Each Simple_list_of_elements has element_entries defined by one or more Data_definition_exchange_-simple_entry objects. Each Data_definition_exchange_simple_entry defines element_entries for zero, one, or more Simple_list_of_elements.

4.3.360 Simple_list_of_files to Accessed_file

Each Simple_list_of_files has file_entries defined by zero or one or more Accessed_file objects. Each Accessed_file defines file_entries for zero, one, or more Simple_list_of_files objects.

4.3.361 Simple_list_of_files to Exchange_file

Each Simple_list_of_files has file_entries defined by zero, one, or more Exchange_file objects. Each Exchange_file defines file_entries for zero, one, or more simple_list_of_files objects.

NOTE At least one Accessed_file or Exchange_file must be in the file_entries for a simple_list_of_files.

4.3.362 Size_characteristics to An_integer

Each Size_characteristics has byte_size defined by zero or one An_integer objects. Each An_integer defines byte_size for zero, one, or more Size_characteristics objects.

NOTE There are rules related to the Size_characteristics object that requires the existence of at least one of the attributes.

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4.3.363 Size_characteristics to Label

Each Size_characteristics has sheet_size defined by zero or one Label objects. Each Label defines sheet_-size for zero, one, or more Size_characteristics objects.

NOTE There are rules related to the Size_characteristics object that requires the existence of at least one of the attributes.

4.3.364 Size_characteristics_internal_divisions to An_integer

Each Size_characteristics_internal_divisions has internal_division_count defined by zero or one An_integer objects. Each An_integer defines internal_division_count for zero, one, or more Size_characteristics_-internal_divisions objects.

NOTE There are rules related to the Size_characteristics_internal_divisions object that requires the existence of at least one of the attributes.

4.3.365 Size_characteristics_internal_divisions to Label

Each Size_characteristics_internal_divisions has internal_division_type defined by zero or one Label objects. Each Label defines internal_division_type for zero, one, or more Size_characteristics_internal_-divisions objects.

NOTE There are rules related to the Size_characteristics_internal_divisions object that requires the existence of at least one of the attributes.

4.3.366 Size_characteristics_sheet_across_file to An_integer

Each Size_characteristics_sheet_across_file has number_of_frames_for_sheet defined by zero or one An_-integer objects. Each An_integer defines number_of_frames_for_sheet for zero, one, or more Size_-characteristics_sheet_across_file objects.

NOTE 1 There are rules related to the Size_characteristics_sheet_across_file object that requires the existence of at least one of the attributes.

Each Size_characteristics_sheet_across_file has frame_number_comprising_this_file defined by zero or one An_integer objects. Each An_integer defines frame_number_comprising_this_file for zero, one, or more Size_characteristics_sheet_across_file objects.

NOTE 2 There are rules related to the Size_characteristics_sheet_across_file object that requires the existence of at least one of the attributes.

4.3.367 Source_information_type to Identifier

Each Source_information_type has source_code defined by zero or one Identifier objects. Each Identifier defines source_code for zero, one, or more Source_information_type objects.

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NOTE There are rules related to the Source_information_type object that requires the existence of at least one of the attributes.

4.3.368 Source_information_type to Text

Each Source_information_type has type_of_coding_scheme defined by zero or one Text objects. Each Text defines type_of_coding_scheme for zero, one, or more Source_information_type objects.

Each Source_information_type has source_description defined by zero or one Text objects. Each Text defines source_description for zero, one, or more Source_information_type objects.

NOTE There are rules related to the Source_information_type object that requires the existence of at least one of the attributes.

4.3.369 Special_condition to Label

Each Special_condition has code defined by zero or one Label objects. Each Label defines code for zero, one, or more Special_condition objects.

NOTE There are rules related to the Special_condition object that requires the existence of at least one of the attributes.

4.3.370 Special_condition to Text

Each Special_condition has type_of_coding_scheme defined by zero or one Text objects. Each Text defines type_of_coding_scheme for zero, one, or more Special_condition objects.

Each Special_condition has description defined by zero or one Text objects. Each Text defines description for zero, one, or more Special_condition objects.

NOTE There are rules related to the Special_condition object that requires the existence of at least one of the attributes.

4.3.371 Status to Identifier

Each Status has status_code defined by exactly one Identifier object. Each Identifier defines status_code for zero, one, or more Status objects.

4.3.372 Status to Text

Each Status has status_code_basis defined by zero or one Text objects. Each Text defines status_code_-basis for zero, one, or more Status objects.

4.3.373 Stock_material to Item

Each Stock_material has material defined by zero or one Item objects. Each Item defines material for zero, one, or more Stock_material objects.

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NOTE There are rules related to the Stock_material object that requires the existence of at least one of the attributes.

4.3.374 Stock_material to Stock_size

Each Stock_material has size defined by zero or one Stock_size objects. Each Stock_size defines size for zero, one, or more Stock_material objects.

NOTE There are rules related to the Stock_material object that requires the existence of at least one of the attributes.

4.3.375 Stock_size to Stock_size_parameters

Each Stock_size has parameters_for defined by one or many Stock_size_parameters object. Each Stock_-size_parameters defines parameters_for for zero, one, or more Stock_size objects.

4.3.376 Stock_size to Text

Each Stock_size has catalog defined by zero or one Text objects. Each Text defines catalog for zero, one, or more Stock_size objects.

NOTE 1 This assertion is established through stock_size_classification.

Each Stock_size has cross_section defined by zero or one Text objects. Each Text defines cross_section for zero, one, or more Stock_size objects.

NOTE 2 This assertion is established through stock_size_cross_section.

4.3.377 Stock_size_parameter to Label

Each Stock_size_parameter has name_of_parameter defined by zero or one label objects. Each Label defines name_of_parameter for zero, one, or more Stock_size_parameters objects

NOTE There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

4.3.378 Stock_size_parameters to Number_with_units

Each Stock_size_parameters has width defined by zero or one Number_with_units objects. Each Number_with_units defines width for zero, one, or many Stock_size_parameters objects.

NOTE 1 There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

Each Stock_size_parameters has a_length defined by zero or one Number_with_units objects. Each Number_with_units defines a_length for zero, one, or more Stock_size_parameters objects.

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NOTE 2 There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

Each Stock_size_parameters has radius defined by zero or one Number_with_units objects. Each Number_with_units defines radius for zero, one, or more Stock_size_parameters objects.

NOTE 3 There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

Each Stock_size_parameters has diameter defined by zero or one Number_with_units objects. Each Number_with_units defines diameter for zero, one, or more Stock_size_parameters objects.

NOTE 4 There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

Each Stock_size_parameters has wall_thickness defined by zero or one Number_with_units objects. Each Number_with_units defines wall_thickness for zero, one, or more Stock_size_parameters objects.

NOTE 5 There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

Each Stock_size_parameters has height defined by zero or one Number_with_units objects. Each Number_with_units defines height for zero, one or more Stock_size_parameters objects.

NOTE 6 There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

Each Stock_size_parameters has numeric_parameter defined by zero or one Number_with_units objects. Each Number_with_units defines numeric_parameter for zero, one, or more Stock_size_parameters objects.

NOTE 7 There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

4.3.379 Stock_size_parameters to Text

Each Stock_size_parameters has textual_parameters defined by zero or one Text objects. Each Text defines textual_parameters for zero, one, or more Stock_size_parameters objects.

NOTE There are rules related to the Stock_size_parameters object that require the existence of at least one of the attributes.

4.3.380 String_location_definition to Load_point

Each String_location_definition has string_load_point defined by exactly one Load_point object. Each Load_point defines string_load_point for zero, one, or more String_location_definition objects.

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4.3.381 System_declaration to Identifier

Each System_declaration has system_element_identifier defined by zero or one Identifier objects. Each Identifier defines system_element_identifier for zero, one, or more System_declaration objects.

NOTE 1 There are rules related to the system_declaration object that requires the existence of at least one of the attributes.

Each System_declaration has system_related_element_identifier defined by zero or one Identifier objects. Each Identifier defines system_related_element_identifier for zero, one, or more System_declaration objects.

NOTE 2 There are rules related to the system_declaration object that requires the existence of at least one of the attributes.

Each System_declaration has system defined by zero or one Identifier objects. Each Identifier defines system for zero, one, or more System_declaration objects.

NOTE 3 There are rules related to the system_declaration object that requires the existence of at least one of the attributes.

4.3.382 System_declaration to Text

Each System_declaration has creating_interface defined by zero or one Text objects. Each Text defines creating_interface for zero, one, or more System_declaration objects.

NOTE 1 There are rules related to the system_declaration object that requires the existence of at least one of the attributes.

Each System_declaration has operating_system defined by zero or one Text objects. Each Text defines operationg_system for zero, one, or more System_declaration objects.

NOTE 2 There are rules related to the system_declaration object that requires the existence of at least one of the attributes.

4.3.383 System_destination to Company

Each System_destination has target_company defined by exactly one Company object. Each Company defines target_company for zero, one, or more System_destination objects.

4.3.384 System_destination to Company_code

Each System_destination has target_company_code defined by zero or one Company_code objects. Each Company_code defines target_company_code for zero, one, or more System_destination objects.

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4.3.385 System_destination to Person

Each System_destination has target_person defined by zero or one Person objects. Each Person defines target_person for zero, one, or more System_destination objects.

4.3.386 Tabulation to Column_header

Each Tabulation has tabulation_columnar_headings defined by zero, one, or more Column_header objects. Each Column_header defines tabulation_columnar_headings for zero, one, or more Tabulation objects.

4.3.387 Tabulation to Columnar_data_content_holder

Each Tabulation has tabulation_columns defined by one or more Columnar_data_content_holder objects. Each Columnar_data_content_holder defines tabulation_columns for zero, one, or more Tabulation objects.

4.3.388 Tabulation to Group_parent_column_header

Each Tabulation has tabulation_group_parent_headings defined by zero, one, or more Group_parent_-header objects. Each Group_parent_header defines tabulation_group_parent_headings for zero, one, or more Tabulation objects.

4.3.389 Tabulation to Group_parent_content_holder

Each Tabulation has parent_columns defined by zero, one, or more Group_parent_column_holder objects. Each Group_parent_column_holder defines parent_columns for zero, one, or more Tabulation objects.

4.3.390 Tabulation to Group_parent_header

Each Tabulation has group_parent_headings defined by zero, one, or more Group_parent_header objects. Each Group_parent_header defines group_parent_headings for zero, one, or more Tabulation objects.

4.3.391 Tabulation to Tabulation_header

Each Tabulation has tabulation_headings defined by zero, one, or more Tabulation_header objects. Each Tabulation_header defines tabulation_headings for zero, one, or more Tabulation objects.

4.3.392 Tabulation_entry to Text

Each Tabulation_entry has column_information defined by one or more Text objects. Each Text defines column_information for zero, one, or more Tabulation_entry objects.

4.3.393 Tabulation_header to Field_title

Each Tabulation_header has single_tabulation_header_titles defined by one or more Field_title objects. Each Field_title defines single_tabulation_header_titles for zero, one, or more Tabulation_header objects.

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4.3.394 Tdp_element_and_item_association to Item

Each Tdp_element_and_item_association has related_item defined by exactly one Item object. Each Tdp_-element_and_item_association defines related_item for zero, one, or more Item objects.

4.3.395 Tdp_element_and_item_association to Tdp_element

Each Tdp_element_and_item_association has related_tdp_element defined by exactly one Tdp_Element object. Each Tdp_element defines related_tdp_element for zero, one, or more Tdp_element_and_item_-association objects.

4.3.396 Tdp_element_list_item to Element_identification

Each Tdp_element_list_item has tdp_element_item defined by exactly one Element_identification object. Each Element_identification defines tdp_element_item for zero, one, or more Tdp_element_list_item objects.

4.3.397 Tdp_element_list_item to Identifier

Each Tdp_element_list_item has reference_code defined by zero or one Identifier objects. Each Identifier defines reference_code for zero, one, or more Tdp_element_list_item objects.

4.3.398 Tdp_element_parent_to_item_child_relationship to Element_-identification

Each Tdp_element_parent_to_item_child_relationship has parent defined by exactly one Element_-identification object. Each Element_identification defines parent for zero, one, or more Tdp_element_-parent_to_item_child_relationship objects.

4.3.399 Tdp_element_parent_to_item_child_relationship to Item_-identification

Each Tdp_element_parent_to_item_child_relationship has child defined by exactly one Item_identification object. Each Item_identification defines child for zero, one, or more Tdp_element_parent_to_item_child_-relationship objects.

4.3.400 Tdp_element_parent_to_tdp_element_child_relationship to Element_-identification

Each Tdp_element_parent_to_tdp_element_child_relationship has parent defined by exactly one Element_-identification object. Each Element_identification defines parent for zero, one, or more Tdp_element_-parent_to_tdp_element_child_relationship objects.

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4.3.401 Tdp_element_parent_to_tdp_element_child_relationship to Item_-identification

Each Tdp_element_parent_to_tdp_element_child_relationship has child defined by exactly one Element_-identification object. Each Element_identification defines child for zero, one , or more Tdp_element_-parent_to_tdp_element_child_relationship objects.

4.3.402 Tdp_indentured_item to Item_identification

Each Tdp_indentured_item has top_indenture defined by exactly one Item_identification object. Each Item_identification defines top_indenture for zero, one, or more Tdp_indentured_item objects.

4.3.403 Tdp_indentured_tdp_element to Element_identification

Each Tdp_indentured_tdp_element has top_indenture defined by exactly one Element_identification object. Each Element_identification defines top_indenture for zero, one, or more Tdp_indentured_tdp_element objects.

4.3.404 Time to A_real

Each Time has second defined by zero or one A_real objects. Each A_real defines second for zero, one, or more Time objects.

4.3.405 Time to An_integer

Each Time has hour defined by exactly one An_integer object. Each An_integer defines hour for zero, one, or more Time objects.

Each Time has minute defined by zero or one An_integer objects. Each An_integer defines minute for zero, one, or more Time objects.

4.3.406 Time to Text

Each Time has zone defined by exactly one Text object. Each Text defines zone for zero, one, or more Time objects.

4.3.407 Volume to Number_with_units

Each Volume has a_value defined by exactly one Number_with_units object. Each Number_with_units defines a_value for zero, one, or more Volume objects.

4.3.408 Weight to A_real

Each Weight has a_value defined by exactly one A_real object. Each A_real defines a_value for zero, one, or more Weight objects.

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4.3.409 Weight to Measure

Each Weight has unit_of_measure defined by exactly one Measure object . Each Measure defines unit_-of_measure for zero, one, or more Weight objects.

4.3.410 Weight to Text

Each Weight has derivation_method defined by zero or one Text objects. Each Text defines derivation_-method for zero, one, or more Weight objects.

5 Application interpreted model

5.1 Mapping table

This clause contains the mapping table that shows how each UoF and application object of this part of ISO 10303 (see clause 4) maps to one or more AIM resource constructs (see annex A).

A number of application objects are common across all UoFs except for Presentation (PRES) and, in some cases, Reference Document (RD). The mappings for these common application objects are contained in Table 4 and are not repeated in the other mapping tables. Table 2 can be used to determine which of the aplication objects in Table 4 do not belong to the Reference Document UoF.

NOTE 1 References that are found in the application element column of the mapping table are described at the end of Mapping Table 14.

The mapping table is organized in five columns. The contents of these five columns are:

Column 1) Application element: Name of and application element as it appears in the application object definition in 4.2. Application object names are written in uppercase. Attribute names and assertions are listed after the application object to which they belong and are written in lowercase.

Column 2) AIM element: Name of an AIM element as it appears in the AIM (see Annex A), the term 'IDENTICAL MAPPING', or the term 'PATH'. AIM entities are written in lower case. Attribute names of AIM entities are referred to as <entity name>.<attribute name>. The mapping of an application element may result in several related AIM elements. Each of these AIM elements requires a line of its own in the table. The term 'IDENTICAL MAPPING' indicates that both application objects of an application assertion maps to the entire reference path.

Column 3) Source: For those AIM elements that are interpreted from the integrated resources, this is the number of the corresponding part of ISO 10303. For those AIM elements that are created for the purpose of this part of ISO 10303, this is the number of this part. For those elements that are directly incorporated from an application interpreted construct (AIC), this is the AIC reference.

Column 4) Rules: One or more numbers may be given that refer to rules that apply to the current AIM element or reference path. For rules that are derived from relationships between application objects, the same rule is referred to by the mapping entries of all the involved AIM elements. The expanded names of the rules are listed after the table.

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Column 5) Reference path: To describe fully the mapping of an application object, it may be necessary to specify a reference path through several related AIM elements. The reference path column documents the role of an AIM element relative to the AIM element in the row succeeding it. Two or more such related AIM elements define the interpretation of the integrated resources that satisfies the requirement specified by the application object. For each AIM element that has been created for use within this part of ISO 10303, a reference path up to its supertype from an integrated resource is specified.

For the expression of reference paths and the relationships between AIM elements the following notational conventions apply:

a) [] : multiple AIM elements or sections of the reference path are required to satisfy an information requirement;

b) () : multiple AIM elements or sections of the reference path are identified as alternatives within the mapping to satisfy an information requirement;

c) { } : enclosed section constrains the reference path to satisfy an information requirement;

d) <> : enclosed section constrains at one or more required reference path;

e) || : enclosed section constrains the supertype entity;

f) -> : attribute references the entity or select type given in the following row;

g) <- : entity or select type is referenced by the attribute in the following row;

h) [i] : attribute is an aggregation of which a single member is given in the following row;

i) [n] : attribute is an aggregation of which member n is given in the following row;

j) => : entity is a supertype of the entity given in the following row;

k) <= : entity is a subtype of the entity given in the following row;

l) = : the string, select, or enumeration type is constrained to a choice or value;

m) \ : the reference path expression continues on the next line.

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Table 4 - Mapping table for common

Application element	AIM element	Source	Rules	Reference path
A_NUMBER	number	11		
A_REAL	real	11		
ALTERNATE_ELEMENT_- IDENTIFICATION	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product_category<= product_category product_category.name='document'} <{product_definition_formation product_or_formation_or_definition=product_definition_formation product_or_formation_or_definition<- document_product_association.related_product document_product_association document_product_association.name='equivalence'} {product_definition_formation product_or_formation_or_definition=product_definition_formation product_or_formation_or_definition<- document_product_association.related_product document_product_association document_product_association.relating_document-> document document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document version'}>

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_element_identification to change_identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action
alternate_element_identification to design_authority (design_activity) #1: person and organization #2: just organization	PATH		13	#1: (product_definition_formation person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment person_and_organization_assignment.role->person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) #2: (product_definition_formation organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment organization_assignment.role->organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_element_identification to element_type (element_classifiations)	PATH			product_definition_formation product_definition_formation.of_product->product<-product_related_product_category.products product_related_product_category<=product_category
alternate_element_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->product product.id
alternate_element_identification to other_reference_document (outstanding_changes)	PATH			product_definition_formation<-product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='outstanding changes'} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation
alternate_element_identification to text (title)	PATH			product_definition_formation product_definition_formation._of_product->product product.name
AN_INTEGER	integer	11		
APPROVAL	applied_approval_assignment	232		applied_approval_assignment<=approval_assignment

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
approval to date (approval_date)	PATH		2	applied_approval_assignment<= approval_assignment approval_assignment.assigned_approval->approval<- approval_date_time.dated_approval approval_date_time approval_date_time.date_time->date_time_select date_time_select=(date_and_time)(date) (date_and_time)(date)
approval to person_organization (person_organization) #1: for single person signoff #2: for multiple person signoff - an unique approval_relationship is used for each person signing off	PATH		3	#1: (applied_approval_assignment<= approval_assignment approval_assignment.assigned_approval->approval<- approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->person_organization_select person_organization_select=person_and_organization person_and_organization) #2: (applied_approval_assignment<= approval_assignment approval_assignment.assigned_approval->approval<- approval_relationship.relating_approval approval_relationship approval_relationship.related_approval->approval<- approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->person_organization_select person_organization_select=person_and_organization person_and_organization)

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
approval to text (purpose_of)	PATH			applied_approval_assignment<= approval_assignment approval_assignment.assigned_approval->approval approval.level
CHANGE_IDENTIFICATION	executed_action	41	4	{executed_action<= action action.description='change identification'}
change_identification to change_type (change_code)	PATH			executed_action<= action action.name {(action.name='original') (action.name='original with change') (action.name='revision') (action.name='revision with change') (action.name='change identification') (action.name='other')}

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
change_identification to date (change_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment date_assignment.assigned_date->date {date_assignment.role->date_role date_role.name='change date'}) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment date_and_time_assignment.assigned_date->date_and_time {date_and_time_assignment.role->date_time_role date_time_role.name='change date'})

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
change_identification to date (issue_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment date_assignment.assigned_date->date {date_assignment.role->date_role (date_role.name) (date_role.name=('issue date')(sequence date’))}) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment date_and_time_assignment.assigned_date->date_and_time {date_and_time_assignment.role->date_time_role (date_time_role.name) (date_time_role.name=('issue date')(‘sequence date’))})

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
change_identification to date (revision_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment date_assignment.assigned_date->date {date_assignment.role->date_role date_role.name='revision date'}) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment date_and_time_assignment.assigned_date->date_and_time {date_and_time_assignment.role->date_time_role date_time_role.name='revision date'})
change_identification to identifier (change_level)	PATH			executed_action<= action<- action_relationship.relating_action action_relationship {action_relationship.name='change identification level'} action_relationship.related_action->action {action.description='change'} action.name

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
change_identification to identifier (issue_level) #1: Use to capture issue or sequence string value. #2: Use to capture explicit relationship between two sequences or issue. Could use this to derive a sequence or issue level based on order of the product_-definition_formation_relationships.	PATH			#1:<executed_action<= action<- action_relationship.relating_action action_relationship {action_relationship.name='change identification level'} action_relationship.related_action->action {action.description=('issue')'(sequence')} action.name> #2:<executed_action action<- applied_action_assignment.assigned_action action_assignment=> {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} applied_action_assignment applied_action_assignment.items[i]->action_item action_item=product_definition_formation product_definition_formation product_definition_formation_relationship.related_product_definition_formation {product_definition_formation_relationship.name='sequence'}>
change_identification to identifier (revision_authorization_identifications)	PATH			executed_action<= action id_attribute_select=action id_attribute_select<- id_attribute.identified_item id_attribute id_attribute.attribute_value

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
change_identification to identifier (revision_level) #1: For versioning products (e.g. parts and documents #2: For versioning files	PATH			<executed_action<= action<- action_relationship.relating_action action_relationship {action_relationship.name='change identification level'} action_relationship.related_action->action {action.description=’revision'} action.name> executed_action<= action<- action_assignment.assigned_action action_assignment=> {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} applied_action_assignment applied_action_assignment.items[i]->action_item #1: (action_item=product_definition_formation product_definition_formation product_definition_formation.id) #2: (action_item=document_file document_file identification_item=document_file identification_item<- assigned_identification_assignment.items[i] assigned_identification_assignment<= identification_assignment {identification_assignment.role->identification_role.name=’version’} identification_assignment.assigned_id)

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
change_identification to other_- reference_document (revision_authorization_identifications)	PATH			executed_action document_reference_item=executed_action document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role (object_role.name) (object_role.name=(’revision authorization identification')(‘change rationale’))} document_reference.assigned_document->>br>document<- {document.kind->>br>document_type document_type.product_data_type=\ ‘configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=>>br>document_product_equivalence} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation
change_identification to status (action_status)	PATH			executed_action<- action_status.assigned_action action_status

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
change_identification to text (change_description)	PATH			executed_action<= action<- action_relationship.relating_action action_relationship {action_relationship.name='change identification level'} action_relationship.related_action->action action.chosen_method->action_method action_method.description
change_identification to text (revision_description)	PATH			<executed_action<= action<- applied_action_assignment.assigned_action action_assignment=> {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} applied_action_assignment applied_action_assignment.items[i]->action_item action_item=product_definition_formation product_definition_formation product_definition_formation.description> <executed_action<= action<- action_relationship.relating_action action_relationship {action_relationship.name='change identification level'} action_relationship.related_action->action action.chosen_method->action_method action_method.description>

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
COMPANY	organization	41		
company to label (name)	PATH			organization organization.name
company to text (address)	PATH			organization<- organizational_address.organizations[i] organizational_address<= address
COMPANY_CODE	organization	41		
company_code to identifier (code) #1: Only one code for organization and no type of administrator information or code type needed. #2: One or more code for organization needed or type of code or code administrator information needed.	PATH			#1 : organization.id #2 : organization<- identification_item=organization identification_item<- applied_identification_assignment.items[i] applied_identification_assignment<= identification_assignment identificaiton_assignment.assigned_id {identification_assignment.role->identification_role identification_role.name='alias id'}

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
company_code to company (code_administrator)	PATH			organization<- identification_item=organization identification_item<- applied_identification_assignment.items[i] applied_identification_assignment<= identification_assignment {identification_assingment.role->\ identification_role identification_role.name='alias id'} {(identification_role.description) (identification_role.description=\ (’CAGE’)(‘commercial and government entity’)\ (‘CEC’)(‘contractor establishment code’)\ (‘DUNS’)(‘data universal numbering system’)\ (‘EIN’)(“employer identification number’)\ (‘PASS’)(“procurement automated source system’))} organization_item=identification_assignment organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->\ organization_role organization_role.name=’alias id administrator’} organization_assignment.assigned_organization->\ organization

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
company_code to text (type_of_code)	PATH			organization<- identification_item=organization identification_item<- applied_identification_assignment.items[i] applied_identification_assignment<= identification_assignment <identification_assingment.role-> identification_role (identification_role.description) (identification_role.description='CAGE') (identification_role.description='CEC') (identification_role.description='DUNS') (identification_role.description='EIN') (identification_role.description='PASS') {identification_role.name='alias id'}> <organization_item=identification_assignment organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment organization_assignment.role-> organization_role description_attribute_select=organization_role description_attribute_select<- description_attribute.described_item description_attribute (description_attribute.attribute_value) (description_attribute.attribute_value=\ ('Commercial and Government Entity')\ ('Contractor Establishment Code')\ ('Data Universal Numbering System')\ ('Employer Identification Number')\ ('Procurement Automated Source System'))>
CONFIGURATION	property_definition	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
configuration to contract (preparing_contracts) #1: use for applying contract to document represenation #2: use for applying contract to version of part or document version	PATH			property_definition property_definition.definition->characterized_definition characterised_definition==characterized_product_definition characterized_product_definition= product_definition product_defintion #1: (contract_item=product_definition) #2: (product_definition.formation->product_definition_formation contract_item=product_definition_formation) contract_item<-applied_contract_assignment.items[i] applied_contract_assignment<=contract_assignment {contract_assignment<-role_select=contract_assignment role_select<-role_association.item_with_role role_association role_association.role->object_role object_role.name= ‘preparing contract’} contract_assignment.assigned_contract->contract

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
configuration to distribution_notice (distribution_authorizations)	PATH			property_definition property_definition.definition-> characterized_definition characterised_definition =characterized_product_definition characterized_product_definition=product_definition product_defintion (approval_item=product_definition) (product_definition.formation-> product_definition_formation approval_item=product_definition_formation) approval_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment {approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='distribution notice'} approval_assignment.assigned_approval-> approval

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
configuration to label (data_usage_rights)	PATH		18	property_definition approval_item=property_definition approval_item<- applied_approval_assignment.items applied_approval_assignment<= approval_assignment {approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='data usage rights'} approval_assignment.assigned_approval->>br>approval approval.level <approval.status->>br>approval_status approval_status.name>

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
configuration to product_configuration (end_item_system_designation) #1: when configuration is for an item/part #2: when configuration is for a group of product data / document where the usage context within the configuration item is required. #3: when configuration is for a group of product data / document, where no usage context within the configuration is required.	PATH			#1, #2: (property_definition property_definition.definition->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition<-product_definition_relationship.related_product_definition product_definition_relationship<-product_definition_effectivity.usage product_definition_effectivity=>configuration_effectivity configuration_effectivity.configuration->configuration_design configuration_design.configuration->configuration_item) #3: property_definition property_definition.definition->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition product_definition.formation->product_definition_formation product_definition_formation=configuration_design_item configuration_design_item<-configuration_design.design configuration_design configuration_design.configuration->configuration_item)

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
onfiguration to release_authentication (release_authorizations)	PATH		18	property_definition approval_item=property_definition approval_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment {approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='release authentication'} approval_assignment.assigned_approval->approval
configuration to security_classifications (security_identifications)	PATH			property_definition property_definition.definition->characterized_definition characterised_definition =characterized_product_definition characterized_product_definition=product_definition product_defintion (security_classification_item=product_definition) (product_definition.formation->product_definition_formation security_classification_item=product_definition_formation) security_classification_item<- applied_security_classification_assignment.items[i] applied_security_classification_assignment<= security_classification_assignment security_classification_assignment.assigned_security_classification->security_classification
CONTRACT	contract	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
contract to identifier (contract_data_requirements_list_-number)	PATH			contract<- contract_assignment.assigned_contract contract_assignment=> {contract_assignment<- role_select=contract_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='contract document'} applied_contract_assignment applied_contract_assignment.items[i]-> contract_item contract_item=product_definition_formation product_definition_formation {product_definition_formation-> product<- product_related_product_category.products product_related_product_category<= product_category.name='document'} product_or_formation_or_definition=product_definition_formation product_or_formation_or_definition<- document_product_association.related_product document_product_association {document_product_association=> document_product_equivalence} document_product_association.relating_document-> document<- document_usage_constraint.source document_usage_constraint {document_usage_constraint.subject_element=\ 'contract data requirements list'} document_usage_constraint.subject_element_value <document_usage_constraint<- document_usage_constraint_assignment.assigned_document_usage document_usage_constraint_assignment {document_usage_constriant_assignment=> applied_document_usage_constraint_assignment} document_usage_constraint_assignment.item[i]-> document_usage_constraint_item document_usage_constraint_item=\ (product_definition)(product_definition_formation)\

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
				(applied_document_reference)>
contract to identifier (contract_number)	PATH			contract-> contract.name
contract to identifier (commercial_item_description or data_item_description_number)	PATH			contract<- contract_assignment.assigned_contract contract_assignment=> {contract_assignment<- role_select=contract_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='reference from contract'} applied_contract_assignment applied_contract_assignment.items[i]-> contract_item contract_item=product_definition_formation product_definition_formation {product_definition_formation-> product<- product_related_product_category.products product_related_product_category<= product_category.name='document'} {product_definition_formation-> product<- product_related_product_category.products product_related_product_category<= product_category.name='data item description list'}
DATE	(date)(date_and_time)	41		
DESIGN_AUTHORITY	(person_and_organization_assignment) (organization_assignment)	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
design_authority to company (design_activity_identification) #1: just organization #2: organization with person	#1,#2: PATH			#1:(organization_assignment organization_assignment.assigned_organization->organization) #2:(person_and_organization_assignment person_and_organization_assignment.assigned_person_and_organization->person_and_organization person_and_organization.the_organization->organization)
design_authority to company_code (design_activity_code) #1: just organization #2: organization with person	#1,#2: PATH			#1:(organization_assignment organization_assignment.assigned_organization->organization) #2:(person_and_organization_assignment person_and_organization_assignment.assigned_person_and_organization->person_and_organization person_and_organization.the_organization->organization)
design_authority to label (role) #1: just organization #2: organization with person				#1: (organization_assignment organization_assignment.role->organization_role (organization_role.name) (organization_role.name=(‘id owner')(‘creator’))) #2: (person_and_organization_assignment person_and_organization_assignment.role->person_and_organization_role (organizaiton_role.name) (person_and_organization_role.name=('id owner')(‘creator’)))
design_authority to person (person_responsible) #1: just organization (see note 2) #2: organization with person	#2: PATH			#2:(person_and_organization_assignment person_and_organization_assignment.assigned_person_and_organization->person_and_organization person_and_organization.the_person->person)
DISTRIBUTION_NOTICE	approval	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
distribution_notice to label (distribution_code)	PATH		11	approval classification_item=approval classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classifcation_assignment.role->classification_role classification_role.name='distribution notice code'} classification_assignment.assigned_class->group group.name {group=> class}
distribution_notice to person_and_-organization (distribution_authority)	PATH		11	approval<- approval_person_organization.authorized_approval approval_person_organization {approval_person_organization.role->approval_role approval_role.name='distribution authorizaton'} approval_person_organization.person_organization->person_organization_select (person_organization_select=organization) (person_organization_select= person_and_organization)
distribution_notice to text (distribution_statement)	PATH		11	approval approval.level

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
ELEMENT_IDENTIFICATION	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product_category<= product_category product_category.name='document'} <{product_definition_formation product_or_formation_or_definition=product_definition_formation product_or_formation_or_definition<- document_product_association.related_product document_product_association document_product_association.name='equivalence'} {product_definition_formation product_or_formation_or_definition=product_definition_formation product_or_formation_or_definition<- document_product_association.related_product document_product_association document_product_association.relating_document-> document document.kind-> document_type document_type.product_data_type='configuration controlled document version'}>
element_identification to alternate_element_identification (alternate_identifications)	PATH			product_definition_formation<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='alternate element identification'} product_definition_formation_relationship.relatrd_product_definition_formation-> product_definition_formation

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
element_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=’change identification’} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action
element_identification to design_-authority (design_activities) #1: person and organization #2: just organization	PATH		13	#1: (product_definition_formation person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment person_and_organization_assignment.role->person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=(’id owner’)(‘creator’))}) #2: (product_definition_formation organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment organization_assignment.role->organization_role (organization_role.name) (organization_role.name=(’id owner’)(‘creator’))})

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
element_identification to element_type (element_classifiations)	PATH			product_definition_formation product_definition_formation.of_product->product<-product_related_product_category.products product_related_product_category<=product_category
element_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->product product.id
element_identification to other_-reference_document (outstanding_changes)	PATH			product_definition_formation<-product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship{product_definition_formation_relationship.name='outstanding changes'} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation
element_identification to text (title)	PATH			product_definition_formation product_definition_formation._of_product->product product.name
ELEMENT_TYPE	product_category	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
element_type to company (code_administrator)	PATH			product_category organiation_item=product_category organizatin_item<- assigned_organization_assignment.item[i] assigned_organization_assignment<= organization_assignment {organization_assignment organization_assignment.role->organization_role organization_role.name='code administrator'} organization_assignment.assigned_organization->organization
element_type to label (element_code)	PATH			product_category product_category.name
element_type to text (type_of_coding_scheme)	PATH			product_category product_category.description
HEADER	property_definition	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
header to an_integer (sheet_count)	PATH			property_definition property_definition.definition->
characterized_definition characterized_definition=characterized_product_defintion characterized_product_definition=product-definition product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.defintion property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->
representation {representation.name='document parameters'} representation.items[i]->
representation_item=> measure_representation_item<= measure_with_unit measure_with_unit.value_component->
measure_value measure_value=count_measure count_measure {representation_item.name='page count'} {measure_with_unit.unit_component->
unit unit=named_unit named_unit=> context_dependent_unit context_dependent_unit.name='count'}
header to header_configuration_with_- element_identification (header_configuration)	IDENTICAL MAPPING			

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
header to label (languages)	PATH			property_definition property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document languages'} representation.items[i]->representation_item=> descriptive_representation_item descriptive_representation_item.description
header to size_characteristics (size_of_sheet)				property_definition property_definition.definition->characterized_definition characterized_definition=characterized_product_defintion characterized_product_definition=product-definition product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<-property_definition.defintion property_definition<-{property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document format'}
header to text (document_abstract)	PATH			property_definition property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document abstract'} representation.items[i]->representation_item=> descriptive_representation_item descriptive_representation_item.description

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
header to text (document_keywords)	PATH			property_definition property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document keywords'} representation.items[i]->representation_item=> descriptive_representation_item descriptive_representation_item.description
HEADER_CONFIGURATION_-WITH_ELEMENT_-IDENTIFICATION	property_definition	41		
header_configuration_with_element_-identification to configuration (data_configuration)	IDENTICAL MAPPING			
header_configuration_with_element_-identification to element_identification (identification)	PATH	41		property_defintion property_definition.definition->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition product_definition.formation->product_definition_formation
IDENTIFIER	identifier	41		
ITEM	product_definition	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
item to alternate_item (alternates) #1: If alternate is a substitute with no concern for which is used in an assembly context #2: If alternate is an alternate item with concern for which is used in an assembly context. #3: If alternate is an alternate item with a one for one substitution and allows for two way substitution in a particular assembly context	PATH			#1: (product_definition product_definition.formation->) product_definition_formation product_definition_formation.of_product->) product<- alternate_product_relationship.base alternate_product_relationship alternate_product_relationship.alternate->) product) #2: (product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.base (assembly_component_usage_substitute) (assembly_component_usage_substitute=> assembly_component_usage_substitute_with_ranking) assembly_component_usage_substitute.substitute->) assembly_component_usage<= product_definition_usage<= product_definition_relationship.related_product_definition->) product_definition product_definition.formation->) product_definition_formation product_definition_formation.of_product->) product) #3: (product_definition<- product_definition_relationship.related_product_definition product_definition_relationship<- product_definition_substitute.context_relationship product_definition_substitute product_definition_substitute.substitute_definition->) product_definition product_definition.formation->) product_definition_formation product_definition_formation_of_product->) product)

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
item to configuration (item_configuration)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition
item to item_identification (identification)	PATH			product_definition product_definition.formation->\ product_definition_formation

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
item to label (item_context)	PATH			(product_definition product_definition.formation->) product_definition_formation product_definition_formation.of_product->) product product.frame_of_references[i]->) product_context<= application_context_element application_context_element.name) (product_definition product_definition.formation->) product_definition_formation product_definition_formation.of_product->) product product.frame_of_references[i]->) product_context<= application_context_element application_context_element.frome_of_reference->) application_context application_context.application) ((product_definition product_definition.frame_of_reference->) (product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference->) product_definition_context product_definition_context<= application_context_element application_context_element.name) ((product_definition product_definition.frame_of_reference->) (product_definition<- product_definition_context_asscoaition.definition product_definition_context_association product_definition_context_association.frame_of_reference->) product_definition_context product_definition_context<= application_context_element application_context_element.frame_of_reference->

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context application_context.application)
item to notation (notes)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name=’descriptive properties’} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='notation'} representation.items[i]->representation_item=> descriptive_representation_item

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
item to reference_document_usage (conditions_defined_through_-constrained_document) #1: Multiple constraints parameters that are applied together. #2: Single constraint applied independently	PATH			#1: (product_definition document_reference_item=product_definition document_reference_item<- applied_document_reference.items[i] applied_document_reference <applied_document_reference<= document_reference<- role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
item to reference_document (conditions_defined_through_simple_-reference)	PATH			product_definition document_item=product_definition document_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role (object_role.name) (object_role.name=’finish condition’) (object_role.name=’final condition’)} document_reference.assigned_document->>br>document<- {docoument.kind->>br>document_type document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=>>br>document_product_equivalence} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
item to special_condition (special_conditions)	PATH			product_definition characterized_product_definition=product_definition characterized_product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='special condition'} representation.items[i]-> representation_item representation_item=> descriptive_representation_item
item to weight (item_weight)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition <- {property_definition.name='weight'} property_definition_representation.definition property_ definition_representation property_definition_representation.used_representation-> representation representation.items[i]-> representation_item
LABEL	label	41		
MEASURE	named_unit	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
OTHER_REFERENCE_-DOCUMENT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product_category<= product_category product_category.name='document'} {product_definition_formation<- product_definition product_definition.frame_of_reference-> product_defninition_context<= application_context_element application_context_element.frame_of_reference-> application_context application_context.application='reference document'}
PERSON	person	41		
PERSON_AND_ORGANIZATION	person_organization_select	41		
person_and_organization to company (organization)	PATH			person_organization_select (person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization-> organization) (person_organization_select=organization organization)
person_and_organization to person (person_identification)	PATH			person_organization_select (person_organization_select=person_and_organization person_and_organization person_and_organization.the_person-> person) (person_organization_select=person person)

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
person_and_organization to text (electronic_mail_address)	PATH			person_organization_select (person_organization_select=person_and_organization person_and_organization person_and_organization.the_person->) (person_organization_select=person) person<- personal_address.people personal_address<= address address.electronic_mail_address
person_and_organization to text (person_address)	PATH			person_organization_select (person_organization_select=person_and_organization person_and_organization person_and_organization.the_person->) (person_organization_select=person) person<- personal_address.people personal_address<= address
PRODUCT_CONFIGURATION	configuration_item	44		
product_configuration to approval (approval_of_configuration)	PATH			configuration_item approval_item =configuration_item approval_item<- applied_approval_assignement.items[i] applied_approval_assignment <applied_approval_assignment<= approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role>

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
product_configuration to identifier (configuration_id)	PATH			configuration_item configuration_item.id
product_configuration to product_-model (product_name)	PATH			configuration_item configuration_item.item_concept-> product_concept
PRODUCT_MODEL	product_concept	44		
product_model to label (model_name)	PATH			product_concept product_concept.id
REFERENCE_DOCUMENT	product_definition_formation	41	26	{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- product_category.name=’document’ product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='reference document'}
reference_document to element_-identification (document_identification)	IDENTICAL MAPPING			
RELEASE_AUTHENTICATION	approval	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
release_authentication to company (release_authority) #1: without person #2: with person	PATH		27	#1:(approval<- approval_person_organization.authorized_approval approval_person_organization {approval_person_organization.role->approval_role approval_role.role='release authentication'} approval_person_organization.person_organization->person_organization_select person_organization_select=organization organization) #2:(approval<- approval_person_organization.authorized_approval approval_person_organization {approval_person_organization.role->approval_role approval_role.role='release authentication'} approval_person_organization.person_organization->person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization->organization)
release_authentication to company_-code (release_authority_code)	PATH		28	approval<- approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->person_organization_select=organization organization

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
release_authentication to date (release_date)	PATH		29	approval<- approval_date_time.dated_approval approval_date_time {approval_date_time role_select=approval_date_time role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='release authentication'} approval_date_time.date_time->date_time_select (date_time_select=date) (date_time_select=date_and_time)
release_authentication to identifier (authentication)	PATH			approval approval.status->approval_status approval_status.name
release_authentication to person (person_responsible)	PATH		27	approval<- approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_person->person
SECURITY_CLASSIFICATION	security_classification	41		

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
security_classification to date (classificaiton_date) #1: Date #2: Date and Time	PATH		30	#1: (security_classification<- security_classification_assignment.assigned_security_classification security_classification_assignment=> applied_security_classification_assignment date_item=applied_security_classification_assignment date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment date_assignment.assigned_date-> date {date_assignment.role-> date_role date_role.name='classification date'}) #2: (security_classification<- security_classification_assignment.assigned_security_classification security_classification_assignment=> applied_security_classification_assignment date_and_time_item=applied_security_classification_assignment date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment date_and_time_assignment.assigned_date-> date_and_time {date_and_time_assignment.role-> date_time_role date_time_role.name='classification date'})

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
security_classification to date (declassification_date) #1: Date #2: Date and Time	PATH		31	#1: (security_classification<- security_classification_assignment.assigned_security_classification security_classification_assignment=> applied_security_classification_assignment date_item=applied_security_classification_assignment date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment date_assignment._date->date {date_assignment.role->date_role date_role.name='declassification date'}) #2: (security_classification<- security_classification_assignment.assigned_security_classification security_classification_assignment=> applied_security_classification_assignment date_and_time_item=applied_security_classification_assignment date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment date_and_time_assignment.assigned_date->date_and_time {date_and_time_assignment.role->date_time_role date_time_role.name='declassification date'})
security_classification to label (item_classification)	PATH			security_classification {security_classification.purpose='item security classification'} security_classification.security_level->security_classification_level security_classification_level.name

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
security_classification to label (title_security_classification)	PATH			security_classification {security_classification.purpose='title security classification'} security_classification.security_level->
 security_classification_level security_classification_level.name
SIZE_CHARACTERISTICS	representation	43		{representation.context_of_items->
 representation_context (representation_context.context_type=’file parameters’) (representation_context.context_type=’entry parameters’) (representation_context.context_type=’document parameters’)}
size_characteristics to a_real (byte_size)	PATH			representation representation.items[i]->
 representation_item {representation_item.name='file size'} representation_item=> measure_representation_item<= measure_with_unit.value_component measure_value measure_value=context_dependent_measure context_dependent_measure {measure_with_unit.unit_component->
 unit unit=named_unit named_unit=> context_dependent_unit context_dependent_unit.name=’byte’}
size_characteristics to label (sheet_size)	PATH			representation {representation.name=’document format’} representation.items[i]->
 representation_item {representation_item.name=('size format')(‘size format standard’)} representation_item=> descriptive_representation_item.description

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
SIZE_CHARACTERISTICS_FULL_- SIZE	representation	43		({representation.name=’one sheet in one file’}) ({representation.name=’document size’})
STATUS	action_status	41		
status to identifier (status_code)	PATH			action_status action_status.status
status to text (status_code_basis)	PATH			action_status classification_item=action_status classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= {classification_assignment role_select=classification_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='status code basis'} classification_assignment classification_assignment.assigned_class->>br>group group.name {group=>>br>class_system}
TDP_ELEMENT_AND_ITEM_- ASSOCIATION	(product_definition_with_associated_- documents) (product_definition_formation_- relationship) (prodcut_definition_relationship) (applied_document_reference)	41 41 41 232		{(product_definition_relationship.name) (product_definition_relationship.name=’fulfills’)}

Table 4 - Mapping table for common (continued)

Application element	AIM element	Source	Rules	Reference path
tdp_element_and_item_association to item (related_item)	PATH			(product_definition_with_associated_documents<= prodcuct_definition product_definition.formation->product_definition_formation) (product_definition_formation_relationship product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) (product_definition_relationship product_definition_relationship.related_product_definition->product_definition product_definition.formation->product_definition_formation (applied_document_reference applied_document_reference.items[i]->document_reference_item document_reference_item=product_definition_formation product_definition_formation)

Table 4 - Mapping table for common (concluded)

Application element	AIM element	Source	Rules	Reference path
tdp_element_and_item_association to tdp_element (related_tdp_element)	PATH			(product_definition_with_associated_documents product_definition_with_associated_documents.documentation.ids[i]-> document<- document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation prodcut_definition_formation) (product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation->product-definition_formation) (product_definition_relationship product_definition_relationship.relating_product_definition->product_definition product_definition.formation->product_definition_formation) (applied_document_reference<= document_reference document-reference.assigned_document->document<- document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_product_definition.definition_formation product_definition_formation)
TEXT	text	41		
TIME	local_time	41		

Table 5 - Mapping table for data_definition_exchange

Application element	AIM element	Source	Rules	Reference path
ACCESSED_FILE	document_file	232		{document_file<= document document.description= ‘access data file’}
accessed_file to text (path_information)	PATH		1	document_file external_identification_item=document_file external_identification_item<- applied_external_identification_assignment.items[i] applied_external_identification_assignment<= external_identification_assignment [external_identification_assignment<= identification_assignment {identification_assignment.role->(identification_role) (identification_role.description='access context')}] [external_identification_assignment.source->external_source external_source.source_id]
accessed_file to text (storage_node_identification)	PATH		1	document_file external_identification_item=document_file external_identification_item<- applied_external_identification_assignment.items[i] applied_external_identification_assignment<= external_identification_assignment<= identification_assignment {identification_assignment.role->(identification_role) (identification_role.description='access context')} identification_assignment.assigned_id
ALTERNATE_IDENTIFICATION_- OF_ITEM	product_definition_formation	41		

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to change_identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action
alternate_identification_of_item to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to drawing_suffix_number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product-> product
alternate_identification_of_item to identifier (identifying_number)	PATH			product_definition_formation [product_definition_formation.id] product_definition_formation.of_product-> product [product.id] <product_defintion_formation oganization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment organization_assignment.assigned_organization-> organization>
alternate_identification_of_item to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category
alternate_identification_of_item to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to source_information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation
ALTERNATE_ITEM #1: If alternate is a substitute with no concern for which is used in an assembly context #2: If alternate is an alternate item with concern for which is used in an assembly context #3: If alternate is an alternate item with a one for one substitution and allows for two way substitution in a particular assembly context	product	41		#1: ({product<- alternate_product_relationship.alternate}) #2: ({product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute}) #3: ({product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute})

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_item to an_integer (usage_conditions) preference_order #1: (see note 2) #3: (see note 2)	#2: (PATH)		117	#2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute_with_ranking assembly_component_usage_substitute_with_ranking.ranking)
alternate_item to item (interchange_item) #2: (see note 2) #3: (see note 2)	PATH			product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition
alternate_item to item_usage (interchange_item) #1: (see note 2) #3: (see note 2)	PATH			#2: product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- (product_definition_relationship.related_product_definition product_definition_relationship)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_item to label (type_of_alternate)	PATH			#1: (product<- alternate_product_relationship.alternate alternate_product_relationship alternate_product_relationship.name) #2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute.name) #3: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute product_definition_substitute.name)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_item to text (usage_conditions) specific_usage	#2: (PATH) #3: (PATH)		117	#1: ({<product<- alternate_product_relationship.basis> <product<- alternate_product_relationship.description>}) #2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute.definition) #3: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute product_definition_substitute.description)
CONTRACT_SUBMISSION	applied_contract_assignment	232		{applied_contract_assignment<= contract_assignment<- contract_assginment_role.assignment contract_assignment_role contract_assignment_role.role->> contract_role contract_role.name='contract submission'}
contract_submission to contract (delivered_contract)	PATH			applied_contract_assignment<= contract_assignment contract_assignment.assigned_contract->> contract

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
contract_submission to date (date_of_submission) #1: If the date includes date and time #2: If the date only includes a date	PATH		5	applied_contract_assignment #1: (date_and_time_item=applied_contract_assignment date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment {date_and_time_assignment date_and_time_assignment.role->> date_time_role date_time_role.name='date and time of submission'} date_and_time_assignment.assigned_date_and_time->> date_and_time) #2: (date_item=applied_contract_assignment date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment {date_assignment date_assignment.role->> date_role date_role.name='date of submission'} date_assignment.assigned_date->> date)
contract_submission to text (location)	PATH		6	applied_contract_assignment organization_item=applied_contract_assignment organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment organization_assignment.role->> organization_role organization_role.name='location of contract submission'} organization_assignment.assigned_organization->> organization<- organizational_address.organizations[i] organizational_address<= address

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
DATA_DEFINITION_ENTRY_- ITEM	(product_definition_with_associated_- documents) (product_definition)	41		{product_definition product_definition.frame_of_reference->
product_definition_context<= application_context_element (application_context_element.name=(‘data definition entry’)) (application_context_element.name)}
data_definition_entry_item to contract_submission (available_from)	PATH			(product_definition_with_associated_documents) (product_definition) contract_item=(product_definition_with_associated_documents)\ (product_definition) contract_item<- applied_contract_assignment.items[i] applied_contract_assignment

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_item to data_-definition_file_entry (entry_files) #1: When file is managed though the item. #2: When the file is just referenced by the item. #3: When the file is the shape of the product.	PATH			#1: (product_definition_with_associated_documents product_definition_with_associated_documents.documentation_ids[i]->document=> document_file) #2: (product_definition document_reference_item=product_definition document_reference_item<- applied_document_reference applied_document_reference.assigned_document->document=> document_file) #3: (product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition {property_definition=> product_definition_shape} representation_definition=property_definition representation_definition<- property_definition_representation {property_definition_representation=> shape_definition_representation} property_definition_representation.used_representation->representation<- {representation=> shape_representation} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition->property_definition property_definition.definition->characterized_definition characterized_definition=characterized_object characterized_object=> document_file)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_item to delivery_accounting (delivery_accounting_references)	PATH			(product_definition) (product_definition_with_associated_docuemnts<= product_definition) product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name='delivery accounting reference'} product_definition_relationship.related_product_definition->product_definition product_definition.formation->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category product_category product_category.name='document'}
data_definition_entry_item to element_identification (superseded_entry)	PATH		7	((product_definition) (product_definition_with_associated_documents<= product_definition) product_definition <- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name=’superseded element’} product_definition_relationship.related_product_definition ->product_definition->product_definition_formation) ((product_definition) (product_definition_with_associated_documents<= product_definition) product_definition.formation->product_definition_formation<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name=\ ‘superseded version’} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_item to identifier (entry_item_change_level)	PATH			(product_defnition)(product_definition_with_associated_documents) action_item=(product_defnition)\ (product_definition_with_associated_documents) action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='change identification for entry'} action_assignment.assigned_action->>br>action {action=> executed_action} action.name
data_definition_entry_item to notation (entry_notes)	PATH			((product_definition)\ (product_definition_with_associated_documnents) characterized_product_definition=(product_definition)\ (product_definition_with_associated_documnents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='exchange entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->>br>representation {representation.name='notation'} representation.items[i]->>br>representation_item=> descriptive_representation_item

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_item to reference_document (available_from)	PATH			((product_definition)\ (product_definition_with_associated_documents) document_reference_item=(product_definition)\ (product_definition_with_associated_documents) document_reference_item<- applied_document_referenece.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='source identification'} document_reference.assigned_document->document<- {docoument.kind->document_type document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products product_related_product-category<=product_category product_category.name='document'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_item to special_-condition (special_conditions)	PATH			(product_defnition)\ (product_definition_with_associated_documents) characterized_product_definition=(product_definition)\ (product_defintion_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='exchange entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='special condition'} representation.items[i]-> representation_item=> descriptive_representation_item
DATA_DEFINITION_ENTRY_-TDP_ELEMENT	(product_definition_with_associated_-documents) (product_definition)	41		{product_definition product_definition.frame_of_reference-> product_definition_context<= application_context_element (application_context_element.name=('data definition entry')\ ('document version')\ ('a representation of a document version')) (application_context_element.name)}
data_definition_entry_tdp_element to contract_submission (available_from)	PATH			(product_definition_with_associated_documents)\ (product_definition) contract_item=(product_definition_with_associated_documents)\ (product_definition) contract_item<- applied_contract_assignment.items[i] applied_contract_assignment
data_definition_entry_tdp_element to data_definition_file_entry (entry_files)	PATH			product_definition_with_associated_documents product_definition_with_associated_documents.documentation_ids[i]-> document=> document_file

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to delivery_accounting (delivery_accounting_references)	PATH			(product_definition) (product_definition_with_associated_docuemnts<= product_definition) product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name='delivery accounting reference'} product_definition_relationship.related_product_definition->product_definition product_definition.formation->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category product_category product_category.name='document'}
data_definition_entry_tdp_element to element_identification (superseded_entry)	PATH		7	((product_definition) (product_definition_with_associated_documents<= product_definition) product_definition <- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name=’superseded element’} product_definition_relationship.related_product_definition ->product_definition->product_definition_formation) ((product_definition) (product_definition_with_associated_documents<= product_definition) product_definition.formation->product_definition_formation<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name=\ ‘superseded version’} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to file_format (entry_format)	PATH			((product_definition)\ (product_definition_with_associated_documents) characterized_product_definition=(product_definition)\ (product_definition_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.name='document format'})
data_definition_entry_tdp_element to identifier (entry_item_change_level)	PATH			(product_defnition)(product_definition_with_associated_documents) action_item=(product_defnition)\ (product_definition_with_associated_documents) action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to label (actual_inclusion_in_data_exchange)	PATH			(product_definition_with_associated_documents)\ (product_defintion) characterized_product_definition= (product_definition_with_associated_documents)\ (product_defintion) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name=’exchange entry property’} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name=’include flag’} representation.items[i]->representation_item {representation_item=>descriptive_representation_item} representation_item.name {(descriptive_representation_item.name) (descriptive_representation_item.name=\ (‘already delivered’)(‘available for access’)(‘fully included’)\ (‘not deliverable’)(‘not delivered yet’)(‘not received’)\ (‘partially included’)(‘receipt accepted’)(‘receipt acknowledged’)\ (‘receipt partially rejected’)(‘receipt rejected’)(‘resubmission’))}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to label (data_usage_rights)	PATH			((product_defnition)(product_definition_formation) characterized_product_definition=(product_defnition)\ (product_definition_formation) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.name=’exchange entry property’} approval_item=property_definition approval_item<- applied_approval_assignment.items applied_approval_assignment<= approval_assignment {approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name=’data usage rights’} approval_assignment.assigned_approval->>br>approval approval.level <approval.status-> approval_status>

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to notation (entry_notes)	PATH			((product_definition)\ (product_definition_with_associated_documnents) characterized_product_definition=(product_definition)\ (product_definition_with_associated_documnents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='exchange entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='notation'} representation.items[i]-> representation_item=> descriptive_representation_item)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to reference_document (available_from)	PATH			(product_definition)\ (product_definition_with_associated_documents) document_reference_item=(product_definition)\ (product_definition_with_associated_documents) document_reference_item<- applied_document_referenece.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='source identification'} document_reference.assigned_document->>br>document<- {docoument.kind->>br>document_type document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation {product_definition_formation.of_product->>br>product<- product_related_product_category.products product_related_product-category<= product_category product_category.name='document'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to size_characteristics (size)	PATH			((product_defnition)\ (product_definition_with_associated_documents) characterized_product_definition=(product_defnition)\ (product_definition_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='document size'})
data_definition_entry_tdp_element to special_condition (special_conditions)	PATH			(product_defnition)\ (product_definition_with_associated_documents) characterized_product_definition=(product_definition)\ (product_defintion_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='exchange entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='special condition'} representation.items[i]-> representation_item=> descriptive_representation_item

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_entry_tdp_element to text (entry_format)	PATH			(product_defnition)\ (product_definition_with_associated_documents) characterized_product_definition=(product_defnition)\ (product_definition_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document format'} representation.items[i]->representation_item=> descriptive_representation_item {(descriptive_representation_item.name) (descriptive_representatoin_item.name=\ ('size format')('character code')('data format')} descriptive_representation_item.description
data_definition_entry_tdp_element to yes_no (master_file)	PATH			(product_definition_with_associated_documents)(product_definition) characterized_product_definition=(product_definition_with_associated_documents)\ (product_definition) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='exchange entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='master representation flag'} representation.items[i]->representation_item {representation_item=>descriptive_representation_item} (representation_item.name='not master representation')}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
DATA_DEFINITION_EXCHANGE	product_definition_formation	41	8	{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='data definition exchange'}
data_definition_exchange to data_- definition_exchange_body (list_body)	PATH			product_definition_formation<- product_definition.formation (product_defnition)(product_definition_with_associated_documents) {product_definition.description='data definition exchange content'}
data_definition_exchange to data_- definition_exchange_header (list_header)	PATH			product_definition_formation<- product_definition.formation (product_defnition)(product_definition_with_associated_documents) {product_definition.description='data definition exchange content'} characterized_product_definition=(product_defnition)\ (product_definition_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='data definition exchange header'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange to list_-presentation (presentation)	PATH		9	product_defnition_formation presented_item_item=product_defnition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation.presentation->presentation_representation_select presentation_representation_select=presentation_set presentation_set
DATA_DEFINITION_EXCHANGE_-BODY	product_definition	41		{product_definition product_definition.description= 'data definition exchange content'}
data_definition_exchange_body to data_definition_indentured_list_method (list_method)	PATH		22	product_definition product_or_formation_or_definition=product_definition product_or_formation_or_definition<- document_product_association.related_product document_product_association=> document_product_equivalence<= document_product_association document_product_association.relating_document->document<- {document.kind->document_type document_type.product_data_type=\ 'configuration controlled document definition'} document_reference.assigned_document document_reference=> {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=(’indentured by document’)\ (‘indentured by item’)(indentured by item and document’)} applied_document_reference

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_body to notation (notes_list)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='data definition exchange body property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name="notation"} representation.items[i]->representation_item=> descriptive_representation_item

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_body to revision (revision_history)	PATH			product_definition <product_definition.formation-> product_definition_formation<- product_definition_formation_relationship.related_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (‘sequence’)(‘iteration’))} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation> action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name=’revision history’} action_assignment.assigned_action-> action=> {(action.description) (action.description=\ ('revision')(‘change’)(‘issue’)(‘sequence’)(‘change identification’)} executed_action

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_body to simple_list_of_elements (list_method)	PATH			product_definition product_or_formation_or_definition=product_definition product_or_formation_or_definition<- document_product_association.related_product document_product_association=> document_product_equivalence<= document_product_association document_product_association.relating_document-> document<- {document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document definition'} document_reference.assigned_document document_reference=> {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='list of elements'} applied_document_reference

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_body to simple_list_of_files (list_method)	PATH			product_definition product_or_formation_or_definition=product_definition product_or_formation_or_definition<- document_product_association.related_product document_product_association=> document_product_equivalence<= document_product_association document_product_association.relating_document-> document<- {document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document definition'} document_reference.assigned_document document_reference=> {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='list of files'} applied_document_reference
DATA_DEFINITION_EXCHANGE_-HEADER	property_definition	41		{property_definition property_definition.name='data definition exchange header'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_header to date (date_of_transfer)	PATH			property_definition property_definition.definition->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition product_definition.formation->product_definition_formation (date_item = product_definition_formation date_item<-applied_date_assignment.items[i] applied_date_assignment<=date_assignment {date_assignment.role->date_role date_role.name='transfer date'} date_assignment.assigned_date->date) product_definition_formation (date_and_time_item = product_definition_formation date_and_time_item<-applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<=date_and_time_assignment {date_and_time_assignment.role->date_time_role date_time_role.name='transfer date'} date_and_time_assignment.assigned_date_and_time->date_and_time date_and_time.date_component->date)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_header to delivery_accounting (delivery_accounting_references)	PATH			property_definition document_reference_item=property_definition document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='delivery accounting'} document_reference.assigned_document->document <- document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation
data_definition_exchange_header to element_identification (procurement_references)	PATH			property_definition property_definition.definition->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition.formation->product_definition_formation<- product_definition_formation_relationship.relating_product_defnition_formation product_definition_formation_relationship {product_definition_formation_relationship.name=\ 'procurement reference'} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_header to header (common_header)	IDENTICAL_MAPPING			
data_definition_exchange_header to item_identification (procurement_references)	PATH			property_definition property_definition.definition->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition.formation->product_definition_formation<-product_definition_formation_relationship.relating_product_defnition_formation product_definition_formation_relationship{product_definition_formation_relationship.name=\'procurement reference'} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation
data_definition_exchange_header to reason (exchange_reason)	IDENTICAL MAPPING			

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_header to system_destination (destinations)	PATH			property_definition property_definition.definition-> characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition product_defnition.formation-> product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role-> person_and_organization_role person_and_organization_role.name='system destination'} person_and_organization_assignment.assigned_person_and_organization-> person_and_organization) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role-> organization_role organization_role.name='system destination'} organization_assignment.assigned_organization-> organization)
DATA_DEFINITION_EXCHANGE_-SIMPLE_ENTRY	product_definition_formation	41		{product_definition_formation product_definition_formatin.of_product-> product<- product_related_product_category.product[i] product_related_product_categoy<= product_category product_category.name='document'}
data_definition_exchange_simple_entry to data_definition_entry_tdp_element (entry)	PATH			product_definition_formation<- product_defintion.formation product_definition

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_exchange_simple_entry to element_identification (simple_entry)	IDENTICIAL MAPPING			
DATA_DEFINITION_-INDENTURED_ENTRY #1: When entry is a document #2: When entry is an item	#1,#2:(product_definition) (product_-definition_with_associated_documents)	41 41		#1,#2:{ (product_definition)\ (product_definition_with_associated_documents)}
data_definition_indentured_entry to data_definition_entry_item (entry_characteristics) #1: (see note 2)	#2: (IDENTICAL MAPPING)			
data_definition_indentured_entry to data_definition_entry_tdp_element (entry_characteristics) #2: (see note 2)	#1: (IDENTICAL MAPPING)			
data_definition_indentured_entry to effectivity (effective_on)	PATH			(product_definition<- product_definition_relationship.related_product_definition product_definition_relationship<- product_definition_effectivity.usage product_definition_effectivity=> configuration_effectivity) (product_definition product_definition=effectivity_item effectivity_item<- applied_effectivity_assignment.item[i] applied_effectivity_assignment=> effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
.data_definition_indentured_entry to item_parent_to_item_child_-relationship (indentured_entry)	PATH			product_definition<- product_definition_relationship.related_product_definition (product_definition_relationship)(alternate_product_relationship)\ (assembly_component_usage)\ (assembly_component_usage_substitute)\ (next_assembly_usage_occurrence)\ (quantified_assembly_component_usage)\ (assembly_component_usage_with_ranking)\ (make_from_usage_option_with_reference_designator)\ (make_from_usage_option)
data_definition_indentured_entry to item_parent_to_tdp_element_child_-relationship (indentured_entry)	PATH			((product_definition)(product_definition_with_associated_documents) product_definition_relationship.related_product_definition product_definition_relationship) ((product_definition)(product_definition_with_associated_documents) document_reference_item=(product_definition)\ (product_definition_with_associated_documents) document_reference_item<- applied_document_reference.items[i] applied_document_reference)
data_definition_indentured_entry to label (indenture_level)			21	product_definition characterized_product_definition=product_definition characterized_defnition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='exchange entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='indentured level tag'} representation.items[i]->representation_item {representation_item=>descriptive_representation_item} representation_item.name

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_indentured_entry to tdp_element_parent_to_item_child_-relationship (indentured_entry)	PATH			(product_definition)(product_definition_with_associated_documents)<-product_definition_relationship.related_product_definition product_definition_relationship
data_definition_indentured_entry to tdp_element_parent_to_tdp_element_-child_relationship (indentured_entry)	PATH			(product_definition)(product_definition_with_associated_documents)<-product_definition_relationship.related_product_definition product_definition_relationship
data_definition_indentured_entry to tdp_indentured_item (indentured_entry) #1: (see note 2)	#2: (IDENTICAL MAPPING)			
data_definition_indentured_entry to tdp_indentured_tdp_element (indentured_entry) #2: (see note 2)	#1: (IDENTICAL MAPPING)			
DATA_DEFINITION_-INDENTURED_LIST_METHOD	applied_document_reference	232		{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name=('indentured by document')('indentured by item')\ (indentured by item and document')}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_indentured_list_method to data_definition_indentured_entry (order_of)	PATH			applied_document_reference applied_document_reference.items[i]-> document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship\ .related_product_definition_formation-> product_definition_formation<- product_definition.formation product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)> <document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.related_product_definition-> product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)> <document_reference_item=applied_document_reference applied_document_reference<= document_reference document_reference.assigned_document-> document<- document_product_association.relating_document document_product_association=> document_product_equivalence<= document_product_association document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=(product_definition_formation product_definition_formation<- product_definition.formation product_definition) (product_definition)> <document_reference_item=product_definition_with_associated_documents product_definition_with_associated_documents> <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation<- product_definition.formation

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition-> product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)> <document_reference_item=product_definition> <document_reference_item=applied_document_reference applied_document_reference applied_document_reference.items[i]-> document_reference_item (document_reference_item=product_definition product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)) (document_reference_item=product_defintion_formation product_definition_formation<- product_definition.formation product_definition (product_definition) (product_definition=> product_definition_with_associated_documents))>

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
data_definition_indentured_list_method to indentured_list_by_document (method_of_entry_tabulation)	IDENTICAL MAPPING			{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='indentured by document'}
data_definition_indentured_list_method to indentured_list_by_part (method_of_entry_tabulation)	IDENTICAL MAPPING			{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='indentured by item'}
data_definition_indentured_list_method to indentured_list_by_part_with_-document_references_to_parts (method_of_entry_tabulation)	IDENTICAL MAPPING			{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='indentured by item and document'}
DATE_EFFECTIVITY	dated_effectivity	41		
date_effectivity to date (end_date)	PATH			dated_effectivity dated_effectivity.effectivity_end_date-> date_and_time

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
date_effectivity to date (start_date)	PATH			dated_effectivity dated_effectivity.effectivity_start_date->date_and_time
DELIVERY_ACCOUNTING	product_definition_formation	41		
delivery_accounting to identifier (reference_identification)	PATH			product_definition_formation [product_definition_formation.id] [product_defiition_formation.of_product->product product.id]
delivery_accounting to text (reference_identification_description)	PATH			product_definition_formation product_definition_formation.of_product->product product.description
DOCUMENT_USAGE_-PARAMETER	document_usage_constraint	41		
document_usage_parameter to label (subject)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {(document_usage_constraint.subject _element_value) (document_usage_constraint.subject_element_value=\ (‘type’)(‘grade’)(‘form’)(‘composition’))}
document_usage_parameter to text (value_of)	PATH			document_usage_constraint document_usage_constraint.subject_element_value
DRAWING_SUFFIX_NUMBER_-COMBINATION	product	41		

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_suffix_number_combination to element_identification (drawing_number)	PATH	41	14	product<- product_relationship.relating_product product_relationship {product_relationship.name=\ 'drawing suffix number combination'} product_relationship.related_product-> product product.id { product<- product_related_product_category.products[i] product_related_product_category<= product_category<- product_categoy.name='document' product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category.name='drawing'}
drawing_suffix_number_combination to identifier (suffix_identifier)	PATH		14	product<- product_relationship.relating_product product_relationship product_relationship.id {product_relationship.name=\ 'drawing suffix number combination'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
EFFECTIVITY #1: When the effectivity is for a part and the next higher part is known #2: When the effectivity is for a part and the next higher part is not known	#1: (<configuration_effectivity> <(serial_numbered_effectivity) (dated_effectivity) (lot_effectivity)>) #2:[applied_effectivity_assignment] [applied_effectivity_context_assignment]	41 41 41 41 232 232		#1: ({configuration_effectivity<= product_definition_effectivity product_definition_effectivity.usage->>br>product_definition_relationship product_definition_relationship.description='item usage'}) #2: ({applied_effectivity_assignment<= effectivity_assignment<- effectivity_context_assignment.assigned_effectivity_assignment effectivity_context_assignment [effectivity_context_assignment.role->>br>effectivity_context_role effectivity_context_role.name=’context document of effectivity’] [effectivity_context_assignment=>>br>applied_effectivity_context_assignment applied_effectivity_context_assignment.items[i]->>br>effectivity_context_item effectivity_context_item=product_definition_formation product_definition_formation product_definition_formation.of_product->>br>product<- product_related_product_category.products[i] product_related_product_category<= product.category product_category.name=’document’]})

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to approval (effectivity_approvals)	PATH			#1: (configuration_effectivity approval_item=configuration_effectivity approval_item<- applied_approval_assignment.items[i] applied_approval_assignment) #2: (applied_effectivity_assignment approval_item=applied_effectivity_assignment approval_item<- applied_approval_assignment.items[i] applied_approval_assignment) <applied_approval_assignment<= approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role>
effectivity to product_configuration (product)	PATH			#1: (configuration_effectivity configuration_effectivity.configuration-> configuration_design configuration_design.configuration-> configuration_item) #2: (applied_effectivity_assignment<= effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity=> product_definition_effectivity=> configuration_effectivity configuration_effectivity.configuration-> configuration_design configuration_design.configuration-> configuration_item)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to text (description)	PATH			#1: (configuration_effectivity<= product_definition_effectivity<= effectivity<- description_attribute_select=effectivity description_attribute_select<- description_attrubute.described_item description_attribute description_attribute.attribute_value) #2: (applied_effectivity_assignment<= effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity<- description_attribute_select=effectivity description_attribute_select<- description_attrubute.described_item description_attribute description_attribute.attribute_value)
EXCHANGE_FILE	document_file	232		{document_file<= document document.description='exchange data file'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
exchange_file to label (included_in_exchange)	PATH			document_file<= characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name='exchange entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name=’include flag’} representation.items[i]->representation_item {representation_item=>descriptive_representation_item} representation_item.name {(representation_item.name) (representation_item.name=\ (‘already delivered’)(‘available for access’)(‘fully included’)\ (‘not deliverable’)(‘not delivered yet’)(‘not received’)\ (‘partially included’)(‘receipt accepted’)(‘receipt acknowledged’)\ (‘receipt partially rejected’)(‘receipt rejected’)(‘resubmission’))}
exchange_file to system_declaration (destination_system)	PATH			document_file<= characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='destination system declaration’}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
FILE	document_file	232		{document_file<= document<- document_representation_type.representation_types document_representation_type document_representation_type.name=('digital')('physical')}
file to change_identification (change_status)	PATH			document_file action_item=document_file action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
file to file_format (context_file_format)	PATH			document_file<= characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document format'}
file to identifier (context_file_name)	PATH			document_file<= document document.id
file to identifier (native_format_file_name)	PATH			(document_file<= document<- document_relationship.related_document document_relationship {document_relationship.name='translation relationship'} document_relationship.relating_document->document {document=> document_file} document.id

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
file to security_classification (security_identification)	PATH			document_file security_classification_item=document_file security_classification_item<- applied_security_classification_assignment.items[i] applied_security_classification_assignment<= security_classification_assignment <security_classification_assignment role_select=security_classification_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role> security_classification_assignment.assigned_security_classification-> security_classification
file to size_characteristics (size)	PATH			document_file<= characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
file to system_declaration (source_system)	PATH			document_file characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name=‘document property’} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name=\ ('source system declaration’)(‘document creation’)}
FILE_FORMAT	representation	43		{representation.name=’document format’}
file_format to date (release_date)	PATH			representation date_item=representation date_item<- applied_date_assignment.items applied_date_assignment<= date_assignment date_assignment.assigned_date->date {date_assignment.role->date_role date_role.name='release date'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
file_format to identifier (change_level)	PATH			representation action_item=representation action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=’change identification’} action_assignment.assigned_action->action {action=>executed_action} action.name {action.chosen_method->action_method action_method.name='change level'}
file_format to identifier (format_code)	PATH			representation representation.items[i]->representation_item=> {representation_item.name=’character code’} descriptive_representation_item descriptive_representation_item.description

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
file_format to identifier (revision_level)	PATH			representation action_item=representation acton_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=’change identification’} action_assignment.assigned_action->action action.name {action=>executed_action) {action.chosen_method->action_method action_method.name='revision level'}
file_format to text (format_standard)				representation {representation.name='document format'} representation.items[i]->representation_item=> {representation_item.name=’data format’} descriptive_representation_item descriptive_representation_item.description
INDENTURED_LIST_BY_- DOCUMENT	applied_document_reference	232		{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=’indentured by document’}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_list_by_document to tdp_- indentured_tdp_element (top_indentured_tdp_elements)	PATH			applied_document_reference applied_document_reference.items[i]-> document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition-> product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition>
INDENTURED_LIST_BY_PART	applied_document_reference	232		{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->> object_role object_role.name='indentured by item'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_list_by_part to tdp_- indentured_item (top_indentured_items)	PATH			applied_document_reference applied_document_reference.items[i]->> document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation->> product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition->> product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition> <document_reference_item=applied_document_reference applied_document_reference applied_document_reference.items[i]->> document_reference_item (document_reference_item=product_definition product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)) (document_reference_item=product_defintion_formation product_definition_formation<- product_definition.formation product_definition (product_definition) (product_definition=> product_definition_with_associated_documents))>

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
INDENTURED_LIST_BY_PART_- WITH_DOCUMENT_- REFERENCES_TO_PARTS	applied_document_reference	232		{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>object_role object_role.name='indentured by item and document'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_list_by_part_with_- document_references_to_parts to tdp_- indentured_item (top_indentured_item)	PATH			applied_document_reference applied_document_reference.items[i]-> document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition-> product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition> <document_reference_item=applied_document_reference applied_document_reference applied_document_reference.items[i]-> document_reference_item (document_reference_item=product_definition product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)) (document_reference_item=product_defintion_formation product_definition_formation<- product_definition.formation product_definition (product_definition) (product_definition=> product_definition_with_associated_documents))>

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_list_by_part_with_- document_references_to_parts to tdp_- indentured_tdp_element (top_indentured_item)	PATH			applied_document_reference applied_document_reference.items[i]->
 document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation->
 product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition->
 product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition> <document_reference_item=applied_document_reference applied_document_reference applied_document_reference.items[i]->
 document_reference_item (document_reference_item=product_definition product_definition (product_definition) (product_definition=> product_definition_with_associated_documents)) (document_reference_item=product_defintion_formation product_definition_formation<- product_definition.formation product_definition (product_definition) (product_definition=> product_definition_with_associated_documents))>
ITEM_IDENTIFICATION	product_definition_formation	41		

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to alternate_-identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) #2:(product_definition_formation->product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product->product<- product_definition_formation)
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to design_- authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role-> person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role-> organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
item_identification to drawing_suffix_- number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
ITEM_PARENT_TO_ITEM_-CHILD_RELATIONSHIP	product_definition_relationship	41		
item_parent_to_item_child_-relationship to item_identification (child)	PATH			product_definition_relationship product_definition_relationship.related_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation
item_parent_to_item_child_-relationship to item_identification (parent)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation
ITEM_PARENT_TO_TDP_-ELEMENT_CHILD_-RELATIONSHIP	(product_definition_relationship) (applied_document_reference)	41 232		

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
item_parent_to_tdp_element_child_-relationship to element_identification (child)	PATH			(product_definition_relationship product_definition_relationship.related_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation) (applied_document_reference<= document_reference document_reference.assigned_document-> document<- {document document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_definition product_or_formation_definition=product_definition_formation product_definition_formation {product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product-category<= product_category product_category.name='document'})
item_parent_to_tdp_element_child_-relationship to item_identification (parent)	PATH			(product_definition_relationship product_definition_relationship.relating_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation) (applied_document_reference applied_document_reference.items[i]-> document_reference_item document_reference_item=product_definition_formation product_definition_formation)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
ITEM_TYPE	product_category	41		
item_type to company (code_administrator)	PATH			product_category organiation_item=product_category organizatin_item<- assigned_organization_assignment.item[i] assigned_organization_assignment<= organization_assignment {organization_assignment organization_assignment.role->organization_role organization_role.name='code administator'} organization_assignment.assigned_organization->organization
item_type to label (item_code)	PATH			product_category product_category.name
item_type to text (type_of_coding_scheme)	PATH			product_category product_category.description
LOT_EFFECTIVITY	lot_effectivity	41		
lot_effectivity to a_number (lot_size)	PATH			lot_effectivity lot_effectivity.effectivity_lot_size->measure_with_unit measure_with_unit.value_component->measure_value
lot_effectivity to identifier (lot_identification)	PATH			lot_effectivity lot_effectivity.effectivity_lot_id

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
lot_effectivity to measure (lot_unit_of_measure)	PATH			lot_effectivity lot_effectivity.effectivity_lot_size->measure_with_unit measure_with_unit.unit_component->unit
MEASURE	named_unit	41		
NOTATION	descriptive_representation_item	45		{descriptive_representation_item<=representation_item<-representation.items[i]representation representation.name='notation'}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
notation to element_identification (referenced_document_in_note)	PATH			descriptive_representation_item document_reference_item=descriptive_representation_item document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference <document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name> document_reference.assigned_document document<- {document.kind-> document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
notation to identifier (reference_code)	PATH			descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role->classification_role classification_role.name='reference code'} classification_assignment.assigned_class->group group.name {group=>class}
notation to label (type_of_notation)	PATH		24	descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_role {classification_assignment classification_assignment.role->classification_role classification_role.name='type of notation'} classification_assignment.assigned_class->group group.name {group=>class_system}
notation to label (note_title)	PATH			descriptive_representation_item descriptive_representation_item.name
notation to text (note)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
notation to text (note_parameter)	PATH			descriptive_representation_item<= representation_item<- representation_item_relationship.relating_representation_item representation_item_relationship {representation_relationship.name='note parameter'} representation_item_relationship.related_representation_item->representation_item=> (descriptive_representation_item) (measure_representation_item)
NUMBER_WITH_UNITS	measure_with_unit	41		
number_with_units to measure (units_-of)	IDENTICAL MAPPING			measure_with_unit mesure_with_unit.unit_component
number_with_units to a_real (value_of)	PATH			measure_with_unit measure_with_unit.value_component
QUANTITY	measure_with_unit	41		
quantity to a_number (value_of)	PATH			measure_with_unit measure_with_unit.value_component->measure_value measure_value=count_measure count_measure
quantity to text (quantity_accuracy)	PATH			measure_with_unit<-measure_qualification.qualified_measure measure_qualification measure_qualification.qualifier->type_qualifier (type_qualifier.name) (type_qualifier.name=('exact')('as required')('approximate'))

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
quantity to text (value_of)	PATH			measure_with_unit measure_with_unit.value_component->measure_value measure_value=descriptive_measure descriptive_measure
quantity to volume (value_of)	IDENTICAL MAPPING			
quantity to weight (value_of)	PATH			measure_with_unit=> measure_representation_item<= representation_item
REASON	property_definition	41		
reason to exchange_reason (base)	PATH		15	property_definition<- property_definition_representation.definition property_definition_represenation property_definition_represenation.used_representation->representation {representation.name=’exchange reason’} representation.items[i]->represenation_item=> {representation_item.name=’base exchange reason’} descriptive_representation_item {(descriptive_representation_item.description) (descriptive_representation_item.description= \ ('acknowledge receipt of delivery') ('engineering design analysis')\ ('interim engineering design review') ('final design review')\ ('initial data submittal') ('procurement design package')\ ('provisioning data submittal') ('request for proposal')\ ('revision update data submittal') ('specification design package'))}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
reason to item_identification (applicable_to)	PATH			property_definition property_definition.definition-> characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition<- {product_definition.description=’data definition exchange content’} product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name='applicable to exchange reason') product_definition_relationship.relating_product_definition-> product_definition-> product_definition.formation
reason to text (exchange_purpose)	PATH		15	property_definition<- property_definition_representation.definition property_definition_represenation property_definition_represenation.used_representation-> representation {representation.name=’exchange reason’} representation.items[i]-> represenation_item=> {representation_item.name=’exchange purpose’} descriptive_representation_item descriptive_representation_item.description
REVISION	executed_action	41		{executed_action<= action (action.description) (action.description=\ ('revision’)(‘change')(‘issue’)(‘sequence’)(‘change identification’))}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
revision to date (revison_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment <date_assignment.role-> date_role date_role.name> date_assignment.assigned_date-> date) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment <date_and_time_assignment.role-> date_time_role date_time_role.name> date_and_time_assignment.assigned_date_and_time-> date_and_time data_and_time.date_component-> date)
revision to identifier (revision_level)	PATH			executed_action<= action action.name

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
revision to other_reference_document (authorizing_documents)	PATH		12	executed_action document_reference_item=executed_action document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->> object_role (object_role.name) (object_role.name=\ ('revision authorizing identification')(‘change rationale’))} document_reference.assigned_document->> document<- {document.kind->> document_type.product_data_type=\ ’configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
revision to person_and_organization (revision_approval) #1: without person #2: with person	PATH		27	executed_action<= action approved_item=action approved_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment <approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role {(object_role.name) (object_role.name='revision approval') (object_role.name='release authenication')}> approval_assignment.assigned_approval->>br>approval<- #1: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=organization) #2: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization->>br>organization)
revision to text (revision_description)	PATH			executed_action<= action action.chosen_method->>br>action_method action_method.description
SEQUENCE_EFFECTIVITY	serial_numbered_effectivity	41		

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
sequence_effectivity to quantity	PATH			serial_numbered_effectivity<= effectivity=> product_definition_effectivity product_definition_effectivity.usage->> product_definition_relationship=> product_definition_usage=> assembly_component_usage=> quantified_assembly_component_usage.quantity->> measure_with_unit
sequence_effectivity to identifier (from_effectivity_id)	PATH			serial_numbered_effectivity serial_numbered_effectivity.effectivity_start_id
sequence_effectivity to identifier (thru_effectivity_id)	PATH			serial_numbered_effectiivity serial_numbered_effectivity..effectivity_end_id
sequence_effectivity to measure (quantity_unit_of_measure)	PATH		10	serial_numbered_effectivity<= effectivity=> product_definition_effectivity product_definition_effectivity.usage->> product_definition_relationship=> product_definition_usage=> assembly_component_usage=> quantified_assembly_component_usage.quantity->> measure_with_unit measure_with_unit.unit_component->> unit

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
SHEET #1: If sheet is identified within AP 232 #2: If sheet is defined as an AP 202 exchange within same file	#1: product_definition_formation #2: [product_definition_formation] [drawing_sheet_revision]	41 41 101	16 19	#1: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: ({drawing_sheet_revision<= presentation_area<= presentation_representation presentation_representation_select=presentation_representation presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation} {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
sheet to configuration (sheet_configuration)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='sheet header'})
sheet to element_identification (sheet_identifier)	IDENTICAL MAPPING			
sheet to label (sheet_size)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {prodcut_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='sheet header'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='document format'} representation.items[i]-> {representation_item.name=('size format')(‘size format standard’)} representation_item=> descriptive_representation_item descriptive_representation_item.description
sheet to product_presentation (presentation_format) (see note 3)				

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
SIMPLE_LIST_OF_ELEMENTS	applied_document_reference	232		{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
SIZE_CHARACTERISTICS_-INTERNAL_DIVISIONS	representation	43		{representation.name='multiple sheets in one file'}
size_characteristics_internal_division to an_integer (internal_division_count)	PATH			representation representation.items[i]->representation_item {representation_item.name='internal division count'} representation_item=>measure_representation_item
size_characteristics_internal_division to label (internal_division_type)	PATH			representation representation.items[i]->representation_item {representation_item.name='internal division type'} representation_item representation_item=>descriptive_representation_item.description
SIZE_CHARACTERISTICS_-SHEET_ACROSS_FILE	representation	43		{representation.name='file containing portion of sheet'}
size_characteristics_sheet_across_file to an_integer (frame_number_-comprising_this_file)	PATH			representation representation.items[i]->representation_item {representation_item.name='sheet portion number'} representation_item=>measure_representation_item
size_characteristics_sheet_across_file to an_integer (number_of_frames_for_sheet)	PATH			representation representation.items[i]->representation_item {representation_item.name='number of portions sheet is divided into'} representation_item=>measure_representation_item

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
SOURCE_INFORMATION_TYPE	representation	43	23	{representation representation.name='source information type'}
source_information_type to identifier (source_code)	PATH			representation representation.items[i]->representation_item {representation_item=>descriptive_representation_item} representation_item.name
source_information_type to text (source_description)	PATH			representation representation.items[i]->representation_item=>descriptive_representation_item descriptive_representation_item.description
source_information_type to text (type_of_coding_scheme)	PATH			representation representation.context_of_items[i]->representation_context representation_context.context_type
SPECIAL_CONDITION	descriptive_representation_item	45		
special_condition to label (code)	PATH			descriptive_representation_item<=representation_item representation_item.name
special_condition to text (description)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
special_condition to text (type_of_coding_scheme)	PATH			descriptive_representation_item<= representation_item<- representation.items[i] representation {representation.name='special condition'} representation.context_of_items[i]->>br>representation_context representation_context.context_type
SPECIFICATION_DOCUMENT	product_definition_formation			{product_definition_formation product_definition_formation.of_product->>br>product<- product_related_product_category.products[i] prodcut_related_product_category<= product_category {product_category.name=’document’} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->>br>product_category<- {product_category.name=’reference_document’} product_category_relationship.category product_category_relationship product_category-relationsip.sub_category->>br>product_category product_category.name=’specification document’}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
STANDARD_DOCUMENT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] prodcut_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category<- {product_category.name='reference_document'} product_category_relationship.category product_category_relationship product_category-relationsip.sub_category-> product_category product_category.name='standard document'}
SYSTEM_DECLARATION	representation	43		{representation.name=('source system declaration')\ ('destination system declaration')('document creation')}

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
system_declaration to identifier (system) #1: Use when system operating system, creating_interface, and system_-related_element_identifier are needed. #2 : Use when system operating system, creating_interface, and system_related_element_identifier are not needed.	PATH			#1: (representation representation.items[i]->representation_item=> {representation_item.name=(’computer system’)(‘creating system’)} descriptive_representation_item descriptive_representation_item.description) #2: (document_file external_identification_item=document_file external_identification_item<-applied_external_identification_assignment.items[i] applied_external_identification_assignment<=external_identification_assignment [external_identification_assignment<=identification_assignment {identification_assignment.role->(identification_role) (identification_role.description=('source system’)(‘destination system')}] [external_identification_assignment.source->external_source external_source.source_id])
system_declaration to identifier (system_element_identifier) #1: Use when system operating system, creating_interface, and system_-related_element_identifier are needed. #2 : Use when system operating system, creating_interface, and system_related_element_identifier are not needed.	PATH			#1: (representation representation.items[i]->representation_item=> {representation_item.name=’element on computer system’} descriptive_representation_item descriptive_representation_item.description) #2: (document_file external_identification_item=document_file external_identification_item<-applied_external_identification_assignment.items[i] applied_external_identification_assignment<=external_identification_assignment<=identification_assignment {identification_assignment.role->(identification_role) (identification_role.description='access context')} identification_assignment.assigned_id)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
system_declaration to identifier (system_related_element_identifier)	PATH			representation representation.items[i]->representation_item=> {representation_item.name='related element on computer system'} descriptive_representation_item descriptive_representation_item.description
system_declaration to text (creating_interface)				representation representation.items[i]->representation_item=> {representation_item.name='creating interface'} descriptive_representation_item descriptive_representation_item.description
system_declaration to text (operating system)				representation representation.items[i]->representation_item=> {representation_item.name='operating system'} descriptive_representation_item descriptive_representation_item.description
SYSTEM_DESTINATION #1: With Person #2: Without Person	#1: person_and_organization #2: organization	41 41		
system_distination to company (target_company)	#1: (PATH) #2: (IDENTICAL MAPPING)			#1:(person_and_organization person_and_organization.the_organization->organization)
system_destination to company_code (target_company_code)	#1: (PATH) #2: (PATH)			#1:(person_and_organization person_and_organization.the_organization->organization) #2: (organization)

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
system_destination to person (target_person) #2: (see note 2)	#1: (PATH)			#1:(person_and_organization person_and_organization.the_person->person)
TDP_ELEMENT	product_definition_formation	41		
TDP_ELEMENT_PARENT_TO_-ITEM_CHILD_RELATIONSHIP	product_definition_relationship	41		
tdp_element_parent_to_item_child_-relationship to element_identification (parent)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition->product_definition product_definition.formation->product_definition_formation {product_definition_formation.of_product->product<-product_related_product_category.products[i] product_related_product_category<=product_category product_category.name='document'}
tdp_element_parent_to_item_child_-relationship to item_identification (child)	PATH			product_definition_relationship product_definition_relationship.related_product_definition ->product_definition product_definition.formation->product_definition_formation
TDP_ELEMENT_PARENT_TO_-TDP_ELEMENT_CHILD_-RELATIONSHIP	product_definition_relationship	41		

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
tdp_element_parent_to_tdp_element_-child_relationship to element_-identification (child)	PATH			product_definition_relationship product_definition_relationship.related_product_definition-> product_definition product_definition.formation-> product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category product_category.name='document'
tdp_element_parent_to_tdp_element_-child_relationship to element_-identification (parent)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition-> product_definition product_definition.formation-> product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category product_category.name='document'
TDP_INDENTURED_ITEM	product_definition	41		
tdp_identured_item to item_-identification (top_indenture)	PATH			product_definition product_definition.formation-> product_definition_formation
TDP_INDENTURED_TDP_-ELEMENT	product_definition	41		
tdp_indentured_tdp_element to element_identification (top_indenture)	PATH			product_definition product_definition.formation-> product_definition_formation

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
VOLUME	measure_with_unit	41		
volume to number_with_units (a_value)	PATH			[measure_with_unit.unit_component->] unit unit=named_unit named_unit=>] volume_unit] [named_unit.dimensions->] dimensional_exponents] {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-0} {dimensional_exponents.mass_exponent=0} {dimensional_exponents.length_exponent=3} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}
WEIGHT	representation_item	43		
weight to a_real (a_value)	PATH			representation_item=>] measure_representation_item<=] measure_with_unit measure_with_unit.value_component->] measure_value measure_value=numeric_measure

Table 5 - Mapping table for data_definition_exchange (continued)

Application element	AIM element	Source	Rules	Reference path
weight to measure (unit_of_measure) #1: If weight is expressed in SI units #2: If weight is not expressed in SI units	PATH			representation_item=> measure_representation_item<= measure_with_unit measure_with_unit.unit_component-> unit unit=named_unit named_unit=> #1: (si_unit si_unit.name-> si_unit_name si_unit_name='newton' [named_unit.dimensions-> dimensional_exponents {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-2} {dimensional_exponents.mass_exponent=1} {dimensional_exponents.length_exponent=1} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}]) #2: (conversion_based_unit conversion_based_unit.name [conversion_based_unit.conversion_factor-> measure_with_unit] [measure_with_unit.value_component-> measure_value] [measure_with_unit.unit_component-> unit unit=named_unit named_unit=> si_unit si_unit.name='newton' [named_unit.dimensions-> dimensional_exponents {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-2} {dimensional_exponents.mass_exponent=1} {dimensional_exponents.length_exponent=1} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}]])

Table 5 - Mapping table for data_definition_exchange (concluded)

Application element	AIM element	Source	Rules	Reference path
weight to weight_derivation (derivation_method)	PATH			representation_item=> [qualified_representation_item qualified_representation_item.qualifiers[i]->value_qualifier] [measure_representation_item<= measure_with_unit<- measure_qualification.qualified_measure measure_qualification {measure_qualification.name='weight derivation method'} measure_qualification.qualifier[i]->value_qualifier] value_qualifier=type_qualifier type_qualifier.name {(type_qualifier.name='calculated') (type_qualifier.name='estimated') (type_qualifier.name='weighed')}

Table 6 - Mapping table for data_list

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_IDENTIFICATION_-OF_ITEM	product_definition_formation	41		
alternate_identification_of_item to change_identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->>br>person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->>br>organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
alternate_identification_of_item to drawing_suffix_number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->>br>product
alternate_identification_of_item to identifier (identifying_number)	PATH			product_definition_formation [product_definition_formation.id] product_definition_formation.of_product->>br>product [product.id] <product_defintion_formation oganization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment organization_assignment.assigned_organization->>br>organization>

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category
alternate_identification_of_item to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product->product product.name
alternate_identification_of_item to source_information_type (source_information)	PATH		23	product_definition_formation<-product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<-property_definition.definition property_definition<-{property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation
ASSOCIATED_LIST #1: If the associated list is a parts_list #2: If the associated list is a data_list #3: If the associated list is an other_list #4: If the associated list is an indentured data list #5: If the associated list is an index list	product_definition_formation	41		product_definition_formation product_defintion_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category #1:({product_category.name='parts list'}) #2:({product_category.name='data list'}) #3:({product_category.name='other list'}) #4:({product_category.name='indentured data list'}) #5:({product_category.name='index list'})

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
associated_list to drawing (related_to)	PATH			product_definition_formation <- product_defnition_formation_relationship.related_product_defnition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='associated list'} product_definition_formation_relationship.relating_product_definition_formation->product_definition_formation
associated_list to list_presentation (presentation)	PATH			product_definition_formation presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation->presentation_representation_select presentation_representation_select=presentation_set presentation_set
associated_list to product_data_set (related_to)	PATH			product_defination_formation<- product_defination.formation product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship product_definition_relationship.related_product_definition->product_definition product_defnition.formation->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products product_related_product_category<= product_category product_category.name ='product data set'}

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
CONTRACT_SUBMISSION	applied_contract_assignment	232		{applied_contract_assignment<= contract_assignment role_select=contract_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
contract_submission to text (location)	PATH		6	applied_contract_assignment organization_item=applied_contract_assignment organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment organization_assignment.role->organization_role organization_role.name='location of contract submission'} organization_assignment.assigned_organization->organization<- organizational_address.organizations[i] organizational_address<= address
DATA_LIST	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category {product_category.name='data list'}}
data_list to data_list_body (body)	PATH			product_definition_formation<- product_defnition.formation product_definition

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list to data_list_header (list_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='data list header'}
DATA_LIST_BODY	product_definition	41		{product_definition product_definition.description='data list body'}
data_list_body to data_list_tabulation (data_list_tabulations)	PATH			product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name='data list tabulation'} product_definition_relationhsip.releted_product_definition-> product_definition
data_list_body to notation (data_list_notes)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition {property_definition.description='data list body'} property_definition<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='notation'} representation.items[i]-> representation_item=> descriptive_representation_item

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_body to revision (revision_history)	PATH			product_definition <product_definition.formation-> product_definition_formation<- product_definition_formation_relationship.related_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (,sequence’)(‘iteration’))} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation> action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='revision history'} action_assignment.assigned_action-> action => {(action.description) (action.description=\ ('revision')(‘change’)(‘issue’)(‘sequence’)(‘change identification’)} executed_action
DATA_LIST_ENTRY #1: If the data_list entry is a AP 232 identified drawing, externally defined drawing, AP 232 identified sheet, externally defined sheet, other_list, parts_list, product_data_set, data_list or reference_document. #2: If the data_list_entry is an AP 202 defined drawing, #3: If the data_list entry is an AP 202 defined sheet	#1: (product_definition) #2: ([draughting_drawing_revision] [product_definition]) #3: ([drawing_sheet_revision] [product_-definition])	41 505 41 505 41		{(product_definition product_definition.frame_of_reference->) (product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference->) product_definition_context product_definition_context<= application_context_element application_context_element..name='data list entry'}

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_entry to contract_submission (available_from)	#1,#2,#3: (PATH)			#1,#2,#3: (product_definition contract_item=product_definition contract_item<- applied_contract_assignment.items[i] applied_contract_assignment)

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_entry to header (list_entry) #3: (see note 2)	#1: (PATH) #2: (PATH)			#1: (product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition=property_definition property_definition #2: ([product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition=property_definition property_definition] [product_definition product_definition.formation product_definition_formation <product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category {product_category.name='drawing'}> presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presentation_item_representation.presentation-> presentation_representation_select presentation_representation_select=presentation_set presentation_set=> drawing_revision=> draughting_drawing_revision])

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_entry to identifier (entry_item_change_level)	#1,#2,#3: (PATH)			#1,#2,#3: (product_definition action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_entry to reference_document (available_from)	#1,#2,#3: (PATH)			#1,#2: (product_definition document_reference_item=product_definition document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name=‘source identification’} document_reference.assigned_document->>br>document<- {document document.kind->>br>document_type document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation {product_definition_formation.of_product->>br>product<- product_related_product_category.products product_related_product_category<= product_category product_category.name='document'})

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_entry to reference_document (list_entry) #2: (see note 2) #3: (see note 2)	#1: (PATH)			#1:(product_definition product_definition.formation->\ product_definition_formation)

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_entry to sheet (list_entry) #2: (see note 2)	#1: (PATH) #3: (PATH)			#1: (product_definition product_definition.formation->) product_definition_formation <product_definition_formation.of_product->) product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->) product_category {product_category.name='sheet'}>) #2: (product_definition product_definition.formation product_definition_formation <product_definition_formation.of_product->) product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->) product_category {product_category.name='sheet'}> presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation->) presentation_representation_select presentation_representation_select=presentation_representation presentation_representation=> presentation_area=> drawing_sheet_revision)

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_entry to special_condition (special_conditions)	#1,#2,#3: (PATH)			#1,#2: (product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='data list entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='special condition'} representation.items[i]->representation_item=>descriptive_representation_item)
DATA_LIST_HEADER	property_definition	41		{property_definition property_definition.description='data list header'}
data_list_header to header (common_header)	IDENTICAL MAPPING			
DATA_LIST_TABULATION #1: If the data_list_tabulation identifies the item that the data list is being tabulated for #2: If the data_list_tabulation does not identify what item the data list is being tabulated for	#1,#2: (product_definition)	41		

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
data_list_tabulation to data_list_entry (data_list_entries)	PATH			product_definition product_or_formation_or_definition=product_definition product_or_formation_or_definition<- document_product_association.related_product document_product_association {document_product_association=> document_product_equivalence) document_product_association.relating_document-> document<- {document document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document definition'} document_reference.assigned_document document_reference=> {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='data list entry'} applied_document_reference applied_document_reference.item[i]-> document_reference_item document_reference_item=product_definition product_defintion
data_list_tabulation to item_- identification (for_item) #2: (see note 2)	#1: (PATH)			#1: (product_definition product_definition.formation-> product_definition_formation)
DOCUMENT_LIST	product_definition_formation	41		

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
DRAWING #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 202 or AP 201 exchange with an AP 232 exchange	#1: (product_definition_formation) #2: ([draughting_drawing_revision] [product_definition_formation])	41 505 41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'}) #2: ({draughting_drawing_revision<= drawing_revision<= presentation_set presentation_representation_select=presentation_set presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'})

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
drawing to header (heading)	#1: (PATH) #2: (PATH)			#1, #2: (product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='drawing header'})
drawing to sheet (pages) (see note 3)				
DRAWING_SUFFIX_NUMBER_- COMBINATION	product	41		
drawing_suffix_number_combination to element_identification (drawing_number)	PATH	41	14	product<- product_relationship.relating_product product_relationship {product_relationship.name=\ 'drawing suffix number combination'} product_relationship.related_product-> product product.id { product<- product_related_product_category.products[i] product_related_product_category<= product_category<- product_categoy.name='document' product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category.name='drawing'}

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_suffix_number_combination to identifier (suffix_identifier)	PATH		14	product<- product_relationship.relating_product product_relationship product_relationship.id {product_relationship.name=\ ’drawing suffix number combination’}
ITEM_IDENTIFICATION	product_definition_formation	41		
item_identification to alternate_-identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) #2:(product_definition_formation->product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product->product<- product_definition_formation) product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation->product_definition_relationship

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.product[i] product_related_product_category<=product_category
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product->product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation
ITEM_TYPE	product_category	41		

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_type to company (code_administrator)	PATH			product_category organiation_item=product_category organizatin_item<- assigned_organization_assignment.item[i] assigned_organization_assignment=> organization_assignment {organization_assignment organization_assignment.role->> organization_role organization_role.name='code administator'} organization_assignment.assigned_organization->> organization
item_type to label (item_code)	PATH			product_category product_category.name
item_type to text (type_of_coding_scheme)	PATH			product_category product_category.description
NOTATION	descriptive_representation_item	45		{descriptive_representation_item<= representation_item<- representation.items[i] representation representation.name='notation'}

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to element_identification (referenced_document_in_note)	PATH			descriptive_representation_item document_reference_item=descriptive_representation_item document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference <document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name> document_reference.assigned_document document<- {document.kind-> document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to identifier (reference_code)	PATH			descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role->> classification_role classification_role.name='reference code'} classification_assignment.assigned_class->> group group.name {group=> class}
notation to label (type_of_notation)	PATH		24	descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role->> classification_role classification_role.name='type of notation'} classification_assignment.assigned_class->> group group.name {group=> class_system}
notation to label (note_title)	PATH			descriptive_representation_item descriptive_representation_item.name
notation to text (note)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to text (note_parameter)	PATH			descriptive_representation_item<= representation_item<- representation_item_relationship.relating_representation_item representation_item_relationship {representation_relationship.name='note parameter'} representation_item_relationship.related_representation_item-> representation_item=> (descriptive_representation_item) (measure_representation_item)
OTHER_LIST	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='other list'}
other_list to other_list_body (list_body) (see note 3)				
other_list to other_list_header ((list_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='other list header'}

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
OTHER_LIST_HEADER	property_definition			{property_definition property_definition.description='other list header'}
other_list_header to header (common_header)	IDENTICAL MAPPING			
PARTS_LIST	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='parts list'}
parts_list to parts_list_body (list_body) (see note 3)				
parts_list to parts_list_header (list_header)	PATH			product_definition_formation product_definition.formation product_definition characterized_product_defintion=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_defintion.definition property_definition {property_definition.description=’parts list header’}
PARTS_LIST_HEADER	property_definition	41		{property_definition property_definition.description='parts list header'}

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
parts_list_header to header (common_header)	IDENTICAL MAPPING			
PRODUCT_DATA_SET	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='product data set'}
product_data_set to drawing (related) (see note 3)				
product_data_set to product_data_set (related) (see note 3)				
product_data_set to source_file (file_configuration) (see note 3)				

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_WITH_- FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set with formation'}
product_data_set_with_format to header (product_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_defintion=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='product data set with format header'}
product_data_set_with_format to product_presentation (presentation_of_product_data_set) (see note 3)				

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_WITH_- SHADING	product_definition_formation			{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set with shading'}
product_data_set_with_shading to header_configuration_with_element_- identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_defintion=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=\ 'product data set with shading header'}
product_data_set_with_shading to shaded_shape_model (a_shaded_- model) (see note 3)				

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_- WITHOUT_FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='product data set without formation'}
product_data_set_without_format to header_configuration_with_element_- identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_defintion=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=\ 'product data set without format header'}
product_data_set_without_format to shape_model (a_model) (see note 3)				
REVISION	executed_action	41		{executed_action<= action (action.description) (action.description=\ ('revision')('change')('issue')('sequence')('change identification'))}

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to date (revison_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment <date_assignment.role->date_role date_role.name> date_assignment.assigned_date->date) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment <date_and_time_assignment.role->date_time_role date_time_role.name> date_and_time_assignment.assigned_date_and_time->date_and_time data_and_time.date_component->date)
revision to identifier (revision_level)	PATH			executed_action<= action action.name

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to other_reference_document (authorizing_documents)	PATH		12	executed_action document_reference_item=executed_action document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role (object_role.name) (object_role.name=\ ('revision authorizing identification')(‘change rationale’))} document_reference.assigned_document->>br>document<- {document.kind->>br>document_type.product_data_type=\ ’configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=>>br>document_product_equivalence} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to person_and_organization (revision_approval) #1: without person #2: with person	PATH		27	executed_action<= action approved_item=action approved_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment <approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role {(object_role.name) (object_role.name='revision approval') (object_role.name='release authenication')}> approval_assignment.assigned_approval->>br>approval<- #1: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=organization) #2: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization->>br>organization)
revision to text (revision_description)	PATH			executed_action<= action action.chosen_method->>br>action_method action_method.description

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
SHEET #1: If sheet is identified within AP 232 #2: If sheet is defined as an AP 202 exchange within same file	#1: product_definition_formation #2: [product_definition_formation] [drawing_sheet_revision]	41 41 101	16 19	#1: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<-product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: ({drawing_sheet_revision<=presentation_area<=presentation_representation presentation_representation_select=presentation_representation presentation_representation_select<-presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation} {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<-product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
sheet to configuration (sheet_configuration)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='sheet header'})
sheet to element_identification (sheet_identifier)	IDENTICAL MAPPING			
sheet to label (sheet_size)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='sheet header'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document format'} representation.items[i]->{representation_item.name=\ (‘size format')(‘size format standard’)} representation_item=> descriptive_representation_item descriptive_representation_item.description
sheet to product_presentation (presentation_format) (see note 3)				

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
SINGLE_DOCUMENT_LIST	product_definition_formation	41		
SPECIAL_CONDITION	descriptive_representation_item	45		
special_condition to label (code)	PATH			descriptive_representation_item<= representation_item representation_item.name
special_condition to text (description)	PATH			descriptive_representation_item descriptive_representation_item.description
special_condition to text (type_of_coding_scheme)	PATH			descriptive_representation_item<= representation_item<- representation.items[i] representation {representation.name='special_condition'} representation.context_of_items[i]-> representation_context representation_context.context_type

Table 6 - Mapping table for data_list (continued)

Application element	AIM element	Source	Rules	Reference path
SPECIFICATION_DOCUMENT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- {product_category.name='reference document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='specification document'}
STANDARD_DOCUMENT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.producst[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- {product_category.name='reference document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='standard document'}

Table 6 - Mapping table for data_list (concluded)

Application element	AIM element	Source	Rules	Reference path
TDP_ELEMENT #1: When tdp_element is a parts list #2: When tdp_element is a drawing defined within this document #3: When tdp_element is a product_-data_set #4: When tdp_element is a reference_-document #5: When tdp_element is a data_list #6: When tdp_element is an other_list #7: When tdp_element is a drawing or a product_data_set and is defined externally to this document #8: When tdp_element is a drawing that is defined by AP 202	#1, #2, #3, #4, #5, #6, #7: (product_-definition_formation) #8: (<draughting_drawing_revision> <product_definition_formation>)	41 505		{product_definiton_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {;roduct_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category #1: (product_category.name='parts list') #2: (product_category.name='drawing') #3: (product_category.name='product data set') #4: (product_category.name='reference document') #5: (product_category.name='data list') #6: (product_category.name='other list') #7: (product_category.name=('drawing')('product data set')) #8:(<product_category.name='drawing'> <draughting_drawing_revision>)}

Table 7 - Maping table for drawing

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_IDENTIFICATION_-OF_ITEM	product_definition_formation	41		
alternate_identification_of_item to change_identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->> object_role object_role.name='change identification'} action_assignment.assigned_action->> action=>> {action.description='change identification'} executed_action

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->>br>person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->>br>organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
alternate_identification_of_item to drawing_suffix_number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->>br>product
alternate_identification_of_item to identifier (identifying_number)	PATH			product_definition_formation [product_definition_formation.id] product_definition_formation.of_product->>br>product [product.id] <product_defintion_formation oganization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment organization_assignment.assigned_organization->>br>organization>

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category
alternate_identification_of_item to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
alternate_identification_of_item to source_information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
ANNOTATION	annotation_occurrence	46		
annotation to geometry (annotation_geometry)	PATH			annotation_occurrence<= styled_item {styled_item<= representation_item<- representation.items[i] representation} styled_item.item-> representation_item=> geometric_representation_item

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
DRAWING #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 202 or AP 201exchange with an AP 232 exchange	#1: product_definition_formation #2: [draughting_drawing_revision] [product_definition_formation]	41 505 41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'}) #2: ({draughting_drawing_revision<= drawing_revision<= presentation_set presentation_representation_select=presentation_set presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'})

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
drawing to header (heading) #2: (see note 2)	#1: (PATH)			#1: (product_definition_formation<- product_definition.formation product_definition characterized_product_defintion=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.name='drawing header'})

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
drawing to sheet (pages) #1: If drawing and sheet are identified within AP 232 #2: If drawing is identified within AP 232 and sheet is defined as AP 202/201 sheet within the same exchange #3: If drawing is defined as an AP 202/201 drawing and the sheet is identified within AP 232 Note: For drawing and sheet defined within AP 201 or AP 202, the mapping path can be found within AP 201 or AP 202, respectively	#1: (PATH) #2: (PATH) #3: (PATH)			#1: (product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name=\ 'drawing membership'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: (product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'} product_definition_formation_relationship.relating_product_definition_formation

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation_relationship {product_definition_formation_relationship.name=\ 'drawing membership'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'} presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation->presentation_representation_select presentation_representation_select=presentation_representation presentation_representation=> presentation_area=> drawing_sheet_revision) #3: (draughting_drawing_revision<= drawing_revision<= presentation_set presentation_representation_select=presentation_set presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition_formation

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name=\ 'drawing membership'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})
DRAWING_SUFFIX_NUMBER_-COMBINATION	product	41		

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_suffix_number_combination to element_identification (drawing_number)	PATH	41	14	product<- product_relationship.relating_product product_relationship {product_relationship.name=\ 'drawing suffix number combination'} product_relationship.related_product->product product.id { product<- product_related_product_category.products[i] product_related_product_category<= product_category<- product_categoy.name='document' product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category.name='drawing'}
drawing_suffix_number_combination to identifier (suffix_identifier)	PATH		14	product<- product_relationship.relating_product product_relationship product_relationship.id {product_relationship.name=\ 'drawing suffix number combination'}
GEOMETRY	geometric_representation_item	42		
ITEM_IDENTIFICATION	product_definition_formation	41		

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to alternate_-identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) #2:(product_definition_formation->product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product->product<- product_definition_formation)
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->>br>person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->>br>organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->>br>product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->>br>product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->>br>product<- product_related_product_category.product[i] product_related_product_category<= product_category

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
ITEM_TYPE	product_category	41		
item_type to company (code_administrator)	PATH			product_category organiation_item=product_category organizatin_item<- assigned_organization_assignment.item[i] assigned_organization_assignment=> organization_assignment {organization_assignment organization_assignment.role-> organization_role organization_role.name='code administator'} organization_assignment.assigned_organization-> organization
item_type to label (item_code)	PATH			product_category product_category.name

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
item_type to text (type_of_coding_scheme)	PATH			product_category product_category.description
PRODUCT_PRESENTATION #1: For general capability #2: For use with AIC 517	#1: (presentatation_representation) #2: (mechanical_design_geometric_- presentation_representation)	46 517		
product_presentation to annotation (annotation_presentation) #2: (see note 2)	#1: (PATH)			#1: (presentation_representation<= representation representation.items[i]-> representation_item=> mapped_item mapped_item.mapping_source-> represenntaton_map mapped_representation-> representation representation.items[i]-> styled_item=> annotation_occurence)

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
product_presentation to shape_model (part_shape_views)	PATH			#1: (presentation_representation<= representation representation.items[i]-> representation_item=> mapped_item mapped_item.mapping_source-> representation_map representation_map.mapped_presentation-> representation (representation=> shape_representation (shape_representation=> edge_based_wireframe_shape_representation) (shape_representation=> shell_based_wireframe_shape_representation) (shape_representation=> geometrically_bounded_2d_wireframe_representation) (shape_representation=> geometrically_bounded_surface_shape_representation) (shape_representation=> non-manifold_surface_shape_representation) (shape_representation=> manifold_surface_shape_representation) (shape_representation=> geometrically_bounded_wireframe_surface_shape_representation) (shape_representation=> faceted_brep_shape_representation) (shape_representation=> elementary_brep_shape_representation) (shape_representation=> advanced_brep_shape_representation) (shape_representation=> csg_shape_representation)) (representation=> shape_representation) (representation representation.items[i]-> representation_item=> topological_representation_item=> connected_face_set connected_face_set.cfs_faces[i]-> advanced_face))

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (mechanical_design_geometric_presentation_\ representation<= presentation_representation<= representation representation.items[i]->>br>representation_item=> mapped_item mapped_item.mapping_source->>br>representation_map representation_map.mapped_presentation->>br>representation (representation=> shape_representation (shape_representation=> edge_based_wireframe_shape_representation) (shape_representation=> shell_based_wireframe_shape_representation) (shape_representation=> geometrically_bounded_2d_wireframe_representation) (shape_representation=> geometrically_bounded_surface_shape_representation) (shape_representation=> non-manifold_surface_shape_representation) (shape_representation=> manifold_surface_shape_representation) (shape_representation=> geometrically_bounded_wireframe_surface_shape_representation) (shape_representation=> faceted_brep_shape_representation) (shape_representation=> elementary_brep_shape_representation) (shape_representation=> advanced_brep_shape_representation) (shape_representation=> csg_shape_representation)) (representation=> shape_representation) (representation representation.items[i]->>br>representation_item=> topological_representation_item=> connected_face_set

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
				connected_face_set.cfs_faces[i]-> advanced_face))
SHAPE_MODEL	#1: (edge_based_wireframe_shape_-representation) #2: (shell_based_wireframe_shape_-representation) #3: (geometrically_bounded_2d_-wireframe_representation) #4: (geometrically_bounded_surface_-shape_representation) #5: (non-manifold_surface_shape_-representation) #6: (manifold_surface_shape_-representation) #7: (geometrically_bounded_wireframe_-surface_shape_representation) #8: (advanced_face) #9: (faceted_brep_shape_representation) #10: (elementary_brep_shape_-representation) #11: (advanced_brep_shape_-representation) #12: (csg_shape_representation) #13: (shape_representation)	501 502 503 507 508 509 510 511 512 513 514 515 41		

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
shape_model to geometry (part_shape_representation)	PATH			#1: (edge_based_wireframe_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #2: (shell_based_wireframe_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #3: (geometrically_bounded_2d_wireframe_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #4: (geometrically_bounded_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #5: (non-manifold_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #6: (manifold_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #7: (geometrically_bounded_wireframe_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item)

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
				#8: (advanced_face<- connected_face_set.cfs_faces[i]-> connected_face_set<= topological_representation_item<= representation_item=> geometric_representation_item) #9: (faceted_brep_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #10: (elementary_brep_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #11: (advanced_brep_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #12: (csg_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #13:(shape_representation<= representation representation.items[i]-> representation_item=> geometric_representation_item)

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
SHEET #1: If sheet is identified within AP 232 #2: If sheet is defined as an AP 202 exchange within same file	#1: product_definition_formation #2: [product_definition_formation] [drawing_sheet_revision]	41 41 101	16 19	#1: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: ({drawing_sheet_revision<= presentation_area<= presentation_representation presentation_representation_select=presentation_representation presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation} {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
sheet to configuration (sheet_configuration)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='sheet header'})
sheet to element_identification (sheet_identifier)	IDENTICAL MAPPING			
sheet to label (sheet_size)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='sheet header'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document format'} representation.items[i]->{representation_item.name=\ (‘size format')(‘size format standard’)} representation_item=> descriptive_representation_item descriptive_representation_item.description

Table 7 - Mapping table for drawing (continued)

Application element	AIM element	Source	Rules	Reference path
sheet to product_presentation (presentation_format) Note: #1, #2: This part of ISO 10303 does not represent product presentation information for the sheet. Usage of ISO 10303:201 or ISO 10303:202 is required. #3: The mapping from drawing_-sheet_revision to the product information can be found in ISO 10303:201 or ISO 10303:202.				

Table 7 - Mapping table for drawing (concluded)

Application element	AIM element	Source	Rules	Reference path
TDP_ELEMENT #1: When tdp_element is a product_-data_set #2: When tdp_element is a reference_-document #3: When tdp_element is a drawing	product_definition_formation	41		#1:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='product data set' }) #2:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='reference document'}) #3:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='drawing'})

Table 8 - Mapping table for indentured_data_list

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_IDENTIFICATION_-OF_ITEM	product_definition_formation	41		
alternate_identification_of_item to change_identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->> object_role object_role.name='change identification'} action_assignment.assigned_action->> action=>> {action.description='change identification'} executed_action

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->>br>person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->>br>organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
alternate_identification_of_item to drawing_suffix_number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->>br>product
alternate_identification_of_item to identifier (identifying_number)	PATH			product_definition_formation [product_definition_formation.id] product_definition_formation.of_product->>br>product [product.id] <product_defintion_formation oganization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment organization_assignment.assigned_organization->>br>organization>

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category
alternate_identification_of_item to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product->product product.name
alternate_identification_of_item to source_information_type (source_information)	PATH		23	product_definition_formation<-product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<-property_definition.definition property_definition<-{property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_ITEM #1: If alternate is a substitute with no concern for which is used in an assembly context #2: If alternate is an alternate item with concern for which is used in an assembly context #3: If alternate is an alternate item with a one for one substitution and allows for two way substitution in a particular assembly context	product	41		#1: ({product<- alternate_product_relationship.alternate}) #2: ({product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute}) #3: ({product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute})
alternate_item to an_integer (usage_conditions) preference_order #1: (see note 2) #3: (see note 2)	#2: (PATH)		117	#2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute_with_ranking assembly_component_usage_substitute_with_ranking.ranking)
alternate_item to item (interchange_item) #2: (see note 2) #3: (see note 2)	PATH			product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_item to item_usage (interchange_item) #1: (see note 2) #3: (see note 2)	PATH			#2: product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- (product_definition_relationship.related_product_definition product_definition_relationship)
alternate_item to label (type_of_alternate)	PATH			#1: (product<- alternate_product_relationship.alternate alternate_product_relationship alternate_product_relationship.name) #2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute.name) #3: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute product_definition_substitute.name)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_item to text (usage_conditions) specific_usage	#2: (PATH) #3: (PATH)		117	#1: ({<product<- alternate_product_relationship.basis> <product<- alternate_product_relationship.description>}) #2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute.definition) #3: (product<- product_definition_formation.of_product product_definition_formation<- jproduct_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute product-definition-substitute.description)
ASSOCIATED_LIST #1: If the associated list is a parts_list #2: If the associated list is a data_list #3: If the associated list is an other_list #4: If the associated list is an indentured data list #5: If the associated list is an index list	product_definition_formation	41		product_definition_formation product_defintion_formation.of_product->product<- product_related_prodcut_category.products[i] product_related_product_category<= product_category #1:({product_category.name='parts list'}) #2:({product_category.name='data list'}) #3:({product_category.name='other list'}) #4:({product_category.name='indentured data list'}) #5:({product_category.name='index list'})

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
associated_list to drawing (related_to)	PATH			#1: (product_definition_formation <- product_defnition_formation_relationship.\ related_product_defnition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='associated list'} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation
associated_list to list_presentation (presentation)	PATH			product_definition_formation presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation-> presentation_representation_select presentation_representation_select=presentation_set presentation_set
associated_list to product_data_set (related_to)	PATH			product_defination_formation<- product_defination.formation product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship product_definition_relationship.related_product_definition-> product_definition product_defnition.formation-> product_definition_formation {product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product_category<= product_category product_category.name ='product data set'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
CONTRACT_SUBMISSION	applied_contract_assignment	232		{applied_contract_assignment<= {contract_assignment role_select=contract_assignment role_select<- role_association.item_with_role role_association role_association.role->>>object_role object_role.name='contract submission'}
contract_submission to contract (delivered_contract)	PATH			applied_contract_assignment<= contract_assignment contract_assignment.assigned_contract->>contract
contract_submission to date (date_of_submission) #1: If the date includes date and time #2: If the date only includes a date	PATH		5	applied_contract_assignment #1: (date_and_time_item=applied_contract_assignment date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment {date_and_time_assignment date_and_time_assignment.role->>>date_time_role date_time_role.name='date and time of submission'} date_and_time_assignment.assigned_date_and_time->>>date_and_time) #2: (date_item=applied_contract_assignment date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment {date_assignment date_assignment.role->>>date_role date_role.name='date of submission'} date_assignment.assigned_date->>>date)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
contract_submission to text (location)	PATH		6	applied_contract_assignment organization_item=applied_contract_assignment organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment organization_assignment.role->>br>organization_role organization_role.name='location of contract submission'} organization_assignment.assigned_organization->>br>organization<- organizational_address.organizations[i] organizational_address<= address
DATE_EFFECTIVITY	dated_effectivity	41		
date_effectivity to date (end_date)	PATH			dated_effectivity dated_effectivity.effectivity_end_date->>br>date_and_time
date_effectivity to date (start_date)	PATH			dated_effectivity dated_effectivity.effectivity_start_date->>br>date_and_time
DOCUMENT_LIST	document	41		
DOCUMENT_USAGE_-PARAMETER	document_usage_constraing	41		
document_usage_parameter to label (subject)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {(document_usage_constraint.subject_element_value) (document_usage_constraint.subject_element_value=\ ('type')('grade')('form')('composition'))}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
document_usage_parameter to text (value_of)	PATH			document_usage_constraint document_usage_constraint.subject_element_value

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
DRAWING #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 201 or 202 exchange with an AP 232 exchange	#1: (product_definition_formation) #2: ([draughting_drawing_revision] [product_definition_formation])	41 505 41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'}) #2: ({draughting_drawing_revision<= drawing_revision<= presentation_set presentation_representation_select=presentation_set presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'})

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
drawing to header (heading)	#1: (PATH) #2: (PATH)			#1, #2: (product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='drawing header'})
drawing to sheet (pages) (see note 3)				
DRAWING_SUFFIX_NUMBER_- COMBINATION	product	41		
drawing_suffix_number_combination to element_identification (drawing_number)	PATH	41	14	product<- product_relationship.relating_product product_relationship {product_relationship.name=\ 'drawing suffix number combination'} product_relationship.related_product-> product product.id { product<- product_related_product_category.products[i] product_related_product_category<= product_category<- product_categoy.name='document' product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category.name='drawing'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_suffix_number_combination to identifier (suffix_identifier)	PATH		14	product<- product_relationship.relating_product product_relationship product_relationship.id {product_relationship.name=\ ’drawing suffix number combination’}
EFFECTIVITY #1: When the effectivity is for a part and the next higher part is known #2: When the effectivity is for a part and the next higher part is not known	#1: (<configuration_effectivity> <(serial_numbered_effectivity) (dated_effectivity) (lot_effectivity)>) #2: ([applied_effectivity_assignment] [applied_effectivity_context_assignment}	41 41 41 41 232 232		#1: ({configuration_effectivity<= product_definition_effectivity product_definition_effectivity.usage->\ product_definition_relationship product_definition_relationship.description='item usage'}) #2: ({applied_effectivity_assignment<= effectivity_assignment<- effectivity_context_assignment.assigned_effectivity_assignment effectivity_context_assignment [effectivity_context_assignment.role->\ effectivity_context_role effectivity_context_role.name=’context document of effectivity’] [effectivity_context_assignment=> applied_effectivity_context_assignment applied_effectivity_context_assignment.items[i]->\ effectivity_context_item effectivity_context_item=product_definition_formation product_definition_formation product_definition_formation.of_product->\ product<- product_related_product_category.products[i] product_related_product_category<= product.category product_category.name=’document’]})

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to approval (effectivity_approvals)	PATH			#1: (configuration_effectivity approval_item=configuration_effectivity approval_item<- applied_approval_assignment.items[i] applied_approval_assignment) #2: (applied_effectivity_assignment approval_item=applied_effectivity_assignment approval_item<- applied_approval_assignment.items[i] applied_approval_assignment) <approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role>
effectivity to product_configuration (product)	PATH			#1: (configuration_effectivity configuration_effectivity.configuration-> configuration_design configuration_design.configuration-> configuration_item) #2: (applied_effectivity_assignment<= effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity=> product_definition_effectivity=> configuration_effectivity configuration_effectivity.configuration-> configuration_design configuration_design.configuration-> configuration_item)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to text (description)	PATH			#1: (configuration_effectivity<= product_definition_effectivity<= effectivity<- description_attribute_select=effectivity description_attribute_select<- description_attribute.described_item description_attribute description_attribute.attribute_value) #2: (applied_effectivity_assignment<= effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity<- description_attribute_select=effectivity description_attribute_select<- description_attribute.described_item description_attribute description_attribute.attribute_value)
INDENTURED_DATA_LIST	product_definition_formation	41	20	{product_definition_formation produc_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='indentured data list'}
indentured_data_list to indentured_- data_list_body (body)	PATH			product_definition_formation<- product_definition.formation (product_definition)(product_definition_with_associated_documents) {product_definition.description='indentured data list content'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list to indentured_- data_list_header (header)	PATH			product_definition_formation<- product_definition.formation (product_definition)(product_definition_with_associated_documents) {product_definition.description='indentured data list content'} characterized_product_definition=(product_defnition)\ (product_definition_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='indentured data list header'}
INDENTURED_DATA_LIST_BODY	product_definition	41		{product_definition product_definition.description='indentured data list content'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_body to element identification (standardization_documents_list)	PATH			product_definition product_or_formation_or_definition=product_definition product_or_formation_or_definition<- document_product_association.related_product document_product_association {document_product_association=> document_product_equivalence} document_product_association.relating_document-> document<- {document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document definition'} document_reference.assigned_document document_reference=> {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='standards document'} applied_document_reference applied_document_reference.items[i]-> document_reference_item document_reference_item=product_definition_formation product_definition_formation {product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category product_category.name='document'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_body to indentured_data_list_tabulation (indentured_tabulation)	PATH		22	product_definition product_or_formation_or_definition=product_definition product_or_formation_or_definition<- document_product_association.related_product document_product_association {document_product_association=> document_product_equivalence} {document_product_association.name=’equivalence’} document_product_association.relating_document-> document<- {document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document definition'} document_reference.assigned_document document_reference=> {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name=(’indentured by document’)\ (‘indentured by item’)(‘indentured by item and document’)} applied_document_reference

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_body to notation (notes_list)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='indentured data list body property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='notation'} representation.items[i]->representation_item=> descriptive_representation_item

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_body to revision (revision_history)	PATH			product_definition <product_definition_formation-> product_definition_formation<- product_definition_formation_relationship.related_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (‘sequence’)(‘iteration’))} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation> action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='revision history'} action_assignment.assigned_action-> action => {(action.description) (action.description=\ ('revision')(‘change’)(‘issue’)(‘sequence’)(‘change identification’)} executed_action

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
INDENTURED_DATA_LIST_- ENTRY #1: When entry is a document #2: When entry is an item	#1,#2: (product_definition_with_- associated_documents) (product_definition)	41		{(product_definition (product_definition.frame_of_reference->) product_definition_context) (product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference->) product_definition_context) product_definition_context=> application_context_element application_context_element.name='indentured data list entry'}
indentured_data_list_entry to configuration (entry_configuration)	PATH			#1,#2:(product_definition_with_associated_documents)\ (product_definition) characterized_product_definition=\ (product_definition_with_associated_documents)(product_definition) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {(property_definition.name) (property_definition.name='indentured data list entry property')}
indentured_data_list_entry to contract_submission (available_from)	PATH			(product_definition_with_associated_documents)\ (product_definition) contract_item=product_definition contract_item<- applied_contract_assignment.items[i] applied_contract_assignment)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_entry to effectivity (effective_on)	PATH			(product_definition<- product_definition_relationship.related_product_definition product_definition_relationship<- product_definition_effectivity.usage product_definition_effectivity=> configuration_effectivity) (prodcut_definition product_definition=effectivity_item effectivity_item<- applied_effectivity_assignment.item[i] applied_effectivity_assignment=> effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity)
indentured_data_list_entry to element_-identification (superseded_entry)	PATH		7	(product_definition <- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name='superseded element'} product_definition_relationship.related_product_definition -> product_definition-> product_definition_formation) (product_definition-> product_definition_formation<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name=\ 'superseded version'} product_definition_formation_relationship.related_product_definition_formation-> product_definition_formation)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_entry to identifier (entry_item_change_level)	PATH			product_defnition action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role object_role.name='change identification for entry'} action_assignment.assigned_action->action<- {action=> executed_action} action_relationship.relationship_action action_relationship action_relationship.related_action->action {action=> executed_action} action.name
indentured_data_list_entry to item_-parent_to_item_child_relationship (entry)	PATH			product_definition<- product_definition_relationship.related_product_definition (product_definition_relationship)(alternate_product_relationship)\ (assembly_component_usage)\ (assembly_component_usage_substitute)\ (next_assembly_usage_occurrence)\ (quantified_assembly_component_usage)\ (assembly_component_usage_with_ranking)\ (make_from_usage_option_with_reference_designator)\ (make_from_usage_option)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_entry to item_-parent_to_tdp_element_child_-relationship (entry)	PATH			((product_definition)(product_definition_with_associated_documents) product_definition_relationship.related_product_definition product_definition_relationship) ((product_definition)(product_definition_with_associated_documents) document_reference_item=(product_definition)/ (product_definition_with_-associated_documents) document_reference_item<- applied_document_reference.items[i] applied_document_reference)
indentured_data_list_entry to label (indenture_level)			21	#1,#2: (product_definition characterized_product_definition=product_definition characterized_defnition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='indentured data list entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='indentured level tag'} representation.items[i]-> representation_item {representation_item=> descriptive_representation_item} representation_item.name)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_entry to notation (entry_notes)	#1: (PATH) #2: (PATH)			#1,#2: (product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='indentured data list entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='notation'} representation.items[i]->representation_item=> descriptive_representation_item)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_entry to reference_document (available_from)	PATH			(product_definition)\ (product_definition_with_associated_documents) document_reference_item=(product_definition)\ (product_definition_with_associated_documents) document_reference_item<- applied_document_referenece.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='source identification'} document_reference.assigned_document->document<- {docoument.kind->document_type document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category product_category.name='document'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_entry to special_-condition (special_conditions)	#1: (PATH) #2: (PATH)			#1,#2: (product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='indentured data list entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='special condition'} representation.items[i]->representation_item=> descriptive_representation_item)
indentured_data_list_entry to tdp_-element_parent_to_item_child_-relationship (entry)	PATH			(product_definition)(product_definition_with_associated_documents)<-product_definition_relationship.related_product_definition product_definition_relationship
indentured_data_list_entry to tdp_-element_parent_to_tdp_element_-child_relationship (entry)	PATH			(product_definition)(product_definition_with_associated_documents)<-product_definition_relationship.related_product_definition product_definition_relationship
indentured_data_list_entry to tdp_-indentured_item (entry) #1: (see note 2)	#2: (IDENTICAL MAPPING)			
indentured_data_list_entry to tdp_-indentured_tdp_element (entry) #2: (see note 2)	#1: (IDENTICAL MAPPING)			

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
INDENTURED_DATA_LIST_-HEADER	property_definition			{property_definition property_definition.name='indentured data list header'}
indentured_data_list_header to header (common_header)	IDENTICAL_MAPPING			
indentured_data_list_header to item_-identification (procurement_references)	PATH			property_definition property_definition.definition->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition.formation->product_definition_formation<- product_definition_formation_relationship.relating_product_defnition_formation product_definition_formation_relationship {product_definition_formation_relationship.name=\ 'procurement reference'} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation
INDENTURED_DATA_LIST_-TABULATION	applied_document_reference	232		{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=('indentured by document')\ ('indentured by item')('indentured by item and document')}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_tabulation to indentured_data_list_entry (tabulation_of_entries)	PATH			applied_document_reference applied_document_reference.items[i]->document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.related_product_definition_formation->product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.related_product_definition->product_definition> <document_reference_item=applied_document_reference applied_document_reference<= document_reference document_reference.assigned_document->document<- document_product_association.relating_document document_product_association=> document_product_equivalence<= document_product_association document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_defintion_formation_relationship.relating_product_definition_formation->product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition->product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition>

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
				<document_reference_item=applied_document_reference applied_document_reference applied_document_reference.item{i}-> document_reference_item (document_reference_item=product_definition product_definition) (document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition)>
indentured_data_list_tabulation to indentured_list_by_document (method_of_entry_tabulation)	IDENTICAL MAPPING			{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='indentured by document'}
indentured_data_list_tabulation to indentured_list_by_part (method_of_entry_tabulation)	IDENTICAL MAPPING			{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='indentured by item'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_data_list_tabulation to indentured_list_by_part_with_-document_references_to_parts (method_of_entry_tabulation)	IDENTICAL MAPPING			{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='indentured by item and document'}
INDENTURED_LIST_BY_-DOCUMENT	applied_document_reference	232		{applied_document_reference<= document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='indentured by document'}
indentured_list_by_document to tdp_-indentured_tdp_element (top_indentured_tdp_elements)	PATH			applied_document_reference applied_document_reference.items[i]->>br>document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation->>br>product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition->>br>product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition>

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
INDENTURED_LIST_BY_PART	applied_document_reference	232		{applied_document_reference<- document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='indentured by item'}
indentured_list_by_part to tdp_- indentured_item (top_indentured_items)	PATH			applied_document_reference applied_document_reference.items[i]->>br>document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation->>br>product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition->>br>product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition> <document_reference_item=applied_document_reference applied_document_reference applied_document_reference.items[i]->>br>document_reference_item (document_reference_item=product_definition product_definition) (document_reference_item=product_defintion_formation product_definition_formation<- product_definition.formation product_definition)>

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
INDENTURED_LIST_BY_PART_- WITH_DOCUMENT_- REFERENCES_TO_PARTS	applied_document_reference	232		{applied_document_reference<- document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->> object_role object_role.name='indentured by item and document'}
indentured_list_by_part_with_- document_references_to_parts to tdp_- indentured_item (top_indentured)	PATH			applied_document_reference applied_document_reference.items[i]->> document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation->> product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition->> product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition> <document_reference_item=applied_document_reference applied_document_reference applied_document_reference.items[i]->> document_reference_item (document_reference_item=product_definition product_definition) (document_reference_item=product_defintion_formation product_definition_formation<- product_definition.formation product_definition)>

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
indentured_list_by_part_with_- document_references_to_parts to tdp_- indentured_tdp_element (top_indentured)	PATH			applied_document_reference applied_document_reference.items[i]->
 document_reference_item <document_reference_item=product_definition_formation_relationship product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation->
 product_definition_formation<- product_definition.formation product_definition> < document_reference_item=product_definition_relationship product_definition_relationship product_definition_relationship.relating_product_definition->
 product_definition> <document_reference_item=product_definition_formation product_definition_formation<- product_definition.formation product_definition> <document_reference_item=product_definition> <document_reference_item=applied_document_reference applied_document_reference applied_document_reference.items[i]->
 document_reference_item (document_reference_item=product_definition product_definition) (document_reference_item=product_defintion_formation product_definition_formation<- product_definition.formation product_definition)>
ITEM_IDENTIFICATION	product_definition_formation	41		

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to alternate_-identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) #2:(product_definition_formation->product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product->product<- product_definition_formation)
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->> person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->> organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->> product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->> product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->> product<- product_related_product_category.products[i] product_related_product_category<= product_category

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
ITEM_PARENT_TO_ITEM_-CHILD_RELATIONSHIP	product_definition_relationship	41		
item_parent_to_item_child_-relationship to item_identification (child)	PATH			product_definition_relationship product_definition_relationship.related_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation
item_parent_to_item_child_-relationship to item_identification (parent)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation
ITEM_PARENT_TO_TDP_-ELEMENT_CHILD_-RELATIONSHIP	(product_definition_relationship) (applied_document_reference)	41		

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_parent_to_tdp_element_child_-relationship to element_identification (child)	PATH			(product_definition_relationship product_definition_relationship.related_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation) (applied_document_reference<= document_reference document_reference.assigned_document-> document<- {document document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation {product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product-category<= product_category product_category.name='document'})
item_parent_to_tdp_element_child_-relationship to item_identification (parent)	PATH			(product_definition_relationship product_definition_relationship.relating_product_definition-> (product_definition)(product_definition_with_associated_documents) product_definition.formation-> product_definition_formation) (applied_document_reference applied_document_reference.items[i]-> document_reference_item document_reference_item=product_definition_formation product_definition_formation)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
ITEM_TYPE	product_category	41		
item_type to company (code_administrator)	PATH			product_category organiation_item=product_category organizatin_item<- assigned_organization_assignment.item[i] assigned_organization_assignment=> organization_assignment {organization_assignment organization_assignment.role->organization_role organization_role.name='code administator'} organization_assignment.assigned_organization->organization
item_type to label (item_code)	PATH			product_category product_category.name
item_type to text (type_of_coding_scheme)	PATH			product_category product_category.description
LOT_EFFECTIVITY	lot_effectivity	41		
lot_effectivity to a_number (lot_size)	PATH			lot_effectivity lot_effectivity.effectivity_lot_size->measure_with_unit measure_with_unit.value_component->measure_value
lot_effectivity to identifier (lot_identification)	PATH			lot_effectivity lot_effectivity.effectivity_lot_id

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
lot_effectivity to measure (lot_unit_of_measure)	PATH			lot_effectivity lot_effectivity.effectivity_lot_size->measure_with_unit measure_with_unit.unit_component->unit
MEASURE	named_unit	41		
NOTATION	descriptive_representation_item	45		{descriptive_representation_item<=representation_item<-representation.items[i]representation representation.name='notation'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to element_identification (referenced_document_in_note)	PATH			descriptive_representation_item document_reference_item=descriptive_representation_item document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference <document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name> document_reference.assigned_document document<- {document.kind-> document_type.product_data_type=\ ’configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to identifier (reference_code)	PATH			descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role_> classification_role classification_role.name='reference code'} classification_assignment.assigned_class-> group group.name {group=> class}
notation to label (type_of_notation)	PATH		24	descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role-> classification_role classification_role.name='type of notation'} classification_assignment.assigned_class-> group group.name {group=> class_system}
notation to label (note_title)	PATH			descriptive_representation_item descriptive_representation_item.name
notation to text (note)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to text (note_parameter)	PATH			descriptive_representation_item<= representation_item<- representation_item_relationship.relating_representation_item representation_item_relationship {representation_relationship.name='note parameter'} representation_item_relationship.related_representation_item->representation_item=> (descriptive_representation_item) (measure_representation_item)
NUMBER_WITH_UNITS	measure_with_unit	41		
number_with_units to measure (units_of)	IDENTICAL MAPPING			measure_with_unit measure_with_unit.unit_component
number_with_units to a_real (value_of)	PATH			measure_with_unit measure_with_unit.value_component
PRODUCT_DATA_SET	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product-category<=product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='product data set'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set to drawing (related) #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 201 or AP 202 exchange within the same file	PATH			#1:(product_definition_formation<- {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='product data set'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='related drawing'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'}) #2: (product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='product data set'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition_formation_relationship.name='related drawing'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<-product_related_product_category.products[i] product_related_product_category<=product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='drawing'} presented_item_item=product_definition_formation presented_item_item<-applied_presented_item.items[i] applied_presented_item<=presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation->presentation_representation_select presentation_representation_select=presentation_set presentation_set=> drawing_revision=> draughting_drawing_revision)

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set to product_data_set (related)	PATH			product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='product data set'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='related product data set'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='product data set'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set to source_file (file_configuration)	PATH		28	product_definition_formation<- product_definition.formation (product_definition=> product_definition_with_associated_documents product_definition_with_associated_documents.documentation_ids[i]-> document=> document_file) (product_defintion document_reference_item=product_defintion document_reference_item<- applied_document_reference.item[i] applied_document_reference<= document_reference=> document_file)
PRODUCT_DATA_SET_WITH_-FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set with format'}
product_data_set_with_format to header (product_header)	PATH			product_defnition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.name=\ 'product data set with format header'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set_with_format to product_presentation (presentation_of_product_data_set) (see note 3)				
PRODUCT_DATA_SET_WITH_-SHADING	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product-category<= product_category<- product_category.name='document' product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set with shading'}
product_data_set_with_shading to header_configuration_with_element_-identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=\ 'product data set with shading header'}
product_data_set_with_shading to shaded_shape_model (a_shaded_model) (see note 3)				

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_- WITHOUT_FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set without format'}
product_data_set_without_format to header_configuration_with_element_- identification (data_configuration)	PATH			product_defnition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.name='product data set without format header'}
product_data_set_without_format to shape_model (a_model) (see note 3)				
QUANTITY	measure_with_unit	41		
quantity to a_number (value_of)	PATH			measure_with_unit measure_with_unit.value_component-> measure_value measure_value=count_measure count_measure

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
quantity to text (quantity_accuracy)	PATH			measure_with_unit<- measure_qualification.qualified_measure measure_qualification measure_qualification.qualifier->>br>type_qualifier (type_qualifier.name) (type_qualifier.name=(‘exact’)(‘as required’)(‘approximate’))
quantity to text (value_of)	PATH			measure_with_unit measure_with_unit.value_compenent->>br>measure_value measure_value=descriptive_measure descriptive_measure
quantity to volume (value_of)	IDENTICAL MAPPING			
quantity to weight (value_of)	PATH			measure_with_unit=> measure_representation_item<= representation_item
REVISION	executed_action	41		{executed_action<= action (action.description) (action.description=\ ('revision’)(‘change')(‘issue’)(‘sequence’)(‘change identification’))}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to date (revison_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment <date_assignment.role->date_role date_role.name> date_assignment.assigned_date->date) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment <date_and_time_assignment.role->date_time_role date_time_role.name> date_and_time_assignment.assigned_date_and_time->date_and_time data_and_time.date_component->date)
revision to identifier (revision_level)	PATH			executed_action<= action action.name

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to other_reference_document (authorizing_documents)	PATH		12	executed_action document_reference_item=executed_action document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role (object_role.name) (object_role.name=\ ('revision authorizing identification')(‘change rationale’))} document_reference.assigned_document-> document<- {document.kind-> document_type.product_data_type=\ ’configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to person_and_organization (revision_approval) #1: without person #2: with person	PATH		27	executed_action<= action approved_item=action approved_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment <approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role {(object_role.name) (object_role.name='revision approval') (object_role.name='release authenication')}> approval_assignment.assigned_approval->approval<- #1: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->person_organization_select person_organization_select=organization) #2: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization->organization)
revision to text (revision_description)	PATH			executed_action<= action action.chosen_method->action_method action_method.description
SEQUENCE_EFFECTIVITY	serial_numbered_effectivity	41		

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
sequence_effectivity to quantity	PATH			serial_numbered_effectivity<= effectivity=> product_definition_effectivity product_definition_effectivity.usage->> product_definition_relationship=> product_definition_usage=> assembly_component_usage=> quantified_assembly_component_usage.quantity->> measure_with_unit
sequence_effectivity to identifier (from_effectivity_id)	PATH			serial_numbered_effectivity serial_numbered_effectivity.effectivity_start_id
sequence_effectivity to identifier (thru_effectivity_id)	PATH			serial_numbered_effectiivity serial_numbered_effectivity..effectivity_end_id
sequence_effectivity to measure (quantity_unit_of_measure)	PATH		10	serial_numbered_effectivity<= effectivity=> product_definition_effectivity product_definition_effectivity.usage->> product_definition_relationship=> product_definition_usage=> assembly_component_usage=> quantified_assembly_component_usage.quantity->> measure_with_unit measure_with_unit.unit_component->> unit

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
SHEET #1: If sheet isidentified within AP 232 #2: If sheet is defined as an AP 202 exchange within same file	#1: product_definition_formation #2: [product_definition_formation] [drawing_sheet_revision]	41 41 101	16 19	#1: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: ({drawing_sheet_revision<= presentation_area<= presentation_representation presentation_representation_select=presentation_representation presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation} {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
sheet to configuration (sheet_configuration)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='sheet header'})
sheet to element_identification (sheet_identifier)	IDENTICAL MAPPING			
sheet to label (sheet_size)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='sheet header'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='document format'} representation.items[i]-> {representation_item.name=\ (‘size format')(‘size format standard’)} representation_item=> descriptive_representation_item descriptive_representation_item.description
sheet to product_presentation (presentation_format) (see note 3)				

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
SOURCE_INFORMATION_TYPE	representation	43	23	{representation representation.name='source information type'}
source_information_type to identifier (source_code)	PATH			representation representation.items[i]->
representation_item {representation_item=>
descriptive_representation_item} representation_item.name
source_information_type to text (source_description)	PATH			representation representation.items[i]->
representation_item=>
descriptive_representation_item descriptive_representation_item.description
source_information_type to text (type_of_coding_scheme)	PATH			representation representation.context_of_items[i]->
representation_context representation_context.context_type
SPECIAL_CONDITION	descriptive_representation_item	45		
special_condition to label (code)	PATH			descriptive_representation_item<=
representation_item representation_item.name
special_condition to text (description)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
special_condition to text (type_of_coding_scheme)	PATH			descriptive_representation_item<= representation_item<- representation.items[i] representation {representation.name='special condition'} representation.context_of_items[i]->>br>representation_context representation_context.context_type
SPECIFICATION_DOCUMENT	product_definition_formation			{product_definition_formation product_definition_formation.of_product->>br>product<- product_related_product_category.products[i] prodcut_related_product_category<= product_category {product_category.name=’document’} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->>br>product_category<- {product_category.name=’reference_document’} product_category_relationship.category product_category_relationship product_category-relationsip.sub_category->>br>product_category product_category.name=’specification document’}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
STANDARD_DOCUMENT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] prodcut_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category<- {product_category.name='reference_document'} product_category_relationship.category product_category_relationship product_category-relationsip.sub_category-> product_category product_category.name='standard document'}

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
TDP_ELEMENT #1: When tdp_element is a reference_-document #2: When tdp_element is an indentured_data_list #3: When tdp_element is a drawing or product_data_set defined externally to thisdocument #4: When tdp_element is a drawing that is defined by AP 202	#1,#2,#3: (product_definition_formation) #4: (<draughting_drawing_revision> <product_definition_formation>)	41 505 41		#1:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='reference document' }) #2:({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='indentured data list' }) #3:({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name=('drawing')('product data set') }) #4:(<draughting_drawing_revision> {product_definition_formation produc_definition_formation.of_product ->

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
				product<- product_related_product_category.products[i] product_related_product_category<= product_category product_category.name='document' product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='drawing' })
TDP_ELEMENT_PARENT_TO_- ITEM_CHILD_RELATIONSHIP	product_definition_relationship	41		
tdp_element_parent_to_item_child_- relationship to element_identification (parent)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition->product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category product_category.name='document'
tdp_element_parent_to_item_child_- relationship to item_identification (child)	PATH			product_definition_relationship product_definition_relationship.related_product_definition ->product_definition product_definition.formation->product_definition_formation
TDP_ELEMENT_PARENT_TO_- TDP_ELEMENT_CHILD_- RELATIONSHIP	product_definition_relationship	41		

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
tdp_element_parent_to_tdp_element_-child_relationship to element_-identification (child)	PATH			product_definition_relationship product_definition_relationship.relatrd_product_definition->product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<-product_related_product_category.products[i] product_related_product_category<=product_category product_category.name='document'
tdp_element_parent_to_tdp_element_-child_relationship to element_-identification (parent)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition->product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<-product_related_product_category.products[i] product_related_product_category<=product_category product_category.name='document'
TDP_INDENTURED_ITEM	product_definition	41		
tdp_identured_item to item_-identification (top_indenture)	PATH			product_definition product_definition.formation->product_definition_formation
TDP_INDENTURED_TDP_-ELEMENT	product_definition	41		
tdp_indentured_tdp_element to element_identification (top_indenture)	PATH			product_definition product_definition.formation->product_definition_formation

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
VOLUME	measure_with_unit	41		
volume to number_with_units (a_value)	IDENTICAL MAPPING			[measure_with_unit.unit_component-> unit unit=named_unit named_unit=> volume_unit] [named_unit.dimensions-> dimensional_exponents] {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-0} {dimensional_exponents.mass_exponent=0} {dimensional_exponents.length_exponent=3} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}
WEIGHT	representation_item	43		
weight to a_real (a_value)	PATH			representation_item=> measure_representation_item<= measure_with_unit measure_with_unit.value_component-> measure_value measure_value=numeric_measure

Table 8 - Mapping table for indentured_data_list (continued)

Application element	AIM element	Source	Rules	Reference path
weight to measure (unit_of_measure) #1: If weight is expressed in SI units #2: If weight is not expressed in SI units	PATH			representation_item=> measure_representation_item<= measure_with_unit measure_with_unit.unit_component-> unit unit=named_unit named_unit=> #1: (si_unit si_unit.name-> si_unit_name si_unit_name='newton' [named_unit.dimensions-> dimensional_exponents {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-2} {dimensional_exponents.mass_exponent=1} {dimensional_exponents.length_exponent=1} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}]) #2: (conversion_based_unit conversion_based_unit.name [conversion_based_unit.conversion_factor-> measure_with_unit] [measure_with_unit.value_component-> measure_value] [measure_with_unit.unit_component-> unit unit=named_unit named_unit=> si_unit si_unit.name='newton' [named_unit.dimensions-> dimensional_exponents {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-2} {dimensional_exponents.mass_exponent=1} {dimensional_exponents.length_exponent=1} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}]])

Table 8 - Mapping table for indentured_data_list (concluded)

Application element	AIM element	Source	Rules	Reference path
weight_derivation (derivation_method)	PATH			representation_item=> [qualified_representation_item qualified_representation_item.qualifiers[i]-> value_qualifier] [measure_representation_item<= measure_with_unit<- measure_qualification.qualified_measure measure_qualification measure_qualification.qualifier[i]-> value_qualifier] value_qualifier=type_qualifier type_qualifier.name {measure_qualification.name='weight derivation method'} {(type_qualifier.name='calculated') (type_qualifier.name='estimated') (type_qualifier.name='weighed')}

Table 9 - Mapping table for index_list

Application Element	AIM Element	Source	Rules	Reference path
ASSOCIATED_LIST #1: If the associated list is a data_list #2: If the associated list is an indentured data list #3: If the associated list is an index list	product_definition_formation	41		#1:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='data list' }) #2:({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='indentured data list' }) #3:({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='index list' })

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
associated_list to drawing (related_to)	PATH			#1: (product_definition_formation <- product_defnition_formation_relationship.related_product_defnition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='associated list'} product_definition_formation_relationship.relating_product_definition_formation->product_definition_formation
associated_list to list_presentation (presentation)	PATH			product_definition_formation presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation->presentation_representation_select presentation_representation_select=presentation_set presentation_set
associated_list to product_data_set (related_to)	PATH			product_defination_formation<- product_defination.formation product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship product_definition_relationship.related_product_definition->product_definition product_defnition.formation->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products product_related_product_category<=product_category product_category.name ='product data set'}

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
DATA_LIST	product_defintion_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category<- product_category.name='data list' }
data_list to data_list_body (body) (see note 3)				
data_list to data_list_header (list_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=’data list header’}
DATA_LIST_HEADER	property_definition	41		{property_definition property_definition.description=’data list header’}
data_list_header to header (common_header)	IDENTICAL MAPPING			
DOCUMENT_LIST	product_definition_formation	41		

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
DRAWING	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='drawing'}
drawing to header (heading) (see note 3)				
drawing to sheet (pages) (see note 3)				
INDENTURED_DATA_LIST	product_definition_formation		20	{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='indentured data list' }

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
indentured_data_list to indentured_- data_list_body (body) (see note 3)				
indentured_data_list to indentured_- data_list_header (header)	PATH			product_definition_formation<- product_definition.formation (product_defnition)(product_definition_with_associated_documents) characterized_product_definition=(product_defnition)\ (product_definition_with_associated_documents) characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=‘indentured data list header’}
INDEX_LIST	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='index list' }
index_list to index_list_body (body)	PATH			product_definition_formation<- product_definition.formation product_definition {product_definition.description='index list body'}

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
index_list to index_list_header (list_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='index list header'}
INDEX_LIST_BODY	product_definition	41		{product_definition product_definition.description=’index list body’}
index_list_body to index_list_entry (index_list_entries)	PATH			product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name='index list entry'} product_definition_relationhsip.releted_product_definition-> product_definition
index_list_body to notation (data_list_notes)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition {property_definition.description='index list body'} property_definition<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='notation'} representation.items[i]-> representation_item=> descriptive_representation_item

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
index_list_body to revision (revision_history)	PATH			product_definition <product_definition.formation-> product_definition_formation<- product_definition_formation_relationship.related_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (‘sequence’)(‘iteration’))} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation> action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='revision history'} action_assignment.assigned_action-> action => {(action.description) (action.description=\ ('revision')(‘change’)(‘issue’)(‘sequence’)(‘change identification’)} executed_action

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
INDEX_LIST_ENTRY	product_definition	41		{(product_definition product_definition.frame_of_reference-> product_definition_context) (product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference-> product_definition_context) product_definition_context=> application_context_element application_context_element..name='index list entry'}
index_list_entry to header (list_entry)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definitioncharacterized_- definition=property_definition property_definition
index_list_entry to identifier (entry_item_change_level)	PATH			(product_definition action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='change identification for entry'} action_assignment.assigned_action-> action {action=> executed_action} action.name)

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
index_list_entry to notation (entry_notes)	(PATH)			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='index list entry property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='notation'} representation.items[i]->representation_item representation_item=>descriptive_representation_item
INDEX_LIST_HEADER	property_definition	41		{property_definition property_definition.description='index list header'}
index_list_header to header (common_header)	IDENTICAL MAPPING			
ITEM_IDENTIFICATION	product_definition_formation	41		

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
item_identification to alternate_-identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation-> product_definition_formation) #2:(product_definition_formation-> product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product-> product<- product_definition_formation)
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='change identification'} action_assignment.assigned_action-> action=> {action.description='change identification'} executed_action

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->> person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->> organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->> product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->> product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->> product<- product_related_product_category.products[i] product_related_product_category<= product_category

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
NOTATION	descriptive_representation_item	45		{descriptive_representation_item<= representation_item<- representation.itemSi] representation representation.name='notation'}

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
notation to element_identification (referenced_document_in_note)	PATH			descriptive_representation_item document_reference_item=descriptive_representation_item document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference <document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name> document_reference.assigned_document document<- {document.kind-> document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
notation to identifier (reference_code)	PATH			descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.ro.e->>br>classification_role classification_role.name='reference code'} classification_assignment.assigned_class->>br>group group.name {group=> class}
notation to label (type_of_notation)	PATH		24	descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role->>br>classification_role classification_role.name='type of notation'} classification_assignment.assigned_class->>br>group group.name {group=> class_system}
notation to label (note_title)	PATH			descriptive_representation_item descriptive_representation_item.name
notation to text (note)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
notation to text (note_parameter)	PATH			descriptive_representation_item<= representation_item<- representation_item_relationship.relating_representation_item representation_item_relationship {representation_relationship.name=’note parameter’} representation_item_relationship.related_representation_item->representation_item=> (descriptive_representation_item) (measure_representation_item)
REVISION	executed_action	41		{executed_action<= action (action.description) (action.description=\ ('revision’)(‘change')(‘issue’)(‘sequence’)(‘change identification’))}
revision to date (revison_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment <date_assignment.role->date_role date_role.name> date_assignment.assigned_date->date) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment <date_and_time_assignment.role->date_time_role date_time_role.name> date_and_time_assignment.assigned_date_and_time->date_and_time data_and_time.date_component->date)

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
revision to identifier (revision_level)	PATH			executed_action<= action action.name
revision to other_reference_document (authorizing_documents)	PATH		12	executed_action document_reference_item=executed_action document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role (object_role.name) (object_role.name=\ ('revision authorizing identification')(‘change rationale’))} document_reference.assigned_document->>br>document<- {document.kind->>br>document_type.product_data_type=\ ’configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 9 - Mapping table for index_list (continued)

Application Element	AIM Element	Source	Rules	Reference path
revision to person_and_organization (revision_approval) #1: without person #2: with person	PATH		27	executed_action<= action approved_item=action approved_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment <approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role {(object_role.name) (object_role.name='revision approval') (object_role.name='release authenication')}> approval_assignment.assigned_approval->>br>approval<- #1: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=organization) #2: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization->>br>organization)
revision to text (revision_description)	PATH			executed_action<= action action.chosen_method->>br>action_method action_method.description

Table 9 - Mapping table for index_list (concluded)

Application Element	AIM Element	Source	Rules	Reference path
SINGLE_DOCUMENT_LIST	product_definition_formation	41		
TDP_ELEMENT #1: When tdp_element is a index list #2: When tdp_element is an indentured_data_list #3: When tdp_element is a data_list	#1, #2, #3: (product_definition_formation)	41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='index list'}) #2: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='indentured data list'}) #3:({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name=('data list'})

Table 10 - Mapping table for other_list

APPLICATION element	AIM element	Source	Rules	Reference path
ASSOCIATED_LIST	product_definitoin_formation	41		
associated_list to drawing (related_to)	PATH			#1: (product_definition_formation <- product_defnition_formation_relationship.related_product_defnition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='associated list'} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation
associated_list to list_presentation (presentation)	PATH			product_definition_formation presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation-> presentation_representation_select presentation_representation_select=presentation_set presentation_set
associated_list to product_data_set (related_to)	PATH			product_defination_formation<- product_defination.formation product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship product_definition_relationship.related_product_definition-> product_definition product_defnition.formation-> product_definition_formation {product_definition_formation.of_product-> product<- product_related_product_category.products product_related_product_category<= product_category product_category.name ='product data set'}

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
DRAWING #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 201 or AP 202 exchange with and AP 232 exchange	#1: (product_defintion_formation) #2: ([draughting_drawing_revision] [product_defintion_formation])	41 505 41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'}) #2: ({draughting_drawing_revision<= drawing_revision<= presentation_set presentation_representation_select=presentation_set presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition_formation product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'})

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
drawing to header (heading)	#1: (PATH) #2: (PATH)			#1, #2: product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='drawing header'})
drawing to sheet (pages) (see note 3)				
ITEM_IDENTIFICATION	product_definition_formation	41		
item_identification to alternate_- identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ ('alternate part identification')('supplied item'))} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) #2:(product_definition_formation->product<- product_relationship.relating_product product_relationship {product_relationship.name='alternate part identification'} product_relationship.related_product->product<- product_definition_formation)

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product->product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
NOTATION	descriptive_representation_item	45		{descriptive_representation_item<= representation_item<- representation.items[i] representation representation.name='notation'}
notation to element_identification (referenced_document_in_note)	PATH			descriptive_representation_item document_reference_item=descriptive_representation_item document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference <document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name> document_reference.assigned_document document<- {document.kind->document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
notation to identifier (reference_code)	PATH			descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role->> classification_role classification_role.name='reference code'} classification_assignment.assigned_class->> group group.name {group=> class}
notation to label (type_of_notation)	PATH		24	descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role->> classification_role classification_role.name='type of notation'} classification_assignment.assigned_class->> group group.name {group=> class_system}
notation to label (note_title)	PATH			descriptive_representation_item descriptive_representation_item.name
notation to text (note)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
notation to text (note_parameter)	PATH			descriptive_representation_item<= representation_item<- representation_item_relationship.relating_representation_item representation_item_relationship {representation_relationship.name=’note parameter’} representation_item_relationship.related_representation_item-> representation_item=> (descriptive_representation_item) (measure_representation_item)
OTHER_LIST	product_definition_formation	41	28	{product_definition_formation product_definition_formation.of_product->>br>product<- product_related_product_category.products product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->>br>product_category product_category='other list'}
other_list to other_list_body (list_body)	PATH			proudct_definition_formation<- product_definition.formation product_definition
other_list to other_list_header (list_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='other list header'}

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
OTHER_LIST_BODY	product_definition	41		{product_definition product_definition.description='other list body'}
other_list_body to notation (notes)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='other list body'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='notation'} representation.items[i]->representation_item=> descriptive_representation_item
other_list_body to other_list_body_-table (list_body_tables)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='other list body'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation=> other_list_table_representation

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
other_list_body to revision (revision_history)	PATH			product_definition <product_definition.formation-> product_definition_formation<- product_definition_formation_relationship.related_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (‘sequence’)(‘iteration’))} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation> action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='revision history'} action_assignment.assigned_action-> action => {(action.description) (action.description=\ ('revision')(‘change’)(‘issue’)(‘sequence’)(‘change identification’)} executed_action
OTHER_LIST_BODY_TABLE	other_list_table_representation	232		other_list_table_representation<= representation
other_list_body_table to label (description_of_tabulation)	PATH			other_list_table_representation<= representation representation.name

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
other_list_body_ table to label (tabulation_column_descriptions)	PATH			other_list_table_representation<= representation representation.items[i]->representation_item {representation_item.name='column names'} representation_item=>compound_representation_item compound_representation_item.item_element->compound_item_definition compound_item_definition=list_representation_item list_representation_item.[i]->representation_item=>descriptive_representation_item {descriptive_representation_item.name='column heading'} descriptive_representation_item.description
other_list_body_table to tabulation_-entry (tabulation_rows)	PATH			other_list_table_representation<= representation representation.items[i]->representation_item=> {representation_item.name='identificatoin of rows'} compound_representation_item compound_representation_item.item_element->compound_item_definition compound_item_definition=list_representation_item list_representation_item.[i]->representation_item=> {representation_item.name='row definition'} compound_representation_item
OTHER_LIST_HEADER	property_definition	41		{property_definition property_definition.description='other list header'}
other_list_header to header (common_header)	IDENTICAL MAPPING			

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category<- product_category.name='product data set'}
product_data_set to drawing (related) (see note 3)				
product_data_set to product_data_set (related) (see note 3)				
product_data_set to source_file (file_configuration) (see note 3)				

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_WITH_-FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category<- product_category.name='product data set with format header'}
product_data_set_with_format to header (product_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='product data set with format header'}
product_data_set_with_format to product_presentation (presentation_of_product_data_set) (see note 3)				

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_WITH_- SHADING	product_definition_formation			{product_definition_formation product_definition_formation.of_product->\ product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->\ product_category<- product_category.name='product data set with shading header'}
product_data_set_with_shading to header_configuration_with_element_- identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=\ 'product data set with shading header'}
product_data_set_with_shading to shaded_shape_model (a_shaded_- model) (see note 3)				

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_- WITHOUT_FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category<- product_category.name='product data set without format header'}
product_data_set_without_format to header_configuration_with_element_- identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='product data set without format header'}
product_data_set_without_format to shape_model (a_model) (see note 3)				
REVISION	executed_action	41		{executed_action<= action (action.description) (action.description=\ ('revision')(‘change')(‘issue’)(‘sequence’)(‘change identification’))}

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
revision to date (revison_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment <date_assignment.role-> date_role date_role.name> date_assignment.assigned_date-> date) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment <date_and_time_assignment.role-> date_time_role date_time_role.name> date_and_time_assignment.assigned_date_and_time-> date_and_time data_and_time.date_component-> date)
revision to identifier (revision_level)	PATH			executed_action<= action action.name

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
revision to other_reference_document (authorizing_documents)	PATH		12	executed_action document_reference_item=executed_action document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role-> object_role (object_role.name) (object_role.name=\ ('revision authorizing identification')(‘change rationale’))} document_reference.assigned_document-> document<- {document.kind-> document_type.product_data_type=\ ’configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_product-> product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
revision to person_and_organization (revision_approval) #1: without person #2: with person	PATH		27	executed_action<= action approved_item=action approved_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment <approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role {(object_role.name) (object_role.name='revision approval') (object_role.name='release authenication')}> approval_assignment.assigned_approval-> approval<- #1: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization-> person_organization_select person_organization_select=organization) #2: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization-> person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization-> organization)
revision to text (revision_description)	PATH			executed_action<= action action.chosen_method-> action_method action_method.description

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
SHEET #1: If sheet is identified within AP 232 #2: If sheet is defined as an AP 202 exchange within same file	#1: product_definition_formation #2: [product_definition_formation] [drawing_sheet_revision]	41 41 101	16 19	#1: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<-product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: ({drawing_sheet_revision<=presentation_area<=presentation_representation presentation_representation_select=presentation_representation presentation_representation_select<-presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition_formation product_definition_formation} {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<-product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
sheet to configuration (sheet_configuration)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='sheet header'})
sheet to element_identification (sheet_identifier)	IDENTICAL MAPPING			
sheet to label (sheet_size)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='sheet header'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='document format'} representation.items[i]-> {representation_item.name=\ (‘size format')(‘size format standard’)} representation_item=> descriptive_representation_item descriptive_representation_item.description
sheet to product_presentation (presentation_format) (see note 3)				

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
TABULATION_ENTRY	list_representation_item	43		
tabulation_entry to text (column_information)	PATH			compound_representaion_item compound_representation_item.item_element->compound_item_definition compound_item_definition=list_representation_item list_representation_item list_representaton_item[i]->representation_item=> {representation_item.name='column entry for row'} descriptive_representation_item descriptive_representation_item.description

Table 10 - Mapping table for other_list (continued)

APPLICATION element	AIM element	Source	Rules	Reference path
TDP_ELEMENT #1: When tdp_element is a drawing defined within this document #2: When tdp_element is a product_-data_set #3: When tdp_element is a reference_-document #4: When tdp_element is an other_list #5: When tdp_element is a drawing or a product_data_set and is defined externally to this document #6: When tdp_element is a drawing defined by AP 202	#1,#2,#3,#4,#5: (product_definition_-formation) #6: (<draughting_drawing_revision> <product_definition_formation>)	41 505 41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.product[i] product_related_product_category<=product_category {product_category.name='document} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='drawing'}) #2: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.product[i] product_related_product_category<=product_category (product_category.name='document'} **1**product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='product data set' }) #3:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.product[i] product_related_product_category<=product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='reference document' }) #4:({product_definition_formation produc_definition_formation.of_product->product<-

Table 10 - Mapping Table for other_list (concluded)

APPLICATION element	AIM element	Source	Rules	Reference path
				product_related_product_category.product[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='other list' }) #5:({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.product[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name=('drawing')('product data set') }) #6:(<draughting_drawing_revision> {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.product[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='drawing' }

Table 11 - Mapping table for parts_list

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_IDENTIFICATION_-OF_ITEM	product_definition_formation	41		
alternate_identification_of_item to change_identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->> object_role object_role.name='change identification'} action_assignment.assigned_action->> action=>> {action.description='change identification'} executed_action

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->>br>person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->>br>organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
alternate_identification_of_item to drawing_suffix_number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->>br>product
alternate_identification_of_item to identifier (identifying_number)	PATH			product_definition_formation [product_definition_formation.id] product_definition_formation.of_product->>br>product [product.id] <product_defintion_formation oganization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment organization_assignment.assigned_organization->>br>organization>

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item toitem_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category
alternate_identification_of_item to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product->product product.name
alternate_identification_of_item to source_information_type (source_information)	PATH		23	product_definition_formation<-product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<-property_definition.definition property_definition<-{property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_ITEM #1: If alternate is a substitute with no concern for which is used in an assembly context #2: If alternate is an alternate item with concern for which is used in an assembly context #3: If alternate is an alternate item with a one for one substitution and allows for two way substitution in a particular assembly context	product	41		#1: ({product<- alternate_product_relationship.alternate}) #2: ({product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute}) #3: ({product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute})
alternate_item to an_integer (usage_conditions) preference_order #1: (see note 2) #3: (see note 2)	#2: (PATH)			#2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute_with_ranking assembly_component_usage_substitute_with_ranking.ranking)
alternate_item to item (interchange_item) #2: (see note 2) #3: (see note 2)	PATH			product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_item to item_usage (interchange_item) #1: (see note 2) #3: (see note 2)	PATH			#2: product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- (product_definition_relationship.related_product_definition product_definition_relationship)
alternate_item to label (type_of_alternate)	PATH			#1: (product<- alternate_product_relationship.alternate alternate_product_relationship alternate_product_relationship.name) #2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute.name) #3: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute product_definition_substitute.name)

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_item to text (usage_conditions) specific_usage	#2: (PATH) #3: (PATH)			#1: ({<product<- alternate_product_relationship.basis> <product<- alternate_product_relationship.description>}) #2: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_relationship.related_product_definition product_definition_relationship=> product_definition_usage=> assembly_component_usage<- assembly_component_usage_substitute.substitute assembly_component_usage_substitute assembly_component_usage_substitute.definition) #3: (product<- product_definition_formation.of_product product_definition_formation<- product_definition.formation product_definition<- product_definition_substitute.substitute_definition product_definition_substitute product_definition_substitute.description)
ASSEMBLY	(assembly_component_usage) (next_assembly_usage_occurrence) (quantified_assembly_component_usage) (specified_higher_usage_occurrence) (promissory_usage_occurrence)	44 44 44 44 44		

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
ASSOCIATED_LIST #1: If the associated list is a parts_list #2: If the associated list is a data_list #3: If the associated list is an other_list #4: If the associated list is an indentured data list #5: If the associated list is an index list	product_definition_formation	41		product_definition_formation product_defintion_formation.of_product->product<- product_related_prodcut_category.products[i] product_related_product_category<= product_category #1:({product_category.name='parts list'}) #2:({product_category.name='data list'}) #3:({product_category.name='other list'}) #4:({product_category.name='indentured data list'}) #5:({product_category.name='index list'})
associated_list to drawing (related_to)	PATH			#1: (product_definition_formation <- product_defnition_formation_relationship.\ related_product_defnition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='associated list'} product_definition_formation_relationship.relating_product_definition_formation->product_definition_formation
associated_list to list_presentation (presentation)	PATH			product_definition_formation presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation->presentation_representation_select presentation_representation_select=presentation_set presentation_set

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
associated_list to product_data_set (related_to)	PATH			product_defination_formation<- product_defination.formation product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship product_definition_relationship.related_product_definition->product_definition product_defnition.formation->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products product_related_product_category<=product_category product_category.name ='product data set'}
DATE_EFFECTIVITY	dated_effectivity	41		
date_effectivity to date (end_date)	PATH			dated_effectivity dated_effectivity.effectivity_end_date->date_and_time
date_effectivity to date (start_date)	PATH			dated_effectivity dated_effectivity.effectivity_start_date->date_and_time
DOCUMENT_USAGE_-PARAMETER	document_usage_constraint	41		
document_usage_parameter to label (subject)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {(document_usage_constraint.subject_element_value) (document_usage_constraint.subject_element_value=\ (‘type’)(‘grade’)(‘form’)(‘composition’))}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
document_usage_parameter to text (value_of)	PATH			document_usage_constraint document_usage_constraint.subject_element_value

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
DRAWING #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 201 or AP 202 exchange with and AP 232 exchange	#1,#2: (product_definition_formation) #3: ([draughting_drawing_revision] [product_definition_formation])	41 505 41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'}) #2: ({draughting_drawing_revision<= drawing_revision<= presentation_set presentation_representation_select=presentation_set presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'})

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
drawing to header (heading) #3: (see note 2)	#1: (PATH) #2: (PATH)			#1,#2: (product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='drawing header'})
drawing to sheet (pages) (see note 3)				
DRAWING_SUFFIX_NUMBER_- COMBINATION	product	41		
drawing_suffix_number_combination to element_identification (drawing_number)	PATH	41	14	product<- product_relationship.relating_product product_relationship {product_relationship.name=\ ’drawing suffix number combination’} product_relationship.\ related_product-> product product.id { product<- product_related_product_category.products[i] product_related_product_category<= product_category<- product_categoy.name=’document’ product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category.name=’drawing’}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_suffix_number_combination to identifier (suffix_identifier)	PATH		14	product<- product_relationship.relating_product product_relationship product_relationship.id {product_relationship.name=\ ’drawing suffix number combination’}
EFFECTIVITY #1: When the effectivity is for a part and the next higher part is known #2: When the effectivity is for a part and the next higher part is not known	#1: (<configuration_effectivity> <(serial_numbered_effectivity) (dated_effectivity) (lot_effectivity)>) #2:[applied_effectivity_assignment] [applied_effectivity_context_assignment]	41 41 41 41 232 232		#1: ({configuration_effectivity<= product_definition_effectivity product_definition_effectivity.usage->\ product_definition_relationship product_definition_relationship.description='item usage'}) #2: ({applied_effectivity_assignment<= effectivity_assignment<- effectivity_context_assignment.assigned_effectivity_assignment effectivity_context_assignment [effectivity_context_assignment.role->\ effectivity_context_role effectivity_context_role.name=’context document of effectivity’] [effectivity_context_assignment=> applied_effectivity_context_assignment applied_effectivity_context_assignment.items[i]->\ effectivity_context_item effectivity_context_item=product_definition_formation product_definition_formation product_definition_formation.of_product->\ product<- product_related_product_category.products[i] product_related_product_category<= product.category product_category.name=’document’]})

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to approval (effectivity_approvals)	#1: (PATH) #2: (PATH)			#1: (configuration_effectivity approval_item=configuration_effectivity approval_item<- applied_approval_assignment.items[i] applied_approval_assignment) #2: (applied_effectivity_assignment approval_item=applied_effectivity_assignment approval_item<- applied_approval_assignment.items[i] applied_approval_assignment) <applied_approval_assignment<= approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role>
effectivity to product_configuration (product)	#1: (PATH) #2: (PATH)			#1: (configuration_effectivity configuration_effectivity.configuration-> configuration_design configuration_design.configuration-> configuration_item) #2: (applied_effectivity_assignment<= effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity=> product_definition_effectivity=> configuration_effectivity configuration_effectivity.configuration-> configuration_design configuration_design.configuration-> configuration_item)

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to text (description)	#1: (PATH) #2: (PATH)			#1: (configuration_effectivity<= product_definition_effectivity<= effectivity<- description_attribute_select=effectivity description_attribute_select<- description_attribute.described_item description_attribute description_attribute.attribute_value) #2: (applied_effectivity_assignment<= effectivity_assignment effectivity_assignment.assigned_effectivity-> effectivity<- description_attribute_select=effectivity description_attribute_select<- description_attribute.described_item description_attribute description_attribute.attribute_value)

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
FOREIGN_DEFINED_ITEM #1: Related item_list is an assembly where the foreign_defined_item is a component. Component is identified on assembly drawing but not defined there. #2: Related item_list is an non assembly where the foreign_defined_-item is just a member of the group of parts listed for some business reason. (Example - list of parts for a kit)	#1,#2: (product_definition_relationship)	41		#1: ({product_definition_relationship product_definition_relationship.related_product_definition->product_definition<- product_definition_relationship.related_product_definition product_definition_relationship [product_definition_relationship.name='foreign defined'] [product_definition_relationship.related_product_definition->product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products product_related_product_category<=product_category<- product_category.name='document' product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category (product_category.name) (product_category.name='drawing')]}) #2: ({product_definition_relationship product_definition_relationship.name='foreign defined'})
ITEM_IDENTIFICATION	product_definition_formation	41		

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to alternate_-identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) #2:(product_definition_formation->product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product->product<- product_definition_formation)
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->>br>person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->>br>organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->>br>product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->>br>product product.id
item_identification toitem_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->>br>product<- product_related_product_category.product[i] product_related_product_category<= product_category

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
ITEM_LIST #1: If the item_list is for a part or assembly and does not identify the drawing or document that the part or assembly is represented on. #2: If the item_list is for a part or assembly and the item_list_drawing is identified for the part or assembly. #3: If the item_list is for an item_list_-drawing and no part or assembly is identified on the item_list_drawing.	product_definition	41		#1,#2,#3: {product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference-> product_definition_context<= application_context_element application_context_element.name='item_list'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_list to component_list_type_- enumeration (type_of_component_list)	#1: (PATH) #2: (PATH) #3: (PATH)			product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference-> product_definition_context<= application_context_element application_context_element.name #1: ({(application_context_element.name) (application_context_element.name=\ ('assembly defined on drawing component list')\ ('made from component list of one')\ ('synthetic part number component list')\ (‘net change list’)}) #2: ({(aplication_context_element.name) (appliciation_context_element.name=\ ('assembly defined on drawing component list')\ ('made from component list of one')\ ('synthetic part number component list')\ ('installation drawing component list')\ ('item not defined on next higher assembly component list')\ (‘net change list’))}) #3: ({(application_context_element.name) (application_context_element.name=\ ('installation drawing component list')\ ('item not defined on next higher assembly component list')\ (‘net change list’))})
item_list to item_identification (list_for)	#1: (PATH) #3, #2: (NOT APPLICABLE)			#1: (product_definition<- product_definition_formation.of_product product_definition_formation)

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_list to item_list_drawing (list_for)	#1: (NOT APPLICABLE) #2: (PATH) #3: (PATH)			#2: (product_definition<- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.description='parts on drawing'} product_definition_relationship.relating_product_definition->product_definition product_definition.formation->product_definition_formation) #3: (product_definition product_definition.formation->product_definition_formation)
item_list to item_usage (component_of)	#1: (PATH) #2: (PATH) #3: (PATH)			#1,#2,#3: (product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship {(product_definition_relationship.description) (product_definition_relationship.description=('item usage'))})
item_list to text (type_of_component_list)	#1: (PATH) #2: (PATH) #3: (PATH)			#1,#2,#3: product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference->product_definition_context<= application_context_element application_context_element.name
ITEM_LIST_DRAWING	(product_definition_formation)	41		{product_definition_formation.of_product->product<- product_related_product_category.products product_related_product_category<=product_category product_category.name=('document')(‘sheet’)}
item_list_drawing to element_-identification (drawing_number)	IDENTICAL MAPPING			

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_list_drawing to item_-identification (assembly_item_list_applies_to)	PATH			product_definition_formation<- product_definition.formation product_definition product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.description='parts on drawing'} product_definition_relationship.related_product_definition-> product_definition product_definition.formation-> product_definition_formation
ITEM_TYPE	product_category	41		
item_type to company (code_administrator)	PATH			product_category organiation_item=product_category organizatin_item<- assigned_organization_assignment.item[i] assigned_organization_assignment=> organization_assignment {organization_assignment organization_assignment.role-> organization_role organization_role.name=’code administator’} organization_assignment.assigned_organization-> organization
item_type to label (item_code)	PATH			product_category product_category.name
item_type to text (type_of_coding_scheme)	PATH			product_category product_category.description

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
ITEM_USAGE #1: If the item_list (that is using the item_usage) is for a part or assembly. #2: If the item_list (that is using the item_usage) is for an item_list_drawing and no part or assembly is identified on the item_list_drawing (example-items in a kit). #3: An Alternate_item is using the Item_usage	#1, #2, #3: (product_definition_-relationship) (Note: Can be all subtypes of product_-definition_relationship also)	41		#1,#2: ({product_definition_relationship (product_definition_relationship.description) (product_definition_relationship.description=('item usage'))}) #3: ({product-definition_relationship (poduct_definition_relationship.description) (product_definition-relationship.description=(‘substitution’))})
item_usage to effectivity (effective_on)	#1: (PATH) #2: (PATH) #3: (PATH)			#1,#2, #3: (product_definition_relationship<- product_definition_effectivity.usage product_definition_effectivity=> configuration_effectivity)
item_usage to item (being_defined_for)	#1: (PATH) #2: (PATH) #3: (PATH)			#1,#2, #3: (product_definition_relationship product_definition_relationship.related_product_definition> product_definition {product_definition<- product_definition_context_association.definition product_definition_context_association product_definition_context_association.frame_of_reference product_definition_context<= application_context_element application_context_element.name='item in list’})
item_usage to list_item_usage (list_item)	#1: (IDENTICAL MAPPING) #2: (IDENTICAL MAPPING) #3: (IDENTICAL MAPPING)			

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_usage to quantity (quantity_used_in_next_higher_-assembly)	#1: (PATH) #2: (PATH) #3: (PATH)			#1, #3: (product_definition_relationship=> product_definition_usage=> assembly_component_usage=> ([next_assembly_usage_occurrence] [assembly_component_usage=> quantified_assembly_component_usage quantified_assembly_component_usage.quantity-> measure_with_unit]) (assembly_component_usage=> quantified_assembly_component_usage quantified_assembly_component_usage.quantity-> measure_with_unit)) #2: (product_definition_relationship characterized_product_definition=-product_definition_relationship characterized_definition=characterized_product_definition characterized_definition<- property_definition {property_definition.name=\ 'component quantity'}<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='component quantity representation'} representation.items[i]-> representation_item=> measure_representation_item<= measure_with_unit)

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
item_usage to retrofit_usage (retrofit)	#1: (PATH) #2: (PATH) #3: (PATH)			#1,#2, #3: (product_definition_relationship action_item=product_definition_relationship action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
LIST_ITEM_USAGE #1: If the item_list (that is using the item_usage) is for a part or assembly. #2: If the item_list (that is using the item_usage) is for an item_list_drawing and no part or assembly is identified on the item_list_drawing (example-items in a kit).	product_definition_relationship	41		

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
list_item_usage to identifier (drawing_zones)	PATH			#1: (product_definition_relationship product_definition_relationship.related_product_definition-> product_definition<- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.relating_product_definition-> product_definition product_definition.formation-> product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name=('document')(‘sheet’)} product_category_relationship.category product_category_relationship product_category_relationship.subcategory-> product_category product_category.name='drawing'} characterized_product_definition=product_definition_relationship characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='item usage properties'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='drawing zones'} representation.items[i]-> representation_item=> {representation_item.name='drawing zone'} descriptive_representation_item descriptive_representation_item.description) #2: (product_definition_relationship characterized_product_definition=product_definition_relationship characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<-

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
				{property_definition.name='item usage properties'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='drawing_zones'} representation.items[i]->representation_item=> {representation_item.name='drawing zone'} descriptive_representation_item descriptive_representation_item.description)
list_item_usage to identifier (entry_item_change_level)	PATH			product_definition_relationship action_item=product_definition_relationship action_item<-applied_action_assignment.items[i] applied_action_assignment<=action_assignment {action_assignment role_select=action_assignment role_select<-role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification for entry'} action_assignment.assigned_action->action action.name

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
list_item_usage to identifier (find_number)	PATH			#1, #2: (product_definition_relationship product_definition_relationship.name <product_definition_relationship document_reference_item=product_definition_relationship document_reference_item<- applied_document_reference.items[i] applied_document_reference applied_document_reference.assigned_document->document>) (product_definition_relationship characterized_property_definition=product_definition_relationship characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition representation_definition=property_definition representation_definition<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation representation.item[i]->representation_item<= descriptive_representation_item descriptive_reprresentation_item.description {descriptive_representation_item.name='drawing find number'} <descriptive_representation_item document_reference_item=descriptive_representation_item document_reference_item<- applied_document_reference.items[i] applied_document_reference applied_document_reference.assigned_document->document>)
list_item_usage to identifier (reference_designators)	PATH			product_definition_relationship=> product_definition_usage=> assembly_component_usage (assembly_component_usage) (assembly_component_usage=> {make_from_usage_option_with_reference_designator}) assembly_component_usage.reference_designator

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
list_item_usage to label (item_type)	PATH			product_definition_relationship product_definition_relationship.related_product_definition->product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product._related_product_category.products[i] product_related_product_category<=product_category product_category.name
list_item_usage to notation (entry_notes)	PATH			product_definition_relationship characterized_product_definition=product_definition_relationship characterized_definition=characterized_product_definition characterized_definition<-property_definition<- {property_definition.name='item usage properties'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='notation'} representation.items[i]->representation_item=> descriptive_representation_item

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
LOCALLY_DEFINED_ITEM #1: Related item_list is an assembly where the Locally_defined_item is a component. Component is identified on assembly drawing but not defined there. The component part is defined on another drawing. #2: Related item_list is an assembly where the Locally_defined_item is a component. Component is identified and defined onthe assembly drawing. #3: Related item_list is an non assembly where the Locally_defined_-item is just a member of the group of parts listed for some business reason. (Example - list of parts for a kit) The Locally_defined_item is defined on an other document.	#1,#2,#3: (product_definition_-relationship)	41		#1,#2,#3: ({product_definition_relationship product_definition_relationship.related_product_definition->product_definition<- product_definition_relationship.related_product_definition product_definition_relationship [product_definition_relationship.relating_product_definition->product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.subcategory->product_category (product_category.name) (product_category.name='drawing')] [(product_definition_relationship.name) (product_definition_relationship.name='locally defined')]})
LOT_EFFECTIVITY	lot_effectivity	41		
lot_effectivity to a_number (lot_size)	PATH			lot_effectivity lot_effectivity.effectivity_lot_size->measure_with_unit measure_with_unit.value_component->measure_value
lot_effectivity to identifier (lot_identification)	PATH			lot_effectivity lot_effectivity.effectivity_lot_id

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
lot_effectivity to measure (lot_unit_of_measure)	PATH			lot_effectivity lot_effectivity.effectivity_lot_size-> measure_with_unit measure_with_unit.unit_component-> unit
MADE_FROM_STOCK_MATERIAL	(make_from_usage_option) (make_from_usage_option _with_reference_designator)	44 232		{make_from_usage_option<= product_definition_usage<= product_definition_relationship product_definition_relationship.name='made from stock'} {make_from_usage_option_with_reference_designator<= [make_from_usage_option] [assembly_component_usage]}
made_from_stock_material to a_-number (quantity_of_item_made_from_stock)	PATH			make_from_usage_option make_from_usage_option.quantity-> measure_with_unit

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
made_from_stock_material to reference_document_usage (specified_by)	PATH			make_from_usage_option document_reference_item=make_from_usage_option document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='specifies made from stock material'} document_usage_constraint_item=document_reference document_usage_constraint_item<- applied_document_usage_constraint_assignment.items[i] applied_document_usage_constraint_assignment<= document_usage_constraint_assignment {document_usage_constraint_assignment.role->>br>document_usage_role document_usage_role.name='specifies made from stock material'} document_usage_constraint_assignment.assigned_document_usage->>br>document_usage_constraint
made_from_stock_material to stock_-material (stock)	PATH			make_from_usage_option<= product_definition_usage<= product_definition_relationship product_definition_relationship.related_product_definition> product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- material_designation.definitions material_designation

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
made_from_stock_material to stock_-size	PATH			make_from_usage_option<= product_definition_usage<= product_definition_relationship characterized_product_definition=product_definition_relationship characterized_definition=charactrized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='size'} property_definition_representation.definition property_definition_representation property-definition_representation.used_representation-> representation {representation.name='stock size parameters'}
MAKE_FROM_AN_ITEM	<make_from_usage_option> <design_make_from_relationship> <make_from_usage_option_ with_reference_designator>	44 232 232		<{make_from_usage_option<= product_definition_usage<= product_definition_relationship> <design_make_from_relationship<= product_definition_relationship> <{make_from_usage_option_with_reference_designator<= [make_from_usage_option] [assembly_component_usage]}>
make_from_an_item to a_number (quantity_of_item_made_from_other_-item)	PATH			<make_from_usage_option make_from_usage_option.quantity-> measure_with_unit> <design_make_from_relationship<= product_definition_usage<= product_definition_relationship=> product_definition_usage=> make_from_usage_option make_from_usage_option.quantity-> measure_with_unit>

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
make_from_an_item to item (item_that_is_acting_as_stock)	PATH			<make_from_usage_option<= product_definition_usage<= product_definition_relationship product_definition_relationship.related_product_definition-> product_definition> <design_make_from_relationship<= product_definition_usage<= product_definition_relationship product_definition_relationship.related_product_definition-> product_definition>
MEASURE	named_unit	41		
NOTATION	descriptive_representation_item	45		{descriptive_representation_item<= representation_item<- representation.items[i] representation representation.name='notation'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to element_identification (referenced_document_in_note)	PATH			descriptive_representation_item document_reference_item=descriptive_representation_item document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference <document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name> document_reference.assigned_document document<- {document.kind->document_type.product_data_type=\ 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association=>document_product_equivalence} document_product_association.related_product->product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to identifier (reference_code)	PATH			descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role->> classification_role classification_role.name='reference code'} classification_assignment.assigned_class->> group group.name {group=> class}
notation to label (type_of_notation)	PATH		24	descriptive_representation_item classification_item=descriptive_representation_item classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= classification_assignment {classification_assignment classification_assignment.role classification_role classification_role.name='type of notation'} classification_assignment.assigned_class->> group group.name {group=> class_system}
notation to label (note_title)	PATH			descriptive_representation_item descriptive_representation_item.name
notation to text (note)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
notation to text (note_parameter)	PATH			descriptive_representation_item<= representation_item<- representation_item_relationship.relating_representation_item representation_item_relationship {representation_relationship.name='note parameter'} representation_item_relationship.related_representation_item->representation_item=> (descriptive_representation_item) (measure_representation_item)
NUMBER_WITH_UNITS	measure_with_unit	41		
number_with_units to a_real (value_of)	PATH			measure_with_unit measure_with_unit.value_component
number_with_units to measure (units_of)	IDENTICAL MAPPING			measure_with_unit measure_with_unit.unit_component

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
PARTS_LIST	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product-> product<- product_related_product_category.producst[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='parts list'} <{product_definition_formation<- document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_document-> document document.kind-> document_type document_type.product_data_type=' 'configuration controlled document version'}>
parts_list to parts_list_body (list_body)	PATH			product_definition_formation<- product_definition.formation product_definition
parts_list to parts_list_header (list_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='parts list header'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
PARTS_LIST_BODY	product_definition	41		{product_definition product_definition.description='parts list body'}
parts_list_body to item_list (parts_tabulations) #1: If the item_list is for a part or assembly and does not identify the drawing or document that the part or assembly is represented on. #2: If the item_list is for a part or assembly and the item_list_drawing is identified for the part or assembly. #3: If the item_list is for an item_list_-drawing and no part or assembly is identified on the item_list_drawing.	#1: (PATH) #2: (PATH) #3: (PATH)			#1,#2,#3: (product_definition<- product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name='parts tabulation'} product_definition_relationhsip.releted_product_definition->product_definition
parts_list_body to notation (list_notes)	PATH			product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description=’parts list body property’} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='notation'} representation.items[i]->representation_item=>descriptive_representation_item

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
parts_list_body to revision (revision_history)	PATH			product_definition <product_definition.formation-> product_definition_formation<- product_definition_formation_relationship.related_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (‘sequence’)(‘iteration’))} product_definition_formation_relationship.relating_product_definition_formation-> product_definition_formation> action_item=product_definition action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role-> object_role object_role.name='revision history'} action_assignment.assigned_action-> action => {(action.description) (action.description=\ ('revision')(‘change’)(‘issue’)(‘sequence’)(‘change identification’)} executed_action

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
parts_list_body to tdp_element_list_-item (referenced_tdp_elements)	PATH			product_definition<- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name='referenced tdp elements'} product_definition_relationship.relating_product_definition->>product_definition {product_definition.formation->>product_definition_formation product_definition_formation.of_product->>product<- product_related_product_category.products[i] product_related_product_category<= product_category product_category.name='document'}
PARTS_LIST_HEADER	property_definition			{property_definition property_definition.description='parts list header'}
parts_list_header to header (common_header)	IDENTICAL MAPPING			

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set'} <{product_definition_formation<- document_product_association.relating_document document_product_association[=> document_product_equivalence] document_product_association.related_document-> document document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document version'}>
product_data_set to drawing (related) (see note 3)				
product_data_set to product_data_set (related) (see note 3)				
product_data_set to source_file (file_configuration) (see note 3)				

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_WITH_- FORMAT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set with format'} <{product_definition_formation<- document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_document-> document document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document version'})>
product_data_set_with_format to header (product_header)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='product data set with format header'}
product_data_set_with_format to product_presentation (presentation_of_product_data_set) (see note 3)				

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_WITH_- SHADING	product_definition_formation			{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category='product data set with shading'}
product_data_set_with_shading to header_configuration_with_element_- identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_defintion=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=\ 'product data set with shading header'}
product_data_set_with_shading to shaded_shape_model (a_shaded_- model) (see note 3)				

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DATA_SET_- WITHOUT_FORMAT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category.name='product data set without format'} <{product_definition_formation<- document_product_association.relating_document document_product_association {document_product_association=> document_product_equivalence} document_product_association.related_document-> document document.kind-> document_type document_type.product_data_type=\ 'configuration controlled document version'}>
product_data_set_without_format to header_configuration with_element_- identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=\ 'product data set without format header'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set_without_format to shape_model (a_model) (see note 3)				
QUANTITY	measure_with_unit	41		
quantity to a_number (value_of)	PATH			measure_with_unit measure_with_unit.value_component->measure_value measure_value=count_measure count_emasure
quantity to text (quantity_accuracy)	PATH			measure_with_unit<-measure_qualification.qualified_measure measure_qualification measure_qualification.qualifier->type_qualifier (type_qualifier.name) (type_qualifier.name=(‘exact’)(‘as required’)(‘approximate’)
quantity to text (value_of)	PATH			measure_with_unit measure_with_unit.value_component->measure_value measure_value=descriptive_measure descriptive_measure
quantity to volume (value_of)	IDENTICAL MAPPING			
quantity to weight (value_of)	PATH			measure_with_unit=> measure_representation_item<=representation_item
REFERENCE_DOCUMENT_USAGE	document_usage_constraint	41		

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
reference_document_usage to document_usage_paraameter (usage_parameter)	IDENTICAL MAPPING			
reference_document_usage to identifier (usage_code)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element='usage code'}
reference_document_usage to label (location_in_document)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element=\ 'location_in_document'}
reference_document_usage to reference_document (document_referenced)	PATH			document_usage_constraint document_usage_constraint.source->>br>document <- {document document.kind->>br>document_type document_type.product_data_type=\ 'configuration controlled document version'} document_relationship.related_document document_relationship {document_relationship.name='document usage reference'} document_relationship.relating_document->>br>document<- document_product_association.relating_document document_product_association {document_product_association=>>br>document_product_equivalence} {document_product_association.name='equivalence'} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
reference_document_usage to text (usage_description)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element='usage description'}
RETROFIT_USAGE	applied_action_assignment	232		{applied_action_assignment<= action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
retrofit_usage to other_reference_-document (defining_document)	PATH			applied_action_assignment<= action_assignment action_assignment.assigned_action->>br>action action.chosen_method->>br>action_method=> action_method_with_associated_documents action_method_with_associated_documents.specification->>br>document
retrofit_usage to retrofit_state (disposition_for)	PATH			applied_action_assignment<= action_assignment action_assignment.assigned_action->>br>action action.chosen_method->>br>action_method action_method.name {(action_method.name='add') (action_method.name='delete') (action_method.name='modify')}
REVISION	executed_action	41		{executed_action<= action (action.description) (action.description=\ ('revision’)(‘change')(‘issue’)(‘sequence’)(‘change identification’))}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to date (revison_date) #1: just date #2: date and time	PATH			#1: (executed_action date_item=executed_action date_item<- applied_date_assignment.items[i] applied_date_assignment<= date_assignment <date_assignment.role-> date_role date_role.name> date_assignment.assigned_date-> date) #2: (executed_action date_and_time_item=executed_action date_and_time_item<- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment<= date_and_time_assignment <date_and_time_assignment.role-> date_time_role date_time_role.name> date_and_time_assignment.assigned_date_and_time-> date_and_time data_and_time.date_component-> date)
revision to identifier (revision_level)	PATH			executed_action<= action action.name

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to other_reference_document (authorizing_documents)	PATH		12	executed_action document_reference_item=executed_action document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->>br>object_role (object_role.name) (object_role.name=\ ('revision authorizing identification')(‘change rationale’))} document_reference.assigned_document->>br>document<- {document.kind->>br>document_type.product_data_type=\ ’configuration controlled document version’} document_product_association.relating_document document_product_association {document_product_association=>>br>document_product_equivalence} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
revision to person_and_organization (revision_approval) #1: without person #2: with person	PATH		27	executed_action<= action approved_item=action approved_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment <approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role {(object_role.name) (object_role.name='revision approval') (object_role.name='release authenication')}> approval_assignment.assigned_approval->>br>approval<- #1: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=organization) #2: (approval_person_organization.authorized_approval approval_person_organization approval_person_organization.person_organization->>br>person_organization_select person_organization_select=person_and_organization person_and_organization person_and_organization.the_organization->>br>organization)
revision to text (revision_description)	PATH			executed_action<= action action.chosen_method->>br>action_method action_method.description

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
SEQUENCE_EFFECTIVITY	serial_numbered_effectivity	41		
sequence_effectivity to quantity	PATH			serial_numbered_effectivity<= effectivity=> product_definition_effectivity product_definition_effectivity.usage->> product_definition_relationship=> product_definition_usage=> assembly_component_usage=> quantified_assembly_component_usage.quantity->> measure_with_unit
sequence_effectivity to identifier (from_effectivity_id)	PATH			serial_numbered_effectivity serial_numbered_effectivity.effectivity_start_id
sequence_effectivity to identifier (thru_effectivity_id)	PATH			serial_numbered_effectiivity serial_numbered_effectivity..effectivity_end_id
sequence_effectivity to measure (quantity_unit_of_measure)	PATH		10	serial_numbered_effectivity<= effectivity=> product_definition_effectivity product_definition_effectivity.usage->> product_definition_relationship=> product_definition_usage=> assembly_component_usage=> quantified_assembly_component_usage.quantity->> measure_with_unit measure_with_unit.unit_component->> unit

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
SHEET #1: If sheet is identified within AP 232 #2: If sheet is defined as an AP 202 exchange within same file	#1: product_definition_formation #2: [product_definition_formation] [drawing_sheet_revision]	41 41 101	16 19	#1: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: ({drawing_sheet_revision<= presentation_area<= presentation_representation presentation_representation_select=presentation_representation presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition_formation product_definition_formation} {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
sheet to configuration (sheet_configuration)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='sheet header'})
sheet to element_identification (sheet_identifier)	IDENTICAL MAPPING			
sheet to label (sheet_size)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='sheet header'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='document format'} representation.items[i]-> {representation_item.name=\ (‘size format')(‘size format standard’)} representation_item=> descriptive_representation_item descriptive_representation_item.description
sheet to product_presentation (presentation_format) (see note 3)				

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
SOURCE_INFORMATION_TYPE	representation	43	23	{representation representation.name='source information type'}
source_information_type to identifier (source_code)	PATH			representation representation.items[i]->
representation_item {representation_item=>
descriptive_representation_item} representation_item.name
source_information_type to text (source_description)	PATH			representation representation.items[i]->
representation_item=>
descriptive_representation_item descriptive_representation_item.description
source_information_type to text (type_of_coding_scheme)	PATH			representation representation.context_of_items[i]->
representation_context representation_context.context_type
SPECIAL_CONDITION	descriptive_representation_item	45		
special_condition to label (code)	PATH			descriptive_representation_item<=
representation_item representation_item.name
special_condition to text (description)	PATH			descriptive_representation_item descriptive_representation_item.description

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
special_condition to text (type_of_coding_scheme)	PATH			descriptive_representation_item<= representation_item<- representation.items[i] representation {representation.name='special_condition'} representation.context_of_items[i]-> representation_context representation_context.context_type
SPECIFICATION_DOCUMENT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- {product_category.name='reference document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='specification document'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
STANDARD_DOCUMENT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category {product_category.name='document'} product_category<-product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- {product_category.name='reference document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='standard document'}
STOCK_MATERIAL	material_designation	45		
stock_material to item (material)	PATH			material_designation material_designation.definitions->characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
stock_material to stock_size (size)	PATH			material_designation material_designation.definitions-> characterized_definition characterized_definition=characterized_product_definition characterized_product_definition=product_definition product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='size'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='stock size parameters'}
STOCK_SIZE	representation	45		
stock_size to stock_size_classification (catalog)	PATH			representation representation.item-> representation_item=> descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description=\ ('bar')('plate')('sheet')('pipe')('tube')('block')('sphere')('roll')} {descriptive_representation_item.name='stock size classification'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
stock_size to stock_size_cross_section (cross_section)	PATH			representation re;resentation.item-> representation_item=> descriptive_representation_item descriptive_representation_item.description {descriptive_representation_item.description) (descriptive_representation_item.description=('round')\ ('square')('oval')('hex')('angle')('channel')('rectangular')('T's')('I's'))} {descriptive_representation_item.name=’cross section’}
stock_size to stock_size_parameters (parameters_for)	PATH			representation representation.item[i]->> representation_item=> measure_representation_item
STOCK_SIZE_PARAMETERS	measure_representation_item	45		{measure_representation_item<= representation_item<- representation.items[i] representation representation.name='stock size parameters'}
stock_size_parameter to label (name_of_parameter)	PATH			measure_representation_item<= representation_item representation_item.name
stock_size_parameters to number_-with_units (a_length)	PATH			measure_representation_item<= measure_with_unit {measure_representation_item<= representation_item representation_item.name='length of stock'}
stock_size_parameters to number_-with_units (diameter)	PATH			measure_representation_item<= measure_with_unit {measure_representation_item<= representation_item representation._item.name='diameter of stock'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
stock_size_parameters to number_-with_units (height)	PATH			measure_representation_item<= measure_with_unit {measure_representation_item<= representation_item representation_item.name='height of stock'}
stock_size_parameters to number_-with_units (numeric_parameter)	PATH			measure_representation_item<= measure_with_unit
stock_size_parameters to number_-with_units (radius)	PATH			measure_representation_item<= measure_with_unit {measure_representation_item<= representation_item representation_item.name='radius of stock'}
stock_size_parameters to number_-with_units (wall_thickness)	PATH			measure_representation_item<= measure_with_unit {measure_representation_item<= representation_item representation_item.name='wall thickness of stock'}
stock_size_parameters to number_-with_units (width)	PATH			measure_representation_item<= measure_with_unit {measure_representation_item<= representation_item representation_item.name='width of stock'}

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
stock_size_parameters to text (textual_parameter)	PATH			measure_representation_item<= measure_with_unit [measure_with_unit.value_component->] measure_value {measure_value = descriptive_measure}] [measure_with_unit.unit_component->] unit unit=named_unit named_unit=> context_dependent_unit {(context_dependent_unit.name) (context-dependent_unit.name='textual parameter')}]
TDP_ELEMENT #1: When tdp_element is a parts list #2: When tdp_element is a drawing defined within this document #3: When tdp_element is a product_-data_set #4: When tdp_element is a reference_-document #5: When tdp_element is a drawing that is externally defined to this document #6: When tdp_element is a drawing and is defined by AP 202	#1,#2,#3,#4,#5: (product_definition_-formation) #6: (<draughting_drawing_revision> <product_definition_formation>)	41 505 41		{product_definition_formation product_definition_formation.of_product->] product<- product_related_product_category.of_products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category _relationship.category product_category_relationship product_category_relationship.sub_category->] product_category #1: (product_category.name='parts list') #2: (product_category.name='drawing') #3: (product_category.name='product data set') #4: (product_category.name='reference document') #5: (product_category.name='externally defined document') #6:(<draughting_drawing_revision> <product_category.name='drawing'>)
TDP_ELEMENT_LIST_ITEM	product_definition	41		
tdp_element_list_item to element_-identification (tdp_element_item)	PATH			product_definition product_definition.formation->] product_definition_formation

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
tdp_element_list_item to identifier (reference_code)	PATH			product_definition classification_item=product_definition classification_item<- applied_classification_assignment.items[i] applied_classification_assignment<= {classification_assignment role_select=classification_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
weight to a_real (a_value)	PATH			representation_item=> measure_representation_item<= measure_with_unit measure_with_unit.value_component-> measure_value measure_value=numeric_measure

Table 11 - Mapping table for parts_list (continued)

Application element	AIM element	Source	Rules	Reference path
weight to measure (unit_of_measure) #1: If weight is expressed in SI units #2: If weight is not expressed in SI units	PATH			representation_item=> measure_representation_item<= measure_with_unit measure_with_unit.unit_component-> unit unit=named_unit named_unit=> #1: (si_unit si_unit.name-> si_unit_name si_unit_name='newton' [named_unit.dimensions-> dimensional_exponents {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-2} {dimensional_exponents.mass_exponent=1} {dimensional_exponents.length_exponent=1} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}]) #2: (conversion_based_unit conversion_based_unit.name [conversion_based_unit.conversion_factor-> measure_with_unit] [measure_with_unit.value_component-> measure_value] [measure_with_unit.unit_component-> unit unit=named_unit named_unit=> si_unit si_unit.name='newton' [named_unit.dimensions-> dimensional_exponents {dimensional_exponents.amount_of_substance_exponent=0} {dimensional_exponents.electric_current_exponent=0} {dimensional_exponents.time_exponent=-2} {dimensional_exponents.mass_exponent=1} {dimensional_exponents.length_exponent=1} {dimensional_exponents.luminous_intensity_exponent=0} {dimensional_exponents.thermodynamic_temperature_exponent=0}]])

Table 11 - Mapping table for parts_list (concluded)

Application element	AIM element	Source	Rules	Reference path
weight to weight_derivation (derivation_method)	PATH			representation_item=> [qualified_representation_item qualified_representation_item.qualifiers[i]->value_qualifier] [measure_representation_item<= measure_with_unit<- measure_qualification.qualified_measure measure_qualification measure_qualification.qualifier[i]->value_qualifier] value_qualifier=type_qualifier type_qualifier.name {measure_qualification.name='weight derivation method'} {(type_qualifier.name='calculated') (type_qualifier.name='estimated') (type_qualifier.name='weighed')}

Table 12 - Mapping table for presentation

Application element	AIM element	Source	Rules	Reference path
A_NUMBER	number	11		
A_REAL	real	11		
AN_INTEGER	integer	11		
BODY_PRESENTATION	area_dependent_annotation_representation	46		
body_presentation to tabulation (body_tabulation_presentation)	IDENTICAL MAPPING			
COLUMNAR_DATA_CONTENT_-HOLDER	area_dependent_annotation_representation	46		
columnar_data_content_holder to field_content_holder_tabulation (column_content_presentation)	PATH			area_dependent_annotation_representation<= presentation_represenation<= representation representation.items-> representation_item[i]=> styled_item=> annotation_occurrence=> annotation_text_occurrence
COLUMN_HEADER	area_dependent_annotation_representation	46		

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
column_header to field_title (single_column_header_titles)	PATH			area_dependent_annotation_representation<= presentation_represenation<= representation representation.items-> representation_item[i]=> styled_item=> annotation_occurrence=> annotation_text_occurrence
DATE	(date)(date_and_time)	41		
EXPLICIT_GRAPHICS	annotation_occurrence	46		
explicit_graphics to geometry (table_geometry)	PATH			[annotation_occurrence=> annotation_point_occurrence] [annotation_occurrence=> annotation_curve_occurrence]
EXTERNAL_GRAPHICS_FILE	externally_defined_symbol_and_ placement	232		
external_graphics_file to a_real (file_loadpoint_x)	PATH			externally_defined_symbol_and_placement<= placement-> cartesian_point cartesian_point.coordinates[1]
external_graphics_file to a_real (file_loadpoint_y)	PATH			externally_defined_symbol_and_placement<= placement-> cartesian_point cartesian_point.coordinates[2]

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
external_graphics_file to file (file_id)	PATH			(externally_defined_symbol_and_placement<= externally_defined_symbol<= externally_defined_item externally_defined_item.item_id) (externally_defined_symbol_and_placement document_reference_item=externally_defined_symbol_and_placement document_reference_item<- applied_document_reference.items[i] applied_document_reference<= document_reference {document_reference role_select=document_reference role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=\ 'presentation graphics file'} document_reference.assigned_document->document=> document_file)
FIELD_CONTENT_HOLDER	annotation_text_occurrence	46		
field_content_holder to label (text_style)	PATH			annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.styles->presentation_style_assignment presentation_style_assignment.styles[i]->presentation_style_select presentation_style_select=text_style text_style text_style.name

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
field_content_holder to text (field_justification)	PATH	46	34	annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.item->representation_item=> geometric_representation_item=> text_literal text_literal.alignment {text_literal.alignment=\ (‘baseline left’)(baseline centre’)(‘baseline right’)}
FIELD_CONTENT_HOLDER_-SINGULAR	annotation_text_occurrence	46		
field_content_holder to text (field_text)	PATH			annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.item->representation_item=> geometric_representation_item=> text_literal text_literal.literal
FIELD_CONTENT_HOLDER_-TABULATION	annotation_text_occurrence	46		
field_content_holder to text (field_text)	PATH			annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.item->representation_item=> geometric_representation_item=> text_literal text_literal.literal
FIELD_LOCATION	axis2_placement_2d	42		

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
FIELD_LOCATION_DEFINITION	axis2_placement_2d	42		
field_location_definition to load_point (field_load_point)	PATH			axis2_placement_2d<= placement placement.location->cartesian_point
FIELD_TITLE	annotation_text_occurrence	46		
field_title to field_location (location)	PATH			annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.item->representation_item=> geometric_representation_item=> text_literal text_literal.alignment->axis2_placement axis2_placement=axis2_placement_2d axis2_placement_2d
field_title to label (field_style)	PATH		35	annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.item->representation_item=> geometric_representation_item=> text_literal text_literal.font->font_select font_select=externally_defined_text_font externally_defined_text_font

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
field_title to text (field_justification)	PATH		34	annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.item->\ representation_item=> geometric_representation_item=> text_literal text_literal.alignment {text_literal.alignment=\ (‘left’)(‘center’)(‘right’)}
field_title to text (field_text)	PATH			annotation_text_occurrence<= annotation_occurrence<= styled_item styled_item.item->\ representation_item=> geometric_representation_item=> text_literal text_literal.literal
FILE	document_file	232		{document_file<= document<- document_representation_type.representation_types document_representation_type document_representation_type.name=(’digital’)(‘physical’)}
file to change_identification (change_status) (see note 3)				
file to distribution_notice (distribution_authorizations) (see note 3)				

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
file to file_format (context_file_format)	PATH			document_file<= characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name='document format'}
file to identifier (context_file_name) (see note 3)				
file to identifier (native_format_file_name) (see note 3)				
file to security_classification (security_identification) (see note 3)				
file to size_characteristics (size) (see note 3)				
file to system_declaration (source_system) (see note 3)				
FILE_FORMAT	representation	41		{represemtation.name='document format'}

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
file_format to date (release_date)	PATH			representation date_item=representation date_item<- applied_date_assignment.items applied_date_assignment<= date_assignment date_assignment.assigned_date->date {date_assignment.role->date_role date_role.name='release date'}
file_format to identifier (change_level) (see note 3)				
file_format to identifier (format_code) (see note 3)				
file_format to identifier (revision_level) (see note 3)				
file_format to text (format_standard) (see note 3)				
GEOMETRY	geometric_representation_item	42		
GROUP_PARENT_COLUMN_- HEADER	area_dependent_annotation_representation	46		

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
group_parent_column_header to field_-title (single_group_parent_column_-header_titles)	PATH			area_dependent_annotation_representation<= presentation_represenation<= representation representation.items-> representation_item[i]=> styled_item=> annotation_occurrence=> annotation_text_occurrence
GROUP_PARENT_CONTENT_-HOLDER	area_dependent_annotation_representation	46		
group_parent_content_holder to field_-content_holder_tabulation (group_parent_content_presentation)	PATH			area_dependent_annotation_representation<= presentation_represenation<= representation representation.items-> representation_item[i]=> styled_item=> annotation_occurrence=> annotation_text_occurrence
GROUP_PARENT_HEADER	area_dependent_annotation_representation	46		
group_parent_header to field_title (single_group_parent_header_titles)	PATH			area_dependent_annotation_representation<= presentation_represenation<= representation representation.items-> representation_item[i]=> styled_item=> annotation_occurrence=> annotation_text_occurrence
HEADER_BLOCK	area_dependent_annotation_occurrence	46		

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
header_block to field_content_holder_-singular (single_block_content_presentation)	PATH			area_dependent_annotation_representation<= presentation_represenation<= representation representation.items-> representation_item[i]=> styled_item=> annotation_occurrence=> annotation_text_occurrence
header_block to field_title (single_block_titles)	PATH			annotation_text_occurrence<= styled_item styled_item.item-> representation_item=> geometric_representation_item=> text_literal
HEADER_PRESENTATION	area_dependent_annotation_representation	46		
header_presentation to header_block (header_blocks_presentation)	IDENTICAL_MAPPING			
header_presentation to tabulation (header_tabulation_presentation)	IDENTICAL_MAPPING			
IDENTIFIER	identifier	41		
LABEL	label	41		
LIST_PRESENTATION	presentation_set	46		

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
list_presentation to measure (unit_of_length)	PATH			presentation_set<- area_in_set.in_set area_in_set area_in_set.area->>br>presentation_area<= presentation_representation<= representation representation.context_of_items->>br>representation_context=> global_unit_assigned_context global_unit_assigned_context.units->>br>unit unit=named_unit named_unit=> length_unit
list_presentation to body_presentation (body_page1_format)	PATH			presentation_set<- area_in_set.in_set area_in_set area_in_set.area->>br>presentation_area<= presentation_representation<= representation representation.items->>br>representation_item=> mapped_item mapped_item.mapping_source->>br>representation_map representation_map.mapped_representation->>br>representation=> presentation_representation=> area_dependent_annotation_representation

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
list_presentation to body_presentation (body_pagen_format)	PATH			presentation_set<- area_in_set.in_set area_in_set area_in_set.area->> presentation_area<= presentation_representation<= representation representation.items->> representation_item=> mapped_item mapped_item.mapping_source->> representation_map representation_map.mapped_representation->> representation=> presentation_representation=> area_dependent_annotation_representation
list_presentation to header_presentation (header_page1_format)	PATH			presentation_set<- area_in_set.in_set area_in_set area_in_set.area->> presentation_area<= presentation_representation<= representation<= representation.items->> representation_item=> mapped_item mapped_item.mapping_source->> representation_map representation_map.mapped_representation->> representation=> presentation_representation=> area_dependent_annotation_representation

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
list_presentation to header_presentation (header_pagen_format)	PATH			presentation_set<- area_in_set.in_set area_in_set area_in_set.area->>br>presentation_area<= presentation_representation<= representation representation.items->>br>representation_item=>>br>mapped_item mapped_item.mapping_source->>br>representation_map representation_map.mapped_representation->>br>representation=>>br>presentation_representation=>>br>area_dependent_annotation_representation
list_presentation to page_presentation (page_format)	PATH			presentation_set<- area_in_set.in_set area_in_set area_in_set.area->>br>presentation_area
LOAD_POINT	cartesian_point	42		
load_point to a_real (load_point_x)	PATH			cartesian_point cartesian_point.coordinates[1]
load_point to a_real (load_point_y)	PATH			cartesian_point cartesian_point.coordinates[2]
MEASURE	named_unit	41		

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
PAGE_PARAMETERS	presentation_size	46		presentation_size {presentation_size.unit->presentation_size_assignment_select presentation_size_assignment_select=presentation_area}
page_parameters to a_real (page_anchor_x)	PATH			presentation_size presentation_size.size->planar_box planar_box.placement->axis2_placement axis2_placement=axis2_placement_2d axis2_placement_2d<=placement placement.location->cartesian_point cartesian_point.coordinates[1]
page_parameter to a_real (page_anchor_y)	PATH			presentation_size presentation_size.size->planar_box planar_box.placement->axis2_placement axis2_placement=axis2_placement_2d axis2_placement_2d<=placement placement.location->cartesian_point cartesian_point.coordinates[2]
page_parameters to explicit_graphics (graphics_declaration)	PATH			presentation_size presentation_size.unit->presentation_size_assignment_select=presentation_area presentation_area<=presentation_representation<=representation representation.items->representation_item=>styled_item=>annotation_occurrence

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
page_parameters to external_graphics_-file (graphics_declaration)	PATH			presentation_size presentation_size.unit->\ presentation_size_assignment_select= presentation_area<= presentation_representation<= representation representation.items->\ representation_item=> geometric_representation_item=> placement=> externally_defined_symbol_and_placement
page_parameter to text (page_size_code)	PATH			presentation_size presentation_size.size->\ planar_box=> externally_defined_planar_box<= externally_defined_item externally_defined_item.source->\ external_source external_source.source_id {(external_source.source-id) (external_source.source_id=\ ('ISO_54-1980')('ASME_14/1-80')) }
page_parameter to text (paper_size)	PATH			presentation_size presentation_size.size->\ planar_box=> externally_defined_planar_box<= externally_defined_item externally_defined_item.item_id->\ source_item
PAGE_PRESENTATION	presentation_area	46		

Table 12 - Mapping table for presentation (continued)

Application element	AIM element	Source	Rules	Reference path
page_presentation to page_parameters (page1_parameters)	PATH			presentation_area presentation_size_assignment_select=presentation_area presentation_size_assignment_select<- presentation_size.unit presentation_size
page_presentation to page_parameters (page_master_parameters)	PATH			presentation_area presentation_size_assignment_select=presentation_area presentation_size_assignment_select<- presentation_size.unit presentation_size
page_presentation to page_parameters (pagen_parameters)	PATH			presentation_area presentation_size_assignment_select=presentation_area presentation_size_assignment_select<- presentation_size.unit presentation_size
STRING_LOCATION_DEFINITION	axis2_placement_2d	42		
string_location_definition to load_point (string_load_point)	PATH			axis2_placement_2d<= placement placement.location->cartesian_point
TABULATION	annotation_text_occurrence	46		
tabulation to column_header (tabulation_columnar_headings)	IDENTICAL MAPPING			
tabulation to columnar_data_content_-holder (tabulation_columns)	IDENTICAL MAPPING			

Table 12 - Mapping table for presentation (concluded)

Application element	AIM element	Source	Rules	Reference path
tabulation to group_parent_column_-header (tabulation_group_parent_headings)	IDENTICAL MAPPING			
tabulation to group_parent_content_-holder (parent_columns)	IDENTICAL MAPPING			
tabulation to group_parent_header (group_parent_headings)	IDENTICAL MAPPING			
tabulation to tabulation_header (tabulation_headings)	IDENTICAL MAPPING			
TABULATION_HEADER	area_dependent_annotation_occurrence	46		
tabulation_header to field_title (single_tabulation_header_titles)	PATH			area_dependent_annotation_representation<= presentation_represenation<= representation representation.items-> representation_item[i]=> styled_item=> annotation_occurrence=> annotation_text_occurrence
TEXT	text	41		
TIME	local_time	41		

Table 13 - Mapping table for product_data_set

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_IDENTIFICATION_-OF_ITEM	product_definition_formation	41		
alternate_identification_of_item to change_identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.item[1] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->> object_role object_role.name='change identification'} action_assignment.assigned_action->> action=>> {action.description='change identification'} executed_action

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->>br>person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->>br>organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
alternate_identification_of_item to drawing_suffix_number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->>br>product
alternate_identification_of_item to identifier (identifying_number)	PATH			product_definition_formation [product_definition_formation.id] product_definition_formation.of_product->>br>product [product.id] <product_defintion_formation oganization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment organization_assignment.assigned_organization->>br>organization>

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
alternate_identification_of_item toitem_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category
alternate_identification_of_item to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
alternate_identification_of_item to source_information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
ANNOTATION	annotation_occurrence	46		
annotation to geometry (annotation_geometry)	PATH			annotation_occurrence<= styled_item {styled_item<= representation_item<- representation.items[i] representation} styled_item.item-> representation_item=> geometric_representation_item

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
DOCUM ENT_USAGE_PARAMETER	document_usage_constraint	41		
document_usage_parameter to label (subject)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {(document_usage_constraint.subject_element_value) (document_usage_constraint.subject_element_value=\ (‘type’)(‘grade’)(‘form’)(‘composition’))}
document_usage_parameter to text (value_of)	PATH			document_usage_constraint document_usage_constraint.subject_element_value

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
DRAWING #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 201 or AP 202 exchange with and AP 232 exchange	#1: (product_definition_formation #2: ([draughting_drawing_revision] [product_definition_formation])	41 505 41		#1: ({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'}) #2: ({draughting_drawing_revision<= drawing_revision<= presentation_set presentation_representation_select=presentation_set presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition product_definition.formation->product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'})

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
drawing to header (heading) #3: (see note 2)	#1: (PATH) #2: (PATH)			#1,#2: (product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description='drawing header'})
drawing to sheet (pages) (see note 3)				
DRAWING_SUFFIX_NUMBER_- COMBINATION	product	41		
drawing_suffix_number_combination to element_identification (drawing_number)	PATH	41	14	product<- product_relationship.relating_product product_relationship {product_relationship.name=’drawing suffix number combination’} product_relationship.related_product-> product product.id { product<- product_related_product_category.products[i] product_related_product_category<= product_category<- product_categoy.name=’document’ product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category.name=’drawing’}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_suffix_number_combination to identifier (suffix_identifier)	PATH		14	product<- product_relationship.relating_product product_relationship product_relationship.id {product_relationship.name='drawing suffix number combination'}
FILE	document_file	232		{document_file<= document<- document_representation_type.representation_types document_representation_type document_representation_type.name=('digital')('physical')}
file to change_identification (change_status)	PATH			document_file action_item=document_file action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>>>

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
file to distribution_notice (distribution_authorizations)	PATH			document_file approval_item=document_file approval_item<- applied_approval_assignment.items[i] applied_approval_assignment<= approval_assignment {approval_assignment<- role_select=approval_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name='distribution notice'} approval_assignment.assigned_approval->>br>approval
file to file_format (context_file_format)	PATH			document_file<= characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->>br>representation {representation.name='document format'}
file to identifier (context_file_name)	PATH			document_file<= document document.id

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
file to identifier (native_format_file_name)	PATH			(document_file<= document<- document_relationship.related_document document_relationship {document_relationship.name='translation relationship'} document_relationship.relating_document->document {document=> document_file} document.id
file to security_classification (security_identifications)	PATH			document_file security_classification_item=document_file security_classification_item<- applied_security_classification_assignment.items[i] applied_security_classification_assignment<= security_classification_assignment <security_classification_assignment role_select=security_classification_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role> security_classification_assignment.assigned_security_classification->security_classification
file to size_characteristics (size)	PATH			document_file<= characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name='document property'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
file to system_declaration (source_system)	PATH			document_file characterized_object characterized_definition=characterized_object characterized_definition<- property_definition.definition property_definition<- {property_definition.name=‘document property’} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation {representation.name=\ ('source system declaration’)(‘document creation’)}
FILE_FORMAT	representation	41		{representation.name=’document format’}
file_format to date (release_date)	PATH			representation date_item=representation date_item<- applied_date_assignment.items applied_date_assignment<= date_assignment date_assignment.assigned_date->date {date_assignment.role->date_role date_role.name='release date'}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
file_format to identifier (change_level)	PATH			representation action_item=representation action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->>br>object_role object_role.name=’change identification’} action_assignment.assigned_action->>br>action {action=> executed_action} action.name {action.chosen_method->>br>action_method action_method.name='change level'}
file_format to identifier (format_code)	PATH			representation representation.items[i]->>br>representation_item=> {representation_item.name=’character code’} descriptive_representation_item descriptive_representation_item.description

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
file_format to identifier (revision_level)	PATH			representation action_item=representation acton_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name=’change identification’} action_assignment.assigned_action->action action.name {action=>executed_action) {action.chosen_method->action_method action_method.name='revision level'}
file_format to text (format_standard)	PATH			representation {representation.name='file format'} representation.items[i]->representation_item=> {representation_item.name=’data format’} descriptive_representation_item descriptive_representation_item.description
GEOMETRY	geometric_representation_item	42		
ITEM_IDENTIFICATION	product_definition_formation	41		

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to alternate_-identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation->product_definition_formation) #2:(product_definition_formation->product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product->product<- product_definition_formation)
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->> person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->> organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->> product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->> product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->> product<- product_related_product_category.producst[i] product_related_product_category<= product_category

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product-> product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation
ITEM_TYPE	product_category	41		
item_type to company (code_administrator)	PATH			product_category organiation_item=product_category organizatin_item<- assigned_organization_assignment.item[i] assigned_organization_assignment=> organization_assignment {organization_assignment organization_assignment.role-> organization_role organization_role.name='code administator'} organization_assignment.assigned_organization-> organization
item_type to label (item_code)	PATH			product_category product_category.name

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
item_type to text (type_of_coding_scheme)	PATH			product_category product_category.description
PRODUCT_DATA_SET	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='product data set'}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set to drawing (related) #1: When drawing is identified within AP 232 #2: When drawing is defined as an AP 201 or AP 202 exchange within the same file	PATH			#1:(product_definition_formation<- {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='product data set'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='related drawing'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='drawing'}) #2: (product_definition_formation {product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product-category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='product data set'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='related drawing'}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation {product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category='drawing'} presented_item_item=product_definition_formation presented_item_item<- applied_presented_item.items[i] applied_presented_item<= presented_item<- presented_item_representation.item presented_item_representation presented_item_representation.presentation-> presentation_representation_select presentation_representation_select=presentation_set presentation_set=> drawing_revision=> draughting_drawing_revision)

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set to product_data_set (related)	PATH			product_definition_formation {product_definition_formation.of_product->product<-product_related_product_category.products[i] product_related_product_category<=product_category<-{product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='product data set'} product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name='related product data set'} product_definition_formation_relationship.related_product_definition_formation ->product_definition_formation {product_definition_formation.of_product->product<-product_related_product_category.products product_related_product_category<=product_category<-{product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category {product_category.name='product data set'}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set to source_file (file_configuration)	PATH			product_definition_formation<- product_definition.formation (product_definition=> product_definition_with_associated_documents product_definition_with_associated_documents.documentation_ids[i]->document=> document_file) (product_defintion document_reference_item=product_defintion document_reference_item<- applied_document_reference.item[i] applied_document_reference<= document_reference=> document_file)
PRODUCT_DATA_SET_WITH_-FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='product data set with format'}
product_data_set_with_format to header (product_header)	PATH			product_defnition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.name='product data set with format header'}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set_with_format to product_presentation (presentation_of_product_data_set)	PATH			product_defnition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation=> (presentation_representation=> mechanical_design_geometric_presentation_representation) (presentation_representation)
PRODUCT_DATA_SET_WITH_-SHADING	product_definition_formation			{product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category='product data set with shading'}
product_data_set_with_shading to header_configuration_with_element_-identification (data_configuration)	PATH			product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=\ 'product data set with shading header'}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set_with_shading to shaded_shape_model (a_shaded_model)	PATH			product_defnition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation=> (presentation_representation=> mechanical_design_shaded_presentation_representation) (presentation_representation)
PRODUCT_DATA_SET_-WITHOUT_FORMAT	product_definition_formation	41		{product_definition_formation product_definition_formation.of_product-> product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category-> product_category product_category='product data set without format'}
product_data_set_without_format to header_configuration with_element_-identification (data_configuration)	PATH			product_defnition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.name=\ 'product data set without format header'}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
product_data_set_without_format to shape_model (a_model)	PATH			product_defnition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation=> shape_representation
PRODUCT_PRESENTATION #1: For general capability #2: For use with AIC 517	#1: (presentatation_representation) #2: (mechanical_design_geometric_- presentation_representation)	46 517		
product_presentation to annotation (annotation_presentation) #2: (see note 2)	#1: (PATH)			#1: (presentation_representation<= representation representation.items[i]-> representation_item=> mapped_item mapped_item.mapping_source-> representation_map representation_map.mapped_representation-> representation representation.items[i]-> styled_item=> annotation_occurrence)

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
product_presentation to shape_model (part_shape_views)	PATH			#1: (presentation_representation<= representation representation.items[i]->>br>representation_item=> mapped_item mapped_item.mapping_source->> representation_map representation_map.mapped_presentation->> representation (representation=> shape_representation (shape_representation=> edge_based_wireframe_shape_representation) (shape_representation=> shell_based_wireframe_shape_representation) (shape_representation=> geometrically_bounded_2d_wireframe_representation) (shape_representation=> geometrically_bounded_surface_shape_representation) (shape_representation=> non-manifold_surface_shape_representation) (shape_representation=> manifold_surface_shape_representation) (shape_representation=> geometrically_bounded_wireframe_surface_shape_representation) (shape_representation=> faceted_brep_shape_representation) (shape_representation=> elementary_brep_shape_representation) (shape_representation=> advanced_brep_shape_representation) (shape_representation=> csg_shape_representation)) (representation=> shape_representation) (representation representation.items[i]->> representation_item=> topological_representation_item=> connected_face_set connected_face_set.cfs_faces[i]->> advanced_face)) #2: (mechanical_design_geometric_presentation_representation<=

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
				presentation_representation<= representation representation.items[i]->>br>representation_item=> mapped_item mapped_item.mapping_source->> representation_map representation_map.mapped_presentation->> representation (representation=> shape_representation (shape_representation=> edge_based_wireframe_shape_representation) (shape_representation=> shell_based_wireframe_shape_representation) (shape_representation=> geometrically_bounded_2d_wireframe_representation) (shape_representation=> geometrically_bounded_surface_shape_representation) (shape_representation=> non-manifold_surface_shape_representation) (shape_representation=> manifold_surface_shape_representation) (shape_representation=> geometrically_bounded_wireframe_surface_shape_representation) (shape_representation=> faceted_brep_shape_representation) (shape_representation=> elementary_brep_shape_representation) (shape_representation=> advanced_brep_shape_representation) (shape_representation=> csg_shape_representation)) (representation=> shape_representation) (representation representation.items[i]->> representation_item=> topological_representation_item=> connected_face_set connected_face_set.cfs_faces[i]->> advanced_face))

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
REFERENCE_DOCUMENT_USAGE	document_usage_constraint	41		
reference_document_usage to document_usage_paraameter (usage_parameter)	IDENTICAL MAPPING			
reference_document_usage to identifier (usage_code)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element='usage code'}
reference_document_usage to label (location_in_document)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element=\ 'location_in_document'}
reference_document_usage to reference_document (document_referenced)	PATH			document_usage_constraint document_usage_constraint.source->>br>document <- {document document.kind->>br>document_type document_type.product_data_type=\ 'configuration controlled document version'} document_relationship.related_document document_relationship {document_relationship.name='document usage reference'} document_relationship.relating_document->>br>document<- document_product_association.relating_document document_product_association {document_product_association=>>br>document_product_equivalence} {document_product_association.name='equivalence'} document_product_association.related_product->>br>product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
reference_document_usage to text (usage_description)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element='usage description'}
SHADED_SHAPE_MODEL	#1: (presentation_representation) #2: (mechanical_design_shaded_-presentation_represenation)	46 518		

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
shaded_shape_model to shape_model (part_shape_views)	PATH			#1: (presentation_representation<= representation representation.items[i]->>br>representation_item=> mapped_item mapped_item.mapping_source->> representation_map representation_map.mapped_presentation->> representation (representation=> shape_representation (shape_representation=> edge_based_wireframe_shape_representation) (shape_representation=> shell_based_wireframe_shape_representation) (shape_representation=> geometrically_bounded_2d_wireframe_representation) (shape_representation=> geometrically_bounded_surface_shape_representation) (shape_representation=> non-manifold_surface_shape_representation) (shape_representation=> manifold_surface_shape_representation) (shape_representation=> geometrically_bounded_wireframe_surface_shape_representation) (shape_representation=> faceted_brep_shape_representation) (shape_representation=> elementary_brep_shape_representation) (shape_representation=> advanced_brep_shape_representation) (shape_representation=> csg_shape_representation)) (representation=> shape_representation) (representation representation.items[i]->> representation_item=> topological_representation_item=> connected_face_set connected_face_set.cfs_faces[i]->> advanced_face))

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (mechanical_design_shaded_presentation_representation<= presentation_representation<= representation representation.items[i]-> representation_item=> mapped_item mapped_item.mapping_source-> representation_map representation_map.mapped_presentation-> representation (representation=> shape_representation (shape_representation=> edge_based_wireframe_shape_representation) (shape_representation=> shell_based_wireframe_shape_representation) (shape_representation=> geometrically_bounded_2d_wireframe_representation) (shape_representation=> geometrically_bounded_surface_shape_representation) (shape_representation=> non-manifold_surface_shape_representation) (shape_representation=> manifold_surface_shape_representation) (shape_representation=> geometrically_bounded_wireframe_surface_shape_representation) (shape_representation=> faceted_brep_shape_representation) (shape_representation=> elementary_brep_shape_representation) (shape_representation=> advanced_brep_shape_representation) (shape_representation=> csg_shape_representation)) (representation=> shape_representation) (representation representation.items[i]-> representation_item=> topological_representation_item=> connected_face_set connected_face_set.cfs_faces[i]->

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
				advanced_face))
SHAPE_MODEL	#1: (edge_based_wireframe_shape_-representation)	501		
	#2: (shell_based_wireframe_shape_-representation)	502		
	#3: (geometrically_bounded_2d_-wireframe_representation)	503		
	#4: (geometrically_bounded_surface_-shape_representation)	507		
	#5: (non-manifold_surface_shape_-representation)	508		
	#6: (manifold_surface_shape_-representation)	509		
	#7: (geometrically_bounded_wireframe_-surface_shape_representation)	510		
	#8: (advanced_face)	511		
	#9: (faceted_brep_shape_representation)	512		
	#10: (elementary_brep_shape_-representation)	513		
	#11: (advanced_brep_shape_-representation)	514		
	#12: (csg_shape_representation)	515		
	#13: (shape_representation)	41		

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
shape_model to geometry (part_shape_representation)	PATH			#1: (edge_based_wireframe_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #2: (shell_based_wireframe_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #3: (geometrically_bounded_2d_wireframe_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #4: (geometrically_bounded_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #5: (non-manifold_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #6: (manifold_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #7: (geometrically_bounded_wireframe_surface_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #8: (advanced_face<-

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
				connected_face_set.cfs_faces[i]-> connected_face_set<= topological_representation_item<= representation_item=> geometric_representation_item) #9: (faceted_brep_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #10: (elementary_brep_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #11: (advanced_brep_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #12: (csg_shape_representation<= shape_represenation<= representation representation.items[i]-> representation_item=> geometric_representation_item) #13:(shape_representation<= representation representation.items[i]-> representation_item=> geometric_representation_item)

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
SHEET #1: If sheet is identified within AP 232 #2: If sheet is defined as an AP 202 exchange within same file	#1: product_definition_formation #2: [product_definition_formation] [drawing_sheet_revision]	41 41 101	16 19	#1: ({product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'}) #2: ({drawing_sheet_revision<= presentation_area<= presentation_representation presentation_representation_select=presentation_representation presentation_representation_select<- presented_item_representation.presentation presented_item_representation presented_item_representation.item->presented_item=> applied_presented_item applied_presented_item.items[i]->presented_item_item presented_item_item=product_definition_formation product_definition_formation} {product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category {product_category.name='document'} product_category<- product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='sheet'})

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
sheet to configuration (sheet_configuration)	PATH			#1, #2 : product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition {property_definition.description=’sheet header’})
sheet to element_identification (sheet_identifier)	IDENTICAL MAPPING			
sheet to label (sheet_size)	PATH			#1, #2: product_definition_formation<- product_definition.formation product_definition {product_definition.description=’sheet content’} characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.description='sheet header'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation-> representation {representation.name='document format'} representation.items[i]-> {representation_item.name=\ (‘size format')(‘size format standard’)} representation_item=> descriptive_representation_item descriptive_representation_item.description
sheet to product_presentation (presentation_format) (see note 3)				

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
SIZE_CHARACTERISTICS_-INTERNAL_DIVISIONS	representation	43		{representation.name=’multiple sheets in one file’)
size_characteristics_internal_division to an_integer (internal_division_count)	PATH			representation representation.items[i]->representation_item {representation_item.name='internal division count'} representation_item=>measure_representation_item
size_characteristics_internal_division to label (internal_division_type)	PATH			representation representation.items[i]->representation_item {representation_item.name='internal division type'} representation_item {representation_item.name='sheet size'} representation_item=>descriptive_representation_item.description
SIZE_CHARACTERISTICS_-SHEET_ACROSS_FILE	representation	43		{representation.name=’file containing portion of sheet’}
size_characteristics_sheet_across_file to an_integer (frame_number_-comprising_this_file)	PATH			representation representation.items[i]->representation_item {representation_item.name='sheet portion number'} representation_item=>measure_representation_item
size_characteristics_sheet_across_file to an_integer (number_of_frames_for_sheet)	PATH			representation representation.items[i]->representation_item {representation_item.name=\ 'number of portions sheet is divided into’} representation_item=>measure_representation_item

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
SOURCE_FILE	document_file	232		
SPECIAL_CONDITION	descriptive_representation_item	45		
special_condition to label (code)	PATH			descriptive_representation_item<= representation_item representation_item.name
special_condition to text (description)	PATH			descriptive_representation_item descriptive_representation_item.description
special_condition to text (type_of_coding_scheme)	PATH			descriptive_representation_item<= representation_item<- representation.items[i] representation {representation.name='special condition'} representation.context_of_items[i]-> representation_context representation_context.context_type
SYSTEM_DECLARATION	representation			{representation.name=('source system declaration’)\ ('destination system declaration’)(‘document creation’)}

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
system_declaration to identifier (system) #1: Use when system operating system, creating_interface, and system_-related_element_identifier are needed. #2 : Use when system operating system, creating_interface, and system_related_element_identifier are not needed.	PATH			#1: (representation representation.items[i]->representation_item=>{representation_item.name=(’computer system’)(‘creating system’)} descriptive_representation_item descriptive_representation_item.description) #2: (document_file external_identification_item=document_file external_identification_item<-applied_external_identification_assignment.items[i] applied_external_identification_assignment<=external_identification_assignment [external_identification_assignment<=identification_assignment {identification_assignment.role->(identification_role) (identification_role.description=('source system’)(‘destination system')}] [external_identification_assignment.source->external_source external_source.source_id])
system_declaration to identifier (system_element_identifier) #1: Use when system operating system, creating_interface, and system_-related_element_identifier are needed. #2 : Use when system operating system, creating_interface, and system_related_element_identifier are not needed.	PATH			#1: (representation representation.items[i]->representation_item=>{representation_item.name=’element on computer system’} descriptive_representation_item descriptive_representation_item.description) #2: (document_file external_identification_item=document_file external_identification_item<-applied_external_identification_assignment.items[i] applied_external_identification_assignment<=external_identification_assignment<=identification_assignment {identification_assignment.role->(identification_role) (identification_role.description='access context')} identification_assignment.assigned_id)

Table 13 - Mapping table for product_data_set (continued)

Application element	AIM element	Source	Rules	Reference path
system_declaration to identifier (system_related_element_identifier)	PATH			representation representation.items[i]->representation_item=> {representation_item.name='related element on computer system'} descriptive_representation_item descriptive_representation_item.description
system_declaration to text (creating_interface)	PATH			representation representation.items[i]->representation_item=> {representation_item.name='creating interface'} descriptive_representation_item descriptive_representation_item.description
system_declaration to text (operating system)	PATH			representation representation.items[i]->representation_item=> {representation_item.name='operating system'} descriptive_representation_item descriptive_representation_item.description

Table 13 - Mapping table for product_data_set (concluded)

Application element	AIM element	Source	Rules	Reference path
TDP_ELEMENT #1: When tdp_element is a product_-data_set #2: When tdp_element is a reference_-document #3: When tdp_element is a drawing	#1,#2: product_definition_formation	41		#1:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='product data set' }) #2:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='reference document'}) #3:({product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<= product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- product_category.name='drawing'})

Table 14 - Mapping table for reference_document

Application element	AIM element	Source	Rules	Reference path
DOCUMENT_USAGE_- PARAMETER	document_usage_constraint	41		
document_usage_parameter to label (subject)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {(document_usage_constraint.subject_element_value) (document_usage_constraint.subject_element_value=\ (‘type’)(‘grade’)(‘form’)(‘composition’))}
document_usage_parameter to text (value_of)	PATH			document_usage_constraint document_usage_constraint.subject_element_value
ITEM_IDENTIFICATION	product_definition_formation	41		
item_identification to alternate_- identification_of_item (alternate_identifications) #1: Use for version to version alternate identification such as supplied parts. #2: Use for part non version alternate identification.	PATH			#1:(product_definition_formaton<- product_definition_formation_relationship.relating_product_definition_formation product_definition_formation_relationship {(product_definition_formation_relationship.name) (product_definition_formation_relationship.name=\ (’alternate part identification’)(‘supplied item’))} product_definition_formation_relationship.related_product_definition_formation-> product_definition_formation) #2:(product_definition_formation-> product<- product_relationship.relating_product product_relationship {product_relationship.name=’alternate part identification’} product_relationship.related_product-> product<- product_definition_formation)

Table 14 - Mapping table for reference_document (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to change_-identification (change_status)	PATH			product_definition_formation action_item=product_definition_formation action_item<- applied_action_assignment.items[i] applied_action_assignment<= action_assignment {action_assignment role_select=action_assignment role_select<- role_association.item_with_role role_association role_association.role->object_role object_role.name='change identification'} action_assignment.assigned_action->action=> {action.description='change identification'} executed_action
item_identification to design_authority (design_activity)	PATH		25	product_definition_formation (person_and_organization_item=product_definition_formation person_and_organization_item<- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment<= person_and_organization_assignment {person_and_organization_assignment.role->person_and_organization_role (person_and_organization_role.name) (person_and_organization_role.name=('id owner')('creator'))}) (organization_item=product_definition_formation organization_item<- applied_organization_assignment.items[i] applied_organization_assignment<= organization_assignment {organization_assignment.role->organization_role (organization_role.name) (organization_role.name=('id owner')('creator'))})

Table 14 - Mapping table for reference_document (continued)

Application element	AIM element	Source	Rules	Reference path
item_identification to drawing_suffix_-number_combination (identifying_number)	PATH			product_defintion_formation product_definition_formation.of_product->product
item_identification to identifier (identifying_number)	PATH			product_definition_formation product_definition_formation.of_product->product product.id
item_identification to item_type (classifications)	PATH			product_definition_formation product_definition_formation.of_product->product<- product_related_product_category.producst[i] product_related_product_category<= product_category
item_identification to label (nomenclature_or_name)	PATH			product_definition_formation product_definition_formation.of_product->product product.name
item_identification to source_-information_type (source_information)	PATH		23	product_definition_formation<- product_definition.formation product_definition characterized_product_definition=product_definition characterized_definition=characterized_product_definition characterized_definition<- property_definition.definition property_definition<- {property_definition.name='source information'} property_definition_representation.definition property_definition_representation property_definition_representation.used_representation->representation
REFERENCE_DOCUMENT_USAGE	document_usage_constraint	41		

Table 14 - Mapping table for reference_document (continued)

Application element	AIM element	Source	Rules	Reference path
reference_document_usage to document_usage_parameter (usage_parameter)	IDENTICAL MAPPING			
reference_document_usage to identifier (usage_code)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element='usage code'}
reference_document_usage to label (location_in_document)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element='location_in_document'}
reference_document_usage to reference_document (document_referenced)	PATH			document_usage_constraint document_usage_constraint.source->& document <- {document document.kind->& document_type document_type.product_data_type='configuration controlled document version'} document_relationship.related_document document_relationship {document_relationship.name='document usage reference'} document_relationship.relating_document->& document<- document_product_association.relating_document document_product_association {document_product_association=>& document_product_equivalence} {document_product_association.name='equivalence'} document_product_association.related_product->& product_or_formation_or_definition product_or_formation_or_definition=product_definition_formation product_definition_formation
reference_document_usage to text (usage_description)	PATH			document_usage_constraint document_usage_constraint.subject_element_value {document_usage_constraint.subject_element='usage description'}

Table 14 - Mapping table for reference_document (concluded)

Application element	AIM element	Source	Rules	Reference path
SPECIFICATION_DOCUMENT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- {product_category.name='reference document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='specification document'}
STANDARD_DOCUMENT	product_definition_formation	41		{product_definition_formation produc_definition_formation.of_product->product<- product_related_product_category.products[i] product_related_product_category<=product_category<- {product_category.name='document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category<- {product_category.name='reference document'} product_category_relationship.category product_category_relationship product_category_relationship.sub_category->product_category product_category.name='standard document'}
TDP_ELEMENT	product_definition_formation	41		

NOTE 2 Application object attribute is not valid for the numbered alternative.

NOTE 3 Application object attribute is not required in the context of the Unit of Functionality.

Rules in the Mapping Table

1) access_file_requires_external_identification
2) approval_requires_approval_date_time
3) approval_requires_approval_person_organization
4) change_identification_restricts_executed_action
5) contract_submission_requires_date_or_date_time
6) contract_submission_requires_destination_organization
7) data_definition_entry_string_restrict_for_superseded_element
8) data_definition_exchange_categorized_as_document
9) data_definition_exchange_restrict_to_one_presentation
10) dependent_instantiable_named_unit
11) distribution_notice_approval_requires_supporting_data
12) document_product_equivalence_existence_rule
13) document_requires_person_organization
14) drawing_suffix_number_combination_identification_constraint
15) exchange_reason_existence_required
16) existence_dependent_drawing_sheet_revision
17) file_format_restricted_to_one_data_definition_entry
18) header_configuration_restricts_property_definition
19) identification_of_sheet_constraint
20) indentured_data_list_identification_constraint
21) indentured_level_tag_identification_constraint
22) indentured_list_method_identification_constraint
23) item_source_information_identification_constraint
24) notation_type_identification_constraint
25) product_requires_person_organization
26) reference_document_requires_subcategorization
27) release_authentication_string_restriction_approval_role
28) release_authentication_string_restriction_company_code
29) release_authentication_string_restriction_date_time_role
30) security_classification_date_string_restriction
31) security_declassification_date_string_restriction
32) simple_list_of_elements_constraint
33) simple_list_of_files_constraint
34) text_literal_alignment_baseline_constraint
35) text_literal_font_requires_externally_defined_text_font

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5.2 AIM EXPRESS short listing

This clause specifies the EXPRESS schema that uses elements from the integrated resources (and the AICs) and contains the types, entity specializations, rules, and functions that are specific to this part of ISO 10303. This clause also specifies modifications to the text for constructs that are imported from the integrated resources (and the AICs). The definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are not imported into the AIM. Requirements stated in the integrated resources that refer to select list items and subtypes apply exclusively to those items that are imported into the AIM.

The following EXPRESS declaration begins the technical_data_packaging and identifies necessary external references.

EXPRESS specification:

```
*)
SCHEMA technical_data_packaging;

USE FROM action_schema                                -- ISO 10303-41
  (action,
   action_method,
   action_relationship,
   action_status,
   executed_action);

USE FROM aic_advanced_brep;                           -- ISO 10303-514

USE FROM aic_csg;                                     -- ISO 10303-515

USE FROM aic_drawing_structure_and_administration     -- ISO 10303-505
  (draughting_approval_assignment,
   draughting_drawing_revision);

USE FROM aic_edge_based_wireframe;                    -- ISO 10303-501

USE FROM aic_elementary_brep;                         -- ISO 10303-513

USE FROM aic_faceted_brep;                            -- ISO 10303-512

USE FROM aic_geometrically_bounded_2d_wireframe;      -- ISO 10303-503

USE FROM aic_geometrically_bounded_surface;           -- ISO 10303-507

USE FROM aic_geometrically_bounded_wireframe;         -- ISO 10303-510

USE FROM aic_manifold_surface;                        -- ISO 10303-509

USE FROM aic_mechanical_design_geometric_presentation;-- ISO 10303-517

USE FROM aic_mechanical_design_shaded_presentation;   -- ISO 10303-518

USE FROM aic_non_manifold_surface;                    -- ISO 10303-508

USE FROM aic_shell_based_wireframe;                   -- ISO 10303-502

USE FROM aic_topologically_bounded_surface;           -- ISO 10303-511
```

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```
USE FROM application_context_schema                    -- ISO 10303-41
  (application_context,
   application_context_relationship,
   application_protocol_definition,
   library_context,
   product_concept_context,
   product_context,
   product_definition_context);

USE FROM approval_schema                               -- ISO 10303-41
  (approval,
   approval_date_time,
   approval_person_organization,
   approval_relationship,
   approval_status);

USE FROM basic_attribute_schema                        -- ISO 10303-41
  (description_attribute,
   id_attribute,
   name_attribute,
   role_association);

USE FROM configuration_management_schema               -- ISO 10303-44
  (configuration_design,
   configuration_effectivity,
   configuration_item);

USE FROM contract_schema                               -- ISO 10303-41
  (contract,
   contract_relationship);

USE FROM date_time_schema                              -- ISO 10303-41
  (calendar_date,
   date_and_time,
   date_time_select);

USE FROM document_schema                               -- ISO 10303-41
  (document,
   document_product_association,
   document_relationship,
   document_representation_type,
   document_type,
   document_usage_constraint,
   product_or_formation_or_definition);

USE FROM draughting_element_schema                     -- ISO 10303-101
  (draughting_callout);

USE FROM drawing_definition_schema                     -- ISO 10303-101
  (draughting_title,
   drawing_revision,
   drawing_sheet_revision);

USE FROM effectivity_schema                            -- ISO 10303-41
  (dated_effectivity,
   effectivity_relationship,
   lot_effectivity,
   serial_numbered_effectivity);
```

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```
USE FROM external_reference_schema                    -- ISO 10303-41
  (externally_defined_item,
   message);

REFERENCE FROM geometry_schema                        -- ISO 10303-42
   (dummy_gri);

USE FROM geometry_schema                              -- ISO 10303-42
   (geometric_representation_item,
   placement,
   surface_curve);

USE FROM group_schema                                 -- ISO 10303-41
  (group,
   group_relationship);

USE FROM management_resources_schema                  -- ISO 10303-41
  (action_assignment,
   approval_assignment,
   classification_assignment,
   contract_assignment,
   date_and_time_assignment,
   date_assignment,
   document_reference,
   document_usage_constraint_assignment,
   effectivity_assignment,
   effectivity_context_assignment,
   external_identification_assignment,
   group_assignment,
   identification_assignment,
   identification_assignment_relationship,
   organization_assignment,
   organizational_project_assignment,
   person_and_organization_assignment,
   security_classification_assignment);

USE FROM material_property_definition_schema          -- ISO 10303-45
  (material_designation,
   property_definition_relationship);

USE FROM measure_schema                               -- ISO 10303-41
  (amount_of_substance_measure,
   amount_of_substance_measure_with_unit,
   amount_of_substance_unit,
   area_measure,
   area_measure_with_unit,
   area_unit,
   context_dependent_measure,
   context_dependent_unit,
   conversion_based_unit,
   count_measure,
   derived_unit,
   descriptive_measure,
   electric_current_measure,
   electric_current_measure_with_unit,
   electric_current_unit,
   global_unit_assigned_context,
   length_measure,
   length_measure_with_unit,
```

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```
   length_unit,
   luminous_intensity_measure,
   luminous_intensity_measure_with_unit,
   luminous_intensity_unit,
   mass_measure,
   mass_measure_with_unit,
   mass_unit,
   measure_value,
   measure_with_unit,
   named_unit,
   numeric_measure,
   parameter_value,
   plane_angle_measure,
   plane_angle_measure_with_unit,
   plane_angle_unit,
   positive_length_measure,
   positive_plane_angle_measure,
   positive_ratio_measure,
   ratio_measure,
   ratio_measure_with_unit,
   ratio_unit,
   si_unit,
   solid_angle_measure,
   solid_angle_measure_with_unit,
   solid_angle_unit,
   thermodynamic_temperature_measure,
   thermodynamic_temperature_measure_with_unit,
   thermodynamic_temperature_unit,
   time_measure,
   time_measure_with_unit,
   time_unit,
   volume_measure,
   volume_measure_with_unit,
   volume_unit);

USE FROM method_definition_schema                    -- ISO 10303-49
   (action_method_with_associated_documents);

USE FROM person_organization_schema                  -- ISO 10303-41
   (address,
   organization,
   organization_relationship,
   organizational_address,
   organizational_project,
   organizational_project_relationship,
   person,
   person_and_organization,
   person_organization_select,
   personal_address);

USE FROM presentation_appearance_schema              -- ISO 10303-46
   (character_glyph_style_outline,
   character_glyph_style_stroke,
   externally_defined_style,
   styled_item,
   text_style,
   text_style_for_defined_font);
```

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```
USE FROM presentation_definition_schema                -- ISO 10303-46
  (annotation_occurrence,
   annotation_curve_occurrence,
   annotation_point_occurrence,
   annotation_text,
   annotation_text_character,
   annotation_text_occurrence,
   composite_text,
   defined_character_glyph,
   externally_defined_character_glyph,
   externally_defined_symbol,
   pre_defined_character_glyph,
   text_literal,
   text_string_representation);

USE FROM presentation_organization_schema              -- ISO 10303-46
  (area_dependent_annotation_representation,
   camera_model,
   camera_usage,
   presentation_area,
   presentation_representation,
   presentation_representation_select,
   presentation_set,
   presented_item,
   presented_item_representation);

USE FROM presentation_resource_schema                  -- ISO 10303-46
  (character_glyph_symbol,
   externally_defined_text_font,
   pre_defined_text_font);

USE FROM process_property_schema                       -- ISO 10303-49
  (action_property,
   product_definition_process,
   process_product_association);

USE FROM process_property_representation_schema        -- ISO 10303-49
  (action_property_representation);

USE FROM product_concept_schema                        -- ISO 10303-44
  (product_concept);

USE FROM product_definition_schema                     -- ISO 10303-41
  (product,
   product_category,
   product_category_relationship,
   product_definition,
   product_definition_context_association,
   product_definition_effectivity,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_formation_with_specified_source,
   product_definition_relationship,
   product_definition_substitute,
   product_definition_with_associated_documents,
   product_related_product_category,
   product_relationship);
```

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```
USE FROM product_property_definition_schema           -- ISO 10303-41
  (characterized_object,
   characterized_product_definition,
   product_definition_shape,
   property_definition,
   shape_aspect,
   shape_aspect_relationship,
   shape_definition);

USE FROM product_property_representation_schema       -- ISO 10303-41
  (item_identified_representation_usage,
   property_definition_representation,
   shape_representation);

USE FROM product_structure_schema                     -- ISO 10303-44
  (alternate_product_relationship,
   assembly_component_usage,
   assembly_component_usage_substitute,
   assembly_component_usage_substitute_with_ranking,
   make_from_usage_option,
   next_assembly_usage_occurrence,
   product_definition_occurrence_relationship,
   promissory_usage_occurrence,
   quantified_assembly_component_usage,
   specified_higher_usage_occurrence);

USE FROM qualified_measure_schema                     -- ISO 10303-45
  (descriptive_representation_item,
   measure_qualification,
   measure_representation_item,
   precision_qualifier,
   qualified_representation_item,
   type_qualifier,
   value_qualifier);

USE FROM representation_schema                        -- ISO 10303-43
  (compound_representation_item,
   compound_item_definition,
   item_defined_transformation,
   list_representation_item,
   mapped_item,
   representation,
   representation_context,
   representation_item,
   representation_item_relationship,
   representation_map,
   representation_relationship);

USE FROM security_classification_schema               -- ISO 10303-41
  (security_classification,
   security_classification_level);

REFERENCE FROM support_resource_schema                -- ISO 10303-41
   (label);

REFERENCE FROM topology_schema                        -- ISO 10303-42
  (dummy_tri);
(*
```

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NOTE - The schemas referenced above can be found in the following parts of ISO 10303:

action_schema	ISO 10303-41
aic_advanced_brep	ISO 10303-514
aic_csg	ISO 10303-515
aic_drawing_structure_and_administration	ISO 10303-505
aic_edge_based_wireframe	ISO 10303-501
aic_elementary_brep	ISO 10303-513
aic_faceted_brep	ISO 10303-512
aic_geometrically_bounded_2d_wireframe	ISO 10303-503
aic_geometrically_bounded_surface	ISO 10303-507
aic_geometrically_bounded_wireframe	ISO 10303-510
aic_manifold_surface	ISO 10303-509
aic_mechanical_design_geometric_presentation	ISO 10303-517
aic_mechanical_design_shaded_presentation	ISO 10303-518
aic_non_manifold_surface	ISO 10303-508
aic_shell_based_wireframe	ISO 10303-502
aic_topologically_bounded_surface	ISO 10303-511
application_context_schema	ISO 10303-41
approval_schema	ISO 10303-41
configuration_management_schema	ISO 10303-44
contract_schema	ISO 10303-41
date_time_schema	ISO 10303-41
document_schema	ISO 10303-41
drawing_definition_schema	ISO 10303-101
effectivity_schema	ISO 10303-41
external_reference_schema	ISO 10303-41
geometry_schema	ISO 10303-42
group_schema	ISO 10303-41
management_resources_schema	ISO 10303-41
material_property_definition_schema	ISO 10303-45
measure_schema	ISO 10303-41
method_definition_schema	ISO 10303-49
person_organization_schema	ISO 10303-41
presentation_appearance_schema	ISO 10303-46
presentation_definition_schema	ISO 10303-46
presentation_organization_schema	ISO 10303-46
presentation_resource_schema	ISO 10303-46
process_property_schema	ISO 10303-49
process_property_representation_schema	ISO 10303-49
product_concept_schema	ISO 10303-44
product_definition_schema	ISO 10303-41
product_property_definition_schema	ISO 10303-41
product_property_representation_schema	ISO 10303-41
product_structure_schema	ISO 10303-44
qualified_measure_schema	ISO 10303-45
representation_schema	ISO 10303-43
security_classification_schema	ISO 10303-41

5.2.1 Fundamental concepts and assumptions

This subclause describes the fundamental concepts and assumptions related to the data structure within this part of ISO 10303. The fundamental concepts and assumptions will be put in the perspective of a collection of generic functional modules to facilitate comprehension of the subject matter. These modules will then be grouped together to form Units of Functionality. Conformance Classes within this part of ISO 10303

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typically follow the identified Units of Functionality. Detail descriptions of capabilities for conformance classes 1 through 7 are located in Annex K of this part of 10303.

The following is a matching of Conformance Classes with Units of Functionality.

Conformance Class	**Units of Functionality**
1 - Data Definition Exchange for files	Common, Data Definition Exchange
2 - Data Definition Exchange for TDP elements	Common, Data Definition Exchange
3 - Data Definition Exchange for indentured methods	Common, Data Definition Exchange
4 - Parts List	Common, Parts List
5 - Data List	Common, Data List
6 - Indentured Data List	Common, Indentured Data List
7 - Index List	Common, Index List
8 - Other list	Common, Other list
9 - List with presentation	Common, Presentation (DDE, PL, DL, IDL, IL, OL)
10 - Reference document identification and drawing	Common, Reference Document and identification Drawing Identification
11 - Reference document identification and drawing w/ ISO 10303-201 and ISO 10303-202	Common, Reference Document and identification Drawing Identification w/ ISO 10303-201 and ISO 10303-202
12 - Product Data Set without presentation format	Common, Product Data Set
13 - Product Data Set with Shading	Common, Product Data Set
14 - Product Data Set with presentation format	Common, Product Data Set

First, the concept of how product structure and document structure can co-exist will be discussed. Then assumptions and concept of each conformance class will be examined.

5.2.1.1 Product structure and document structure interaction

ISO 10303 is founded on the basis of sharing/exchanging product model data. This part of ISO 10303 is focused on grouping the product data per the product (e.g., part or assembly) that is defined. This grouping provides the means for configuration control of the product data from a product structure view point. There are many systems and applications that group and configuration control product data through a non product structure view, which this part of ISO 10303 calls a document view. A document may contain product data for one or more products. This part of ISO 10303 will provide the structure that will allow documents to be identified and configuration controlled in the context of a product structure view point, plus provide the structure so that the contents of a particular set of documents can coexist in a ISO 10303 architecture. These documents include parts list, data list, index list, indentured data list, other lists, and product data sets.

A fundamental concept to this part of ISO 10303 is that the data needed to support configuration control of both documents and products concurrently will be captured. Configuration control will be done for both documents and products through **product**, **product_definition_formation**, **product_definition**, **product_-definition_relationship**, **property_definition**, and the management resource constructs in ISO 10303-41. The way to distinguish a part from a document will be done through the **product_category**. For

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documents, there shall exist a **product_category.name** equal to ‘document’. For parts, there shall NOT be an associated **product_category.name** equal to ‘document’.

The versioning of a document will be satisfied by instancing a group of related entities. The entities consist of :

product_category.name =’document’
product
product_definition_formation
document_product_equivalence
document
document_type.product_data_type =’configuration controlled document version’

The **product** and **product_definition_formation** entities provide the versioning capability. The **document_product_equivalence** entity establishes the equivalence between the following:

— **document** entity and the **product_definition_formation**,

— **document** entity and the **product** entity,

— **document** entity and the **product_definition** entity.

The **document** entity provides the links to the document specific functionality like **document_usage_-constraint** and **document_reference**.

These specializations and constraints are used for consistent mapping of documents.

Document_product_equivalence is a new entity is created in this part of ISO 10303. This new entity will establish that an instance of a **product**, **product_definition_formation** or a **product_definition** entity that is equivalent to a **document** entity. The new entity will be called "**document_product_equivalence**" and is a subtype of **document_product_association**. The attribute **document_product_equivalence.name** will be constrained to the value of ‘equivalence’. Also the value of the attribute **document_-type.product_data_type** will be constrained to ‘configuration controlled document’ or configuration controlled document version or ‘configuration controlled document definition’ based on whether **document_product_equivalence.related_product** reference **product**, **product_definition_formation** or **product_definition**. These constraints are captured as WHERE rules in the definition of **document_-product_equivalence** (see 5.2.3.1.23)

Interrelationships among products and documents is another fundamental concept that this part of ISO 10303 supports. **Product_definition_relationship**, and **document_reference** will provide the basic product/document relationships. The **product_definition_relationship** will provide a relationship that may put a document or a part in a subordinate view to each other based on which **product_definition** is related through the attribute **product_definition_relationship.related_product_definition**. The **document_-reference** primarily puts the document in a subordinate view to the related part when the **document_-product_equivalence** path is to a **product_definition_formation**. The **document_reference** is also used as a listing mechanism when the **document_product_equivalence** path is to a **product_definition**.

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The string value of the attribute **document_reference_role.name** is the key to the meaning of many relationships associated with document. These string values are denoted in the mapping tables (see 5.1), and the application interpreted model rules (see 5.2.4).

The use of **property_definition** to collect document configuration data is a notable fundamental concept. **Property_definition** plays the role here in the context of a document header information. The attribute **property_definition.name** will contain a string value with the characters 'header' somewhere inside. Each **property_definition** used in this document context will have it's name attribute defined explicitly in the mapping tables (see 5.1), and the application interpreted model rules (see 5.2.4).

Uniquely specifying a document with the use of **product_category** will provide the key to interpreting the context and mappings of certain documents. The attribute **product_category.name** string types will be uniquely denoted in the mapping table (see 5.1), and the application interpreted model rules (see 5.2.4).

5.2.1.2 Data Definition Exchange assumptions

The concept of facilitating a configuration controlled exchange among Product Data Management (PDM) systems is captured in the Data Definition Exchange Unit of Functionality / Conformance Class.

Definition of a Data Definition Exchange is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that document, with the attribute **product_category.name** equal to 'data definition exchange'.

Unique instances of **product_definition_formation** signify content changes within a document. This is done by using **product_definition_formation.id** to identify the unique version based on contents changes and additional information consisting of document revision, change, issue, and sequence identification and their respective dates captured through **executed_action**s.

A unique instance of **product_definition** may signify different external (outside of ISO 10303) representations of a document version. When this is the case, an instance of **product_definition_with_-associated_documents** which is a subtype of **product_definition** is used to identify the unique external representation of the document. A document version (**product_definition_formation**) may have zero, one or many document representations (**product_definition**) associated to itself. Each **product_definition_-with_associated_documents** instance for a document will act as the collector for a set of files (**document_files**) that contain the content or presentation of a particular version of a document. A **product_definition_with_associated_documents** may have one or more files (**document_file**) associated to itself.

An external file is captured through the entity **document_file**. **Document_file** is a subtype of **document** and **characterized_object**. With a file being a subtype of **characterized_object**, properties can be associated through the use of **property_definition**. The format of a file is captured through an instance of **representation**. Files (**document_file**) can also be associated to a part (**product**) through the use of a **product_definition_with_associated_documents**, **applied_document_reference**, or **property_-definition** for a part's shape.

The concept of interrelating products and documents is a major function of the Data Definition Exchange capability. The entity **applied_document_reference** with the select type **document_reference_item** and associated **object_role.name** equal to 'indentured by document' or 'indentured by item' or 'indentured by

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item and document' provide the basic mechanism for identifying the group of relationships among documents and products. The associated **object_role.name** provides the type of relationships that may be present in the group. These relationships are of four different types. They are the **product_definition_-relationship**, **product_definition_with_associated_documents**, **applied_document_reference**, and **product_definition_formation_relationship**.

5.2.1.3 Parts List

Definition of a Parts List is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_-category.name** equal to 'parts list'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated . A **document_product_equivalence** instance is created referencing the **product_definition_formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_-type.product_data_type** equal to 'configuration controlled document version'.

5.2.1.4 Data List

Definition of a Data List is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_-category.name** equal to 'data list'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated. A **document_product_equivalence** instance is created referencing the **product_definition_formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_-type.product_data_type** equal to 'configuration controlled document version'.

5.2.1.5 Indentured Data List

Definition of an Indentured Data List is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_category.name** equal to 'indentured data list'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated.. A **document_product_equivalence** instance is created referencing the **product_definition_-formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_type.product_data_type** equal to 'configuration controlled document version'.

5.2.1.6 Index List

Definition of a Index List is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_-category.name** equal to 'index list'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated. A **document_product_equivalence** instance is created referencing the **product_definition_formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_-type.product_data_type** equal to 'configuration controlled document version'.

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5.2.1.7 Drawing

Definition of a Drawing is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_-category.name** equal to 'drawing'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated. A **document_product_equivalence** instance is created referencing the **product_definition_formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_-type.product_data_type** equal to 'configuration controlled document version'.

5.2.1.8 Product Data Set

Definition of a Product Data Set is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_-category.name** equal to 'product data set'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated. A **document_product_equivalence** instance is created referencing the **product_definition_formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_-type.product_data_type** equal to 'configuration controlled document version'.

5.2.1.9 Reference Document

Definition of a Reference Document is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_category.name** equal to 'reference document'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated. A **document_product_equivalence** instance is created referencing the **product_definition_-formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_type.product_data_type** equal to 'configuration controlled document version'.

5.2.1.10 Other List

Definition of an Other List is through identification of a **product_definition_formation**, a **product** for that **product_definition_formation**, a **product_category** for that **product**, with an attribute **product_-category.name** equal to 'other list'. An equivalent instance of the **document** entity is needed if an **applied_document_reference** or **applied_document_usage_constraint** is to be instantiated. A **document_product_equivalence** instance is created referencing the **product_definition_formation** and **document** instance. The **document** instance references a **document_type** with the attribute **document_-type.product_data_type** equal to 'configuration controlled document version'.

5.2.1.11 List Presentation

Definition of a List Presentation is through identification of a **presentation_set** with a **presented_item** identifying the document it is presenting.

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5.2.2 Technical_data_packaging types

5.2.2.1 Technical_data_packaging constant and type definitions

5.2.2.1.1 approval_item

An **approval_item** specifies an **action**, **applied_effectivity_assignment**, **configuration_effectivity**, **configuration_item, contract, document_file**, **product_definition, property_definition**, or **product_-definition_formation** which an **approval** may be assigned.

EXPRESS specification:

```
*)
TYPE approval_item = SELECT
  (action,
   applied_effectivity_assignment,
   configuration_effectivity,
   configuration_item,
   contract,
   document_file,
   product_definition,
   property_definition,
   product_definition_formation);
END_TYPE;
(*
```

5.2.2.1.2 action_item

An **action_item** specifies a **document_file**, **product_definition**, **product_definition_with_associated_-documents**, **product_definition_formation**, **product_definition_relationship**, **property_definition**, or **representation** which an **executed_action** may be assigned.

EXPRESS specification:

```
*)
TYPE action_item = SELECT
  (document_file,
   product_definition,
   product_definition_with_associated_documents,
   product_definition_relationship,
   product_definition_formation,
   property_definition,
   representation);
END_TYPE;
(*
```

5.2.2.1.3 classification_item

A **classification_item** specifies a **action_status**, **approval**, or **descriptive_representation_item** which a **class or class_system** may be assigned.

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EXPRESS specification:

```
*)
TYPE classification_item = SELECT
  (action_status,
   approval,
   descriptive_representation_item);
END_TYPE;
(*
```

5.2.2.1.4 contract_item

A **contract_item** specifies a **executed_action**, **product_definition**, **product_definition_formation**, **product_definition_with_associated_documents**, or **property_definition** which a **contract** may be assigned.

EXPRESS specification:

```
*)
TYPE contract_item = SELECT
  (executed_action,
   product_definition,
   product_definition_formation,
   product_definition_with_associated_documents,
   property_definition);
END_TYPE;
(*
```

5.2.2.1.5 date_and_time_item

A **date_and_time_item** specifies an **applied_security_classification_assignment, applied_contract_-assignment**, **executed_action**, **product_definition**, or **product_definition_formation** which a **date_and_-time** may be assigned.

EXPRESS specification:

```
*)
TYPE date_and_time_item = SELECT
  (applied_contract_assignment,
   applied_security_classification_assignment,
   executed_action,
   product_definition,
   product_definition_formation);
END_TYPE;
(*
```

5.2.2.1.6 date_item

A **date_item** specifies an **applied_contract_assignment**, **applied_security_classification_assignment**, **executed_action**, **product_definition** or **product_definition_formation** which a **date** may be assigned.

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EXPRESS specification:

```
*)
TYPE date_item = SELECT
  (applied_contract_assignment,
   applied_security_classification_assignment,
   executed_action,
   product_definition,
   product_definition_formation);
END_TYPE;
(*
```

5.2.2.1.7 document_reference_item

A **document_reference_item** specifies an **alternate_product_relationship**, **applied_document_-reference**, **assembly_component_usage_substitute_with_ranking, descriptive_representation_item, document_file**, **executed_action**, **externally_defined_symbol_and_placement**, **make_from_usage_-option**, **make_from_usage_option_with_reference_designator**, **next_assembly_usage_occurrence**, **product**, **product_definition**, **product_definition_formation**, **product_definition_formation_-relationship**, **product_definition_occurrence_relationship**, **product_definition_relationship**, **product_-definition_with_associated_documents**, **promissory_usage_occurrence**, **property_definition**, **quantified_assembly_component_usage**, **shape_aspect**, **shape_aspect_relationship**, or **specified_-higher_usage_occurrence** which a **document** may be assigned.

EXPRESS specification:

```
*)
TYPE document_reference_item = SELECT
  (alternate_product_relationship,
   applied_document_reference,
   assembly_component_usage_substitute_with_ranking,
   descriptive_representation_item,
   document_file,
   executed_action,
   externally_defined_symbol_and_placement,
   make_from_usage_option,
   make_from_usage_option_with_reference_designator,
   next_assembly_usage_occurrence,
   product,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_occurrence_relationship,
   product_definition_relationship,
   product_definition_with_associated_documents,
   promissory_usage_occurrence,
   property_definition,
   quantified_assembly_component_usage,
   shape_aspect,
   shape_aspect_relationship,
   specified_higher_usage_occurrence);
END_TYPE;
(*
```

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5.2.2.1.8 document_usage_constraint_item

A **document_usage_constraint_item** specifies a **alternate_product_relationship**, **applied_document_-reference**, **assembly_component_usage_substitute_with_ranking**, **document_file**, **executed_action**, **externally_defined_symbol_and_placement**, **make_from_usage_option**, **make_from_usage_option_-with_reference_designator**, **next_assembly_usage_occurrence**, **product**, **product_definition**, **product_-definition_formation**, **product_definition_formation_relationship**, **product_definition_occurrence_-relationship**, **product_definition_relationship**, **product_definition_with_associated_documents**, **promissory_usage_occurrence**, **property_definition**, **quantified_assembly_component_usage**, **shape_-aspect**, **shape_aspect_relationship**, or **specified_higher_usage_occurrence** which a **document_usage_-constraint** may be assigned.

EXPRESS specification:

```
*)
TYPE document_usage_constraint_item = SELECT
  (alternate_product_relationship,
   applied_document_reference,
   assembly_component_usage_substitute_with_ranking,
   document_file,
   executed_action,
   externally_defined_symbol_and_placement,
   make_from_usage_option,
   make_from_usage_option_with_reference_designator,
   next_assembly_usage_occurrence,
   product,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_occurrence_relationship,
   product_definition_relationship,
   product_definition_with_associated_documents,
   promissory_usage_occurrence,
   property_definition,
   quantified_assembly_component_usage,
   shape_aspect,
   shape_aspect_relationship,
   specified_higher_usage_occurrence );
END_TYPE;
(*
```

5.2.2.1.9 effectivity_context_item

A **effectivity_context_item** specifies an **organization** or **product_definition_formation** that provides the **context** to an **effectivity_assignment.**

EXPRESS specification:

```
*)
TYPE effectivity_context_item  = SELECT
  (organization,
   product_definition_formation);
END_TYPE;
(*
```

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5.2.2.1.10 effectivity_item

A **effectivity_item** specifies a **product_definition**, **product_definition_formation**, or **product_-definition_relationship** which an **effectivity** is being placed upon.

EXPRESS specification:

```
*)
TYPE effectivity_item  = SELECT
  (product_definition,
   product_definition_formation,
   product_definition_relationship);
END_TYPE;
(*
```

5.2.2.1.11 external_identification_item

An **external_identification_item** specifies an additional identification to a File or location of product representation. The identification is external to this part of ISO 10303.

EXPRESS specification:

```
*)
TYPE external_identification_item  = SELECT
  (document_file,
   product_definition,
   product_definition_with_associated_documents);
END_TYPE;
(*
```

5.2.2.1.12 group_item

A **group_item** specifies an **action_status**, **approval**, or **descriptive_representation_item** which a **group** or the subtype of a **group** may be assigned.

EXPRESS specification:

```
*)
TYPE group_item  = SELECT
  (action_status,
   approval,
   descriptive_representation_item);
END_TYPE;
(*
```

5.2.2.1.13 identification_item

A **identification_item** specifies a **document_file** or **organization**, **application_context**, **document**, **product, product_definition**, or **security_classification_level** that an identifying string is assigned.

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NOTE The identifying string may be a version identification for a **document_file**. The identifying string may be a company code for an **organization**.

EXPRESS specification:

```
*)
TYPE identification_item  = SELECT
  (application_context,
   document,
   document_file,
   organization,
   product,
   product_definition,
   security_classification_level);
END_TYPE;
(*
```

5.2.2.1.14 language_item

A **language_item** specifies a **document_file, product, product_definition**, or **product_definition_-formation** that an identifying string is assigned

EXPRESS specification:

```
*)
TYPE language_item = SELECT
   (product,
    product_definition,
    product_definition_formation,
    document_file);
END_TYPE;
(*
```

5.2.2.1.15 organization_item

An **organization_item** specifies an **action**, **applied_action_assignment**, **applied_contract_assignment**, **applied_identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_-definition**, or **product_definition_formation** which an **organization** may be assigned.

EXPRESS specification:

```
*)
TYPE organization_item = SELECT
  (action,
   applied_action_assignment,
   applied_contract_assignment,
   applied_identification_assignment,
   configuration_item,
   contract,
   document_file,
   product,
   product_definition,
```

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```
   product_definition_formation);
END_TYPE;
(*
```

5.2.2.1.16 organizational_project_item

An **organizational_project_item** specifies an **action, applied_action_assignment, applied_contract_-assignment, applied_identification_assignment, configuration_item, contract, document_file, product, product_definition, or product_definition_formation** which an **organizational_project** may be assigned.

EXPRESS Specification:

```
*)
TYPE organizational_project_item = SELECT
   (action,
    applied_action_assignment,
    applied_contract_assignment,
    applied_identification_assignment,
    configuration_item,
    contract,
    document_file,
    product,
    product_definition,
    product_definition_formation);
END_TYPE;
(*
```

5.2.2.1.17 person_and_organization_item

A **person_and_organization_item** specifies an **action**, **applied_action_assignment**, **applied_contract_-assignment**, **applied_identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_definition**, or **product_definition_formation** which a **person_and_organization** may be assigned.

NOTE A **product_definition_formation** may be either a version of a part or a version of a document to which a person and organization may be assigned.

EXPRESS specification:

```
*)
TYPE person_and_organization_item = SELECT
  (action,
   applied_action_assignment,
   applied_contract_assignment,
   applied_identification_assignment,
   configuration_item,
   contract,
   document_file,
   product,
   product_definition,
   product_definition_formation);
END_TYPE;
(*
```

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5.2.2.1.18 presented_item_item

A **presented_item_item** specifies the version of a document which a **presented_item** may be assigned.

EXPRESS specification:

```
*)
TYPE presented_item_item = SELECT
  (product_definition_formation);
END_TYPE;
(*
```

5.2.2.1.19 security_classification_item

A **security_classification_item** specifies an **assembly_component_usage**, **document_file**, **product_-definition**, **product_definition_formation**, or **property_definition** which a **security_classification** may be assigned.

EXPRESS specification:

```
*)
TYPE security_classification_item  = SELECT
  (assembly_component_usage,
   document_file,
   product_definition,
   property_definition,
   product_definition_formation);
END_TYPE;
(*
```

5.2.3 Technical_data_packaging entities

5.2.3.1 Technical_data_packaging entity definitions

5.2.3.1.1 applied_action_assignment

An **applied_action_assignment** is a type of **action_assignment** that identifies the action taken against a document or product. The action is related to either the version or the status of the document or product. The document or product is in a list that identifies the **document** or **product** by the revision, change, and issue.

EXPRESS specification:

```
*)
ENTITY applied_action_assignment
  SUBTYPE OF (action_assignment);
  items : SET [1:?] OF action_item;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **action_item**s which identifies the **document_file**, **product_definition, product_-definition_with_associated_documents**, **product_definition_relationship**, **product_definition_-formation**, **property_definition**, or **representation** that the **applied_action_assignment** applies.

5.2.3.1.2 applied_approval_assignment

An **applied_approval_assignment** is a type of **action_assignment** that specifies an **approval** for an **action**, **applied_effectivity_assignment**, **configuration_effectivity**, **configuration_item, contract, document_file**, **product_definition, property_definition**, or **product_definition_formation**.

EXPRESS specification:

```
*)
ENTITY applied_approval_assignment
  SUBTYPE OF (approval_assignment);
  items : SET [1:?] OF approval_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **approval_item**s that identify the particular product data that the **approval** applies.

5.2.3.1.3 applied_classification_assignment

An **applied_classification_assignment** is a type of **classification_assignment** that assigns a **class** or **class_system** to a particular piece of product data .

EXPRESS specification:

```
*)
ENTITY applied_classification_assignment
  SUBTYPE OF (classification_assignment);
  items : SET [1:?] OF classification_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **classification_item**s that identify the particular **action_status**, **approval**, or **descriptive_-representation_item** that the **class** or **class_system** applies.

5.2.3.1.4 applied_contract_assignment

An **applied_contract_assignment** is a type of **contract_assignment** that assigns a **contract** to a particular piece of product data .

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EXPRESS specification:

```
*)
ENTITY applied_contract_assignment
  SUBTYPE OF (contract_assignment);
  items : SET [1:?] OF contract_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **contract_item**s that identify the particular **executed_action**, **product_definition**, **product_definition_formation**, **product_definition_with_associated_documents**, or **property_definition** that the **contract** applies.

5.2.3.1.5 applied_date_and_time_assignment

An **applied_date_and_time_assignment** is a type of **date_and_time_assignment** that specifies the **date_-and_time** for a **applied_contract_assignment**, **applied_security_classification_assignment**, **executed_-action**, **product_definition**, or **product_definition_formation**.

EXPRESS specification:

```
*)
ENTITY applied_date_and_time_assignment
  SUBTYPE OF (date_and_time_assignment);
  items : SET [1:?] OF date_and_time_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **date_and_time_item**s that identify the particular **applied_contract_assignment**, **applied_security_classification_assignment**, **executed_action product_definition**, or **product_-definition_formation** that the **date_and_time** applies.

5.2.3.1.6 applied_date_assignment

An **applied_date_assignment** is a type of **date_assignment** that specifies the **date** for an **applied_-contract_assignment**, **applied_security_classification_assignment**, **executed_action**, **product_-definition**, or **product_definition_formation**.

EXPRESS specification:

```
*)
ENTITY applied_date_assignment
  SUBTYPE OF (date_assignment);
  items : SET [1:?] OF date_item;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **date_item**s that identify the particular **applied_contract_assignment**, **applied_security_-classification_assignment**, **executed_action**, **product_definition** or **product_definition_formation** that the **date** applies.

5.2.3.1.7 applied_document_reference

An **applied_document_reference** is a type of **document_reference** that specifies the relationship between a **document** and a particular piece of product data.

An **applied_document_reference** assigns a **product_definition_with_associated_documents**, **product_-definition_formation_relationship**, **product_definition_relationship**, or **applied_document_reference** as a member of a collection of parent/child relationship among parts and parts, documents and documents, parts and documents, and documents and parts. An **applied_document_reference** may assign a **product_-definition_formation** as a member of a collection of documents. An **applied_document_reference** may assign a **document_file** as a member of a collection of electronic data files.

NOTE 1 The **applied_document_reference** with the **document_reference_item** provides the structure to relate products and documents together from multiple contexts.

NOTE 2 An **applied_document_reference** will be used in both a Data Definition Exchange capability and a Indentured Data List capability.

NOTE 3 The **document_role** that is associated with the **applied_document_reference** specifies the context of the relationship the **applied_document_reference** establishes.

EXPRESS specification:

```
*)
ENTITY applied_document_reference
  SUBTYPE OF (document_reference);
  items : SET [1:?] OF document_reference_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **document_reference_item**s that identify the particular **alternate_product_relationship**, **applied_document_reference**, **assembly_component_usage_substitute_with_ranking**, **descriptive_-representation_item**, **document_file**, **executed_action**, **externally_defined_symbol_and_placement**, **make_from_usage_option**, **make_from_usage_option_with_reference_designator**, **next_assembly_-usage_occurence**, **product**, **product_definition**, **product_definition_formation**, **product_definition_-formation_relationship**, **product_definition_occurrence_relationship, product_definition_relationship**, **product_definition_with_associated_documents**, **promissory_usage_occurrence, property_definition**, **quantified_assembly_component_usage**, **shape_aspect**, **shape_aspect_relationship**, or **specified_-higher_usage_occurrence** that the **document_reference** applies.

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5.2.3.1.8 applied_document_usage_constraint_assignment

An **applied_document_usage_constraint** is a type of **document_usage_constraint** that specifies the relationship between a **document** and a particular piece of product data. Within the relationship there is a constraint identified on the used of the document.

NOTE The **document_usage_constraint_role** that is associated with the **applied_document_usage_-constraint** specifies the context of the relationship the **applied_document_usage_constraint** establishes.

EXPRESS specification:

```
*)
ENTITY applied_document_usage_constraint_assignment
  SUBTYPE OF (document_usage_constraint_assignment);
  items : SET [1:?] OF document_usage_constraint_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **document_usage_constraint_item**s that identify the particular **alternate_product_-relationship**, **applied_document_reference**, **assembly_component_usage_substitute_with_ranking**, **document_file**, **executed_action**, **externally_defined_symbol_and_placement**, **make_from_usage_-option**, **make_from_usage_option_with_reference_designator**, **next_assembly_usage_occurence**, **product**, **product_definition**, **product_definition_formation**, **product_definition_formation_-relationship**, **product_definition_occurrence_relationship, product_definition_relationship**, **product_-definition_with_associated_documents**, **promissory_usage_occurrence, property_definition**, **quantified_assembly_component_usage**, **shape_aspect**, **shape_aspect_relationship**, or **specified_-higher_usage_occurrence** that the **document_usage_constraint** applies.

5.2.3.1.9 applied_effectivity_assignment

An **applied_effectivity_assignment** is a type of **effectivity_assignment** that specifies the relationship between an **effectivity** and a particular piece of product data.

EXPRESS specification:

```
*)
ENTITY applied_effectivity_assignment
  SUBTYPE OF (effectivity_assignment);
  items : SET [1:?] OF effectivity_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **effectivity_item**s that identify the particular **product_definition**, **product_definition_-formation**, or **product_definition_relationship** that the **effectivity** applies.

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5.2.3.1.10 applied_effectivity_context_assignment

An **applied_effectivity_context_assignment** is a type of **effectivity_context_assignment** that specifies the relationship between a **applied_effectivity_assignment** and a particular piece of product data defining the context of the **applied_effectivity_assignment**.

EXPRESS specification:

```
*)
ENTITY applied_effectivity_context_assignment
  SUBTYPE OF (effectivity_context_assignment);
  items : SET [1:?] OF effectivity_context_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **effectivity_context_item**s that identify the particular **organization** or **product_-definition_formation** that the **effectivity_context** applies.

5.2.3.1.11 applied_external_identification_assignment

An **applied_external_identification_assignment** is a type of **external_identification_assignment** that specifies the identification of a particular piece of product data at an **external_source**.

EXPRESS specification:

```
*)
ENTITY applied_external_identification_assignment
  SUBTYPE OF (external_identification_assignment);
  items : SET [1:?] OF external_identification_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **external_identification_item**s that identify the particular **document_file**, **product_-definition,** or **product_definition_with_associated_documents** that the **external_identification** applies.

5.2.3.1.12 applied_group_assignment

An **applied_group_assignment** is a type of **group_assignment** that specifies the relationship between a **group** and a particular piece of product data.

NOTE The **group_role** that is associated with the **applied_group_assignment** specifies the context of the relationship the **applied_group_assignment** establishes.

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EXPRESS specification:

```
*)
ENTITY applied_group_assignment
  SUBTYPE OF (group_assignment);
  items : SET [1:?] OF group_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **group_item**s that identify the particular **action_status**, **approval**, or **descriptive_-representation_item** that the **group** applies.

5.2.3.1.13 applied_identification_assignment

An **applied_identification_assignment** is a type of **identification_assignment** that specifies the relationship between an **identification_assignment** and a particular piece of product data.

NOTE An **applied_identification_assignment** specifies the version of a **document_file** and the company code for an **organization**.

EXPRESS specification:

```
*)
ENTITY applied_identification_assignment
  SUBTYPE OF (identification_assignment);
  items : SET [1:?] OF identification_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **idenfication_item**s that identify the particular **application_context**, **document**, **document_file**, or **organization**, **product**, **product_definition**, or **security_classification_level** that the **identifier** applies.

5.2.3.1.14 applied_organization_assignment

An **applied_organization_assignment** is a type of **organization_assignment** that specifies the **organization** for an **action**, **applied_action_assignment**, **applied_contract_assignment**, **applied_-identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_definition** or **product_definition_formation**.

EXPRESS specification:

```
*)
ENTITY applied_organization_assignment
  SUBTYPE OF (organization_assignment);
  items : SET [1:?] OF organization_item;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **organization_item**s that identify the particular **action**, **applied_action_assignment**, **applied_contract_assignment**, **applied_identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_definition** or **product_definition_formation** that the **organization** applies.

5.2.3.1.15 applied_organizational_project_assignment

An **applied_organizational_project_assignment** is a type of **organizational_project_assignment** that specifies the **organizational_project** for an **action**, **applied_action_assignment**, **applied_contract_-assignment**, **applied_identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_definition** or **product_definition_formation**.

EXPRESS Specification:

```
*)
ENTITY applied_organizational_project_assignment
  SUBTYPE OF (organizational_project_assignment);
  items : SET [1:?] OF organizational_project_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **organizational_project_items** that identify the particular **action**, **applied_action_-assignment**, **applied_contract_assignment**, **applied_identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_definition** or **product_definition_formation** that the **organizational_project** applies.

5.2.3.1.16 applied_person_and_organization_assigmnent

An **applied_persion_and_organization_assignment** is a type of **person_and_organization_assignment** that specifies the **person and organization** for an **action**, **applied_action_assignment**, **applied_contract_-assignment**, **applied_identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_definition** or **product_definition_formation**.

EXPRESS specification:

```
*)
ENTITY applied_person_and_organization_assignment
  SUBTYPE OF (person_and_organization_assignment);
  items : SET [1:?] OF person_and_organization_item;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **person_and_ organization_item**s that identify the particular **action**, **applied_action_-assignment**, **applied_contract_assignment**, **applied_identification_assignment**, **configuration_item**, **contract**, **document_file**, **product**, **product_definition** or **product_definition_formation** that the **person_and_organization** applies.

5.2.3.1.17 applied_presented_item

A **applied_presented_item** is a type of **presented_item** that identifies a **presented_item** to a particular **product_definition_formation**.

EXPRESS specification:

```
*)
ENTITY applied_presented_item
  SUBTYPE OF (presented_item);
  items : SET [1:?] OF presented_item_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **presented_item_item** that identify the particular **product_definition_formation** that the **presented_item** applies.

5.2.3.1.18 applied_security_classification_assignment

An **applied_security_classification_assignment** is a type of **security_classification_assignment** that specifies the **security_classification** for an **assembly_component_usage**, **document_file**, **product_-definition, product_definition_formation**, or **property_definition**.

EXPRESS specification:

```
*)
ENTITY applied_security_classification_assignment
  SUBTYPE OF (security_classification_assignment);
  items : SET [1:?] OF security_classification_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **security_classification_item**s that identify the particular **assembly_component_usage**, **document_file**, **product_definition, product_definition_formation**, or **property_definition** that the **security_classification** applies.

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5.2.3.1.19 class

A **class** is a type of **group** that is a classification of an object which characterizes all objects of the same kind; such a classification is independent from the application of the classified object..

EXPRESS specification:

```
*)
ENTITY class
  SUBTYPE OF (group);
END_ENTITY;
(*
```

5.2.3.1.20 class_system

A **class_system** is a type of **group** that specifies a method for classifing.

EXPRESS specification:

```
*)
ENTITY class_system
  SUBTYPE OF (group);
END_ENTITY;
(*
```

5.2.3.1.21 design_make_from_relationship

A **design_make_from_relationship** is a type of **product_definition_relationship** that specifies that one product's design has been derived from another product's design. The use of the **design_make_from_-relationship** also implies that the physical product resulting from the manufacture of the **product_-definition_relationship.relating_product_definition** is to be used as the basis for the manufacture of the **product_definition_relationship.related_product_definition**.

EXPRESS specification:

```
*)
ENTITY design_make_from_relationship
  SUBTYPE OF (product_definition_relationship);
END_ENTITY;
(*
```

Attribute definitions:

SELF/product_definition_relationship.relating_product_definition: the **product_definition** that is the source of the make from relationship.

SELF/product_definition_relationship.related_product_definition: the **product_definition** entity that is created from the source product_definition.

NOTE The above definition, EXPRESS specification, and attribute definition is from ISO 10303-203:1994.

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5.2.3.1.22 document_file

A **document_file** is a type of **document** and a type of **characterized_object** that is a file on a computer system that represents the whole or a portion of a document.

NOTE One or more **document_file**s may make up a complete representation of a document.

EXPRESS specification:

```
*)
ENTITY document_file
   SUBTYPE OF (document,
     characterized_object);
WHERE
  WR1: (SELF\characterized_object.name = '');
  WR2: (NOT EXISTS(SELF\characterized_object.description));
  WR3: (SIZEOF (QUERY( drt <* SELF\document.representation_types |
(drt.name IN ['digital','physical']) )) = 1);
END_ENTITY;
(*
```

Formal propositions:

WR1: inherited attribute **characterized_object.name** in **document_file** entity shall be blank.

WR2: inherted attribute **characterized_object.description** in **document_file** entity shall be blank.

WR3: The document shall have exactly one document representation type with a name of either 'digital' or 'physical'.

5.2.3.1.23 document_product_equivalence

A **document_product_equivalence** is a type of **document_product_association** that establishes a one to one corespondence between a **product_definition_formation**, **product_definition,** or **product** construct and a **document** construct for identifying the concept of a single document.

NOTE A **document_product_equivalence** ties the functionality in both the ISO 10303-41 **document_schema** and the **product_definition_schema** so that document accountability can be satisfied.

EXPRESS specification:

```
*)
ENTITY document_product_equivalence
   SUBTYPE OF (document_product_association);
WHERE
WR1: SELF.name = 'equivalence';
WR2: NOT('TECHNICAL_DATA_PACKAGING.PRODUCT' IN TYPEOF(SELF.related_-
product)) OR
((SELF.relating_document.kind.
product_data_type = 'configuration controlled document') AND
(SIZEOF( QUERY(
```

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```
prpc <* USEDIN(SELF.related_product,'TECHNICAL_DATA_PACKAGING.' +
'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS') |
prpc.name = 'document'
)) = 1));
WR3: NOT('TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION' IN
TYPEOF(SELF.related_product)) OR
((SELF.relating_document.kind.product_data_type =
'configuration controlled document version') AND
(SIZEOF( QUERY( prpc <* USEDIN(SELF.related_product\
product_definition_formation.of_product,
'TECHNICAL_DATA_PACKAGING.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS') |
prpc.name = 'document')) = 1));
WR4: NOT('TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION' IN
TYPEOF(SELF.related_product)) OR
((SELF.relating_document.kind.product_data_type =
'configuration controlled document definition') AND
(SIZEOF( QUERY( prpc <* USEDIN(SELF.related_product\
product_definition.formation.of_product,
'TECHNICAL_DATA_PACKAGING.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS') |
prpc.name = 'document'
)) = 1));
END_ENTITY;
(*
```

Formal propositions:

WR1: **document_product_equivalence.name** shall equal ‘equivalence’.

WR2: If **document_product_equivalence.related_product** references **product**, THEN **document_-product_equivalence.relating_document** shall reference a **document** WHERE the **document.kind** shall reference a **document_type** WHERE the **document_type.product_data_type** shall equal ‘configuration controlled document’ AND there is an associated **product_category** with **product_-category.name** equal to ‘document’.

WR3: If **document_product_equivalence.related_product** references **product_definition_-formation**, THEN **document_product_equivalence.relating_document** shall reference a **document** WHERE the **document.kind** shall reference a **document_type** WHERE the **document_-type.product_data_type** shall equal ‘configuration controlled document version', AND there is an associated **product_category** with **product_category.name** equal to ‘document'.

WR4: If **document_product_equivalence.related_product** references **product_definition**, THEN **document_product_equivalence.relating_document** shall reference a **document** WHERE the **document.kind** shall reference a **document_type** WHERE the **document_type.product_data_type** shall equal ‘configuration controlled document definition', AND there is an associated **product_-category** with **product_category.name** equal to ‘document'.

5.2.3.1.24 externally_defined_planar_box

An **externally_defined_planar_box** is a type of **planar_box** and a type of **externally_defined_item** with an identified externally defined page size code.

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EXPRESS specification:

```
*)
ENTITY externally_defined_planar_box
SUBTYPE OF (externally_defined_item,
  planar_box);
END_ENTITY;
(*
```

5.2.3.1.25 externally_defined_symbol_and_placement

An **externally_defined_symbol_and_placement** is a type of **placement** and a type of **externally_-defined_symbol** with an identified **placement**.

EXPRESS specification:

```
*)
ENTITY externally_defined_symbol_and_placement
SUBTYPE OF (externally_defined_symbol,
  placement);
END_ENTITY;
(*
```

5.2.3.1.26 language_assignment

A **language_assignment** is a type of **classification_assignment**. It specifies a language for the items it is assigned to. This language shall be specified in the **name** of the **group** that is refernced in the role of the **assigned classification**.

EXPRESS specification:

```
*)
ENTITY language_assignment
  SUBTYPE OF (classification_assignment);
 items : SET [1:?] OF language_item;
END_ENTITY;
(*
```

Attribute definitions:

items : the set of **items** to which a **group** is assigned.

5.2.3.1.27 make_from_usage_option_with_reference_designator

A **make_from_usage_option_with_reference_designator** is a type of **make_from_usage_option** where a reference designator can be captured and where a substitute can be identified through the use of **assembly_component_usage_substitute.**

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EXPRESS specification:

```
*)
ENTITY make_from_usage_option_with_reference_designator
 SUBTYPE OF (make_from_usage_option, assembly_component_usage);
END_ENTITY;
(*
```

5.2.3.1.28 other_list_table_representation

An **other_list_table_representation** is a type of **representation** that is a table of information that is used for design disclosure for the TDP element that the **other_list** is associated to.

EXPRESS specification:

```
*)
ENTITY other_list_table_representation
  SUBTYPE OF (representation);
END_ENTITY;
(*
```

5.2.3.2 technical_data_packaging imported entity modifications

5.2.3.2.1 approval

The base definition of the **approval** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **approval** entity:

— approval_requires_approval_date_time (see 5.2.4.2)

— approval_requires_approval_person_organization (see 5.2.4.3)

— distribution_notice_approval_requires_supporting_data (see 5.2.4.10)

— release_authentication_string_restriction (see 5.2.4.26)

5.2.3.2.2 approval_date_time

The base definition of the **approval_date_time** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **approval_date_time** entity:

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— approval_requires_approval_date_time (see 5.2.4.2)

— reference_document_requires_subcategorization (see 5.2.4.25)

5.2.3.2.3 approval_person_organization

The base definition of the **approval_person_organization** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **approval_person_organization** entity:

— approval_requires_approval_person_organization (see 5.2.4.3)

— distribution_notice_approval_requires_supporting_data (see 5.2.4.10)

— release_authentication_string_restriction (see 5.2.4.26)

5.2.3.2.4 document

The base definition of the **document** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **document** entity:

— document_product_equivalence_existence_rule (see 5.2.4.11)

5.2.3.2.5 drawing_sheet_revision

The base definition of the **drawing_sheet_revision** entity is given in ISO 10303-101. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **drawing_sheet_revision** entity:

— existence_dependent_drawing_sheet_revision (see 5.2.4.15)

5.2.3.2.6 executed_action

The base definition of the **executed_action** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

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Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **executed_action** entity:

— change_identification_restricts_executed_action (see 5.2.4.4)

5.2.3.2.7 named_unit

The base definition of the **named_unit** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **named_unit** entity:

— dependent_instantiable_named_unit (see 5.2.4.9)

5.2.3.2.8 product_definition

The base definition of the **product_definition** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition** entity:

— file_format_restricted_to_one_data_definition_entry (see 5.2.4.16)

5.2.3.2.9 product_definition_context_association

The base definition of the **product_definition_context_association** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition_context_-association** entity:

— file_format_restricted_to_one_data_definition_entry (see 5.2.4.16)

5.2.3.2.10 product_definition_formation

The base definition of the **product_definition_formation** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

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Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition_formation** entity:

— data_definition_exchange_restrict_to_one_presentation (see 5.2.4.8)

— document_requires_person_organization (see 5.2.4.12)

— product_requires_person_organization (see 5.2.4.24)

5.2.3.2.11 product_definition_formation_relationship

The base definition of the **product_definition_formation_relationship** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition_-formation_-relationship** entity:

— data_definition_entry_string_restrict_for_supersede_element (see 5.2.4.6)

5.2.3.2.12 product_definition_relationship

The base definition of the **product_definition_relationship** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition_relationship** entity:

— data_definition_entry_string_restrict_for_supersede_element (see 5.2.4.6)

5.2.3.2.13 property_definition

The base definition of the **property_definition** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **property_definition** entity:

— exchange_reason_existence_required (see 5.2.4.14)

— file_format_restricted_to_one_data_definition_entry (see 5.2.4.16)

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— header_configuration_restricts_property_definition (see 5.2.4.17)

— item_source_information_identification_constraint (see 5.2.4.22)

5.2.3.2.14 product_related_product_category

The base definition of the **product_related_product_category** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_related_-product_-category** entity:

— data_definition_exchange_categorized_as_document (see 5.2.4.7)

— identification_of_sheet_constraint (see 5.2.4.18)

— indentured_data_list_identification_constraint (see 5.2.4.19)

— reference_document_requires_subcategorization (see 5.2.4.25)

5.2.3.2.15 product_relationship

The base definition of the **product_relationship** entity is given in ISO 10303-41. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_relationship** entity:

— drawing_suffix_number_combination_identification_constraint (see 5.2.4.13)

5.2.3.2.16 representation

The base definition of the **representation** entity is given in ISO 10303-43. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **representation** entity:

— exchange_reason_existence_required (see 5.2.4.14)

— indentured_level_tag_identification_constraint (see 5.2.4.20)

— notation_type_identification_constraint (see 5.2.4.23)

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5.2.3.2.17 text_literal

The base definition of the **text_literal** entity is given in ISO 10303-46. The following modifications to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **text_literal** entity:

— text_literal_alignment_baseline_constraint (see 5.2.4.30)

— text_literal_font_requires_externally_defined_text_font (see 5.2.4.31)

5.2.4 Technical_data_packaging rule definitions

5.2.4.1 access_file_requires_external_identification

The **access_file_requires_external_identification** rule specifies how a **document_file** being identified for access requires an association with an **external_identification_assignment**.

NOTE 1 This rule applies to mapping table rule 1.

EXPRESS specification:

```
*)
RULE access_file_requires_external_identification
     FOR (document_file);
LOCAL
  result :  BOOLEAN  := TRUE;
  df     : SET OF document_file;
  aeia   : BAG OF applied_external_identification_assignment;
END_LOCAL;
  df := document_file;
  REPEAT  i := 1 TO SIZEOF (df);
    IF df[i]\document.description = 'access data file' THEN
      aeia := USEDIN(df[i], ‘TECHNICAL_DATA_PACKAGING.’+
                     'APPLIED_EXTERNAL_IDENTIFICATION_ASSIGNMENT.ITEMS');
      IF (SIZEOF(aeia) < 1) THEN
        result := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

document_file: identifies the set of all instances of **document_file** entities.

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Formal propositions:

WR1: A **document_file** where supertype **document.description** ='access data file' shall have an **applied_external_identification_assignment.items[i]** that points to the **document_file**.

NOTE 2 **Identification_role.name** shall name the specific interpretation context that applies. An example could be 'URL' which stands for Uniform Resource Locator.

5.2.4.2 approval_requires_approval_date_time

The **approval_requires_approval_date_time** rule specifies that each instance of **approval** shall be referenced by exactly one **approval_date**. This rule enforces the requirement for every **approval** to have a **date** on which the approval obtained its specified status.

NOTE This rule applies to mapping table rule 2.

EXPRESS specification:

```
*)
RULE approval_requires_approval_date_time FOR (approval, approval_date_time);
WHERE
  wr1: SIZEOF (QUERY (app <* approval |
                  NOT (SIZEOF (QUERY (adt <* approval_date_time |
                      app :=: adt.dated_approval )) = 1 ))) = 0;
END_RULE;
(*
```

Argument definitions:

approval: identifies the set of all instances of **approval** entities.

approval_date_time: identifies the set of all instances of **approval_date_time** entities.

Formal propositions:

WR1: For each instance of **approval**, there shall be exactly one instance of **approval_date_time** which contains the instance of **approval** as its **dated_approval** attribute.

5.2.4.3 approval_requires_approval_person_organization

The **approval_requires_approval_person_organization** specifies that each instance of **approval** shall have at least one **approval_person_organization** referencing it except for approval instances that act as collectors of other approval instances. These collector approvals will be associated with the other approvals through approval_relationship entities. The collector approval will be related to the approval_-relationship through the approval_relationship.relating_approval attribute. This rule enforces the requirement for an **approval** to be authorized by one or more people within their organizations.

NOTE This rule applies to mapping table rule 3.

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EXPRESS specification:

```
*)
RULE approval_requires_approval_person_organization
   FOR (approval, approval_person_organization);
WHERE
  wr1: SIZEOF(QUERY(app <* approval | NOT (SIZEOF(QUERY(apo <*
   approval_person_organization |
   app :=: apo.authorized_approval )) >= 1 ))) = 0;
END_RULE;
(*
```

Argument definitions:

approval: identifies the set of all instances of **approval** entities.

approval_person_organization: identifies the set of all instances of **approval_person_organization** entities.

Formal propositions:

WR1: For each instance of **approval**, that is not pointed at by an **approval_relationship.relating_-approval** attribute with an **approval_relationship.name** ='approver group', there shall be one or more instances of **approval_person_organization** which contains the instance of **approval** as its **authorized_-approval** attribute.

5.2.4.4 change_identification_restricts_executed_action

The **change_identification_restricts_executed_action** rule specifies that an **executed_action** with **executed_action.description** equal to 'change identification' shall have one or more **applied_action_-assignment**s associated to itself.

NOTE This rule applies to mapping table rule 4.

EXPRESS specification:

```
*)
RULE change_identification_restricts_executed_action
     FOR (executed_action);
LOCAL
  result  : BOOLEAN := TRUE;
  found   : BOOLEAN := FALSE;
  exeact  : SET OF executed_action;
  acta    : BAG OF action_assignment;
END_LOCAL;
  exeact := executed_action;
  REPEAT i := 1 TO SIZEOF(exeact);
    IF (exeact[i].description = 'change identification') THEN
      acta := USEDIN(exeact[i],
     'TECHNICAL_DATA_PACKAGING.ACTION_ASSIGNMENT.ASSIGNED_ACTION');
      found := FALSE;
      REPEAT j := 1 TO SIZEOF(acta);
        IF (EXISTS(acta[j].role)) then
```

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```
          IF ((acta[j].role.name = 'change identification') XOR
              (acta[j].role.name = 'revision history')) THEN
            found := TRUE;
          END_IF;
        END_IF;
      END_REPEAT;
      IF (NOT found) THEN
        result := FALSE;
        ESCAPE;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

executed_action: identifies the set of all instances of **executed_action** entities.

Formal propositions:

WR1: An **executed_action** with **executed_action.description** equal to ‘change identification’ shall have one or more of the following associated to it:

— Is pointed to by a single **applied_action_assignment** with the **applied_action_assignment**’s associated object_role.name =’change identification’; OR

— Is pointed to by a single **applied_action_assignment** with the **applied_action_assignment**’s associated object_role.name =‘revision history’.

5.2.4.5 contract_submission_requires_date_and_organization

The **contract_submission_requires_date_and_organization** rule specifies how a **contract** being submitted must have date of submission and location of the destination organization.

NOTE 1 This rule applies to mapping table rule 5 and 6.

EXPRESS specification:

```
*)
RULE contract_submission_requires_date_and_organization
    FOR (applied_contract_assignment);
LOCAL
  result : BOOLEAN := TRUE;
  found : BOOLEAN;
  apc : SET OF applied_contract_assignment;
  adta : BAG OF applied_date_and_time_assignment;
  ada : BAG OF applied_date_assignment;
END_LOCAL;
  apc := applied_contract_assignment;
  REPEAT i := 1 TO SIZEOF(apc);
    IF (EXISTS(apc[i]\contract_assignment.role)) THEN
```

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```
     IF (apc[i]\contract_assignment.role.name = 'contract submission') THEN
        adta := USEDIN(apc[i], ‘TECHNICAL_DATA_PACKAGING.’+
                       'APPLIED_DATE_AND_TIME_ASSIGNMENT.ITEMS');
        found := FALSE;
        REPEAT j := 1 TO SIZEOF(adta);
          IF (EXISTS(adta[j]\date_and_time_assignment.role)) then
            IF (adta[j]\date_and_time_assignment.role.name =
                'date and time of submission') THEN
              found := TRUE;
            END_IF;
          END_IF;
        END_REPEAT;
        IF (NOT found) THEN
          result := FALSE;
          ESCAPE;
        END_IF;
        ada := USEDIN(apc[i], ‘TECHNICAL_DATA_PACKAGING.’+
                      'APPLIED_DATE_ASSIGNMENT.ITEMS');
        found := FALSE;
        REPEAT j := 1 TO SIZEOF(ada);
          IF (EXISTS(ada[j]\date_assignment.role)) THEN
            IF (ada[j]\date_assignment.role.name = 'date of submission')
 THEN
              found := TRUE;
            END_IF;
          END_IF;
        END_REPEAT;
        IF (NOT found) THEN
          result := FALSE;
          ESCAPE;
        END_IF;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

applied_contract_assignment: identifies the set of all instances of **applied_contract_assignment** entities.

Formal propositions:

WR1: If an **applied_contract_assignment** that has its associated **object_role.name**=’contract submission’, then:

— the **applied_contract_assignment** shall be pointed to by an **applied_date_and_time_assignment** where the **data_time_role.name** =‘date and time of submission’; OR

— the **applied_contract_assignment** shall be pointed to by an **applied_date_assignment** where the **data_role.name** =‘date of submission’.

NOTE 2 This rule applies to mapping table rule 5.

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WR2: If an **applied_contract_assignment** that has its associated **object_role.name** ='contract submission', then the **applied_contract_assignment** shall be pointed to by an **applied_organization_-assignment** where the **organization_role.name** ='location of contract submission' and the **applied_-organization_assignment** is pointed to by an **organizational_address**. The **organizational_address** represents the location where the **contract** is submitted.

NOTE 3 This rule applies to mapping table rule 6.

5.2.4.6 data_definition_entry_string_restrict_for_supersede_element

The **data_definition_entry_string_restrict_for_superseded_element** rule specifies how a superseded relationship is identified through the restriction of a **product_definition_relationship.name** attribute or a **product_definition_formation_relationship.name** atribute.

NOTE 1 This rule applies to mapping table rule 7.

EXPRESS specification:

```
*)
RULE data_definition_entry_string_restrict_for_superseded_element
FOR (product_definition) ;
LOCAL
  found : BOOLEAN;
  result1 : BOOLEAN;
  result2 : BOOLEAN;
  pd : SET OF product_definition;
  pdca : SET OF product_definition_context_association;
  pdc : product_definition_context;
  pdf : product_definition_formation;
END_LOCAL;
  result1 := TRUE;
  result2 := TRUE;
  pd :=product_definition;
  REPEAT i := 1 TO SIZEOF (pd);
   found :=FALSE;
   pdca :=USEDIN (pd[i], 'TECHNICAL_DATA_PACKAGING.'+
          'PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.DEFINITION');
   REPEAT j :=1 TO SIZEOF (pdca);
      pdc :=pdca [j].frame_of_reference;
      IF (pdc\application_context_element.name IN
         ['document version',
          'a representation of a document version',
          'data definition entry',
          'indentured data list entry']) THEN
        found :=TRUE;
      END_IF;
  END_REPEAT;
  IF (found) THEN
    IF ((SIZEOF (QUERY(pdr <* USEDIN(pd[i], 'TECHNICAL_DATA_PACKAGING.'+
                    'PRODUCT_DEFINITION_RELATIONSHIP.'+
                    'RELATED_PRODUCT_DEFINITION') |
         (pdr.name = 'superseded element')))) > 1) THEN
   result1 :=FALSE;
    END_IF;
```

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```
    pdf := pd[i].formation;
    IF ((SIZEOF(QUERY(pdfr <* USEDIN(pdf, 'TECHNICAL_DATA_PACKAGING.'+
                  'PRODUCT_DEFINITION_FORMATION_RELATIONSHIP.'+
                  'RELATED_PRODUCT_DEFINITION_FORMATION') |
         (pdfr.name = 'superseded version')))) > 1) THEN
   result2 := FALSE;
    END_IF;
    END_IF;
    END_REPEAT;
WHERE
    wr1 : result1;
    wr2 : result2;
END_RULE;
(*
```

Argument definitions:

product_definition: identifies the set of all instances of **product_definition** entities.

Formal propositions:

WR1: A **product_definition** that has a related **product_definiton_context_association** that has an associated **application_context_element.name** ='document version' OR an **application_context_-element.name** ='a representation of a document version' OR an **application_context_element.name** ='data definition entry' or an **application_context_element.name** ='indentured data list entry' shall have zero or one **product_definition_relationships** that have a **product_definition_relationship.name** ='superseded element'.

WR2: A **product_definition** that has a related **product_definiton_context_association** that has an associated **application_context_element.name** ='document version' OR an **application_context_-element.name** ='a representation of a document version' OR an **application_context_element.name** ='data definition entry' or 'indentured data list entry' where the **product_definition.formation** points to a **product_definition.formation** which shall have zero or one **-product_definition_formation_-relationships** that have a **product_definition_formation_relationship.name** ='superseded version'.

5.2.4.7 data_definition_exchange_categorized_as_document

The **data_definition_exchange_categorized_as_document** rule specifies how a **data_definition_exchange** must be categorized as a document.

NOTE 1 This rule applies to mapping table rule 8.

EXPRESS specification:

```
*)
RULE data_definition_exchange_categorized_as_document
   FOR (product_related_product_category);
LOCAL
  result : BOOLEAN := TRUE;
  prpc   : SET OF product_related_product_category;
  prds   : SET OF product := [];
  pdf    : BAG OF product_definition_formation;
  pc     : SET OF product_category;
```

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```
END_LOCAL;
  prpc := QUERY(v <* product_related_product_category |
                v.name = 'data definition exchange');
  REPEAT i := 1 TO SIZEOF(prpc);
    prds := prpc[i].products;
    REPEAT j := 1 TO SIZEOF(prds);
      pdf := USEDIN(prds[j], 'TECHNICAL_DATA_PACKAGING.'+
              'PRODUCT_DEFINITION_FORMATION.OF_PRODUCT');
      IF (SIZEOF(pdf) > 0) THEN
        pc := product_category_graph_members(prpc[i]);
        IF (SIZEOF(QUERY(v <* pc | v.name = 'document')) < 1) THEN
          result := FALSE;
        END_IF;
      END_IF;
    END_REPEAT;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

product_related_product_category: identifies the set of all instances of **product_related_product_-category** entities.

Formal propositions:

WR1: A **product_definition_formation** where the **product_definition_formation.of_product** points to a **product** where the **product** is pointed at by a **product_related_product_category.products** and the **product_related_product_category.name** ='data definition exchange', then a second instance of **product_related_product_category** shall exist in the same product category structure, established by **product_category_relationships**, with the attribute **product_related_product_category.name** ='document'.

NOTE 2 Related rule mapping table 12.

5.2.4.8 data_definition_exchange_restrict_to_one_presentation

The **data_definition_exchange_restrict_to_one_presentation** rule specifies how to insure that a **data_-definition_exchange** document will never have more than one presentation, captured within this part of ISO 10303.

NOTE This rule applies to mapping table rule 9.

EXPRESS specification:

```
*)
RULE data_definition_exchange_restrict_to_one_presentation
   FOR (product_related_product_category);
LOCAL
  result : BOOLEAN := TRUE;
  prpc   : SET OF product_related_product_category;
```

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```
  prds   : SET OF product := [];
  pdf    : BAG OF product_definition_formation;
END_LOCAL;
  prpc := product_related_product_category;
  REPEAT i := 1 TO SIZEOF(prpc);
    IF (prpc[i]\product_category.name = 'data definition exchange') THEN
      prds := prds + prpc[i].products;
    END_IF;
  END_REPEAT;
  REPEAT i := 1 TO SIZEOF(prds);
    pdf := USEDIN(prds[i], 'TECHNICAL_DATA_PACKAGING.'+
                    'PRODUCT_DEFINITION_FORMATION.OF_PRODUCT');
    REPEAT j := 1 TO SIZEOF(pdf);
      IF (SIZEOF(USEDIN(pdf[j], 'TECHNICAL_DATA_PACKAGING.'+
                        'APPLIED_PRESENTED_ITEM.ITEMS')) > 1) THEN
        result := FALSE;
      END_IF;
    END_REPEAT;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

product_related_product_category: identifies the set of all instances of **product_related_product_-category** entities.

Formal propositions:

WR1: If a **product_definition_formation** has an associated **product_category.name** ='data definition exchange', then the **product_definition_formation** may be pointed to by zero or one **presented_item**.

5.2.4.9 dependent_instantiable_named_unit

The **dependent_instantiable_named_unit** rule specifies that a **named_unit** may not be instantiated without being related to another entity.

NOTE 1 This rule applies to mapping table rule 10.

EXPRESS specification:

```
*)
RULE dependent_instantiable_named_unit
  FOR (named_unit);
LOCAL
  result : BOOLEAN := TRUE;
  nu     : SET OF named_unit;
END_LOCAL;
  nu := named_unit;
  REPEAT i := 1 TO SIZEOF(nu);
    IF (SIZEOF(USEDIN(nu[i], '')) < 1) THEN
      result := FALSE;
    END_IF;
```

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```
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

named_unit: identifies the set of all instances of **named_unit** entities.

Formal propositions:

WR1: For each instance of **named_unit**, there shall be a reference to the **named_unit** instance from an attribute of another entity.

NOTE 2 From ISO 10303-203 section 5.2.4.53 **dependent_instantiable_named_unit**.

5.2.4.10 distribution_notice_approval_requires_supporting_data

The **distribution_notice_approval_requires_supporting_data** rule specifies that an **approval** with an associated **applied_approval_assignment** with an **object_role.name** = ‘distribution notice’ shall have at least one piece of supporting data associated with itself.

NOTE This rule applies to mapping table rule 11.

EXPRESS specification:

```
*)
RULE distribution_notice_approval_requires_supporting_data
   FOR (applied_approval_assignment);
LOCAL
  result  : BOOLEAN := TRUE;
  found   : BOOLEAN;
  aaa     : SET OF applied_approval_assignment;
  ap      : approval;
  apo     : BAG OF approval_person_organization;
  aca     : BAG OF applied_classification_assignment;
END_LOCAL;
  aaa := applied_approval_assignment;
  REPEAT i := 1 TO SIZEOF(aaa);
    IF (EXISTS(aaa[i].role)) THEN
      IF (aaa[i].role.name = 'distribution notice') THEN
        ap := aaa[i].assigned_approval;
        found := FALSE;
        IF (LENGTH(ap.level) > 0) THEN
          found := TRUE;
        END_IF;
        apo := USEDIN(ap, ‘TECHNICAL_DATA_PACKAGING.’+
                      ‘APPROVAL_PERSON_ORGANIZATION.AUTHORIZED_APPROVAL');
        REPEAT j := 1 TO SIZEOF(apo);
          IF (apo[j].role.role = 'distribution authorization') THEN
            found := TRUE;
          END_IF;
```

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```
        END_REPEAT;
        aca := USEDIN(ap, 'TECHNICAL_DATA_PACKAGING.'+
                        'APPLIED_CLASSIFICATION_ASSIGNMENT.ITEMS');
        REPEAT j := 1 TO SIZEOF(aca);
         IF (EXISTS(aca[j]\classification_assignment.role)) THEN
          IF ((aca[j]\classification_assignment.role.name =
                'distribution notice code') AND
                (('TECHNICAL_DATA_PACKAGING.CLASS') IN
TYPEOF(aca[j]\classification_assignment.assigned_class))) THEN
              found := TRUE;
            END_IF;
          END_IF;
        END_REPEAT;
        IF (NOT found) THEN
          result := FALSE;
        END_IF;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

applied_approval_assignment: identifies the set of all instances of **applied_approval_assignment** entities.

Formal proposition:

WR1: Each instance of **approval** with an associated **applied_approval_assignment** with an **object_-role.name** = 'distribution notice' shall have at least one of the following:

— an associated **class** with an **applied_classification_assignment** with a **classification_role.name** = 'distribution notice code';

— an **approval_person_organization** where **approval_person_organization.role** points to an **approval_role** where **approval_role.name** ='distribution authorization';

— an **approval.level** that is non-null.

5.2.4.11 document_product_equivalence_existence_rule

The **document_product_equivalence_existence_rule** rule specifies that the when a document references other product data through a **document_reference** or a **document_usage_constraint** a collection of entities need to be instantated. These entities include **product**, **product_definition_formation**, **document_-product_equivalence**, **document**, **document_type**, and **product_related_product_category**.

NOTE This rule applies to mapping table rule 12.

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EXPRESS specification:

```
*)
RULE document_product_equivalence_existence_rule
  FOR (applied_document_reference);
LOCAL
  found  : BOOLEAN := FALSE;
  result : BOOLEAN := TRUE;
  adr    : SET OF applied_document_reference;
  doc    : document;
  dpa    : BAG OF document_product_association;
  pfd    : product_or_formation_or_definition;
  dt     : label;
END_LOCAL;
  adr := applied_document_reference;
  REPEAT i := 1 TO SIZEOF(adr);
    doc := adr[i]\document_reference.assigned_document;
    dt := doc.kind.product_data_type;
    dpa := USEDIN(doc, ‘TECHNICAL_DATA_PACKAGING.’+
          'DOCUMENT_PRODUCT_ASSOCIATION.RELATING_DOCUMENT');
    REPEAT j := 1 TO SIZEOF(dpa);
      IF ((‘TECHNICAL_DATA_PACKAGING.DOCUMENT_PRODUCT_EQUIVALENCE')
 IN TYPEOF(dpa[j])) THEN
        found := TRUE;
        pfd := dpa[j].related_product;
        IF ((‘TECHNICAL_DATA_PACKAGING.PRODUCT') IN TYPEOF(pfd)) THEN
          IF (dt <> 'configuration controlled document') THEN
            result := FALSE;
          END_IF;
        ELSE
          IF ((‘TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION')
 IN TYPEOF(pfd)) THEN
            IF (dt <> 'configuration controlled document version') THEN
              result := FALSE;
            END_IF;
          ELSE
            IF ((‘TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION') IN
TYPEOF(pfd)) THEN
              IF (dt <> 'configuration controlled document definition')
THEN
                result := FALSE;
              END_IF;
            ELSE
              result := FALSE;
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_REPEAT;
    IF (NOT found) THEN
      (* There must be at least one *)
      result := FALSE;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

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Argument definitions:

applied_document_reference: identifies the set of all instances of **applied_document_reference** entities.

Formal propositions:

WR1: If an **applied_document_reference** or an **applied_document_usage_constraint** exist, then the associated **document** instance shall be associated to a **product**, **product_definition_formation**, or a **product_definition** through the entity **document_product_equivalence**. The **document_product_-equivalence** instance will have its name attribute equal to 'equivalence'. The **document** instance shall have an associated **document_type.product_data_type** to either 'configuration controlled document', 'configuration controlled document version', or 'configuration controlled document definition' based on what **document_product_equivalence** is pointing at, either a **product**, **product_definition_formation**, or **product_definition**, respectively.

5.2.4.12 document_requires_person_organization

The **document_requires_person_organization** rule specifies that each document requires a **organization** or **person_and_organization** associated with itself.

NOTE This rule applies to mapping table rule 13.

EXPRESS specification:

```
*)
RULE document_requires_person_organization FOR
  (product_related_product_category);
LOCAL
  result : BOOLEAN := TRUE;
  prpc   : SET OF product_related_product_category;
  prds   : SET OF product := [];
  pdf    : BAG OF product_definition_formation;
END_LOCAL;
  prpc := product_related_product_category;
  REPEAT i := 1 TO SIZEOF(prpc);
    IF (prpc[i]\product_category.name = 'document') THEN
      prds := prds + prpc[i].products;
    END_IF;
  END_REPEAT;
  REPEAT i := 1 TO SIZEOF(prds);
    pdf := USEDIN(prds[i], 'TECHNICAL_DATA_PACKAGING.'+
                   'PRODUCT_DEFINITION_FORMATION.OF_PRODUCT');
    REPEAT j := 1 TO SIZEOF(pdf);
      IF ((SIZEOF(USEDIN(pdf[j], 'TECHNICAL_DATA_PACKAGING.'+
          'APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT.ITEMS')) +
           (SIZEOF(USEDIN(pdf[j], 'TECHNICAL_DATA_PACKAGING.'+
                          'APPLIED_ORGANIZATION_ASSIGNMENT.ITEMS')))) < 1)
THEN
        result := FALSE;
      END_IF;
    END_REPEAT;
  END_REPEAT;
WHERE
```

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```
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

product_related_product_category: identifies the set of all instances of **product_related_-product_-category** entities.

Formal proposition:

WR1: Each instance of **product_definition_formation** where the **product_definition_formation.of_-product** points to a **product** where the **product** is pointed at by a **product_related_product_-category.products** and the **product_category.name** ='document', shall be pointed to by one of the following:

— a **person_and_organization_assignment** where the **person_and_organization_assignment.role** points to a **person_and_organization_role**; OR

— an **organization_assignment** where **organization_assignment.role** points to an **organization_role**.

5.2.4.13 drawing_suffix_number_combination_identification_constraint

The **drawing_suffix_number_combination_identification_constraint** rule specifies how to identify the document in a drawing suffix number combination relationship.

NOTE This rule applies to mapping table rule 14.

EXPRESS specification:

```
*)
RULE drawing_suffix_number_combination_identification_constraint
    FOR (product_relationship);
LOCAL
  result  : BOOLEAN := TRUE;
  tresult : BOOLEAN;
  pr      : SET OF product_relationship;
  p       : product;
  prpc    : BAG OF product_related_product_category;
END_LOCAL;
  pr := QUERY(v <* product_relationship |
              v.name = 'drawing suffix number combination');
  REPEAT i := 1 to SIZEOF(pr);
    p := pr[i].relating_product;
    prpc := USEDIN(p, 'TECHNICAL_DATA_PACKAGING.'+
                    'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
    REPEAT j := 1 TO SIZEOF(prpc);
      IF (prpc[j]\product_category.name = 'document') THEN
        result := FALSE;
      END_IF;
    END_REPEAT;
    p := pr[i].related_product;
    prpc := USEDIN(p, 'TECHNICAL_DATA_PACKAGING.'+
```

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```
                    'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
    tresult := FALSE;
    REPEAT j := 1 TO SIZEOF(prpc);
      IF (prpc[j]\product_category.name = 'document') THEN
        tresult := TRUE;
      END_IF;
    END_REPEAT;
    IF (NOT tresult) THEN
      result := FALSE;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

product_relationship: identifies the set of all instances of **product_relationship** entities.

Formal propositions:

WR1: This rule applies if a part identification has the name of the drawing that defines it as a portion of the part's identification and this fact needs to be captured. If a **product_relationship** exist with **product_-relationship.name** equal to 'drawing suffix number combination' then its **product_relationship.relating_-product** will point to a **product** without an associated **product_related_product_category.name** ='document' and its **product_relationship.related_product** will point to a **product** with an associated **product_related_product_category.name** ='document'.

5.2.4.14 exchange_reason_existence_required

The **exchange_reason_existence_required** rule specifies that an exchange reason needs to exist for a **data_definition_exchange** document.

NOTE This rule applies to mapping table rule 15.

EXPRESS specification:

```
*)
RULE exchange_reason_existence_required
    FOR (property_definition);
LOCAL
  result : BOOLEAN  := TRUE;
  prpd   : SET OF property_definition;
  prdr   : BAG OF property_definition_representation;
  repi   : representation;
  dri    : descriptive_representation_item;
END_LOCAL;
  prpd := property_definition;
  REPEAT i := 1 TO SIZEOF(prpd);
    IF (prpd[i].name = 'data definition exchange header') THEN
      result := FALSE;
      prdr := USEDIN(prpd[i],'TECHNICAL_DATA_PACKAGING.'+
                     'PROPERTY_DEFINITION_REPRESENTATION.DEFINITION');
```

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```
      REPEAT j := 1 TO SIZEOF (prdr);
        repi := prdr[j].used_representation;
        IF (NOT (repi.name = 'exchange reason')) THEN
          ESCAPE;
        ELSE -- (cycle through representation items)
          REPEAT k := 1 TO SIZEOF (repi.items);
            IF ('TECHNICAL_DATA_PACKAGING.DESCRIPTIVE_REPRESENTATION_ITEM'
IN TYPEOF(repi.items[k])) THEN
              dri := repi.items[k];
              IF ((dri.name = 'exchange purpose') XOR
                  (dri.name = 'base exchange reason')) THEN
                     -- (having an additional dri.name = 'exchange purpose'
                     -- is irrelevant since the above condition already
                     -- entail a TRUE condition)
                result := TRUE;
                ESCAPE;
              END_IF;
            END_IF;
          END_REPEAT;
        END_IF;
      END_REPEAT;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

property_definition: identifies the set of all instances of **property_definition** entities.

Formal propositions:

WR1: A **property_definition** with **property_definition.name** ='data definition exchange header' shall have an associated **representation** with **representation.name** ='exchange reason'. This **representation** shall have either one associated descriptive_representation_item with **descriptive_representation_-item.name** ='base exchange reason' OR one associated **descriptive_representation_item** with **descriptive_representation_item.name** ='exchange purpose', OR two associated **descriptive_-representation_item**, one with **descriptive_representation_item.name** ='base exchange reason' and the other with **descriptive_representation_item.name** ='exchange purpose'.

5.2.4.15 existence_dependent_drawing_sheet_revision

The **existence_dependent_drawing_sheet_revision** rule specifies that a **drawing_sheet_revision** shall alway be associated with a **product** that is of **product_category** named 'sheet'.

NOTE This rule applies to mapping table rule 16.

EXPRESS specification:

```
*)
RULE existence_dependent_drawing_sheet_revision
    FOR (drawing_sheet_revision);
```

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```
LOCAL
  result : BOOLEAN := TRUE;
  dsr    : SET OF drawing_sheet_revision;
  pir    : BAG OF presented_item_representation;
  pdf    : SET OF product_definition_formation;
  prpc   : BAG OF product_related_product_category;
END_LOCAL;
  dsr := drawing_sheet_revision;
  REPEAT i := 1 TO SIZEOF(dsr);
    pir := USEDIN(dsr[i], 'TECHNICAL_DATA_PACKAGING.'+
                  'PRESENTED_ITEM_REPRESENTATION.PRESENTATION');
      IF (SIZEOF(pir) < 1) THEN
        result := FALSE;
      END_IF;
      REPEAT j := 1 TO SIZEOF(pir);
        pdf := pir[j].item\applied_presented_item.items;
        IF (SIZEOF(pdf) < 1) THEN
          result := FALSE;
        END_IF;
        REPEAT k := 1 TO SIZEOF(pdf);
          prpc := USEDIN(pdf[k].of_product, 'TECHNICAL_DATA_PACKAGING.' +
                         'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
          IF (SIZEOF(prpc) < 1) THEN
            result := FALSE;
          END_IF;
          REPEAT l := 1 TO SIZEOF(prpc);
            IF (prpc[l]\product_category.name <> 'sheet') THEN
              result := FALSE;
            END_IF;
          END_REPEAT;
        END_REPEAT;
      END_REPEAT;
    END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

drawing_sheet_revision: identifies the set of all instances of **drawing_sheet_revision** entities.

Formal propositions:

WR1: If a **drawing_sheet_revision** exist, then it will be pointed at by a **presented_item_-representation.presentation**. Also the **presented_item_representation** will point to an **applied_-presented_item** which in turn will point at a **product_definition_formation** with an associated **product_-related_product_category.name** =’sheet’.

5.2.4.16 file_format_restricted_to_one_data_definition_entry

The **file_format_restricted_to_one_data_definition_entry** rule specifies how only one file format can be associated directly with a Data_definition_entry_tdp_element.

NOTE This rule applies to mapping table rule 17.

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EXPRESS specification:

```
*)
RULE file_format_restricted_to_one_data_definition_entry
    FOR (product_definition);
LOCAL
  result   :  BOOLEAN  := TRUE;
  pd       :  SET OF product_definition;
  propd : BAG OF property_definition;
END_LOCAL;
  pd := product_definition;
  REPEAT i := 1 TO SIZEOF(pd);
    IF ((pd[i].frame_of_reference.name = 'document version') XOR
        (pd[i].frame_of_reference.name =
                'a representation of a document version')) THEN
      propd := USEDIN(pd[i], 'TECHNICAL_DATA_PACKAGING.'+
                        'PROPERTY_DEFINITION.DEFINITION');
      IF (SIZEOF(QUERY(p <* propd | p.name = 'document format')) > 1) THEN
        result := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

product_definition: identifies the set of all instances of **product_definition** entities.

Formal propositions:

WR1: A **product_definition** OR **product_definition_with_associated_document** that has a **product_-definition_context_association** that has an **application_context_element.name** ='document version' OR an **application_context_element.name** ='a representation of a document version' shall have zero or one **property_definition** where the **property_definition.name** ='document format'.

5.2.4.17 header_configuration_restricts_property_definition

The **header_configuration_restricts_property_definition** rule specifies that a **property_definition** with **property_definition.name** equal to 'xxx header' (with the word 'header' being the last set of characters in the string) shall have one or more of the following associated to it:

— **applied_approval_assignment**;

— **property_definition_representation**.

NOTE This rule applies to mapping table rule 18.

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EXPRESS specification:

```
*)
RULE header_configuration_restricts_property_definition
    FOR (property_definition);
LOCAL
  result  : BOOLEAN := TRUE;
  found   : BOOLEAN;
  pd      : SET OF property_definition;
  apa     : BAG OF applied_approval_assignment;
END_LOCAL;
  pd := QUERY(v <* property_definition | v.name LIKE '* header');
  REPEAT i := 1 TO SIZEOF(pd);
    found := FALSE;
    apa := USEDIN(pd[i],
   'TECHNICAL_DATA_PACKAGING.APPLIED_APPROVAL_ASSIGNMENT.ITEMS');
    REPEAT j := 1 TO SIZEOF(apa);
      IF (EXISTS(apa[j]\approval_assignment.role)) THEN
        IF ((apa[j]\approval_assignment.role.name = 'release
authentication') OR
            (apa[j]\approval_assignment.role.name = 'data usage rights'))
THEN
          found := TRUE;
        END_IF;
      END_IF;
    END_REPEAT;
    IF (SIZEOF(USEDIN(pd[i], 'TECHNICAL_DATA_PACKAGING.' +
                      'PROPERTY_DEFINITION_REPRESENTATION.DEFINITION')) > 0)
THEN
      found := TRUE;
    END_IF;
    IF (NOT found) THEN
      result := FALSE;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

property_definition: identifies the set of all instances of **property_definition** entities.

Formal proposition:

WR1: A **property_definition** with **property_definition.name** equal to 'xxx header' (with the 'header' being the last set of characters in the string) shall have one or more of the following associated to it:

— an **applied_approval_assignment** where **object_role.name** ='release authentication';

— an **applied_approval_assignment** where **object_role.name** ='data usage rights'; OR

— a **property_definition_representation**.

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5.2.4.18 identification_of_sheet_constraint

The **identification_of_sheet_constraint** rule specifies the string value that identifies a sheet of a document that is mapped as a **product**.

NOTE 1 This rule applies to mapping table rule 19.

EXPRESS specification:

```
*)
RULE identification_of_sheet_constraint
    FOR (product_definition_formation);
LOCAL
  found  : BOOLEAN;
  result : BOOLEAN := TRUE;
  pdf    : SET OF product_definition_formation;
  prpc   : BAG OF product_related_product_category;
  pc     : SET OF product_category;
END_LOCAL;
  pdf := product_definition_formation;
  REPEAT i := 1 TO SIZEOF(pdf);
    prpc := USEDIN(pdf[i].of_product, ‘TECHNICAL_DATA_PACKAGING.’ +
                   'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
    REPEAT j := 1 TO SIZEOF(prpc);
      IF (prpc[j]\product_category.name = 'sheet') THEN
        pc := product_category_graph_members(prpc[j]);
        found := FALSE;
        REPEAT k := 1 TO SIZEOF(pc);
          IF (pc[k].name = 'document') THEN
            found := TRUE;
          END_IF;
        END_REPEAT;
        IF (NOT found) THEN
          result := FALSE;
          ESCAPE;
        END_IF;
      END_IF;
    END_REPEAT;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

product_definition_formation: identifies the set of all instances of **product_definition_formation** entities.

Formal propositions:

WR1: A **product_definition_formation** where the **product_definition_formation.of_product** points to a **product** where the **product** is pointed at by a **product_related_product_category.products** and the **product_category.name** =’sheet’, then a second instance of **product_category** shall exist in the same

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product category structure, established by **product_category_relationships**, with the attribute **product_-category.name** = 'document'. **Product_related_product_category**, a subtype of **product_category**, can be use instead of an instance of **product_category** in this rule.

5.2.4.19 indentured_data_list_identification_constraint

The **indentured_data_list_identification_constraint** rule specifies the string values in **product_category** that identify Indentured_data_lists.

NOTE This rule applies to mapping table rule 20.

EXPRESS specification:

```
*)
RULE indentured_data_list_identification_constraint
  FOR (product_definition_formation);
LOCAL
  result : BOOLEAN := TRUE;
  pdf : SET OF product_definition_formation;
  prpc : BAG OF product_related_product_category;
  pc : SET OF product_category;
END_LOCAL;
  pdf := product_definition_formation;
  REPEAT i := 1 TO SIZEOF(pdf);
    prpc := USEDIN(pdf[i].of_product,
   'TECHNICAL_DATA_PACKAGING.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
    REPEAT j  := 1 TO SIZEOF(prpc);
      IF (prpc[j]\product_category.name = 'indentured data list') THEN
        pc := product_category_graph_members(prpc[j]);
        result := FALSE;
        REPEAT k := 1 TO SIZEOF(pc);
          IF (pc[k].name = 'document') THEN
            result := TRUE;
          END_IF;
        END_REPEAT;
        IF (result = FALSE) THEN
          ESCAPE;
        END_IF;
      END_IF;
    END_REPEAT;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

product_definition_formation: identifies the set of all instances of **product_definition_formation** entities.

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Formal propositions:

WR1: A **product_definition_formation** where the **product_definition_formation.of_product** points to a **product** where the **product** is pointed at by a **product_related_product_category.products** and the **product_category.name** =’indentured data list’, then a second instance of **product_related_product_-category** shall exist in the same product category structure, established by **product_category_-relationship**s, with the attribute **product_related_product_category.name**= ‘document’.

5.2.4.20 indentured_level_tag_identification_constraint

The **indentured_level_tag_identification_constraint** rule specifies the string value used to identify a human interpretable indentured level for a Data_definition_entry and Indentured_data_list_entry.

NOTE This rule applies to mapping table rule 21.

EXPRESS specification:

```
*)
RULE indentured_level_tag_identification_constraint
    FOR (property_definition_representation);
LOCAL
  result : BOOLEAN := TRUE;
  pdr    : SET OF property_definition_representation;
END_LOCAL;
  pdr := property_definition_representation;
  REPEAT  i := 1 TO SIZEOF(pdr);
    IF (pdr[i].used_representation.name = 'indentured level tag') THEN
      IF NOT ((pdr[i].definition.name = 'dde entry property') XOR
              (pdr[i].definition.name = 'idl entry property')) THEN
        result := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

property_definition_representation: identifies the set of all instances of **property_definition_-representation** entities.

Formal propositions:

WR1: For any **representation.name** =’indentured level tag’, the associated **property_definition.name** =’exchange entry property’ or ‘indentured data list entry property’

5.2.4.21 indentured_list_method_identification_constraint

The **indentured_list_method_identification_constraint** rule specifies that the three different types of indentured list methods may be applied to only **data_definition_exchanges** and **indentured_data_lists**.

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NOTE This rule applies to mapping table rule 22.

EXPRESS specification:

```
*)
RULE indentured_list_method_identification_constraint
  FOR (applied_document_reference);
LOCAL
  result : BOOLEAN := TRUE;
  adr : SET OF applied_document_reference;
  d : document;
  dpa : BAG OF document_product_association;
  pfd : product_or_formation_or_definition;
  p : product;
  prpc : BAG OF product_related_product_category;
END_LOCAL;
  adr := applied_document_reference;
  REPEAT i := 1 TO SIZEOF(adr);
   IF (EXISTS(adr[i]\document_reference.role)) THEN
    IF ((adr[i]\document_reference.role.name = 'indentured by document') OR
       (adr[i]\document_reference.role.name = 'indentured by item') OR
       (adr[i]\document_reference.role.name =
                    'indentured by item and document'))
THEN
        d := adr[i]\document_reference.assigned_document;
        dpa := USEDIN(d, ‘TECHNICAL_DATA_PACKAGING.'+
                      'DOCUMENT_PRODUCT_ASSOCIATION.RELATING_DOCUMENT');
        REPEAT j := 1 TO SIZEOF(dpa);
          pfd := dpa[j].related_product;
          IF (‘TECHNICAL_DATA_PACKAGING.PRODUCT' IN TYPEOF(pfd)) THEN
            p := pfd;
          ELSE
           IF (‘TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION' IN
TYPEOF(pfd)) THEN
              p := pfd\product_definition_formation.of_product;
            ELSE
              IF (‘TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION' IN
TYPEOF(pfd)) THEN
              p := pfd\product_definition.formation.of_product;
              ELSE
                p := ?;
              END_IF;
            END_IF;
          END_IF;
          result := FALSE;
          prpc := USEDIN(p, ‘TECHNICAL_DATA_PACKAGING.'+
          'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
          REPEAT k := 1 TO SIZEOF(prpc);
            IF ((prpc[k].name = 'data definition exchange') OR
                (prpc[k].name = 'indentured data list')) THEN
              result := TRUE;
            END_IF;
          END_REPEAT;
        END_REPEAT;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
```

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```
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

applied_document_reference: identifies the set of all instances of **applied_document_reference** entities.

Formal propositions:

WR1: For an **applied_document_reference**, if its associated **object_role.name** ='indentured by document' or 'indentured by item' or 'indentured by item and document', then the associated **document** with its equivalent **product_definition** will have a corresponding **product_related_product_-category.name** ='data definition exchange' or 'indentured data list'.

5.2.4.22 item_source_information_identification_constraint

The **item_source_information_identification_constraint** rule specifies the string values that identify the item source information.

NOTE This rule applies to mapping table rule 23.

EXPRESS specification:

```
*)
RULE item_source_information_identification_constraint
   FOR (property_definition);
LOCAL
  result : BOOLEAN  := TRUE;
  prpd   : SET OF property_definition;
  prdr   : BAG OF property_definition_representation;
END_LOCAL;
  prpd := property_definition;
  REPEAT i := 1 TO SIZEOF(prpd);
    IF (prpd[i].name = 'source information') THEN
      result := FALSE;
      prdr := USEDIN(prpd[i],'TECHNICAL_DATA_PACKAGING.'+
                     'PROPERTY_DEFINITION_REPRESENTATION.DEFINITION');
      REPEAT j := 1 TO SIZEOF(prdr);
        IF (prdr[j].used_representation.name = 'source information type')
THEN
          result := TRUE;
        END_IF;
      END_REPEAT;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

property_definition: identifies the set of all instances of **property_definition** entities.

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Formal propositions:

WR1: A **property_definition** with the **property_definition.name** ='source information' shall have an associated **representation** with the **representation.name** ='source information type'.

5.2.4.23 notation_type_identification_constraint

The **notation_type_identification_constraint** rule specifies the string values required to identify **notation** and their types.

NOTE This rule applies to mapping table rule 24.

EXPRESS specification:

```
*)
RULE notation_type_identification_constraint
  FOR (representation);
LOCAL
  result : BOOLEAN;
  note : SET OF representation;
END_LOCAL;
  note := QUERY(rep <* representation | rep.name='notation');
  result := FALSE;
  REPEAT i := 1 TO SIZEOF(note);
    REPEAT j := 1 TO SIZEOF(note[i].items);
      IF ('TECHNICAL_DATA_PACKAGING.DESCRIPTIVE_REPRESENTATION_ITEM' IN
TYPEOF(note[i].items[j])) then
        result := TRUE;
        ESCAPE;
      END_IF;
    END_REPEAT;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

representation: identifies the set of all instances of **representation** entities.

Formal propositions:

WR1: Each **representation** with the **representation.name** ='notation' shall have a one or more associated **descriptive_representation_item** and the **descriptive_representation_item**.

5.2.4.24 product_requires_person_organization

The **product_requires_person_organization** rule specifies that a **product_definition_formation** requires the association with an **organization** or **person_and_organization**. The organization and person is a parameter that aids in uniquely identifying the **product_definition_formation**.

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NOTE 1 More than one organization or person_and_organization may be associated with a product. This rule specifies that at least one of those organization_assignment.role or person_and_organization.role attrubutes have the value of ‘id owner’ or ‘creator’.

NOTE 2 This rule applies to mapping table rule 25.

EXPRESS specification:

```
*)
RULE product_requires_person_organization
   FOR (product_definition_formation);
LOCAL
  found  : BOOLEAN;
  result : BOOLEAN := TRUE;
  pdf    : SET OF product_definition_formation;
  apos   : BAG OF applied_person_and_organization_assignment;
  apoa   : BAG OF applied_organization_assignment;
END_LOCAL;
  pdf := product_definition_formation;
  REPEAT i := 1 TO SIZEOF(pdf);
    apos := USEDIN(pdf[i], ‘TECHNICAL_DATA_PACKAGING.’ +
                   'APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT.ITEMS');
    found := FALSE;
    REPEAT j := 1 TO SIZEOF(apos);
      IF (EXISTS(apos[j].role)) THEN
        IF ((apos[j].role.name = 'id owner') OR
            (apos[j].role.name = 'creator')) THEN
          found := TRUE;
        END_IF;
      END_IF;
    END_REPEAT;
    IF (found) THEN
      result := TRUE;
      ESCAPE;
    END_IF;
    apoa := USEDIN(pdf[i], ‘TECHNICAL_DATA_PACKAGING.’ +
                   'APPLIED_ORGANIZATION_ASSIGNMENT.ITEMS');
    REPEAT j := 1 TO SIZEOF(apoa);
      IF (EXISTS(apoa[j].role)) THEN
        IF ((apoa[j].role.name = 'id owner') OR
            (apoa[j].role.name = 'creator')) THEN
          found := TRUE;
        END_IF;
      END_IF;
    END_REPEAT;
    IF (NOT found) THEN
      result := FALSE;
      ESCAPE;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

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Argument definitions:

product_definition_formation: identifies the set of all instances of **product_definition_formation** entities.

Formal propositions:

WR1: A **product_definition_formation** shall be pointed to by one of the following:

— a **person_and_organization_assignment** where the **person_and_organization_assignment.role** points to a **person_and_organization_role** and the **person_and_organization_role.name** ='id owner' or 'creator';

— an **organization_assignment** where **organization_assignment.role** points to an **organization_role** where the **organization_role.name** ='id owner' of 'creator'.

NOTE Related to mapping rule 14.

5.2.4.25 reference_document_requires_subcategorization

The **reference_document_requires_subcategorization** rule specifies that a **product_related_product_-category.name='reference document'** requires a lower level categorization using **product_category**.

NOTE This rule applies to mapping table rule 26.

EXPRESS specification:

```
*)
RULE reference_document_requires_subcategorization
    FOR (product_related_product_category);
LOCAL
  result : BOOLEAN := TRUE;
  prpc : SET OF product_related_product_category;
  pcr : BAG OF product_category_relationship;
END_LOCAL;
  prpc := QUERY(v <* product_related_product_category |
                          v\product_category.name = 'reference document');
  REPEAT i := 1 TO SIZEOF(prpc);
  pcr := USEDIN(prpc[i], 'TECHNICAL_DATA_PACKAGING.'+
                 'PRODUCT_CATEGORY_RELATIONSHIP.CATEGORY');
    IF SIZEOF(pcr) < 1 THEN
      result := FALSE;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

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Argument definitions:

product_related_product_category: identifies the set of all instances of **product_related_-product_-category** entities.

Formal propositions:

WR1: A product_related_product_category.name='reference document' shall never be instanced without an associated subcategory.

5.2.4.26 release_authentication_string_restriction

The **release_authentication_string_restriction** rule specifies how certain attribute string values in **approval**, **approval_role**, **identification_role**, and **approval_date_time_role** denote specific release authentication parameters.

NOTE 1 This rule applies to mapping table rule 27, 28, and 29.

EXPRESS specification:

```
*)
RULE release_authentication_string_restriction
  FOR (approval);
LOCAL
  result1 : BOOLEAN := TRUE;
  result2 : BOOLEAN := TRUE;
  found   : BOOLEAN;
  ar      : STRING := 'release authentication';
  appr    : SET OF approval;
  aaa     : BAG OF applied_approval_assignment;
  apo     : BAG OF approval_person_organization;
  adt     : BAG OF approval_date_time;
END_LOCAL;
  appr := approval;
  (* For each approval *)
  REPEAT i := 1 TO SIZEOF(appr);
    aaa := USEDIN(appr[i],'TECHNICAL_DATA_PACKAGING.'+
                  'APPROVAL_ASSIGNMENT.ASSIGNED_APPROVAL');
    (* Look for a release authentication approval assignment *)
    found := FALSE;
    REPEAT j := 1 TO SIZEOF(aaa);
      IF (EXISTS(aaa[j]\approval_assignment.role)) THEN
        IF (aaa[j].role.name = ar) THEN
          found := TRUE;
        END_IF;
      END_IF;
    END_REPEAT;
    IF (found) THEN
      (* Check for corresponding approval person organization *)
      apo := USEDIN(appr[i], 'TECHNICAL_DATA_PACKAGING.'+
                    'APPROVAL_PERSON_ORGANIZATION.AUTHORIZED_APPROVAL');
      found := FALSE;
      REPEAT j := 1 TO SIZEOF(apo);
        IF (EXISTS(apo[j].role)) THEN
          IF (apo[j].role.role = ar) THEN
            found := TRUE;
          END_IF;
```

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```
        END_IF;
      END_REPEAT;
      IF (NOT found) THEN
        result1 := FALSE;
      END_IF;
      (* Check for corresponding approval date time *)
      adt := USEDIN(appr[i], 'TECHNICAL_DATA_PACKAGING.'+
                    'APPROVAL_DATE_TIME.DATED_APPROVAL');
      found := FALSE;
      REPEAT j := 1 TO SIZEOF(adt);
        IF (EXISTS(adt[j].role)) then
          IF (adt[j].role.name = ar) THEN
            found := TRUE;
          END_IF;
        END_IF;
      END_REPEAT;
      IF (NOT found) THEN
        result2 := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result1;
  wr2 : result2;
END_RULE;
(*
```

Argument definitions:

applied_approval_assignment: identifies the set of all instances of **applied_approval_assignment** entities.

Formal propositions:

WR1: An **approval,** where its **applied_approval_assignment**'s associated **object_role.name** ='release authentication', shall have a **organization** or a **person_and_organization** that points to it and the associated **approval_role.role** ='release authentication'.

NOTE 2 This rule applies to mapping table rule 27.

WR2: An **approval**, where its **applied_approval_assignment**'s associated **object_role.name** = 'release authentication' shall be pointed to by an **approval_date_time** where the associated **approval_date_time_-role.name** = 'release authentication'.

NOTE 3 This rule applies to mapping table rule 29.

Informal propositions:

IP1: An **approval**, where its **applied_approval_assignment**'s associated **object_role.name** ='release authentication' shall have an **organization** or a **person_and_organization** that points to it. The **organization** shall have zero or one **applied_identification_assignment** pointing at it with an associated **identificaiton_role.name** equal to 'alias id'.

NOTE 4 This rule applies to mapping table rule 28.

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5.2.4.27 security_classification_date_string_restriction

The **security_classification_date_string_restriction** rule specifies how certain attribute string values in **date_role** and **date_time_role** denote specific classification and declassification dates.

NOTE 1 This rule applies to mapping table rule 30 and 31.

EXPRESS specification:

```
*)
RULE security_classification_date_string_restriction
    FOR (applied_security_classification_assignment);
LOCAL
  result  : BOOLEAN  := TRUE;   -- If there is no "security_assignment",
                                -- constraint does not apply
  tresult : BOOLEAN;   -- Temporary result for each iteration
  asca    : SET OF applied_security_classification_assignment;
  adta    : BAG OF applied_date_and_time_assignment;
  ada     : BAG OF applied_date_assignment;
END_LOCAL;
  asca := applied_security_classification_assignment;
  REPEAT i := 1 TO SIZEOF (asca);
    adta := USEDIN(asca[i],‘TECHNICAL_DATA_PACKAGING.’+
                   'APPLIED_DATE_AND_TIME_ASSIGNMENT.ITEMS');
    tresult := FALSE;
    REPEAT j := 1 TO SIZEOF (adta);
      REPEAT k := 1 TO SIZEOF (adta[j].items); -- JRN added [j] index
        IF (adta[j].items[k] = asca[i]) THEN
          IF (EXISTS(adta[j]\date_and_time_assignment.role)) then
            IF (adta[j]\date_and_time_assignment.role.name =
                  'classification date') THEN
              tresult := TRUE;
            END_IF;
          END_IF;
          result := result AND tresult;
        END_IF;
      END_REPEAT;
    END_REPEAT;
    ada := USEDIN(asca[i],‘TECHNICAL_DATA_PACKAGING.’+
                  'APPLIED_DATE_ASSIGNMENT.ITEMS');
    REPEAT j := 1 TO SIZEOF (ada);
      REPEAT k := 1 TO SIZEOF (ada[j].items);-- JRN added [j] index
        IF (ada[j].items[k] = asca[i]) THEN
          IF (EXISTS(ada[j]\date_assignment.role)) THEN
            IF (ada[j]\date_assignment.role.name = 'classification date')
THEN
              tresult := TRUE;
            END_IF;
          END_IF;
          result := result AND tresult;
        END_IF;
      END_REPEAT;
    END_REPEAT;
  END_REPEAT;
WHERE
```

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```
  wr1: result;
END_RULE;
(*
```

Argument definitions:

applied_security_classification_assignment: identifies the set of all instances of **applied_security_-classification_assignment** entities.

Formal propositions:

WR1: An **applied_security_classification_assignment** shall be pointed to either:

— by a **date_assignment** where the **date_role.name** ='classification date'; OR

— by a **date_and_time_assignment** where the **date_time_role.name** = 'classification date'.

NOTE 2 This rule applies to mapping table rule 30.

Informal proposition:

IP1: An **applied_security_classification_assignment** shall be pointed to by zero or one of either:

— by a **date_assignment** where the **date_role.name** ='declassification date'; OR

— by a **date_and_time_assignment** where the **date_time_role.name** = 'declassification date'.

NOTE 3 This rule applies to mapping table rule 31.

5.2.4.28 simple_list_of_elements_constraint

The **simple_list_of_elements_constraint** rule specifies the valid entities with in the select type **document_-reference_item** when used to identify a simple list of elements for a **data_definition_exchange** list.

NOTE This rule applies to mapping table rule 32.

EXPRESS specification:

```
*)
RULE simple_list_of_elements_constraint
  FOR (applied_document_reference);
LOCAL
  result : BOOLEAN := TRUE;
  adr    : SET OF applied_document_reference;
  dri    : SET OF document_reference_item;
END_LOCAL;
  adr := applied_document_reference;
  REPEAT i := 1 TO SIZEOF(adr);
    IF (EXISTS(adr[i]\document_reference.role)) THEN
      IF (adr[i]\document_reference.role.name = 'list of elements') then
        dri := adr[i].items;
```

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```
        IF (SIZEOF(dri) < 1) THEN
          result := FALSE;
        END_IF;
        REPEAT j := 1 TO SIZEOF(dri);
          IF (NOT
      ('TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION' IN
TYPEOF(dri[j]))) THEN
            result := FALSE;
          END_IF;
        END_REPEAT;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

applied_document_reference: identifies the set of all instances of **applied_document_reference** entities.

Formal propositions:

WR1: For any **applied_document_reference** that has an associated **object_role.name** ='list of elements', the set of **document_reference_items** pointed to by the **applied_document_reference** shall be constrained to be of type **product_definition_formation**.

5.2.4.29 simple_list_of_files_constraint

The **simple_list_of_files_constraint** rule specifies the valid entities with in the select type **document_-reference_item** when used to identify a simple list of files for a Data_definition_exchange list.

NOTE This rule applies to mapping table rule 33.

EXPRESS specification:

```
*)
RULE simple_list_of_files_constraint
    FOR (applied_document_reference);
LOCAL
  result : BOOLEAN := TRUE;
  nameok : BOOLEAN;
  adr    : SET OF applied_document_reference;
  dri    : SET OF document_reference_item;
  drt    : SET OF document_representation_type;
END_LOCAL;
  adr := applied_document_reference;
  REPEAT i := 1 TO SIZEOF(adr);
    IF (EXISTS(adr[i]\document_reference.role)) THEN
      IF (adr[i]\document_reference.role.name = 'list of files') THEN
        dri := adr[i].items;
        IF (SIZEOF(dri) < 1) THEN
          result := FALSE;
        END_IF;
```

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```
        REPEAT j := 1 TO SIZEOF(dri);
          IF (NOT ('TECHNICAL_DATA_PACKAGING.DOCUMENT_FILE' IN
TYPEOF(dri[j]))) THEN
            result := FALSE;
          END_IF;
          drt := dri[j].representation_types;
          nameok := FALSE;
          REPEAT k := 1 TO SIZEOF(drt);
            IF ((drt[k].name = 'digital') OR (drt[k].name = 'physical'))
THEN
              nameok := TRUE;
            END_IF;
          END_REPEAT;
          IF (NOT nameok) THEN
            result := FALSE;
          END_IF;
        END_REPEAT;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1 : result;
END_RULE;
(*
```

Argument definitions:

applied_document_reference: identifies the set of all instances of **applied_document_reference** entities.

Formal propositions:

WR1: For any **applied_document_reference** that has an associated **object_role.name** ='list of files', the set of **document_reference_items** pointed to by the **applied_document_reference** shall be constrained to be of type **document_file**. The **document_file** shall have an associated **document_representation_-type.name** ='digital' or 'physical'.

5.2.4.30 text_literal_alignment_baseline_constraint

The **text_literal_alignment_baseline_constraint** rule specifies the values for the **text_literal.alignment**.

NOTE This rule applies to mapping table rule 34.

EXPRESS specification:

```
*)
RULE text_literal_alignment_baseline_constraint
   FOR (text_literal);

WHERE
 wr1 : SIZEOF(QUERY(t <* text_literal|
            NOT (t.alignment IN
                 ['left', 'center', 'right']))) = 0;
END_RULE;
(*
```

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Argument definitions:

text_literal: identifies the set of all instances of **text_literal** entities.

Formal propositions:

WR1: The values for **text_literal.alignment** shall be 'left', 'center', or 'right'.

5.2.4.31 text_literal_font_requires_externally_defined_text_font

The **text_literal_font_requires_externaly_defined_text_font** rule specifies the value for the **text_-literal.font**.

NOTE This rule applies to mapping table rule 35.

EXPRESS specification:

```
*)
RULE text_literal_font_requires_externally_defined_text_font
   FOR (text_literal);
WHERE
 wr1 : SIZEOF(QUERY(t <* text_literal |
          NOT (('TECHNICAL_DATA_PACKAGING.EXTERNALLY_DEFINED_TEXT_FONT') IN
             TYPEOF (t.font)))) = 0;
END_RULE;
(*
```

Argument definitions:

text_literal: identifies the set of all instances of **text_literal** entities.

Formal propositions:

WR1: The value for **text_literal.font** shall be **externally_defined_text_font**.

5.2.5 Technical_data_packaging funtion definitions

5.2.5.1 product_category_graph_members

The **product_category_graph_members** funtion specifies the set of **product_category** instances that are in the same **product_category_relationship**.

EXPRESS specification:

```
*)
FUNCTION product_category_graph_members (p : product_category) :
     SET OF product_category;
LOCAL
  result : SET OF product_category := [];
```

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```
  pcr : BAG OF product_category_relationship;
END_LOCAL;
  pcr := USEDIN(p, ‘TECHNICAL_DATA_PACKAGING.'+
                 'PRODUCT_CATEGORY_RELATIONSHIP.CATEGORY');
  IF (SIZEOF(pcr) > 0) THEN
    result := result + p;
    REPEAT i := 1 TO SIZEOF(pcr);
      result := result + product_category_graph_members(pcr[i].sub_-
category);
    END_REPEAT;
  END_IF;
  pcr := USEDIN(p, ‘TECHNICAL_DATA_PACKAGING.'+
                  'PRODUCT_CATEGORY_RELATIONSHIP.SUB_CATEGORY');
  IF (SIZEOF(pcr) > 0) THEN
    result := result + p;
    REPEAT i := 1 TO SIZEOF(pcr);
      result := result + product_category_graph_members(pcr[i].category);
    END_REPEAT;
  END_IF;
  RETURN(result);
END_FUNCTION;
(*
```

Argument definitions:

product_category: identifies an instance of a **product_category** entity.

Formal propositions:

Given an instance of a product_category, the function returns the (possibly empty) set of product_category instances that are in the same product_category_relationship graph.

```
*)
END_SCHEMA;
(*
```

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6 Conformance requirements

Conformance to this part of ISO 10303 includes satisfying the requirements stated in this part of ISO 10303, the requirements of the implementation method(s) supported, and the relevant requirements of the normative references.

An implementation shall support at least one of the following implementation methods:

— ISO 10303-21

Requirements with respect to implementation methods specific requirements are specified in annex C.

The Protocol Information Conformance Statement (PICS) proforma lists the options or the combinations of options that may be included in the implementation. The PICS proforma is provided in annex D.

This part of ISO 10303 provides for a number of options that may be supported by an implementation. These options have been grouped into the following conformance classes:

— Class 1: Data definition exchange (DDE) for files;

— Class 2: Data definition exchange (DDE) for TDP elements;

— Class 3: Data definition exchange (DDE) for indentured methods;

— Class 4: Parts list (PL);

— Class 5: Data list (DL);

— Class 6: Indentured data list (IDL);

— Class 7: Index list (IL);

— Class 8: Other list (OL);

— Class 9: List with presentation;

— Class 10: Reference document identification and drawing identification;

— Class 11: Reference document identification and drawing identification with ISO 10303-201 and ISO 10303-202 drawing presentation identification;

— Class 12: Product data set (PDS) without presentation format;

— Class 13: Product data set (PDS) with shading;

— Class 14: Product data set (PDS) with presentation format;

Support for a particular conformance class requires support of all the options specified in that class.

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This part of ISO 10303 specifies fourteen conformance classes. Table 15 identifies the fourteen conformance classes that are defined for this part of ISO 10303.

Table 15 - Conformance classes

Capabilities	Classes													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Data Definition Exchange for files	X								#					
Data Definition Exchange for TDP Elements		X							#					
Data Definition Exchange for Indentured Methods			X						#					
Parts List (PL)				X					#					
Data List (DL)					X				#					
Indentured Data List (IDL)						X			#					
Index List (IDL)							X		#					
Other List (OL)								X	#					
List Presentation									X					
Reference Document and Drawing Identification										X	X			
Reference Document and Drawing Presentation Identification with ISO 10303-201 and ISO 10303-202											X			
Product Data Set with surfaces and solids												X	X	X
Shading for surfaces and solids													X	X
Presentation, annotation, and tolerances for Product Data Set														X

Key: X - Must Exist
- List presentation may be directly associated to the data context identified in Conformance Classes 1-8

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Conformance to a particular class requires that all AIM elements defined as part of that class be supported. Table 16 defines the classes to which each AIM element belongs.

NOTE 1 ISO 10303-332[5] defines the abstract test suite to be used in the assessment of conformance. ISO 10303-32[6] describes the conformance assessment process.

NOTE 2 There may be AIM elements that do not belong to any conformance class but appear within the expanded listing by the use of the implicit reference rules of ISO 10303-11. These AIM elements are not required for any implementation of this part of ISO 10303, but were included in Table 16 for completeness.

NOTE 3 For each TDP element and the DDE there are different levels of capability that can be obtained in a data exchange. An implementation that is conformant to one or more of the following conformance classes shall support the highest level of capability. The different levels of capability are described in annex K.

NOTE 4 Files may conform to ISO 10303-21 coding for an ISO 10303-200 series part, raster files, or other formats agreed to by exchanging parties.

EXAMPLE 1 A business practice defines that each TDP element be contained in its own unique file.

EXAMPLE 2 A business practice defines that a particular collection of TDP elements be contained in a common file.

6.1 Data definition exchange for files, conformance class 1

The Data definition exchange for files has the ability to capture the packaging/shipping information required to identify and relate among one another the files exchanged, in whole or in part, between two enterprises or between two systems. Annex K.5 provides details as to the functionality of this conformance class and provides the list of application objects it supports.

6.2 Data definition exchange for TDP elements, conformance class 2

The Data definition exchange for TDP elements has the ability to capture the packaging/shipping information required to identify and relate among one another the documents and files exchanged, in whole or in part, between two enterprises or between two systems. Annex K.5 provides details as to the functionality of this conformance class and provides the list of application objects it supports.

6.3 Data definition exchange for indentured methods, conformance class 3

The Data definition exchange for indentured methods has the ability to capture the packaging/shipping information required to identify and relate among one another the product structure, documents and files exchanged, in whole or in part, between two enterprises or between two systems. Annex K.5 provides details as to the functionality of this conformance class and provides the list of application objects it supports.

---

[5] To be published.

[6] To be published.

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6.4 Parts list, conformance class 4

The Parts list conformance class has the ability to capture part or item information including configuration and accountability information for the purposes of exchanging the bill of material and product structure information between two enterprises or between two systems. These levels of capability do not address graphical presentation of the Parts List. A set of usage options for this conformance class have been established that provide guidance for implementations. The options include a minium level for simple commercial usage, a controlled level where more stringent requirements are needed, a limited history and material identification level, and a supplemental identification level. Annex K.2 provides more details as to the functionality of these conformance class's options and provides the list of application objects it supports.

6.5 Data list, conformance class 5

The Data list has the ability to capture document management and accountability information for the purposes of exchanging a list of document information between two enterprises or between two systems. A set of usage options for this conformance class have been established that provide guidance for implementations. The options include a minium level for simple commercial usage, a controlled level where more stringent requirements are needed, and a supplemental identification level. These levels of capability do not address graphical presentation of the Data List. Annex K.3 provides more details as to the functionality of this conformance class and provides the list of application objects it supports.

6.6 Indentured data list, conformance class 6

The Indentured data list has the ability to capture document management and accountability information for the purposes of exchanging a design document disclosing a master list of Technical Data Package elements (TDP elements) such as engineering drawings, associated lists, referenced documents, or other design disclosure data which together provide product design data for a given product, assembly, or detail. A set of usage options for this conformance class have been established that provide guidance for implementations. The options include a minium level for simple commercial usage, a controlled level where more stringent requirements are needed, a part number indenture basis, and a supplemental identification level. Annex K.6 provides more details as to the functionality of this conformance class and provides the list of application objects it supports.

6.7 Index list, conformance class 7

The Index list has the ability to capture document management and accountability information for the purposes of exchanging a list of data list, indentured data list and other index list information between two enterprises or between two systems. A set of usage options for this conformance class have been established that provide guidance for implementations. The options include a minium level for simple commercial usage, a controlled level where more stringent requirements are needed, and a supplemental identification level. These levels of capability do not address graphical presentation of the Index List. Annex K.4 provides more details as to the functionality of this conformance class and provides the list of application objects it supports.

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6.8 Other list, conformance class 8

Other list has the ability to capture the basic table information. Other list will allow the ability to provide row and column information about any product information that needs to be exchanged. Other list provides the same document management and accountability information as the other conformance classes.

6.9 List with presentation, conformance class 9

List with presentation has the ability to capture the presentation information of any document list. The presentation information provides the layout information of each page and the content information. Conformance class nine shall be implemented in conjunction with one or more of conformance classes, one through eight.

6.10 Reference document identification and drawing identification, Conformance Class 10

Reference document identification and drawing identification has the ability to capture the identification of any reference document or drawing with some basic document management and accountability information. The ability to document usage constraints for reference documents and sheet count for drawings is also provided. When this part of ISO 10303 is implemented independently of ISO 10303-201 or ISO 10303-202, the implementation method is defined in Annex C.2.1.

6.11 Reference document identification and drawing identification with ISO 10303-201 and ISO 10303-202 drawing presentation identification, Conformance Class 11

Reference document identification and drawing identification with ISO 10303-201 and ISO 10303-202 drawing presentation identification has the ability to associate the drawing's document management and accountability information to the drawing's content information captured with ISO 10303-201 and ISO 10303-202. The implementation method options are defined in Annex C.2.2 and C.2.3 for this part of ISO 10303 using ISO 10303-505 constructs.

6.12 Product data set (PDS) without presentation format, Conformance Class 12

Product data set (PDS) without presentation format has the ability to capture 3D models with surfaces and solids. This conformance class has the ability to capture document management and accountability information for the purposes of exchanging geometry data sets between two enterprises or between two systems. The geometry AICs that are options for this conformance class include the following:

— ISO 10303-501, AIC, Edge-based wireframe;

— ISO 10303-502, AIC, Shell-based wireframe;

— ISO 10303-503, AIC, Geometrically bounded 2D wireframe;

— ISO 10303-507, AIC, Geometrically bounded surface;

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— ISO 10303-508, AIC, Non-manifold surface;

— ISO 10303-509, AIC, Manifold surface;

— ISO 10303-510, AIC, Geometrically bounded wireframe;

— ISO 10303-511, AIC, Topologically bounded surface;

— ISO 10303-512, AIC, Faceted boundary rrepresentation;

— ISO 10303-513, AIC, Elementary boundary representation;

— ISO 10303-514, AIC, Advanced boundary representation;

— ISO 10303-515, AIC, Constructive solid geometry.

These AIC geometry options can be used together or independently to satisfy this conformance class.

6.13 Product data set (PDS) with shading, conformance class 13

Product data set (PDS) with shading has the ability to capture 3D models with surfaces, solids, and shading. Conformance class 13 is conformance class 12 and shading information. This conformance class has the ability to capture document management and accountability information for the purposes of exchanging geometry data sets between two enterprises or between two systems. AIC, ISO 10303-517, Mechanical design geometric presentation, provides the additinal functionality of conformance class 13 over conformance class 12.

6.14 Product data set (PDS) with presentation format, conformance class 14

Product data set (PDS) with presentation format has the ability to capture 3D models with surfaces, solids, shading, annotation, and presentation information for human readability. Conformance class 14 is conformance class 13 and annotation. This conformance class has the ability to capture document management and accountability information for the purposes of exchanging geometry data sets between two enterprises or between two systems. AIC, ISO 10303-518, Mechanical design shaded presentation, provides the additinal functionality of conformance class 14 over conformance class 13.

Table 16 - Conformance class elements

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
action	X	X	X	X	X	X	X	X		X	X	X	X	X
action_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
action_method	X	X	X	X	X	X	X	X		X	X	X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
action_method_with_document_reference	X	X	X	X	X	X	X	X		X	X	X	X	X
action_property				X										
action_property_representation				X										
action_relationship	X	X	X	X	X	X	X	X		X	X			
action_status	X	X	X	X	X	X	X	X		X	X			
address	X	X	X	X	X	X	X	X		X	X			
advanced_brep_shape_-representation												X	X	X
advanced_face												X	X	X
alternate_product_relationship	X	X	X	X		X						X	X	X
amount_of_substance_-measure_with_unit	X	X	X	X	X	X	X	X		X	X			
amount_of_substance_unit	X	X	X	X	X	X	X	X		X	X			
annotation_curve_occurrence									X					
annotation_occurrence									X			X	X	X
annotation_point_occurrence									X					
annotation_text									X					
annotation_text_character									X					
annotation_text_occurrence									X					
application_context	X	X	X	X	X	X	X	X		X	X	X	X	X
application_context_element	X	X	X	X	X	X	X	X		X	X	X	X	X
application_context_relationship	X	X	X	X	X	X	X	X		X	X	X	X	X
application_protocol_definition	X	X	X	X	X	X	X	X	X	X	X	X	X	X
applied_action_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
applied_approval_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
applied_classification_-assignment	X	X	X	X	X	X	X	X		X	X			
applied_contract_assignment	X	X	X	X	X	X	X	X		X	X			
applied_date_and_time_-assignment	X	X	X	X	X	X	X	X		X	X			
applied_date_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
applied_document_reference	X	X	X	X	X	X	X	X		X	X	X	X	X
applied_document_usage_-constraint_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
applied_effectivity_assignment	X	X	X	X										
applied_effectivity_context_-assignment	X	X	X	X										
applied_external_identification_-assignment	X	X	X	X										
applied_group_assignment	X	X	X	X	X	X	X	X		X	X			
applied_identification_-assignment	X	X	X	X										
applied_organization_assignment	X	X	X	X	X	X	X	X		X	X			
applied_organizational_project_-assignment	X	X	X	X	X	X	X	X		X	X			
applied_person_and_-organization_assignment	X	X	X	X	X	X	X	X		X	X			
applied_presented_item	X	X	X	X	X	X	X	X			X	X	X	X
applied_security_classification_-assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
approval	X	X	X	X	X	X	X	X		X	X	X	X	X
approval_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
approval_date_time	X	X	X	X	X	X	X	X		X	X	X	X	X
approval_person_organization	X	X	X	X	X	X	X	X		X	X	X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
approval_relationship				X										
approval_role	X	X	X	X	X	X	X	X		X	X			
approval_status	X	X	X	X	X	X	X	X		X	X			
area_dependent_annotation_-representation									X					
area_in_set									X					
area_measure_with_unit	X	X	X	X	X	X	X	X		X	X			
area_unit	X	X	X	X	X	X	X	X		X	X			
assembly_component_usage	X	X	X	X		X						X	X	X
assembly_component_usage_-substitute	X	X	X	X		X						X	X	X
assembly_component_usage_-substitute_with_ranking		X	X	X		X								
axis1_placement												X	X	X
axis2_placement_2d									X			X	X	X
axis2_placement_3d												X	X	X
b_spline_curve												X	X	X
b_spline_curve_with_knots												X	X	X
b_spline_surface												X	X	X
b_spline_surface_with_knots												X	X	X
background_colour													X	X
bezier_curve												X	X	X
bezier_surface												X	X	X
block												X	X	X
boolean_result												X	X	X
boundary_curve												X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
bounded_curve												X	X	X
bounded_pcurve												X	X	X
bounded_surface												X	X	X
bounded_surface_curve												X	X	X
box_domain												X	X	X
boxed_half_space												X	X	X
brep_with_voids												X	X	X
calendar_date	X	X	X	X	X	X	X	X		X	X	X	X	X
camera_image													X	X
camera_image_3d_with_scale									X					X
camera_model												X	X	X
camera_model_d3													X	X
camera_model_d3_with_hlhsr													X	X
camera_model_with_light_-sources													X	X
camera_usage													X	X
cartesian_point									X			X	X	X
cartesian_transformation_-operator												X	X	X
cartesian_transformation_-operator_3d												X	X	X
character_glyph_style_outline									X					X
character_glyph_style_stroke									X					X
character_glyph_symbol									X					
characterized_object						X								
circle												X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
class	X	X	X	X	X	X	X	X		X	X	X	X	X
class_system	X	X	X	X	X	X	X	X		X	X	X	X	X
classification_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
classification_role	X	X	X	X	X	X	X	X		X	X	X	X	X
closed_shell												X	X	X
colour													X	X
colour_rgb													X	X
colour_specification													X	X
composite_curve												X	X	X
composite_curve_on_surface												X	X	X
composite_curve_segment												X	X	X
composite_text									X					
compound_representation_item												X	X	X
configuration_design	X	X	X	X	X	X	X	X		X	X			
configuration_effectivity	X	X	X	X	X	X	X	X		X	X			
configuration_item	X	X	X	X	X	X	X	X		X	X	X	X	X
conic												X	X	X
conical_surface												X	X	X
connected_edge_set												X	X	X
connected_face_set												X	X	X
context_dependent_unit	X	X	X	X	X	X	X	X		X	X			
contract	X	X	X	X	X	X	X	X		X	X			
contract_assignment	X	X	X	X	X	X	X	X		X	X			
contract_relationship	X	X	X	X	X	X	X	X		X	X			
contract_type	X	X	X	X	X	X	X	X		X	X			

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
conversion_based_unit	X	X	X	X	X	X	X	X		X	X			
coordinated_universal_time_-offset	X	X	X	X	X	X	X	X		X	X	X	X	X
csg_shape_representation												X	X	X
csg_solid												X	X	X
curve												X	X	X
curve_bounded_surface												X	X	X
curve_replica												X	X	X
curve_style													X	X
curve_style_font														X
curve_style_font_pattern														X
curve_style_rendering													X	X
cylindrical_surface												X	X	X
date	X	X	X	X	X	X	X	X		X	X	X	X	X
date_and_time	X	X	X	X	X	X	X	X		X	X	X	X	X
date_and_time_assignment	X	X	X	X	X	X	X	X		X	X			
date_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
date_role	X	X	X	X	X	X	X	X		X	X	X	X	X
date_time_role	X	X	X	X	X	X	X	X		X	X			
dated_effectivity			X	X		X								
defined_character_glyph									X					
definitional_representation												X	X	X
degenerate_pcurve												X	X	X
degenerate_toroidal_surface												X	X	X
derived_unit	X	X	X	X	X	X	X	X		X	X			

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
derived_unit_element	X	X	X	X	X	X	X	X		X	X			
description_attribute	X	X	X	X	X	X	X	X		X	X	X	X	X
descriptive_representation_item	X	X	X	X	X	X	X	X		X	X	X	X	X
design_make_from_relationship				X										
dimensional_exponents				X										
direction												X	X	X
document	X	X	X	X	X	X	X	X		X	X	X	X	X
document_file	X	X	X											
document_product_association	X	X	X	X	X	X	X	X		X	X	X	X	X
document_product_equivalence	X	X	X	X	X	X	X	X		X	X	X	X	X
document_reference	X	X	X	X	X	X	X	X		X	X	X	X	X
document_relationship				X		X	X			X	X	X	X	X
document_representation_type	X	X	X	X	X	X	x	X		X	X	X	X	X
document_type	X	X	X	X	X	X	X	X		X	X	X	X	X
document_usage_constraint	X	X	X	X	X	X	X	X		X	X	X	X	X
document_usage_constraint_-assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
document_usage_role	X	X	X	X	X	X	X	X		X	X	X	X	X
draughting_approval_assignment											X			
draughting_callout											X			X
draughting_drawing_revision				X	X			X			X			
draughting_pre_defined_colour														X
draughting_pre_defined_curve_-font														X
draughting_title											X			X
drawing_definition											X			

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
drawing_revision					X						X			
drawing_sheet_revision					X	X					X			
edge												X	X	X
edge_based_wireframe_model												X	X	X
edge_based_wireframe_shape_-representation												X	X	X
edge_curve												X	X	X
edge_loop												X	X	X
effectivity			X	X		X								
effectivity_assignment			X	X		X								
effectivity_context_assignment			X	X		X								
effectivity_context_role			X	X		X								
effectivity_relationship	X	X	X	X	X	X	X	X		X	X			
electric_current_measure_with_-unit	X	X	X	X	X	X	X	X		X	X			
electric_current_unit			X	X		X								
elementary_brep_shape_-representation												X	X	X
elementary_surface												X	X	X
ellipse												X	X	X
evaluated_degenerate_pcurve												X	X	X
executed_action	X	X	X	X	X	X	X	X		X	X	X	X	X
external_identification_-assignment	X		X						X					
external_source	X		X						X					
externally_defined_character_-glyph									X					

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
externally_defined_item									X					
externally_defined_planar_box									X					
externally_defined_style									X					
externally_defined_symbol									X					
externally_defined_symbol_-and_placement									X					
externally_defined_text_font									X					
extruded_face_solid												X	X	X
face												X	X	X
face_based_surface_model												X	X	X
face_bound												X	X	X
face_outer_bound												X	X	X
face_surface												X	X	X
faceted_brep												X	X	X
faceted_brep_shape_-representation												X	X	X
fill_area_style														X
fill_area_style_colour														X
founded_item												X	X	X
functionally_defined_-transformation												X	X	X
geometric_curve_set												X	X	X
geometric_representation_-context									X			X	X	X
geometric_representation_item									X			X	X	X
geometric_set												X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
geometrically_bounded_2d_-wireframe_representation												X	X	X
geometrically_bounded_-surface_shape_representation												X	X	X
geometrically_bounded_-wireframe_shape_representation												X	X	X
global_unit_assigned_context									X			X	X	X
group	X	X	X	X	X	X	X	X		X	X			
group_assignment	X	X	X	X	X	X	X	X		X	X			
group_relationship	X	X	X	X	X	X	X	X		X	X			
half_space_solid												X	X	X
hyperbola												X	X	X
id_attribute	X	X	X	X	X	X	X	X		X	X	X	X	X
identification_assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
identifcation_assignment_-relationship	X	X	X	X	X	X	X	X		X	X	X	X	X
identification_role	X	X	X	X	X	X	X	X		X	X	X	X	X
intersection_curve												X	X	X
invisibility														X
item_defined_transformation												X	X	X
item_identified_representation_-usage												X	X	X
language_assignment	X	X	X	X	X	X	X	X		X	X			X
length_measure_with_unit	X	X	X	X	X	X	X	X	X	X	X			
length_unit	X	X	X	X	X	X	X	X	X	X	X			
library_context									X					
light_source													X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
light_source_ambient													X	X
light_source_direction													X	X
light_source_positional													X	X
light_source_spot													X	X
line												X	X	X
local_time	X	X	X	X	X	X	X	X		X	X	X	X	X
loop												X	X	X
lot_effectivity			X	X		X								
luminous_intensity_measure_-with_unit	X	X	X	X	X	X	X	X		X	X			
luminous_intensity_unit	X	X	X	X	X	X	X	X		X	X			
make_from_usage_option				X										
make_from_usage_option_-with_reference_designator				X										
manifold_solid_brep												X	X	X
manifold_surface_shape_-representation												X	X	X
mapped_item								X	X			X	X	X
mass_measure_with_unit	X	X	X	X	X	X	X	X		X	X			
mass_unit	X	X	X	X	X	X	X	X		X	X			
material_designation				X										
measure_qualification				X										
measure_representation_item	X	X	X	X	X	X	X	X		X	X			
measure_with_unit	X	X	X	X	X	X	X	X		X	X			
mechanical_design_geometric_-presentation_area													X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
mechanical_design_geometric_-presentation_representation													X	X
mechanical_design_shaded_-presentation_area													X	X
mechanical_design_shaded_-presentation_representation													X	X
name_attribute	X	X	X	X	X	X	X	X		X	X	X	X	X
named_unit	X	X	X	X	X	X	X	X	X	X	X			
next_assembly_usage_-occurrence			X	X										
non-manifold_surface_shape_-representation												X	X	X
object_role	X	X	X	X	X	X	X	X		X	X	X	X	X
offset_curve_2d												X	X	X
offset_curve_3d												X	X	X
offset_surface												X	X	X
open_shell												X	X	X
organization	X	X	X	X	X	X	X	X		X	X	X	X	X
organization_assignment	X	X	X	X	X	X	X	X		X	X			
organization_relationship	X	X	X	X	X	X	X	X		X	X	X	X	X
organization_role	X	X	X	X	X	X	X	X		X	X	X	X	X
organizational_address	X	X	X	X	X	X	X	X		X	X	X	X	X
organizational_project	X	X	X	X	X	X	X	X		X	X	X	X	X
organizational_project_-assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
organizational_project_-relationship	X	X	X	X	X	X	X	X		X	X	X	X	X
organizational_project_role	X	X	X	X	X	X	X	X		X	X	X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
oriented_closed_shell												X	X	X
oriented_edge												X	X	X
oriented_face												X	X	X
oriented_open_shell												X	X	X
oriented_path												X	X	X
other_list_table_representation								X						
outer_boundary_curve												X	X	X
over_riding_style_item									X					X
parabola												X	X	X
parametric_representation_-context												X	X	X
path												X	X	X
pcurve												X	X	X
person	X	X	X	X	X	X	X	X		X	X	X	X	X
person_and_organization	X	X	X	X	X	X	X	X		X	X	X	X	X
person_and_organization_-assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
person_and_organization_role	X	X	X	X	X	X	X	X		X	X	X	X	X
personal_address	X	X	X	X	X	X	X	X		X	X			
placement									X			X	X	X
planar_box									X			X	X	X
planar_extent									X			X	X	X
plane									X			X	X	X
plane_angle_measure_with_unit	X	X	X	X	X	X	X	X		X	X			
plane_angle_unit	X	X	X	X	X	X	X	X		X	X			
point									X			X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
point_on_curve												X	X	X
point_on_surface												X	X	X
point_replica												X	X	X
point_style													X	X
poly_loop												X	X	X
polyline												X	X	X
pre_defined_character_glyph									X					
pre_defined_colour													X	X
pre_defined_curve_font														X
pre_defined_item													X	X
pre_defined_text_font									X					X
presentation_area					X	X			X					X
precision_qualifier				X										
presentation_representation					X	X			X		X	X	X	X
presentation_set	X	X	X	X	X	X	X	X	X		X			X
presentation_size									X				X	X
presentation_style_assignment													X	X
presentation_style_by_context													X	X
presentation_view													X	X
presented_item	X	X	X	X	X	X	X	X			X	X	X	X
presented_item_representation	X	X	X	X	X	X	X	X			X	X	X	X
process_product_association	X	X	X	X	X	X	X	X		X	X	X	X	X
product	X	X	X	X	X	X	X	X		X	X	X	X	X
product_category	X	X	X	X	X	X	X	X		X	X	X	X	X
product_category_relationship	X	X	X	X	X	X	X	X		X	X	X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
product_concept	X	X	X	X	X	X	X	X		X	X	X	X	X
product_concept_context	X	X	X	X	X	X	X	X		X	X	X	X	X
product_context	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_context	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_context_-association	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_context_role	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_effectivity	X	X	X	X	X	X	X	X		X	X			
product_definition_formation	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_formation_-relationship	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_formation_-with_specified_source	X	X	X	X	X	X	X	X		X	X	X	X	X
pproduct_definition_-occurrence_relationship			X	X		X								
product_definition_process	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_relationship	X	X	X	X	X	X	X	X		X	X	X	X	X
product_definition_shape									X			X	X	X
product_definition_substitute			X	X		X								
product_definition_usage	X	X	X	X		X						X	X	X
product_definition_with_-associated_documents	X	X	X	X	X	X	X	X		X	X	X	X	X
product_related_product_-category	X	X	X	X	X	X	X	X		X	X	X	X	X
product_relationship	X	X	X	X	X	X	X	X		X	X	X	X	X
promissory_usage_occurrence	X	X	X	X		X						X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
property_definition	X	X	X	X	X	X	X	X		X	X	X	X	X
property_definition_relationship												X		X
property_definition_-representation	X	X	X	X	X	X	X	X		X	X	X	X	X
qualified_representation_item				X										
quantified_assembly_-component_usage			X	X		X								
quasi_uniform_curve												X	X	X
quasi_uniform_surface												X	X	X
ratio_measure_with_unit	X	X	X	X	X	X	X	X		X	X			
ratio_unit	X	X	X	X	X	X	X	X		X	X			
rational_b_spline_curve												X	X	X
rational_b_spline_surface												X	X	X
rectangular_composite_surface												X	X	X
rectangular_trimmed_surface												X	X	X
reparametrised_composite_-curve_segment												X	X	X
representation	X	X	X	X	X	X	X	X	X	X	X	X	X	X
representation_context	X	X	X	X	X	X			X			X	X	X
representation_item	X	X	X	X	X	X	X	X	X	X	X	X	X	X
representation_item_relationship								X				X	X	X
representation_map								X	X			X	X	X
representation_relationship								X						
revolved_face_solid												X	X	X
right_angular_wedge												X	X	X
right_circular_cone												X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
right_circular_cylinder												X	X	X
role_association	X	X	X	X	X	X	X	X		X	X	X	X	X
seam_curve												X	X	X
security_classification	X	X	X	X	X	X	X	X		X	X	X	X	X
security_classification_-assignment	X	X	X	X	X	X	X	X		X	X	X	X	X
security_classification_level	X	X	X	X	X	X	X	X		X	X	X	X	X
serial_numbered_effectivity			X	X		X								
shape_aspect												X	X	X
shape_aspect_relationship												X	X	X
shape_representation												X	X	X
shell_based_surface_model												X	X	X
shell_based_wireframe_model												X	X	X
shell_based_wireframe_shape_-representation												X	X	X
si_unit				X										
solid_angle_measure_with_unit	X	X	X	X	X	X	X	X		X	X			
solid_angle_unit	X	X	X	X	X	X	X	X		X	X			
solid_model												X	X	X
solid_replica												X	X	X
specified_high_usage_-occurrence	X	X	X	X		X						X	X	X
sphere												X	X	X
spherical_surface												X	X	X
styled_item									X				X	X
surface												X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
surface_curve												X	X	X
surface_of_linear_extrusion												X	X	X
surface_of_revolution												X	X	X
surface_patch												X	X	X
surface_rendering_properties													X	X
surface_replica												X	X	X
surface_side_style													X	X
surface_style_boundary													X	X
surface_style_control_grid														X
surface_style_fill_area														X
surface_style_parameter_line														X
surface_style_reflectance_-ambient													X	X
surface_style_reflectance_-ambient_diffuse													X	X
surface_style_reflectance_-ambient_diffuse_specular													X	X
surface_style_rendering													X	X
surface_style_rendering_with_-properties													X	X
surface_style_segmentation_-curve													X	X
surface_style_silhouette														X
surface_style_transparent												X	X	X
surface_style_usage												X	X	X
swept_face_solid												X	X	X
swept_surface												X	X	X

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Table 16 - Conformance class elements (continued)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
symbol_representation									X					
text_literal									X					
text_string_representation									X					
text_style									X					X
text_style_for_defined_font									X					X
thermodynamic_temperature_-measure_with_unit	X	X	X	X	X	X	X	X		X	X			
thermodynamic_temperature_-unit	X	X	X	X	X	X	X	X		X	X			
time_measure_with_units	X	X	X	X	X	X	X	X		X	X			
time_unit	X	X	X	X	X	X	X	X		X	X			
topological_representation_item												X	X	X
toroidal_surface												X	X	X
torus												X	X	X
trimmed_curve												X	X	X
type_qualifier				X										
uniform_curve												X	X	X
uniform_surface												X	X	X
vector												X	X	X
vertex												X	X	X
vertex_loop												X	X	X
vertex_point												X	X	X
vertex_shell												X	X	X
view_volume				X										
volume_measure_with_unit	X	X	X	X	X	X	X	X		X	X			
volume_unit	X	X	X	X	X	X	X	X		X	X			

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Conformance class elements (concluded)

AIM element	Class													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
wire_shell												X	X	X

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Annex A
(normative)

AIM EXPRESS expanded listing

The following EXPRESS is the expanded form of the short form schema given in 5.2. In the event of any discrepancy between the short form and this expanded listing, the expanded listing shall be used.

```
SCHEMA technical_data_packaging;

  CONSTANT
  dummy_gri : geometric_representation_item := representation_item('') ||
                 geometric_representation_item();
  dummy_tri : topological_representation_item := representation_item('')
                 || topological_representation_item();
  END_CONSTANT;

  TYPE action_item = SELECT
    (document_file,
     product_definition,
     product_definition_with_associated_documents,
     product_definition_relationship,
     product_definition_formation,
     property_definition,
     representation);
  END_TYPE; -- action_item

  TYPE ahead_or_behind = ENUMERATION OF
    (ahead,
     exact,
     behind);
  END_TYPE; -- ahead_or_behind

  TYPE amount_of_substance_measure = REAL;
  END_TYPE; -- amount_of_substance_measure

  TYPE approval_item = SELECT
    (action,
     applied_effectivity_assignment,
     configuration_effectivity,
     configuration_item,
     contract,
     document_file,
     product_definition,
     property_definition,
     product_definition_formation);
  END_TYPE; -- approval_item

  TYPE approved_item = SELECT
    (drawing_revision,
     drawing_sheet_revision);
  END_TYPE; -- approved_item

  TYPE area_measure = REAL;
  END_TYPE; -- area_measure
```

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```
TYPE area_or_view = SELECT
  (presentation_area,
   presentation_view);
END_TYPE; -- area_or_view

TYPE attribute_type = SELECT
  (label,
   text);
END_TYPE; -- attribute_type

TYPE axis2_placement = SELECT
  (axis2_placement_2d,
   axis2_placement_3d);
END_TYPE; -- axis2_placement

TYPE b_spline_curve_form = ENUMERATION OF
  (polyline_form,
   circular_arc,
   elliptic_arc,
   parabolic_arc,
   hyperbolic_arc,
   unspecified);
END_TYPE; -- b_spline_curve_form

TYPE b_spline_surface_form = ENUMERATION OF
  (plane_surf,
   cylindrical_surf,
   conical_surf,
   spherical_surf,
   toroidal_surf,
   surf_of_revolution,
   ruled_surf,
   generalised_cone,
   quadric_surf,
   surf_of_linear_extrusion,
   unspecified);
END_TYPE; -- b_spline_surface_form

TYPE boolean_operand = SELECT
  (solid_model,
   half_space_solid,
   csg_primitive,
   boolean_result);
END_TYPE; -- boolean_operand

TYPE boolean_operator = ENUMERATION OF
  (union,
   intersection,
   difference);
END_TYPE; -- boolean_operator

TYPE central_or_parallel = ENUMERATION OF
  (central,
   parallel);
END_TYPE; -- central_or_parallel

TYPE character_spacing_select = SELECT
  (length_measure,
   ratio_measure,
```

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```
     measure_with_unit,
     descriptive_measure);
  END_TYPE; -- character_spacing_select

  TYPE character_style_select = SELECT
    (character_glyph_style_stroke,
     character_glyph_style_outline,
     text_style_for_defined_font);
  END_TYPE; -- character_style_select

  TYPE characterized_action_definition = SELECT
    (action,
     action_method,
     action_relationship);
  END_TYPE; -- characterized_action_definition

  TYPE characterized_definition = SELECT
    (characterized_object,
     characterized_product_definition,
     shape_definition);
  END_TYPE; -- characterized_definition

  TYPE characterized_product_definition = SELECT
    (product_definition,
     product_definition_relationship);
  END_TYPE; -- characterized_product_definition

  TYPE classification_item = SELECT
    (action_status,
     approval,
     descriptive_representation_item);
  END_TYPE; -- classification_item

  TYPE classified_item = SELECT
    (drawing_revision,
     drawing_sheet_revision);
  END_TYPE; -- classified_item

  TYPE compound_item_definition = SELECT
    (list_representation_item);
  END_TYPE; -- compound_item_definition

  TYPE configuration_design_item = SELECT
    (product_definition,
     product_definition_formation);
  END_TYPE; -- configuration_design_item

  TYPE context_dependent_measure = REAL;
  END_TYPE; -- context_dependent_measure

  TYPE contract_item = SELECT
    (executed_action,
     product_definition,
     product_definition_formation,
     product_definition_with_associated_documents,
     property_definition);
  END_TYPE; -- contract_item

  TYPE contracted_item = SELECT
```

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```
  (drawing_revision);
END_TYPE; -- contracted_item

TYPE count_measure = NUMBER;
END_TYPE; -- count_measure

TYPE csg_primitive = SELECT
  (sphere,
   block,
   right_angular_wedge,
   torus,
   right_circular_cone,
   right_circular_cylinder);
END_TYPE; -- csg_primitive

TYPE csg_select = SELECT
  (boolean_result,
   csg_primitive);
END_TYPE; -- csg_select

TYPE curve_font_or_scaled_curve_font_select = SELECT
  (curve_style_font_select);
END_TYPE; -- curve_font_or_scaled_curve_font_select

TYPE curve_on_surface = SELECT
  (pcurve,
   surface_curve,
   composite_curve_on_surface);
END_TYPE; -- curve_on_surface

TYPE curve_or_annotation_curve_occurrence = SELECT
  (curve,
   annotation_curve_occurrence);
END_TYPE; -- curve_or_annotation_curve_occurrence

TYPE curve_or_render = SELECT
  (curve_style,
   curve_style_rendering);
END_TYPE; -- curve_or_render

TYPE curve_style_font_select = SELECT
  (curve_style_font,
   pre_defined_curve_font);
END_TYPE; -- curve_style_font_select

TYPE date_and_time_item = SELECT
  (applied_contract_assignment,
   applied_security_classification_assignment,
   executed_action,
   product_definition,
   product_definition_formation);
END_TYPE; -- date_and_time_item

TYPE date_item = SELECT
  (applied_contract_assignment,
   applied_security_classification_assignment,
   executed_action,
   product_definition,
```

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```
    product_definition_formation);
END_TYPE; -- date_item

TYPE date_time_or_event_occurrence = SELECT
  (date_time_select);
END_TYPE; -- date_time_or_event_occurrence

TYPE date_time_select = SELECT
  (date,
   local_time,
   date_and_time);
END_TYPE; -- date_time_select

TYPE day_in_month_number = INTEGER;
WHERE
  wr1: ((1 <= SELF) AND (SELF <= 31));
END_TYPE; -- day_in_month_number

TYPE defined_glyph_select = SELECT
  (pre_defined_character_glyph,
   externally_defined_character_glyph);
END_TYPE; -- defined_glyph_select

TYPE defined_symbol_select = SELECT
  (externally_defined_symbol);
END_TYPE; -- defined_symbol_select

TYPE derived_property_select = SELECT
  (property_definition,
   action_property);
END_TYPE; -- derived_property_select

TYPE description_attribute_select = SELECT
  (application_context,
   approval_role,
   configuration_design,
   date_role,
   date_time_role,
   effectivity,
   external_source,
   organization_role,
   person_and_organization_role,
   person_and_organization,
   property_definition_representation,
   representation);
END_TYPE; -- description_attribute_select

TYPE descriptive_measure = STRING;
END_TYPE; -- descriptive_measure

TYPE dimension_count = INTEGER;
WHERE
  wr1: (SELF > 0);
END_TYPE; -- dimension_count

TYPE direction_count_select = SELECT
  (u_direction_count,
   v_direction_count);
END_TYPE; -- direction_count_select
```

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```
TYPE document_reference_item = SELECT
  (alternate_product_relationship,
   applied_document_reference,
   assembly_component_usage_substitute_with_ranking,
   descriptive_representation_item,
   document_file,
   executed_action,
   externally_defined_symbol_and_placement,
   make_from_usage_option,
   make_from_usage_option_with_reference_designator,
   next_assembly_usage_occurrence,
   product,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_occurrence_relationship,
   product_definition_relationship,
   product_definition_with_associated_documents,
   promissory_usage_occurrence,
   property_definition,
   quantified_assembly_component_usage,
   shape_aspect,
   shape_aspect_relationship,
   specified_higher_usage_occurrence);
END_TYPE; -- document_reference_item

TYPE document_usage_constraint_item = SELECT
  (alternate_product_relationship,
   applied_document_reference,
   assembly_component_usage_substitute_with_ranking,
   document_file,
   executed_action,
   externally_defined_symbol_and_placement,
   make_from_usage_option,
   make_from_usage_option_with_reference_designator,
   next_assembly_usage_occurrence,
   product,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_occurrence_relationship,
   product_definition_relationship,
   product_definition_with_associated_documents,
   promissory_usage_occurrence,
   property_definition,
   quantified_assembly_component_usage,
   shape_aspect,
   shape_aspect_relationship,
   specified_higher_usage_occurrence);
END_TYPE; -- document_usage_constraint_item

TYPE draughting_callout_element = SELECT
  (annotation_text_occurrence,
   annotation_curve_occurrence);
END_TYPE; -- draughting_callout_element

TYPE draughting_organization_item = SELECT
  (product_definition_formation,
   drawing_revision,
```

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```
    drawing_sheet_revision);
END_TYPE; -- draughting_organization_item

TYPE draughting_presented_item_select = SELECT
  (product_definition_formation);
END_TYPE; -- draughting_presented_item_select

TYPE draughting_titled_item = SELECT
  (drawing_revision,
   drawing_sheet_revision);
END_TYPE; -- draughting_titled_item

TYPE effectivity_context_item = SELECT
  (organization,
   product_definition_formation);
END_TYPE; -- effectivity_context_item

TYPE effectivity_item = SELECT
  (product_definition,
   product_definition_formation,
   product_definition_relationship);
END_TYPE; -- effectivity_item

TYPE electric_current_measure = REAL;
END_TYPE; -- electric_current_measure

TYPE external_identification_item = SELECT
  (document_file,
   product_definition,
   product_definition_with_associated_documents);
END_TYPE; -- external_identification_item

TYPE fill_style_select = SELECT
  (fill_area_style_colour);
END_TYPE; -- fill_style_select

TYPE font_select = SELECT
  (pre_defined_text_font,
   externally_defined_text_font);
END_TYPE; -- font_select

TYPE founded_item_select = SELECT
  (founded_item,
   representation_item);
END_TYPE; -- founded_item_select

TYPE geometric_set_select = SELECT
  (point,
   curve,
   surface);
END_TYPE; -- geometric_set_select

TYPE group_item = SELECT
  (action_status,
   approval,
   descriptive_representation_item);
END_TYPE; -- group_item
```

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```
TYPE hiding_or_blanking_select = SELECT
  (presentation_area,
   presentation_view,
   area_dependent_annotation_representation);
END_TYPE; -- hiding_or_blanking_select

TYPE hour_in_day = INTEGER;
WHERE
  wr1: ((0 <= SELF) AND (SELF < 24));
END_TYPE; -- hour_in_day

TYPE id_attribute_select = SELECT
  (action,
   address,
   product_category,
   property_definition,
   shape_aspect,
   shape_aspect_relationship,
   application_context,
   group,
   organizational_project,
   representation);
END_TYPE; -- id_attribute_select

TYPE identification_item = SELECT
  (application_context,
   document,
   document_file,
   organization,
   product,
   product_definition,
   security_classification_level);
END_TYPE; -- identification_item

TYPE identifier = STRING;
END_TYPE; -- identifier

TYPE invisibility_context = SELECT
  (presentation_representation,
   presentation_set);
END_TYPE; -- invisibility_context

TYPE invisible_item = SELECT
  (styled_item,
   representation);
END_TYPE; -- invisible_item

TYPE knot_type = ENUMERATION OF
  (uniform_knots,
   unspecified,
   quasi_uniform_knots,
   piecewise_bezier_knots);
END_TYPE; -- knot_type

TYPE label = STRING;
END_TYPE; -- label

TYPE language_item = SELECT
  (product,
```

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```
    product_definition,
    product_definition_formation,
    document_file);
END_TYPE; -- language_item

TYPE layered_item = SELECT
  (presentation_representation,
   representation_item);
END_TYPE; -- layered_item

TYPE length_measure = REAL;
END_TYPE; -- length_measure

TYPE list_of_reversible_topology_item = LIST [0:?] OF
            reversible_topology_item;
END_TYPE; -- list_of_reversible_topology_item

TYPE list_representation_item = LIST [1:?] OF representation_item;
END_TYPE; -- list_representation_item

TYPE luminous_intensity_measure = REAL;
END_TYPE; -- luminous_intensity_measure

TYPE marker_select = SELECT
  (marker_type);
END_TYPE; -- marker_select

TYPE marker_type = ENUMERATION OF
  (dot,
   x,
   plus,
   asterisk,
   ring,
   square,
   triangle);
END_TYPE; -- marker_type

TYPE mass_measure = REAL;
END_TYPE; -- mass_measure

TYPE measure_value = SELECT
  (length_measure,
   mass_measure,
   time_measure,
   electric_current_measure,
   thermodynamic_temperature_measure,
   amount_of_substance_measure,
   luminous_intensity_measure,
   plane_angle_measure,
   solid_angle_measure,
   area_measure,
   volume_measure,
   ratio_measure,
   parameter_value,
   numeric_measure,
   context_dependent_measure,
   descriptive_measure,
   positive_length_measure,
   positive_plane_angle_measure,
```

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```
   positive_ratio_measure,
   count_measure);
END_TYPE; -- measure_value

TYPE message = STRING;
END_TYPE; -- message

TYPE minute_in_hour = INTEGER;
WHERE
  wr1: ((0 <= SELF) AND (SELF <= 59));
END_TYPE; -- minute_in_hour

TYPE month_in_year_number = INTEGER;
WHERE
  wr1: ((1 <= SELF) AND (SELF <= 12));
END_TYPE; -- month_in_year_number

TYPE name_attribute_select = SELECT
  (address,
   configuration_design,
   derived_unit,
   effectivity,
   person_and_organization,
   product_definition,
   product_definition_substitute,
   property_definition_representation);
END_TYPE; -- name_attribute_select

TYPE numeric_measure = NUMBER;
END_TYPE; -- numeric_measure

TYPE organization_item = SELECT
  (action,
   applied_action_assignment,
   applied_contract_assignment,
   applied_identification_assignment,
   configuration_item,
   contract,
   document_file,
   product,
   product_definition,
   product_definition_formation);
END_TYPE; -- organization_item

TYPE organizational_project_item = SELECT
  (action,
   applied_action_assignment,
   applied_contract_assignment,
   applied_identification_assignment,
   configuration_item,
   contract,
   document_file,
   product,
   product_definition,
   product_definition_formation);
END_TYPE; -- organizational_project_item

TYPE parameter_value = REAL;
END_TYPE; -- parameter_value
```

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```
TYPE pcurve_or_surface = SELECT
  (pcurve,
   surface);
END_TYPE; -- pcurve_or_surface

TYPE person_and_organization_item = SELECT
  (action,
   applied_action_assignment,
   applied_contract_assignment,
   applied_identification_assignment,
   configuration_item,
   contract,
   document_file,
   product,
   product_definition,
   product_definition_formation);
END_TYPE; -- person_and_organization_item

TYPE person_organization_select = SELECT
  (person,
   organization,
   person_and_organization);
END_TYPE; -- person_organization_select

TYPE plane_angle_measure = REAL;
END_TYPE; -- plane_angle_measure

TYPE positive_length_measure = length_measure;
WHERE
  wr1: (SELF > 0);
END_TYPE; -- positive_length_measure

TYPE positive_plane_angle_measure = plane_angle_measure;
WHERE
  wr1: (SELF > 0);
END_TYPE; -- positive_plane_angle_measure

TYPE positive_ratio_measure = ratio_measure;
WHERE
  wr1: (SELF > 0);
END_TYPE; -- positive_ratio_measure

TYPE preferred_surface_curve_representation = ENUMERATION OF
  (curve_3d,
   pcurve_s1,
   pcurve_s2);
END_TYPE; -- preferred_surface_curve_representation

TYPE presentable_text = STRING;
END_TYPE; -- presentable_text

TYPE presentation_representation_select = SELECT
  (presentation_representation,
   presentation_set);
END_TYPE; -- presentation_representation_select

TYPE presentation_size_assignment_select = SELECT
  (presentation_view,
   presentation_area,
```

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```
   area_in_set);
END_TYPE; -- presentation_size_assignment_select

TYPE presentation_style_select = SELECT
  (point_style,
   curve_style,
   surface_style_usage,
   fill_area_style,
   text_style,
   externally_defined_style);
END_TYPE; -- presentation_style_select

TYPE presented_item_item = SELECT
  (product_definition_formation);
END_TYPE; -- presented_item_item

TYPE process_or_process_relationship = SELECT
  (product_definition_process,
   relationship_with_condition);
END_TYPE; -- process_or_process_relationship

TYPE product_or_formation_or_definition = SELECT
  (product,
   product_definition_formation,
   product_definition);
END_TYPE; -- product_or_formation_or_definition

TYPE property_or_shape_select = SELECT
  (property_definition,
   shape_definition);
END_TYPE; -- property_or_shape_select

TYPE ratio_measure = REAL;
END_TYPE; -- ratio_measure

TYPE relationship_with_condition = SELECT
  (action_relationship);
END_TYPE; -- relationship_with_condition

TYPE rendering_properties_select = SELECT
  (surface_style_reflectance_ambient,
   surface_style_transparent);
END_TYPE; -- rendering_properties_select

TYPE represented_definition = SELECT
  (property_definition,
   property_definition_relationship,
   shape_aspect,
   shape_aspect_relationship);
END_TYPE; -- represented_definition

TYPE reversible_topology = SELECT
  (reversible_topology_item,
   list_of_reversible_topology_item,
   set_of_reversible_topology_item);
END_TYPE; -- reversible_topology

TYPE reversible_topology_item = SELECT
  (edge,
```

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```
    path,
    face,
    face_bound,
    closed_shell,
    open_shell);
END_TYPE; -- reversible_topology_item

TYPE role_select = SELECT
  (action_assignment,
   approval_assignment,
   approval_date_time,
   contract_assignment,
   document_reference,
   effectivity_assignment,
   group_assignment,
   security_classification_assignment);
END_TYPE; -- role_select

TYPE second_in_minute = REAL;
WHERE
  wr1: ((0 <= SELF) AND (SELF <= 60));
END_TYPE; -- second_in_minute

TYPE security_classification_item = SELECT
  (assembly_component_usage,
   document_file,
   product_definition,
   property_definition,
   product_definition_formation);
END_TYPE; -- security_classification_item

TYPE set_of_reversible_topology_item = SET [0:?] OF
            reversible_topology_item;
END_TYPE; -- set_of_reversible_topology_item

TYPE shading_curve_method = ENUMERATION OF
  (constant_colour,
   linear_colour);
END_TYPE; -- shading_curve_method

TYPE shading_surface_method = ENUMERATION OF
  (constant_shading,
   colour_shading,
   dot_shading,
   normal_shading);
END_TYPE; -- shading_surface_method

TYPE shape_definition = SELECT
  (product_definition_shape,
   shape_aspect,
   shape_aspect_relationship);
END_TYPE; -- shape_definition

TYPE shell = SELECT
  (vertex_shell,
   wire_shell,
   open_shell,
   closed_shell);
END_TYPE; -- shell
```

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```
TYPE si_prefix = ENUMERATION OF
  (exa,
   peta,
   tera,
   giga,
   mega,
   kilo,
   hecto,
   deca,
   deci,
   centi,
   milli,
   micro,
   nano,
   pico,
   femto,
   atto);
END_TYPE; -- si_prefix

TYPE si_unit_name = ENUMERATION OF
  (metre,
   gram,
   second,
   ampere,
   kelvin,
   mole,
   candela,
   radian,
   steradian,
   hertz,
   newton,
   pascal,
   joule,
   watt,
   coulomb,
   volt,
   farad,
   ohm,
   siemens,
   weber,
   tesla,
   henry,
   degree_celsius,
   lumen,
   lux,
   becquerel,
   gray,
   sievert);
END_TYPE; -- si_unit_name

TYPE size_select = SELECT
  (positive_length_measure,
   measure_with_unit,
   descriptive_measure);
END_TYPE; -- size_select

TYPE solid_angle_measure = REAL;
END_TYPE; -- solid_angle_measure
```

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```
TYPE source = ENUMERATION OF
  (made,
   bought,
   not_known);
END_TYPE; -- source

TYPE source_item = SELECT
  (identifier,
   message);
END_TYPE; -- source_item

TYPE specified_item = SELECT
  (drawing_revision);
END_TYPE; -- specified_item

TYPE style_context_select = SELECT
  (group,
   representation,
   representation_item,
   presentation_set);
END_TYPE; -- style_context_select

TYPE supported_item = SELECT
  (action,
   action_method);
END_TYPE; -- supported_item

TYPE surface_model = SELECT
  (shell_based_surface_model,
   face_based_surface_model);
END_TYPE; -- surface_model

TYPE surface_side = ENUMERATION OF
  (positive,
   negative,
   both);
END_TYPE; -- surface_side

TYPE surface_side_style_select = SELECT
  (surface_side_style);
END_TYPE; -- surface_side_style_select

TYPE surface_style_element_select = SELECT
  (surface_style_fill_area,
   surface_style_boundary,
   surface_style_silhouette,
   surface_style_segmentation_curve,
   surface_style_control_grid,
   surface_style_parameter_line,
   surface_style_rendering);
END_TYPE; -- surface_style_element_select

TYPE text = STRING;
END_TYPE; -- text

TYPE text_alignment = label;
END_TYPE; -- text_alignment
```

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```
TYPE text_or_character = SELECT
  (annotation_text,
   annotation_text_character,
   defined_character_glyph,
   composite_text,
   text_literal);
END_TYPE; -- text_or_character

TYPE text_path = ENUMERATION OF
  (left,
   right,
   up,
   down);
END_TYPE; -- text_path

TYPE thermodynamic_temperature_measure = REAL;
END_TYPE; -- thermodynamic_temperature_measure

TYPE time_measure = REAL;
END_TYPE; -- time_measure

TYPE transformation = SELECT
  (item_defined_transformation,
   functionally_defined_transformation);
END_TYPE; -- transformation

TYPE transition_code = ENUMERATION OF
  (discontinuous,
   continuous,
   cont_same_gradient,
   cont_same_gradient_same_curvature);
END_TYPE; -- transition_code

TYPE trimming_preference = ENUMERATION OF
  (cartesian,
   parameter,
   unspecified);
END_TYPE; -- trimming_preference

TYPE trimming_select = SELECT
  (cartesian_point,
   parameter_value);
END_TYPE; -- trimming_select

TYPE u_direction_count = INTEGER;
WHERE
  wr1: (SELF > 1);
END_TYPE; -- u_direction_count

TYPE unit = SELECT
  (named_unit,
   derived_unit);
END_TYPE; -- unit

TYPE v_direction_count = INTEGER;
WHERE
  wr1: (SELF > 1);
END_TYPE; -- v_direction_count
```

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```
TYPE value_qualifier = SELECT
  (precision_qualifier,
   type_qualifier);
END_TYPE; -- value_qualifier

TYPE vector_or_direction = SELECT
  (vector,
   direction);
END_TYPE; -- vector_or_direction

TYPE volume_measure = REAL;
END_TYPE; -- volume_measure

TYPE wireframe_model = SELECT
  (shell_based_wireframe_model,
   edge_based_wireframe_model);
END_TYPE; -- wireframe_model

TYPE year_number = INTEGER;
END_TYPE; -- year_number

ENTITY action;
    name          : label;
    description   : OPTIONAL text;
    chosen_method : action_method;
  DERIVE
    id : identifier := get_id_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
END_ENTITY; -- action

ENTITY action_assignment
  ABSTRACT SUPERTYPE;
    assigned_action : action;
  DERIVE
    role : object_role := get_role(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
END_ENTITY; -- action_assignment

ENTITY action_method;
    name        : label;
    description : OPTIONAL text;
    consequence : text;
    purpose     : text;
END_ENTITY; -- action_method

ENTITY action_method_with_associated_documents
  SUBTYPE OF (action_method);
    documents : SET [1:?] OF document;
END_ENTITY; -- action_method_with_associated_documents

ENTITY action_property;
    name        : label;
    description : text;
    definition  : characterized_action_definition;
END_ENTITY; -- action_property
```

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```
  ENTITY action_property_representation;
      name           : label;
      description    : text;
      property       : action_property;
      representation : representation;
  END_ENTITY; -- action_property_representation

  ENTITY action_relationship;
      name            : label;
      description     : OPTIONAL text;
      relating_action : action;
      related_action  : action;
  END_ENTITY; -- action_relationship

  ENTITY action_status;
      status          : label;
      assigned_action : executed_action;
  END_ENTITY; -- action_status

  ENTITY address;
      internal_location       : OPTIONAL label;
      street_number           : OPTIONAL label;
      street                  : OPTIONAL label;
      postal_box              : OPTIONAL label;
      town                    : OPTIONAL label;
      region                  : OPTIONAL label;
      postal_code             : OPTIONAL label;
      country                 : OPTIONAL label;
      facsimile_number        : OPTIONAL label;
      telephone_number        : OPTIONAL label;
      electronic_mail_address : OPTIONAL label;
      telex_number            : OPTIONAL label;
    DERIVE
      name : label := get_name_value(SELF);
      url  : identifier := get_id_value(SELF);
    WHERE
      wr1: (EXISTS(internal_location) OR EXISTS(street_number) OR EXISTS(
               street) OR EXISTS(postal_box) OR EXISTS(town) OR EXISTS(
               region) OR EXISTS(postal_code) OR EXISTS(country) OR EXISTS(
               facsimile_number) OR EXISTS(telephone_number) OR EXISTS(
               electronic_mail_address) OR EXISTS(telex_number));
  END_ENTITY; -- address

  ENTITY advanced_brep_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1: (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
               'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP',
               'TECHNICAL_DATA_PACKAGING.FACETED_BREP',
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
               'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] * TYPEOF(it))
               = 1)) )) = 0);
      wr2: (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
               'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP',
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
               > 0);
      wr3: (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
```

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```
               'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP' IN
TYPEOF(it)) )
                | (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
               SIZEOF(QUERY ( fcs <* csh\connected_face_set.cfs_faces | (
               NOT ('TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN
TYPEOF(fcs)))
))
               = 0)) )) = 0)) )) = 0);
      wr4: (SIZEOF(QUERY ( msb <* QUERY ( it <* items | (
               'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP' IN
TYPEOF(it)) )
                | ('TECHNICAL_DATA_PACKAGING.ORIENTED_CLOSED_SHELL' IN
               TYPEOF(msb\manifold_solid_brep.outer)) )) = 0);
      wr5: (SIZEOF(QUERY ( brv <* QUERY ( it <* items | (
               'TECHNICAL_DATA_PACKAGING.BREP_WITH_VOIDS' IN TYPEOF(it)) )
                | (NOT (SIZEOF(QUERY ( csh <* brv\brep_with_voids.voids |
               csh\oriented_closed_shell.orientation )) = 0)) )) = 0);
      wr6: (SIZEOF(QUERY ( mi <* QUERY ( it <* items | (
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
               NOT
               ('TECHNICAL_DATA_PACKAGING.ADVANCED_BREP_SHAPE_-
REPRESENTATION'
               IN TYPEOF(mi\mapped_item.mapping_source.
               mapped_representation))) )) = 0);
  END_ENTITY; -- advanced_brep_shape_representation

  ENTITY advanced_face
    SUBTYPE OF (face_surface);
    WHERE
      wr1 : (SIZEOF(['TECHNICAL_DATA_PACKAGING.ELEMENTARY_SURFACE',
                'TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE',
                'TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE'] * TYPEOF(
                face_geometry)) = 1);
      wr2 : (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path.
                edge_list | (NOT ('TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN
                TYPEOF(oe\oriented_edge.edge_element))) )) = 0)) )) = 0);
      wr3 : (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path.
                edge_list | (NOT (SIZEOF(['TECHNICAL_DATA_PACKAGING.LINE',
                'TECHNICAL_DATA_PACKAGING.CONIC',
                'TECHNICAL_DATA_PACKAGING.POLYLINE',
                'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE',
                'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE'] * TYPEOF(oe.
                edge_element\edge_curve.edge_geometry)) = 1)) )) = 0)) )) =
                 0);
      wr4 : (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path.
                edge_list | (NOT (('TECHNICAL_DATA_PACKAGING.VERTEX_POINT'
                IN TYPEOF(oe\edge.edge_start)) AND (
                'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT' IN TYPEOF(oe\
                edge.edge_start\vertex_point.vertex_geometry)) AND (
                'TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(oe\edge.
```

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```
                edge_end)) AND ('TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT'
                IN TYPEOF(oe\edge.edge_end\vertex_point.vertex_geometry))))
))
                = 0)) )) = 0);
      wr5 : (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | ('TECHNICAL_DATA_PACKAGING.ORIENTED_PATH' IN TYPEOF(
                elp_fbnds.bound)) )) = 0);
      wr6 : ((NOT ('TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE' IN TYPEOF(
                face_geometry))) OR (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.LINE',
                'TECHNICAL_DATA_PACKAGING.CONIC',
                'TECHNICAL_DATA_PACKAGING.POLYLINE',
                'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE'] * TYPEOF(
                face_geometry\swept_surface.swept_curve)) = 1));
      wr7 : (SIZEOF(QUERY ( vlp_fbnds <* QUERY ( bnds <* bounds | (
                'TECHNICAL_DATA_PACKAGING.VERTEX_LOOP' IN
TYPEOF(bnds.bound))
)
                 | (NOT (('TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN
                TYPEOF(vlp_fbnds\face_bound.bound\vertex_loop.loop_vertex))
                AND ('TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT' IN TYPEOF(
                vlp_fbnds\face_bound.bound\vertex_loop.loop_vertex\
                vertex_point.vertex_geometry)))) )) = 0);
      wr8 : (SIZEOF(QUERY ( bnd <* bounds | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP',
                'TECHNICAL_DATA_PACKAGING.VERTEX_LOOP'] *
TYPEOF(bnd.bound))
                = 1)) )) = 0);
      wr9 : (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path.
                edge_list | (('TECHNICAL_DATA_PACKAGING.SURFACE_CURVE' IN
                TYPEOF(oe\oriented_edge.edge_element\edge_curve.
                edge_geometry)) AND (NOT (SIZEOF(QUERY ( sc_ag <* oe.
                edge_element\edge_curve.edge_geometry\surface_curve.
                associated_geometry | (NOT (
                'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(sc_ag)))
                 )) = 0))))) = 0)) )) = 0);
      wr10: (((NOT ('TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE' IN TYPEOF(
                face_geometry))) OR (NOT (
                'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(face_geometry
                \swept_surface.swept_curve))) OR (SIZEOF(face_geometry\
                swept_surface.swept_curve\polyline.points) >= 3)) AND (
                SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path.
                edge_list | (('TECHNICAL_DATA_PACKAGING.POLYLINE' IN
                TYPEOF(oe\oriented_edge.edge_element\edge_curve.
                edge_geometry)) AND (NOT (SIZEOF(oe\oriented_edge.
                edge_element\edge_curve.edge_geometry\polyline.points) >=
3)))
                 )) = 0)) )) = 0));
  END_ENTITY; -- advanced_face
```

```
ENTITY alternate_product_relationship;
    name       : label;
    definition : OPTIONAL text;
    alternate  : product;
    base       : product;
    basis      : text;
  UNIQUE
    ur1 : alternate, base;
  WHERE
    wr1: (alternate :<>: base);
END_ENTITY; -- alternate_product_relationship

ENTITY amount_of_substance_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.AMOUNT_OF_SUBSTANCE_UNIT' IN TYPEOF(
              SELF\measure_with_unit.unit_component));
END_ENTITY; -- amount_of_substance_measure_with_unit

ENTITY amount_of_substance_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
              named_unit.dimensions.mass_exponent = 0) AND (SELF\
              named_unit.dimensions.time_exponent = 0) AND (SELF\
              named_unit.dimensions.electric_current_exponent = 0) AND (
              SELF\named_unit.dimensions.
              thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
              .dimensions.amount_of_substance_exponent = 1) AND (SELF\
              named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- amount_of_substance_unit

ENTITY annotation_curve_occurrence
  SUBTYPE OF (annotation_occurrence);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.CURVE' IN TYPEOF(SELF\styled_item.
              item));
END_ENTITY; -- annotation_curve_occurrence

ENTITY annotation_occurrence
  SUPERTYPE OF (ONEOF (annotation_point_occurrence,
      annotation_curve_occurrence,annotation_text_occurrence))
  SUBTYPE OF (styled_item);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.GEOMETRIC_REPRESENTATION_ITEM' IN
              TYPEOF(SELF));
END_ENTITY; -- annotation_occurrence

ENTITY annotation_point_occurrence
  SUBTYPE OF (annotation_occurrence);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.POINT' IN TYPEOF(SELF\styled_item.
              item));
END_ENTITY; -- annotation_point_occurrence

ENTITY annotation_text
  SUBTYPE OF (mapped_item);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(SELF\
```

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```
                mapped_item.mapping_target));
      wr2: ('TECHNICAL_DATA_PACKAGING.TEXT_STRING_REPRESENTATION' IN
                TYPEOF(SELF\mapped_item.mapping_source.mapped_-
representation));
      wr3: ('TECHNICAL_DATA_PACKAGING.GEOMETRIC_REPRESENTATION_ITEM' IN
                TYPEOF(SELF));
  END_ENTITY; -- annotation_text

  ENTITY annotation_text_character
    SUBTYPE OF (mapped_item);
      alignment : text_alignment;
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.CHARACTER_GLYPH_SYMBOL' IN TYPEOF(
                SELF\mapped_item.mapping_source.mapped_representation));
      wr2: ('TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(SELF\
                mapped_item.mapping_target));
      wr3: ('TECHNICAL_DATA_PACKAGING.GEOMETRIC_REPRESENTATION_ITEM' IN
                TYPEOF(SELF));
  END_ENTITY; -- annotation_text_character

  ENTITY annotation_text_occurrence
    SUBTYPE OF (annotation_occurrence);
    WHERE
      wr1: (SIZEOF(['TECHNICAL_DATA_PACKAGING.TEXT_LITERAL',
                'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT',
                'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT_CHARACTER',
                'TECHNICAL_DATA_PACKAGING.DEFINED_CHARACTER_GLYPH',
                'TECHNICAL_DATA_PACKAGING.COMPOSITE_TEXT'] * TYPEOF(SELF\
                styled_item.item)) > 0);
  END_ENTITY; -- annotation_text_occurrence

  ENTITY application_context;
      application : label;
    DERIVE
      description : text := get_description_value(SELF);
      id          : identifier := get_id_value(SELF);
    INVERSE
      context_elements : SET [1:?] OF application_context_element FOR
                            frame_of_reference;
    WHERE
      wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
                'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
      wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
                'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
  END_ENTITY; -- application_context

  ENTITY application_context_element
    SUPERTYPE OF (ONEOF (library_context,product_concept_context,
        product_context,product_definition_context));
      name               : label;
      frame_of_reference : application_context;
  END_ENTITY; -- application_context_element

  ENTITY application_context_relationship;
      name             : label;
      description      : OPTIONAL text;
      relating_context : application_context;
      related_context  : application_context;
  END_ENTITY; -- application_context_relationship
```

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```
ENTITY application_protocol_definition;
    status                                    : label;
    application_interpreted_model_schema_name : label;
    application_protocol_year                 : year_number;
    application                               : application_context;
END_ENTITY; -- application_protocol_definition

ENTITY applied_action_assignment
  SUBTYPE OF (action_assignment);
    items : SET [1:?] OF action_item;
END_ENTITY; -- applied_action_assignment

ENTITY applied_approval_assignment
  SUBTYPE OF (approval_assignment);
    items : SET [1:?] OF approval_item;
END_ENTITY; -- applied_approval_assignment

ENTITY applied_classification_assignment
  SUBTYPE OF (classification_assignment);
    items : SET [1:?] OF classification_item;
END_ENTITY; -- applied_classification_assignment

ENTITY applied_contract_assignment
  SUBTYPE OF (contract_assignment);
    items : SET [1:?] OF contract_item;
END_ENTITY; -- applied_contract_assignment

ENTITY applied_date_and_time_assignment
  SUBTYPE OF (date_and_time_assignment);
    items : SET [1:?] OF date_and_time_item;
END_ENTITY; -- applied_date_and_time_assignment

ENTITY applied_date_assignment
  SUBTYPE OF (date_assignment);
    items : SET [1:?] OF date_item;
END_ENTITY; -- applied_date_assignment

ENTITY applied_document_reference
  SUBTYPE OF (document_reference);
    items : SET [1:?] OF document_reference_item;
END_ENTITY; -- applied_document_reference

ENTITY applied_document_usage_constraint_assignment
  SUBTYPE OF (document_usage_constraint_assignment);
    items : SET [1:?] OF document_usage_constraint_item;
END_ENTITY; -- applied_document_usage_constraint_assignment

ENTITY applied_effectivity_assignment
  SUBTYPE OF (effectivity_assignment);
    items : SET [1:?] OF effectivity_item;
END_ENTITY; -- applied_effectivity_assignment

ENTITY applied_effectivity_context_assignment
  SUBTYPE OF (effectivity_context_assignment);
    items : SET [1:?] OF effectivity_context_item;
END_ENTITY; -- applied_effectivity_context_assignment

ENTITY applied_external_identification_assignment
  SUBTYPE OF (external_identification_assignment);
```

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```
    items : SET [1:?] OF external_identification_item;
END_ENTITY; -- applied_external_identification_assignment

ENTITY applied_group_assignment
  SUBTYPE OF (group_assignment);
    items : SET [1:?] OF group_item;
END_ENTITY; -- applied_group_assignment

ENTITY applied_identification_assignment
  SUBTYPE OF (identification_assignment);
    items : SET [1:?] OF identification_item;
END_ENTITY; -- applied_identification_assignment

ENTITY applied_organization_assignment
  SUBTYPE OF (organization_assignment);
    items : SET [1:?] OF organization_item;
END_ENTITY; -- applied_organization_assignment

ENTITY applied_organizational_project_assignment
  SUBTYPE OF (organizational_project_assignment);
    items : SET [1:?] OF organizational_project_item;
END_ENTITY; -- applied_organizational_project_assignment

ENTITY applied_person_and_organization_assignment
  SUBTYPE OF (person_and_organization_assignment);
    items : SET [1:?] OF person_and_organization_item;
END_ENTITY; -- applied_person_and_organization_assignment

ENTITY applied_presented_item
  SUBTYPE OF (presented_item);
    items : SET [1:?] OF presented_item_item;
END_ENTITY; -- applied_presented_item

ENTITY applied_security_classification_assignment
  SUBTYPE OF (security_classification_assignment);
    items : SET [1:?] OF security_classification_item;
END_ENTITY; -- applied_security_classification_assignment

ENTITY approval;
    status : approval_status;
    level  : label;
END_ENTITY; -- approval

ENTITY approval_assignment
  ABSTRACT SUPERTYPE;
    assigned_approval : approval;
  DERIVE
    role : object_role := get_role(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
END_ENTITY; -- approval_assignment

ENTITY approval_date_time;
    date_time      : date_time_select;
    dated_approval : approval;
  DERIVE
    role : object_role := get_role(SELF);
  WHERE
```

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```
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
END_ENTITY; -- approval_date_time

ENTITY approval_person_organization;
    person_organization : person_organization_select;
    authorized_approval : approval;
    role                : approval_role;
END_ENTITY; -- approval_person_organization

ENTITY approval_relationship;
    name              : label;
    description       : OPTIONAL text;
    relating_approval : approval;
    related_approval  : approval;
END_ENTITY; -- approval_relationship

ENTITY approval_role;
    role : label;
  DERIVE
    description : text := get_description_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- approval_role

ENTITY approval_status;
    name : label;
END_ENTITY; -- approval_status

ENTITY area_dependent_annotation_representation
  SUBTYPE OF (presentation_representation);
  WHERE
    wr1: (SIZEOF(QUERY ( item <* SELF\representation.items | (NOT (
             SIZEOF(['TECHNICAL_DATA_PACKAGING.' +
             'ANNOTATION_OCCURRENCE',
             'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT'] * TYPEOF(item))
             = 1)) )) = 0);
    wr2: (SIZEOF(QUERY ( item <* SELF\representation.items | (
             'TECHNICAL_DATA_PACKAGING.ANNOTATION_OCCURRENCE' IN TYPEOF(
             item)) )) >= 1);
END_ENTITY; -- area_dependent_annotation_representation

ENTITY area_in_set;
    area   : presentation_area;
    in_set : presentation_set;
END_ENTITY; -- area_in_set

ENTITY area_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.AREA_UNIT' IN TYPEOF(SELF\
             measure_with_unit.unit_component));
END_ENTITY; -- area_measure_with_unit

ENTITY area_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 2) AND (SELF\
```

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```
                named_unit.dimensions.mass_exponent = 0) AND (SELF\
                named_unit.dimensions.time_exponent = 0) AND (SELF\
                named_unit.dimensions.electric_current_exponent = 0) AND (
                SELF\named_unit.dimensions.
                thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
                .dimensions.amount_of_substance_exponent = 0) AND (SELF\
                named_unit.dimensions.luminous_intensity_exponent = 0));
  END_ENTITY; -- area_unit

  ENTITY assembly_component_usage
    SUPERTYPE OF (ONEOF (next_assembly_usage_occurrence,
        specified_higher_usage_occurrence,promissory_usage_occurrence))
    SUBTYPE OF (product_definition_usage);
      reference_designator : OPTIONAL identifier;
  END_ENTITY; -- assembly_component_usage

  ENTITY assembly_component_usage_substitute;
      name       : label;
      definition : OPTIONAL text;
      base       : assembly_component_usage;
      substitute : assembly_component_usage;
    UNIQUE
      ur1 : base, substitute;
    WHERE
      wr1: (base.relating_product_definition :=: substitute.
               relating_product_definition);
      wr2: (base :<>: substitute);
  END_ENTITY; -- assembly_component_usage_substitute

  ENTITY assembly_component_usage_substitute_with_ranking
    SUBTYPE OF (assembly_component_usage_substitute);
      ranking           : INTEGER;
      ranking_rationale : text;
  END_ENTITY; -- assembly_component_usage_substitute_with_ranking

  ENTITY axis1_placement
    SUBTYPE OF (placement);
      axis : OPTIONAL direction;
    DERIVE
      z : direction := NVL(normalise(axis),dummy_gri ||
direction([0,0,1]));
    WHERE
      wr1: (SELF\geometric_representation_item.dim = 3);
  END_ENTITY; -- axis1_placement

  ENTITY axis2_placement_2d
    SUBTYPE OF (placement);
      ref_direction : OPTIONAL direction;
    DERIVE
      p : LIST [2:2] OF direction := build_2axes(ref_direction);
    WHERE
      wr1: (SELF\geometric_representation_item.dim = 2);
  END_ENTITY; -- axis2_placement_2d

  ENTITY axis2_placement_3d
    SUBTYPE OF (placement);
      axis          : OPTIONAL direction;
      ref_direction : OPTIONAL direction;
    DERIVE
```

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```
    p : LIST [3:3] OF direction := build_axes(axis,ref_direction);
  WHERE
    wr1: (SELF\placement.location.dim = 3);
    wr2: ((NOT EXISTS(axis)) OR (axis.dim = 3));
    wr3: ((NOT EXISTS(ref_direction)) OR (ref_direction.dim = 3));
    wr4: ((NOT EXISTS(axis)) OR (NOT EXISTS(ref_direction)) OR (
             cross_product(axis,ref_direction).magnitude > 0));
END_ENTITY; -- axis2_placement_3d

ENTITY b_spline_curve
  SUPERTYPE OF (ONEOF (uniform_curve,b_spline_curve_with_knots,
      quasi_uniform_curve,bezier_curve) ANDOR rational_b_spline_curve)
  SUBTYPE OF (bounded_curve);
    degree              : INTEGER;
    control_points_list : LIST [2:?] OF cartesian_point;
    curve_form          : b_spline_curve_form;
    closed_curve        : LOGICAL;
    self_intersect      : LOGICAL;
  DERIVE
    upper_index_on_control_points : INTEGER := SIZEOF(
                                        control_points_list) - 1;
    control_points               : ARRAY [0:
                                        upper_index_on_control_points] OF
                                         cartesian_point := list_to_array(
                                        control_points_list,0,
                                        upper_index_on_control_points);
  WHERE
    wr1: (('TECHNICAL_DATA_PACKAGING.UNIFORM_CURVE' IN TYPEOF(SELF)) OR
             ('TECHNICAL_DATA_PACKAGING.QUASI_UNIFORM_CURVE' IN TYPEOF(
             SELF)) OR ('TECHNICAL_DATA_PACKAGING.BEZIER_CURVE' IN
             TYPEOF(SELF)) OR (
             'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE_WITH_KNOTS' IN
             TYPEOF(SELF)));
END_ENTITY; -- b_spline_curve

ENTITY b_spline_curve_with_knots
  SUBTYPE OF (b_spline_curve);
    knot_multiplicities : LIST [2:?] OF INTEGER;
    knots               : LIST [2:?] OF parameter_value;
    knot_spec           : knot_type;
  DERIVE
    upper_index_on_knots : INTEGER := SIZEOF(knots);
  WHERE
    wr1: constraints_param_b_spline(degree,upper_index_on_knots,
             upper_index_on_control_points,knot_multiplicities,knots);
    wr2: (SIZEOF(knot_multiplicities) = upper_index_on_knots);
END_ENTITY; -- b_spline_curve_with_knots

ENTITY b_spline_surface
  SUPERTYPE OF (ONEOF (b_spline_surface_with_knots,uniform_surface,
      quasi_uniform_surface,bezier_surface) ANDOR
      rational_b_spline_surface)
  SUBTYPE OF (bounded_surface);
    u_degree            : INTEGER;
    v_degree            : INTEGER;
    control_points_list : LIST [2:?] OF LIST [2:?] OF cartesian_point;
    surface_form        : b_spline_surface_form;
    u_closed            : LOGICAL;
    v_closed            : LOGICAL;
```

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```
    self_intersect      : LOGICAL;
  DERIVE
    u_upper        : INTEGER := SIZEOF(control_points_list) - 1;
    v_upper        : INTEGER := SIZEOF(control_points_list[1]) - 1;
    control_points : ARRAY [0:u_upper] OF ARRAY [0:v_upper] OF
                         cartesian_point := make_array_of_array(
                        control_points_list,0,u_upper,0,v_upper);
  WHERE
    wr1: (('TECHNICAL_DATA_PACKAGING.UNIFORM_SURFACE' IN TYPEOF(SELF))
              OR ('TECHNICAL_DATA_PACKAGING.QUASI_UNIFORM_SURFACE' IN
              TYPEOF(SELF)) OR ('TECHNICAL_DATA_PACKAGING.BEZIER_SURFACE'
              IN TYPEOF(SELF)) OR (
              'TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE_WITH_KNOTS' IN
              TYPEOF(SELF)));
END_ENTITY; -- b_spline_surface

ENTITY b_spline_surface_with_knots
  SUBTYPE OF (b_spline_surface);
    u_multiplicities : LIST [2:?] OF INTEGER;
    v_multiplicities : LIST [2:?] OF INTEGER;
    u_knots          : LIST [2:?] OF parameter_value;
    v_knots          : LIST [2:?] OF parameter_value;
    knot_spec        : knot_type;
  DERIVE
    knot_u_upper : INTEGER := SIZEOF(u_knots);
    knot_v_upper : INTEGER := SIZEOF(v_knots);
  WHERE
    wr1: constraints_param_b_spline(SELF\b_spline_surface.u_degree,
              knot_u_upper,SELF\b_spline_surface.u_upper,u_multiplicities,
              u_knots);
    wr2: constraints_param_b_spline(SELF\b_spline_surface.v_degree,
              knot_v_upper,SELF\b_spline_surface.v_upper,v_multiplicities,
              v_knots);
    wr3: (SIZEOF(u_multiplicities) = knot_u_upper);
    wr4: (SIZEOF(v_multiplicities) = knot_v_upper);
END_ENTITY; -- b_spline_surface_with_knots

ENTITY background_colour
  SUBTYPE OF (colour);
    presentation : area_or_view;
  UNIQUE
    ur1 : presentation;
END_ENTITY; -- background_colour

ENTITY bezier_curve
  SUBTYPE OF (b_spline_curve);
END_ENTITY; -- bezier_curve

ENTITY bezier_surface
  SUBTYPE OF (b_spline_surface);
END_ENTITY; -- bezier_surface
```

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```
  ENTITY block
    SUBTYPE OF (geometric_representation_item);
      position : axis2_placement_3d;
      x        : positive_length_measure;
      y        : positive_length_measure;
      z        : positive_length_measure;
  END_ENTITY; -- block

  ENTITY boolean_result
    SUBTYPE OF (geometric_representation_item);
      operator       : boolean_operator;
      first_operand  : boolean_operand;
      second_operand : boolean_operand;
  END_ENTITY; -- boolean_result

  ENTITY boundary_curve
    SUBTYPE OF (composite_curve_on_surface);
    WHERE
      wr1: SELF\composite_curve.closed_curve;
  END_ENTITY; -- boundary_curve

  ENTITY bounded_curve
    SUPERTYPE OF (ONEOF (polyline,b_spline_curve,trimmed_curve,
        bounded_pcurve,bounded_surface_curve,composite_curve))
    SUBTYPE OF (curve);
  END_ENTITY; -- bounded_curve

  ENTITY bounded_pcurve
    SUBTYPE OF (pcurve, bounded_curve);
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.BOUNDED_CURVE' IN TYPEOF(SELF\pcurve
                .reference_to_curve.items[1]));
  END_ENTITY; -- bounded_pcurve

  ENTITY bounded_surface
    SUPERTYPE OF (ONEOF (b_spline_surface,rectangular_trimmed_surface,
        curve_bounded_surface,rectangular_composite_surface))
    SUBTYPE OF (surface);
  END_ENTITY; -- bounded_surface

  ENTITY bounded_surface_curve
    SUBTYPE OF (surface_curve, bounded_curve);
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.BOUNDED_CURVE' IN TYPEOF(SELF\
                surface_curve.curve_3d));
  END_ENTITY; -- bounded_surface_curve

  ENTITY box_domain;
      corner  : cartesian_point;
      xlength : positive_length_measure;
      ylength : positive_length_measure;
      zlength : positive_length_measure;
    WHERE
      wr1: (SIZEOF(QUERY ( item <* USEDIN(SELF,'') | (NOT (
                'TECHNICAL_DATA_PACKAGING.BOXED_HALF_SPACE' IN
TYPEOF(item)))
))
                = 0);
  END_ENTITY; -- box_domain
```

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```
  ENTITY boxed_half_space
    SUBTYPE OF (half_space_solid);
      enclosure : box_domain;
  END_ENTITY; -- boxed_half_space

  ENTITY brep_with_voids
    SUBTYPE OF (manifold_solid_brep);
      voids : SET [1:?] OF oriented_closed_shell;
  END_ENTITY; -- brep_with_voids

  ENTITY calendar_date
    SUBTYPE OF (date);
      day_component   : day_in_month_number;
      month_component : month_in_year_number;
    WHERE
      wr1: valid_calendar_date(SELF);
  END_ENTITY; -- calendar_date

  ENTITY camera_image
    SUBTYPE OF (mapped_item);
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.CAMERA_USAGE' IN TYPEOF(SELF\
               mapped_item.mapping_source));
      wr2: ('TECHNICAL_DATA_PACKAGING.PLANAR_BOX' IN TYPEOF(SELF\
               mapped_item.mapping_target));
      wr3: ('TECHNICAL_DATA_PACKAGING.GEOMETRIC_REPRESENTATION_ITEM' IN
               TYPEOF(SELF));
  END_ENTITY; -- camera_image

  ENTITY camera_image_3d_with_scale
    SUBTYPE OF (camera_image);
    DERIVE
      scale : positive_ratio_measure := SELF\mapped_item.mapping_target\
                 planar_extent.size_in_x / SELF\mapped_item.mapping_source.
                 mapping_origin\camera_model_d3.perspective_of_volume.
                 view_window.size_in_x;
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.CAMERA_MODEL_D3' IN TYPEOF(SELF\
               mapped_item.mapping_source.mapping_origin));
      wr2: (aspect_ratio(SELF\mapped_item.mapping_target) = aspect_ratio(
               SELF\mapped_item.mapping_source.mapping_origin\
               camera_model_d3.perspective_of_volume.view_window));
      wr3: (SELF\mapped_item.mapping_source.mapping_origin\camera_model_d3
               .perspective_of_volume.front_plane_clipping AND SELF\
               mapped_item.mapping_source.mapping_origin\camera_model_d3.
               perspective_of_volume.view_volume_sides_clipping);
      wr4: ((SELF\mapped_item.mapping_target\planar_extent.size_in_x > 0)
               AND (SELF\mapped_item.mapping_target\planar_extent.size_in_y
               > 0));
      wr5: ((SELF\mapped_item.mapping_source.mapping_origin\
               camera_model_d3.perspective_of_volume.view_window.size_in_x
               > 0) AND (SELF\mapped_item.mapping_source.mapping_origin\
               camera_model_d3.perspective_of_volume.view_window.size_in_y
               > 0));
      wr6: ((('TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
               TYPEOF(SELF\mapped_item.mapping_target\planar_-
box.placement))
               AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
               'AXIS2_PLACEMENT_3D') IN TYPEOF(SELF\mapped_item.
```

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```
              mapping_target\planar_box.placement))));
END_ENTITY; -- camera_image_3d_with_scale

ENTITY camera_model
  SUPERTYPE OF (camera_model_d3)
  SUBTYPE OF (geometric_representation_item);
  WHERE
    wr1: ((SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'ITEM_DEFINED_TRANSFORMATION.' + 'TRANSFORM_ITEM_1')) +
              SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'REPRESENTATION_MAP.MAPPING_ORIGIN'))) > 0);
    wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'STYLED_ITEM.ITEM')) = 0);
END_ENTITY; -- camera_model

ENTITY camera_model_d3
  SUBTYPE OF (camera_model);
    view_reference_system : axis2_placement_3d;
    perspective_of_volume : view_volume;
  WHERE
    wr1: ((dot_product(SELF.view_reference_system.p[3],SELF.
              perspective_of_volume.view_window.placement.p[3]) = 1) AND (
              SELF.view_reference_system.location.coordinates[3] = SELF.
              perspective_of_volume.view_window.placement.location.
              coordinates[3]));
    wr2: (SELF\geometric_representation_item.dim = 3);
END_ENTITY; -- camera_model_d3

ENTITY camera_model_d3_with_hlhsr
  SUBTYPE OF (camera_model_d3);
    hidden_line_surface_removal : BOOLEAN;
END_ENTITY; -- camera_model_d3_with_hlhsr

ENTITY camera_model_with_light_sources
  SUBTYPE OF (camera_model_d3);
    sources : SET [1:?] OF light_source;
END_ENTITY; -- camera_model_with_light_sources

ENTITY camera_usage
  SUBTYPE OF (representation_map);
  WHERE
    wr1: (NOT ('TECHNICAL_DATA_PACKAGING.PRESENTATION_REPRESENTATION' IN
               TYPEOF(SELF\representation_map.mapped_representation)));
    wr2: ('TECHNICAL_DATA_PACKAGING.CAMERA_MODEL' IN TYPEOF(SELF\
              representation_map.mapping_origin));
END_ENTITY; -- camera_usage

ENTITY cartesian_point
  SUBTYPE OF (point);
    coordinates : LIST [1:3] OF length_measure;
END_ENTITY; -- cartesian_point

ENTITY cartesian_transformation_operator
  SUPERTYPE OF (cartesian_transformation_operator_3d)
  SUBTYPE OF (geometric_representation_item,
      functionally_defined_transformation);
    axis1        : OPTIONAL direction;
    axis2        : OPTIONAL direction;
    local_origin : cartesian_point;
```

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```
    scale        : OPTIONAL REAL;
  DERIVE
    scl : REAL := NVL(scale,1);
  WHERE
    wr1: (scl > 0);
END_ENTITY; -- cartesian_transformation_operator

ENTITY cartesian_transformation_operator_3d
  SUBTYPE OF (cartesian_transformation_operator);
    axis3 : OPTIONAL direction;
  DERIVE
    u : LIST [3:3] OF direction := base_axis(3,SELF\
           cartesian_transformation_operator.axis1,SELF\
           cartesian_transformation_operator.axis2,axis3);
  WHERE
    wr1: (SELF\geometric_representation_item.dim = 3);
END_ENTITY; -- cartesian_transformation_operator_3d

ENTITY character_glyph_style_outline;
    outline_style : curve_style;
END_ENTITY; -- character_glyph_style_outline

ENTITY character_glyph_style_stroke;
    stroke_style : curve_style;
END_ENTITY; -- character_glyph_style_stroke

ENTITY character_glyph_symbol
  SUBTYPE OF (symbol_representation);
    character_box  : planar_extent;
    baseline_ratio : ratio_measure;
  DERIVE
    box_height : length_measure := character_box.size_in_y;
  WHERE
    wr1: ((0 <= baseline_ratio) AND (baseline_ratio <= 1));
    wr2: item_in_context(SELF.character_box,SELF\representation.
             context_of_items);
    wr3: ('TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN TYPEOF(
             SELF.box_height));
END_ENTITY; -- character_glyph_symbol

ENTITY characterized_object;
    name        : label;
    description : OPTIONAL text;
END_ENTITY; -- characterized_object

ENTITY circle
  SUBTYPE OF (conic);
    radius : positive_length_measure;
END_ENTITY; -- circle

ENTITY class
  SUBTYPE OF (group);
END_ENTITY; -- class

ENTITY class_system
  SUBTYPE OF (group);
END_ENTITY; -- class_system
```

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```
ENTITY classification_assignment
  ABSTRACT SUPERTYPE;
    assigned_class : group;
    role           : classification_role;
END_ENTITY; -- classification_assignment

ENTITY classification_role;
    name        : label;
    description : OPTIONAL text;
END_ENTITY; -- classification_role

ENTITY closed_shell
  SUBTYPE OF (connected_face_set);
END_ENTITY; -- closed_shell

ENTITY colour;
END_ENTITY; -- colour

ENTITY colour_rgb
  SUBTYPE OF (colour_specification);
    red   : REAL;
    green : REAL;
    blue  : REAL;
  WHERE
    wr1: ((0 <= red) AND (red <= 1));
    wr2: ((0 <= green) AND (green <= 1));
    wr3: ((0 <= blue) AND (blue <= 1));
END_ENTITY; -- colour_rgb

ENTITY colour_specification
  SUBTYPE OF (colour);
    name : label;
END_ENTITY; -- colour_specification

ENTITY composite_curve
  SUBTYPE OF (bounded_curve);
    segments       : LIST [1:?] OF composite_curve_segment;
    self_intersect : LOGICAL;
  DERIVE
    n_segments   : INTEGER := SIZEOF(segments);
    closed_curve : LOGICAL := segments[n_segments].transition <>
                       discontinuous;
  WHERE
    wr1: (((NOT closed_curve) AND (SIZEOF(QUERY ( temp <* segments | (
             temp.transition = discontinuous) )) = 1)) OR (closed_curve
             AND (SIZEOF(QUERY ( temp <* segments | (temp.transition =
             discontinuous) )) = 0)));
END_ENTITY; -- composite_curve

ENTITY composite_curve_on_surface
  SUPERTYPE OF (boundary_curve)
  SUBTYPE OF (composite_curve);
  DERIVE
    basis_surface : SET [0:2] OF surface := get_basis_surface(SELF);
  WHERE
    wr1: (SIZEOF(basis_surface) > 0);
    wr2: constraints_composite_curve_on_surface(SELF);
END_ENTITY; -- composite_curve_on_surface
```

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```
ENTITY composite_curve_segment
  SUBTYPE OF (founded_item);
    transition   : transition_code;
    same_sense   : BOOLEAN;
    parent_curve : curve;
  INVERSE
    using_curves : BAG [1:?] OF composite_curve FOR segments;
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.BOUNDED_CURVE' IN TYPEOF(
             parent_curve));
END_ENTITY; -- composite_curve_segment

ENTITY composite_text
  SUBTYPE OF (geometric_representation_item);
    collected_text : SET [2:?] OF text_or_character;
  WHERE
    wr1: acyclic_composite_text(SELF,SELF.collected_text);
END_ENTITY; -- composite_text

ENTITY compound_representation_item
  SUBTYPE OF (representation_item);
    item_element : compound_item_definition;
END_ENTITY; -- compound_representation_item

ENTITY configuration_design;
    configuration : configuration_item;
    design        : configuration_design_item;
  DERIVE
    name        : label := get_name_value(SELF);
    description : text := get_description_value(SELF);
  UNIQUE
    ur1 : configuration, design;
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'NAME_ATTRIBUTE.NAMED_ITEM')) <= 1);
    wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- configuration_design

ENTITY configuration_effectivity
  SUBTYPE OF (product_definition_effectivity);
    configuration : configuration_design;
  UNIQUE
    ur1 : configuration, usage, id;
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_USAGE' IN TYPEOF(
             SELF\product_definition_effectivity.usage));
END_ENTITY; -- configuration_effectivity

ENTITY configuration_item;
    id           : identifier;
    name         : label;
    description  : OPTIONAL text;
    item_concept : product_concept;
    purpose      : OPTIONAL label;
END_ENTITY; -- configuration_item

ENTITY conic
  SUPERTYPE OF (ONEOF (circle,ellipse,hyperbola,parabola))
```

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```
    SUBTYPE OF (curve);
      position : axis2_placement;
  END_ENTITY; -- conic

  ENTITY conical_surface
    SUBTYPE OF (elementary_surface);
      radius     : length_measure;
      semi_angle : plane_angle_measure;
    WHERE
      wr1: (radius >= 0);
  END_ENTITY; -- conical_surface

  ENTITY connected_edge_set
    SUBTYPE OF (topological_representation_item);
      ces_edges : SET [1:?] OF edge;
  END_ENTITY; -- connected_edge_set

  ENTITY connected_face_set
    SUPERTYPE OF (ONEOF (closed_shell,open_shell))
    SUBTYPE OF (topological_representation_item);
      cfs_faces : SET [1:?] OF face;
  END_ENTITY; -- connected_face_set

  ENTITY context_dependent_unit
    SUBTYPE OF (named_unit);
      name : label;
  END_ENTITY; -- context_dependent_unit

  ENTITY contract;
      name    : label;
      purpose : text;
      kind    : contract_type;
  END_ENTITY; -- contract

  ENTITY contract_assignment
    ABSTRACT SUPERTYPE;
      assigned_contract : contract;
    DERIVE
      role : object_role := get_role(SELF);
    WHERE
      wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
               'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
  END_ENTITY; -- contract_assignment

  ENTITY contract_relationship;
      id                : identifier;
      name              : label;
      description       : OPTIONAL text;
      relating_contract : contract;
      related_contract  : contract;
  END_ENTITY; -- contract_relationship

  ENTITY contract_type;
      description : label;
  END_ENTITY; -- contract_type

  ENTITY conversion_based_unit
    SUBTYPE OF (named_unit);
      name              : label;
```

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```
      conversion_factor : measure_with_unit;
  END_ENTITY; -- conversion_based_unit

  ENTITY coordinated_universal_time_offset;
      hour_offset   : INTEGER;
      minute_offset : OPTIONAL INTEGER;
      sense         : ahead_or_behind;
    WHERE
      wr1: ((0 <= hour_offset) AND (hour_offset <= 12));
      wr2: ((0 <= minute_offset) AND (minute_offset <= 59));
      wr3: (NOT ((hour_offset <> 0) AND (sense = exact)));
  END_ENTITY; -- coordinated_universal_time_offset

  ENTITY csg_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1: (SELF.context_of_items\geometric_representation_context.
               coordinate_space_dimension = 3);
      wr2: (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
               'TECHNICAL_DATA_PACKAGING.CSG_SOLID',
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
               'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D',
               'TECHNICAL_DATA_PACKAGING.SOLID_REPLICA',
               'TECHNICAL_DATA_PACKAGING.REVOLVED_FACE_SOLID',
               'TECHNICAL_DATA_PACKAGING.EXTRUDED_FACE_SOLID'] *
TYPEOF(it))
               <> 1) )) = 0);
      wr3: (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
               NOT ('TECHNICAL_DATA_PACKAGING.CSG_SHAPE_REPRESENTATION' IN
               TYPEOF(mi\mapped_item.mapping_source.mapped_-
representation)))
                )) = 0);
      wr4: (SIZEOF(QUERY ( sr <* QUERY ( it <* SELF.items | (
               'TECHNICAL_DATA_PACKAGING.SOLID_REPLICA' IN TYPEOF(it)) ) |
               (SIZEOF(['TECHNICAL_DATA_PACKAGING.CSG_SOLID',
               'TECHNICAL_DATA_PACKAGING.REVOLVED_FACE_SOLID',
               'TECHNICAL_DATA_PACKAGING.EXTRUDED_FACE_SOLID'] * TYPEOF(sr\
               solid_replica.parent_solid)) = 0) )) = 0);
      wr5: (SIZEOF(QUERY ( it <* SELF.items | (NOT (
               'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D' IN
TYPEOF(it)))
                )) > 0);
  END_ENTITY; -- csg_shape_representation

  ENTITY csg_solid
    SUBTYPE OF (solid_model);
      tree_root_expression : csg_select;
  END_ENTITY; -- csg_solid

  ENTITY curve
    SUPERTYPE OF (ONEOF (line,conic,pcurve,surface_curve,offset_curve_2d,
        offset_curve_3d,curve_replica))
    SUBTYPE OF (geometric_representation_item);
  END_ENTITY; -- curve

  ENTITY curve_bounded_surface
    SUBTYPE OF (bounded_surface);
      basis_surface  : surface;
```

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```
      boundaries     : SET [1:?] OF boundary_curve;
      implicit_outer : BOOLEAN;
    WHERE
      wr1: (NOT (implicit_outer AND (
               'TECHNICAL_DATA_PACKAGING.OUTER_BOUNDARY_CURVE' IN TYPEOF(
               boundaries))));
      wr2: ((NOT implicit_outer) OR (
               'TECHNICAL_DATA_PACKAGING.BOUNDED_SURFACE' IN TYPEOF(
               basis_surface)));
      wr3: (SIZEOF(QUERY ( temp <* boundaries | (
               'TECHNICAL_DATA_PACKAGING.OUTER_BOUNDARY_CURVE' IN TYPEOF(
               temp)) )) <= 1);
      wr4: (SIZEOF(QUERY ( temp <* boundaries | (temp\
               composite_curve_on_surface.basis_surface[1] <> SELF.
               basis_surface) )) = 0);
  END_ENTITY; -- curve_bounded_surface

  ENTITY curve_replica
    SUBTYPE OF (curve);
      parent_curve   : curve;
      transformation : cartesian_transformation_operator;
    WHERE
      wr1: (transformation.dim = parent_curve.dim);
      wr2: acyclic_curve_replica(SELF,parent_curve);
  END_ENTITY; -- curve_replica

  ENTITY curve_style;
      name         : label;
      curve_font   : curve_font_or_scaled_curve_font_select;
      curve_width  : size_select;
      curve_colour : colour;
  END_ENTITY; -- curve_style

  ENTITY curve_style_font;
      name         : label;
      pattern_list : LIST [1:?] OF curve_style_font_pattern;
  END_ENTITY; -- curve_style_font

  ENTITY curve_style_font_pattern;
      visible_segment_length   : positive_length_measure;
      invisible_segment_length : positive_length_measure;
  END_ENTITY; -- curve_style_font_pattern

  ENTITY curve_style_rendering;
      rendering_method     : shading_curve_method;
      rendering_properties : surface_rendering_properties;
  END_ENTITY; -- curve_style_rendering

  ENTITY cylindrical_surface
    SUBTYPE OF (elementary_surface);
      radius : positive_length_measure;
  END_ENTITY; -- cylindrical_surface

  ENTITY date
    SUPERTYPE OF (calendar_date);
      year_component : year_number;
  END_ENTITY; -- date
```

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```
ENTITY date_and_time;
    date_component : date;
    time_component : local_time;
END_ENTITY; -- date_and_time

ENTITY date_and_time_assignment
  ABSTRACT SUPERTYPE;
    assigned_date_and_time : date_and_time;
    role                   : date_time_role;
END_ENTITY; -- date_and_time_assignment

ENTITY date_assignment
  ABSTRACT SUPERTYPE;
    assigned_date : date;
    role          : date_role;
END_ENTITY; -- date_assignment

ENTITY date_role;
    name : label;
  DERIVE
    description : text := get_description_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- date_role

ENTITY date_time_role;
    name : label;
  DERIVE
    description : text := get_description_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- date_time_role

ENTITY dated_effectivity
  SUBTYPE OF (effectivity);
    effectivity_end_date   : OPTIONAL date_time_or_event_occurrence;
    effectivity_start_date : date_time_or_event_occurrence;
END_ENTITY; -- dated_effectivity

ENTITY defined_character_glyph
  SUBTYPE OF (geometric_representation_item);
    definition : defined_glyph_select;
    placement  : axis2_placement;
END_ENTITY; -- defined_character_glyph

ENTITY definitional_representation
  SUBTYPE OF (representation);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.PARAMETRIC_REPRESENTATION_CONTEXT'
             IN TYPEOF(SELF\representation.context_of_items));
END_ENTITY; -- definitional_representation

ENTITY degenerate_pcurve
  SUBTYPE OF (point);
    basis_surface      : surface;
    reference_to_curve : definitional_representation;
  WHERE
```

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```
    wr1: (SIZEOF(reference_to_curve\representation.items) = 1);
    wr2: ('TECHNICAL_DATA_PACKAGING.CURVE' IN TYPEOF(reference_to_curve\
             representation.items[1]));
    wr3: (reference_to_curve\representation.items[1]\
             geometric_representation_item.dim = 2);
END_ENTITY; -- degenerate_pcurve

ENTITY degenerate_toroidal_surface
  SUBTYPE OF (toroidal_surface);
    select_outer : BOOLEAN;
  WHERE
    wr1: (major_radius < minor_radius);
END_ENTITY; -- degenerate_toroidal_surface

ENTITY derived_unit;
    elements : SET [1:?] OF derived_unit_element;
  DERIVE
    name : label := get_name_value(SELF);
  WHERE
    wr1: ((SIZEOF(elements) > 1) OR ((SIZEOF(elements) = 1) AND (
             elements[1].exponent <> 1)));
    wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'NAME_ATTRIBUTE.NAMED_ITEM')) <= 1);
END_ENTITY; -- derived_unit

ENTITY derived_unit_element;
    unit     : named_unit;
    exponent : REAL;
END_ENTITY; -- derived_unit_element

ENTITY description_attribute;
    attribute_value : text;
    described_item  : description_attribute_select;
END_ENTITY; -- description_attribute

ENTITY descriptive_representation_item
  SUBTYPE OF (representation_item);
    description : text;
END_ENTITY; -- descriptive_representation_item

ENTITY design_make_from_relationship
  SUBTYPE OF (product_definition_relationship);
END_ENTITY; -- design_make_from_relationship

ENTITY dimensional_exponents;
    length_exponent                    : REAL;
    mass_exponent                      : REAL;
    time_exponent                      : REAL;
    electric_current_exponent          : REAL;
    thermodynamic_temperature_exponent : REAL;
    amount_of_substance_exponent       : REAL;
    luminous_intensity_exponent        : REAL;
END_ENTITY; -- dimensional_exponents

ENTITY direction
  SUBTYPE OF (geometric_representation_item);
    direction_ratios : LIST [2:3] OF REAL;
  WHERE
```

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```
    wr1: (SIZEOF(QUERY ( tmp <* direction_ratios | (tmp <> 0) )) > 0);
END_ENTITY; -- direction

ENTITY document;
    id          : identifier;
    name        : label;
    description : OPTIONAL text;
    kind        : document_type;
  INVERSE
    representation_types : SET [0:?] OF document_representation_type FOR
                                  represented_document;
END_ENTITY; -- document

ENTITY document_file
  SUBTYPE OF (document, characterized_object);
  WHERE
    wr1: (SELF\characterized_object.name = '');
    wr2: (NOT EXISTS(SELF\characterized_object.description));
    wr3: (SIZEOF(QUERY ( drt <* SELF\document.representation_types | (
             drt.name IN ['digital','physical']) )) = 1);
END_ENTITY; -- document_file

ENTITY document_product_association;
    name              : label;
    description       : OPTIONAL text;
    relating_document : document;
    related_product   : product_or_formation_or_definition;
END_ENTITY; -- document_product_association

ENTITY document_product_equivalence
  SUBTYPE OF (document_product_association);
  WHERE
    wr1: (SELF.name = 'equivalence');
    wr2: ((NOT ('TECHNICAL_DATA_PACKAGING.PRODUCT' IN TYPEOF(SELF.
             related_product))) OR ((SELF.relating_document.kind.
             product_data_type = 'configuration controlled document') AND
              (SIZEOF(QUERY ( prpc <* USEDIN(SELF.related_product,
             'TECHNICAL_DATA_PACKAGING.' +
             'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS') | (prpc.name =
             'document') )) = 1)));
    wr3: ((NOT ('TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION'
             IN TYPEOF(SELF.related_product))) OR ((SELF.
             relating_document.kind.product_data_type =
             'configuration controlled document version') AND (SIZEOF(
             QUERY ( prpc <* USEDIN(SELF.related_product\
             product_definition_formation.of_product,
             'TECHNICAL_DATA_PACKAGING.'+
             'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS')
              | (prpc.name = 'document') )) = 1)));
    wr4: ((NOT ('TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION' IN TYPEOF(
             SELF.related_product))) OR ((SELF.relating_document.kind.
             product_data_type =
             'configuration controlled document definition') AND (SIZEOF(
             QUERY ( prpc <* USEDIN(SELF.related_product\
             product_definition.formation.of_product,
             'TECHNICAL_DATA_PACKAGING.'+
             'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS')
              | (prpc.name = 'document') )) = 1)));
END_ENTITY; -- document_product_equivalence
```

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```
  ENTITY document_reference
    ABSTRACT SUPERTYPE;
      assigned_document : document;
      source            : label;
    DERIVE
      role : object_role := get_role(SELF);
    WHERE
      wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
               'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
  END_ENTITY; -- document_reference

  ENTITY document_relationship;
      name               : label;
      description        : OPTIONAL text;
      relating_document  : document;
      related_document   : document;
  END_ENTITY; -- document_relationship

  ENTITY document_representation_type;
      name                  : label;
      represented_document  : document;
  END_ENTITY; -- document_representation_type

  ENTITY document_type;
      product_data_type : label;
  END_ENTITY; -- document_type

  ENTITY document_usage_constraint;
      source                : document;
      subject_element       : label;
      subject_element_value : text;
  END_ENTITY; -- document_usage_constraint

  ENTITY document_usage_constraint_assignment
    ABSTRACT SUPERTYPE;
      assigned_document_usage : document_usage_constraint;
      role                    : document_usage_role;
  END_ENTITY; -- document_usage_constraint_assignment

  ENTITY document_usage_role;
      name        : label;
      description : OPTIONAL text;
  END_ENTITY; -- document_usage_role

  ENTITY draughting_approval_assignment
    SUBTYPE OF (approval_assignment);
      approved_items : SET [1:?] OF approved_item;
    WHERE
      wr1: (SIZEOF(QUERY ( item <* approved_items | (
               'TECHNICAL_DATA_PACKAGING.DRAWING_REVISION' IN TYPEOF(item))
))
               <= 1);
  END_ENTITY; -- draughting_approval_assignment

  ENTITY draughting_callout
    SUBTYPE OF (geometric_representation_item);
      contents : SET [1:?] OF draughting_callout_element;
  END_ENTITY; -- draughting_callout
```

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```
  ENTITY draughting_drawing_revision
    SUBTYPE OF (drawing_revision);
    WHERE
      wr1 : ((SIZEOF(USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET')) >= 1) AND (
                 SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                 'TECHNICAL_DATA_PACKAGING.DRAWING_SHEET_REVISION' IN
                 TYPEOF(ais.area))) )) = 0));
      wr2 : (SIZEOF(QUERY ( app_ass <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'DRAUGHTING_APPROVAL_ASSIGNMENT.APPROVED_ITEMS') | (NOT (
                 SIZEOF(USEDIN(app_ass.assigned_approval,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'APPROVAL_DATE_TIME.DATED_APPROVAL')) = 1)) )) = 0);
      wr3 : (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                 SIZEOF(QUERY ( app_ass <* USEDIN(ais.area,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'DRAUGHTING_APPROVAL_ASSIGNMENT.APPROVED_ITEMS') | (NOT (
                 SIZEOF(USEDIN(app_ass.assigned_approval,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'APPROVAL_DATE_TIME.DATED_APPROVAL')) = 1)) )) = 0)) )) =
0);
      wr4 : (SIZEOF(QUERY ( app_ass <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'DRAUGHTING_APPROVAL_ASSIGNMENT.APPROVED_ITEMS') | (NOT (
                 SIZEOF(USEDIN(app_ass.assigned_approval,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'APPROVAL_PERSON_ORGANIZATION.AUTHORIZED_APPROVAL')) >= 1))
))
                 = 0);
      wr5 : (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                 SIZEOF(QUERY ( app_ass <* USEDIN(ais.area,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'DRAUGHTING_APPROVAL_ASSIGNMENT.APPROVED_ITEMS') | (NOT (
                 SIZEOF(USEDIN(app_ass.assigned_approval,
                 'TECHNICAL_DATA_PACKAGING.' +
                 'APPROVAL_PERSON_ORGANIZATION.AUTHORIZED_APPROVAL')) >= 1))
))
                 = 0)) )) = 0);
      wr6 : (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
                 'DRAUGHTING_TITLE.ITEMS')) <= 1);
      wr7 : (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                 SIZEOF(USEDIN(ais.area,'TECHNICAL_DATA_PACKAGING.' +
                 'DRAUGHTING_TITLE.ITEMS')) <= 1)) )) = 0);
      wr8 : (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                 SIZEOF(QUERY ( item <* ais.area.items | (NOT (SIZEOF(
                 TYPEOF(item) * ['TECHNICAL_DATA_PACKAGING.STYLED_ITEM',
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT',
                 'TECHNICAL_DATA_PACKAGING.PLANAR_BOX']) = 1)) )) = 0)) )) =
                  0);
      wr9 : (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
```

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```
                SIZEOF(QUERY ( item <* ais.area.items |
(SIZEOF(TYPEOF(item)
                * ['TECHNICAL_DATA_PACKAGING.STYLED_ITEM',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM']) = 1) )) > 0)) )) =
                 0);
      wr10: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                SIZEOF(QUERY ( p_b <* QUERY ( item <* ais.area.items | (
                'TECHNICAL_DATA_PACKAGING.PLANAR_BOX' IN TYPEOF(item)) ) |
                (NOT (SIZEOF(USEDIN(p_b,'TECHNICAL_DATA_PACKAGING.' +
                'PRESENTATION_SIZE.SIZE')) = 1)) )) = 0)) )) = 0);
      wr11: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                SIZEOF(QUERY ( mi <* QUERY ( item <* ais.area.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) )
                 | (NOT ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN
                TYPEOF(mi.mapping_source.mapped_representation))) )) = 0))
))
                = 0);
      wr12: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                SIZEOF(QUERY ( a2p <* QUERY ( item <* ais.area.items | (
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(item))
)
                 | (NOT (SIZEOF(USEDIN(a2p,'TECHNICAL_DATA_PACKAGING.' +
                'MAPPED_ITEM.MAPPING_TARGET')) > 0)) )) = 0)) )) = 0);
      wr13: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                SIZEOF(ais.area.context_of_items.representations_in_-
context)
                = 1)) )) = 0);
      wr14: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                SIZEOF(QUERY ( mi <* QUERY ( item <* ais.area.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) )
                 | (NOT (SIZEOF(USEDIN(mi.mapping_source.
                mapped_representation,'TECHNICAL_DATA_PACKAGING.' +
                'REPRESENTATION_MAP.MAPPED_REPRESENTATION')) = 1)) )) = 0))
))
                = 0);
      wr15: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                SIZEOF(QUERY ( mi <* QUERY ( item <* ais.area.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) )
                 | (NOT (SIZEOF(QUERY ( pv_item <* mi.mapping_source.
                mapped_representation.items | (NOT (SIZEOF(TYPEOF(pv_item)
                * ['TECHNICAL_DATA_PACKAGING.' + 'STYLED_ITEM',
                'TECHNICAL_DATA_PACKAGING.CAMERA_IMAGE',
                'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT']) = 1)) ))
                = 0)) )) = 0)) )) = 0);
      wr16: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                SIZEOF(QUERY ( mi <* QUERY ( item <* ais.area.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) )
                 | (NOT (SIZEOF(QUERY ( pv_item <* mi.mapping_source.
                mapped_representation.items | (
                'TECHNICAL_DATA_PACKAGING.CAMERA_IMAGE' IN TYPEOF(pv_item))
))
                = 1)) )) = 0)) )) = 0);
```

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      wr17: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                 SIZEOF(QUERY ( mi <* QUERY ( item <* ais.area.items | (
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) )
                  | (NOT (SIZEOF(QUERY ( a2p <* QUERY ( pv_item <* mi.
                 mapping_source.mapped_representation.items | (
                 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(
                 pv_item)) ) | (('TECHNICAL_DATA_PACKAGING.' +
                 'MAPPING_SOURCE.MAPPING_ORIGIN') IN ROLESOF(a2p)) )) = 1))
))
                 = 0)) )) = 0);
      wr18: (SIZEOF(QUERY ( ais <* USEDIN(SELF,
                 'TECHNICAL_DATA_PACKAGING.AREA_IN_SET.IN_SET') | (NOT (
                 SIZEOF(QUERY ( mi <* QUERY ( item <* ais.area.items | (
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) )
                  | (NOT (SIZEOF(mi.mapping_source.mapped_representation.
                 context_of_items.representations_in_context) = 1)) )) = 0))
))
                 = 0);
  END_ENTITY; -- draughting_drawing_revision

  ENTITY draughting_pre_defined_colour
    SUBTYPE OF (pre_defined_colour);
    WHERE
      wr1: (SELF.name IN ['red','green','blue','yellow','magenta','cyan',
               'black','white']);
  END_ENTITY; -- draughting_pre_defined_colour

  ENTITY draughting_pre_defined_curve_font
    SUBTYPE OF (pre_defined_curve_font);
    WHERE
      wr1: (SELF.name IN ['continuous','chain','chain double dash',
               'dashed','dotted']);
  END_ENTITY; -- draughting_pre_defined_curve_font

  ENTITY draughting_title;
      items    : SET [1:?] OF draughting_titled_item;
      language : label;
      contents : text;
  END_ENTITY; -- draughting_title

  ENTITY drawing_definition;
      drawing_number : identifier;
      drawing_type   : OPTIONAL label;
  END_ENTITY; -- drawing_definition

  ENTITY drawing_revision
    SUBTYPE OF (presentation_set);
      revision_identifier : identifier;
      drawing_identifier  : drawing_definition;
      intended_scale      : OPTIONAL text;
    UNIQUE
      ur1 : revision_identifier, drawing_identifier;
  END_ENTITY; -- drawing_revision

  ENTITY drawing_sheet_revision
    SUBTYPE OF (presentation_area);
      revision_identifier : identifier;
    WHERE
```

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```
      wr1: (SIZEOF(QUERY ( item <* SELF\representation.items | ((
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) AND
                ('TECHNICAL_DATA_PACKAGING.DRAWING_SHEET_REVISION' IN
                TYPEOF(item\mapped_item.mapping_source.mapped_-
representation)))
                 )) = 0);
  END_ENTITY; -- drawing_sheet_revision

  ENTITY edge
    SUPERTYPE OF (ONEOF (edge_curve,oriented_edge))
    SUBTYPE OF (topological_representation_item);
      edge_start : vertex;
      edge_end   : vertex;
  END_ENTITY; -- edge

  ENTITY edge_based_wireframe_model
    SUBTYPE OF (geometric_representation_item);
      ebwm_boundary : SET [1:?] OF connected_edge_set;
  END_ENTITY; -- edge_based_wireframe_model

  ENTITY edge_based_wireframe_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1: (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.EDGE_BASED_WIREFRAME_MODEL',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] * TYPEOF(it))
                = 1)) )) = 0);
      wr2: (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.EDGE_BASED_WIREFRAME_MODEL',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
                >= 1);
      wr3: (SIZEOF(QUERY ( ebwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.EDGE_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( eb <* ebwm\
                edge_based_wireframe_model.ebwm_boundary | (NOT (SIZEOF(
                QUERY ( edges <* eb.ces_edges | (NOT (
                'TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN TYPEOF(edges))) ))
                = 0)) )) = 0)) )) = 0);
      wr4: (SIZEOF(QUERY ( ebwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.EDGE_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( eb <* ebwm\
                edge_based_wireframe_model.ebwm_boundary | (NOT (SIZEOF(
                QUERY ( pline_edges <* QUERY ( edges <* eb.ces_edges | (
                'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(edges\
                edge_curve.edge_geometry)) ) | (NOT (SIZEOF(pline_edges\
                edge_curve.edge_geometry\polyline.points) > 2)) )) = 0)) ))
                = 0)) )) = 0);
      wr5: (SIZEOF(QUERY ( ebwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.EDGE_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( eb <* ebwm\
                edge_based_wireframe_model.ebwm_boundary | (NOT (SIZEOF(
                QUERY ( edges <* eb.ces_edges | (NOT ((
                'TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(edges.
                edge_start)) AND ('TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN
                 TYPEOF(edges.edge_end)))) )) = 0)) )) = 0)) )) = 0);
      wr6: (SIZEOF(QUERY ( ebwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.EDGE_BASED_WIREFRAME_MODEL' IN
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                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( eb <* ebwm\
                edge_based_wireframe_model.ebwm_boundary | (NOT (SIZEOF(
                QUERY ( edges <* eb.ces_edges | (NOT
                valid_wireframe_edge_curve(edges\edge_curve.edge_geometry))
))
                = 0)) )) = 0)) )) = 0);
      wr7: (SIZEOF(QUERY ( ebwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.EDGE_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( eb <* ebwm\
                edge_based_wireframe_model.ebwm_boundary | (NOT (SIZEOF(
                QUERY ( edges <* eb.ces_edges | (NOT (
                valid_wireframe_vertex_point(edges.edge_start\vertex_point.
                vertex_geometry) AND valid_wireframe_vertex_point(edges.
                edge_end\vertex_point.vertex_geometry))) )) = 0)) )) = 0))
))
                = 0);
      wr8: (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT (('TECHNICAL_DATA_PACKAGING.' +
                'EDGE_BASED_WIREFRAME_SHAPE_REPRESENTATION') IN TYPEOF(mi\
                mapped_item.mapping_source.mapped_representation))) )) = 0);
      wr9: (SELF.context_of_items\geometric_representation_context.
                coordinate_space_dimension = 3);
  END_ENTITY; -- edge_based_wireframe_shape_representation

  ENTITY edge_curve
    SUBTYPE OF (edge, geometric_representation_item);
      edge_geometry : curve;
      same_sense    : BOOLEAN;
  END_ENTITY; -- edge_curve

  ENTITY edge_loop
    SUBTYPE OF (loop, path);
    DERIVE
      ne : INTEGER := SIZEOF(SELF\path.edge_list);
    WHERE
      wr1: (SELF\path.edge_list[1].edge_start :=: SELF\path.edge_list[ne].
                edge_end);
  END_ENTITY; -- edge_loop

  ENTITY effectivity
    SUPERTYPE OF (ONEOF (serial_numbered_effectivity,dated_effectivity,
        lot_effectivity));
      id : identifier;
    DERIVE
      name        : label := get_name_value(SELF);
      description : text := get_description_value(SELF);
    WHERE
      wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
                'NAME_ATTRIBUTE.NAMED_ITEM')) <= 1);
      wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
                'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
  END_ENTITY; -- effectivity

  ENTITY effectivity_assignment
    ABSTRACT SUPERTYPE;
      assigned_effectivity : effectivity;
    DERIVE
      role : object_role := get_role(SELF);
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    WHERE
      wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
                'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
  END_ENTITY; -- effectivity_assignment

  ENTITY effectivity_context_assignment
    ABSTRACT SUPERTYPE;
      assigned_effectivity_assignment : effectivity_assignment;
      role                            : effectivity_context_role;
  END_ENTITY; -- effectivity_context_assignment

  ENTITY effectivity_context_role;
      name        : label;
      description : OPTIONAL text;
  END_ENTITY; -- effectivity_context_role

  ENTITY effectivity_relationship;
      name                 : label;
      description          : OPTIONAL text;
      related_effectivity  : effectivity;
      relating_effectivity : effectivity;
  END_ENTITY; -- effectivity_relationship

  ENTITY electric_current_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.ELECTRIC_CURRENT_UNIT' IN TYPEOF(
                SELF\measure_with_unit.unit_component));
  END_ENTITY; -- electric_current_measure_with_unit

  ENTITY electric_current_unit
    SUBTYPE OF (named_unit);
    WHERE
      wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
                named_unit.dimensions.mass_exponent = 0) AND (SELF\
                named_unit.dimensions.time_exponent = 0) AND (SELF\
                named_unit.dimensions.electric_current_exponent = 1) AND (
                SELF\named_unit.dimensions.
                thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
                .dimensions.amount_of_substance_exponent = 0) AND (SELF\
                named_unit.dimensions.luminous_intensity_exponent = 0));
  END_ENTITY; -- electric_current_unit

  ENTITY elementary_brep_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1 : (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP',
                 'TECHNICAL_DATA_PACKAGING.FACETED_BREP',
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] *
TYPEOF(it))
                 = 1)) )) = 0);
      wr2 : (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP',
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
                 > 0);
      wr3 : (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
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                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it))) |
                (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
                SIZEOF(QUERY ( fcs <* csh.cfs_faces | (NOT (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fcs))) ))
                = 0)) )) = 0)) )) = 0);
      wr4 : (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it)))
                 | (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
                SIZEOF(QUERY ( fcs <* csh\connected_face_set.cfs_faces | (
                NOT ('TECHNICAL_DATA_PACKAGING.ELEMENTARY_SURFACE' IN
                TYPEOF(fcs\face_surface.face_geometry))) )) = 0)) )) = 0))
))
                = 0);
      wr5 : (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it)))
                 | (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
                SIZEOF(QUERY ( fcs <* csh\connected_face_set.cfs_faces | (
                NOT (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fcs.bounds
                 | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path
                .edge_list | (NOT ('TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN
                 TYPEOF(oe.edge_element))) )) = 0)) )) = 0)) )) = 0)) )) =
                0)) )) = 0);
      wr6 : (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it)))
                 | (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
                SIZEOF(QUERY ( fcs <* csh\connected_face_set.cfs_faces | (
                NOT (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fcs.bounds
                 | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path
                .edge_list | (NOT (SIZEOF(['TECHNICAL_DATA_PACKAGING.LINE',
                'TECHNICAL_DATA_PACKAGING.CONIC',
                'TECHNICAL_DATA_PACKAGING.POLYLINE'] * TYPEOF(oe.
                edge_element\edge_curve.edge_geometry)) = 1)) )) = 0)) )) =
                 0)) )) = 0)) )) = 0)) )) = 0);
      wr7 : (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it)))
                 | (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
                SIZEOF(QUERY ( fcs <* csh\connected_face_set.cfs_faces | (
                NOT (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fcs.bounds
                 | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path
                .edge_list | (NOT (('TECHNICAL_DATA_PACKAGING.VERTEX_POINT'
                IN TYPEOF(oe.edge_start)) AND (
                'TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(oe.
                edge_end)))) )) = 0)) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr8 : (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it)))
                 | (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
                SIZEOF(QUERY ( fcs <* csh\connected_face_set.cfs_faces | (
                NOT (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fcs.bounds
                 | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds.bound\path
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                .edge_list | (('TECHNICAL_DATA_PACKAGING.POLYLINE' IN
                TYPEOF(oe.edge_element\edge_curve.edge_geometry)) AND (NOT
                (SIZEOF(oe\oriented_edge.edge_element\edge_curve.
                edge_geometry\polyline.points) >= 3))) )) = 0)) )) = 0)) ))
                = 0)) )) = 0)) )) = 0);
      wr9 : (SIZEOF(QUERY ( msb <* QUERY ( it <* items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it)))
                 | ('TECHNICAL_DATA_PACKAGING.ORIENTED_CLOSED_SHELL' IN
                TYPEOF(msb\manifold_solid_brep.outer)) )) = 0);
      wr10: (SIZEOF(QUERY ( brv <* QUERY ( it <* items | (
                'TECHNICAL_DATA_PACKAGING.BREP_WITH_VOIDS' IN TYPEOF(it)) )
                 | (NOT (SIZEOF(QUERY ( csh <* brv\brep_with_voids.voids |
                csh\oriented_closed_shell.orientation )) = 0)) )) = 0);
      wr11: (SIZEOF(QUERY ( mi <* QUERY ( it <* items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT
            ('TECHNICAL_DATA_PACKAGING.ELEMENTARY_BREP_SHAPE_-
REPRESENTATION'
                IN TYPEOF(mi\mapped_item.mapping_source.
                mapped_representation))) )) = 0);
      wr12: (SIZEOF(QUERY ( msb <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP'
                IN TYPEOF(it)))
                 | (NOT (SIZEOF(QUERY ( csh <* msb_shells(msb) | (NOT (
                SIZEOF(QUERY ( fcs <* csh\connected_face_set.cfs_faces | (
                NOT (SIZEOF(QUERY ( vlp_fbnds <* QUERY ( bnds <* fcs.bounds
                 | ('TECHNICAL_DATA_PACKAGING.VERTEX_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (('TECHNICAL_DATA_PACKAGING.VERTEX_POINT'
                IN TYPEOF(vlp_fbnds\face_bound.bound\vertex_loop.
                loop_vertex)) AND (
                'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT' IN TYPEOF(
                vlp_fbnds\face_bound.bound\vertex_loop.loop_vertex\
                vertex_point.vertex_geometry)))) )) = 0)) )) = 0)) )) = 0))
))
                = 0);
  END_ENTITY; -- elementary_brep_shape_representation

  ENTITY elementary_surface
    SUPERTYPE OF (ONEOF (plane,cylindrical_surface,conical_surface,
        spherical_surface,toroidal_surface))
    SUBTYPE OF (surface);
      position : axis2_placement_3d;
  END_ENTITY; -- elementary_surface

  ENTITY ellipse
    SUBTYPE OF (conic);
      semi_axis_1 : positive_length_measure;
      semi_axis_2 : positive_length_measure;
  END_ENTITY; -- ellipse

  ENTITY evaluated_degenerate_pcurve
    SUBTYPE OF (degenerate_pcurve);
      equivalent_point : cartesian_point;
  END_ENTITY; -- evaluated_degenerate_pcurve

  ENTITY executed_action
    SUBTYPE OF (action);
  END_ENTITY; -- executed_action
```

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ENTITY external_identification_assignment
  ABSTRACT SUPERTYPE
  SUBTYPE OF (identification_assignment);
    source : external_source;
END_ENTITY; -- external_identification_assignment

ENTITY external_source;
    source_id : source_item;
  DERIVE
    description : text := get_description_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- external_source

ENTITY externally_defined_character_glyph
  SUBTYPE OF (externally_defined_item);
END_ENTITY; -- externally_defined_character_glyph

ENTITY externally_defined_item;
    item_id : source_item;
    source  : external_source;
END_ENTITY; -- externally_defined_item

ENTITY externally_defined_planar_box
  SUBTYPE OF (externally_defined_item, planar_box);
END_ENTITY; -- externally_defined_planar_box

ENTITY externally_defined_style
  SUBTYPE OF (externally_defined_item);
END_ENTITY; -- externally_defined_style

ENTITY externally_defined_symbol
  SUBTYPE OF (externally_defined_item);
END_ENTITY; -- externally_defined_symbol

ENTITY externally_defined_symbol_and_placement
  SUBTYPE OF (externally_defined_symbol, placement);
END_ENTITY; -- externally_defined_symbol_and_placement

ENTITY externally_defined_text_font
  SUBTYPE OF (externally_defined_item);
END_ENTITY; -- externally_defined_text_font

ENTITY extruded_face_solid
  SUBTYPE OF (swept_face_solid);
    extruded_direction : direction;
    depth              : positive_length_measure;
  WHERE
    wr1: (dot_product(SELF\swept_face_solid.swept_face.face_geometry\
              elementary_surface.position.p[3],extruded_direction) <> 0);
END_ENTITY; -- extruded_face_solid

ENTITY face
  SUPERTYPE OF (ONEOF (face_surface,oriented_face))
  SUBTYPE OF (topological_representation_item);
    bounds : SET [1:?] OF face_bound;
  WHERE
    wr1: (NOT mixed_loop_type_set(list_to_set(list_face_loops(SELF))));
```

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      wr2: (SIZEOF(QUERY ( temp <* bounds | (
               'TECHNICAL_DATA_PACKAGING.FACE_OUTER_BOUND' IN TYPEOF(temp))
))
               <= 1);
  END_ENTITY; -- face

  ENTITY face_based_surface_model
    SUBTYPE OF (geometric_representation_item);
      fbsm_faces : SET [1:?] OF connected_face_set;
  END_ENTITY; -- face_based_surface_model

  ENTITY face_bound
    SUBTYPE OF (topological_representation_item);
      bound       : loop;
      orientation : BOOLEAN;
  END_ENTITY; -- face_bound

  ENTITY face_outer_bound
    SUBTYPE OF (face_bound);
  END_ENTITY; -- face_outer_bound

  ENTITY face_surface
    SUBTYPE OF (face, geometric_representation_item);
      face_geometry : surface;
      same_sense    : BOOLEAN;
  END_ENTITY; -- face_surface

  ENTITY faceted_brep
    SUBTYPE OF (manifold_solid_brep);
  END_ENTITY; -- faceted_brep

  ENTITY faceted_brep_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1: (SIZEOF(QUERY ( it <* items | (NOT (SIZEOF([
               'TECHNICAL_DATA_PACKAGING.FACETED_BREP',
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
               'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] * TYPEOF(it))
               = 1)) )) = 0);
      wr2: (SIZEOF(QUERY ( it <* items | (SIZEOF([
               'TECHNICAL_DATA_PACKAGING.FACETED_BREP',
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
               > 0);
      wr3: (SIZEOF(QUERY ( fbrep <* QUERY ( it <* items | (
               'TECHNICAL_DATA_PACKAGING.FACETED_BREP' IN TYPEOF(it)) ) | (
               NOT (SIZEOF(QUERY ( csh <* msb_shells(fbrep) | (NOT (SIZEOF(
               QUERY ( fcs <* csh\connected_face_set.cfs_faces | (NOT ((
               'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fcs)) AND
               ('TECHNICAL_DATA_PACKAGING.PLANE' IN TYPEOF(fcs\face_surface
               .face_geometry)) AND (
               'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT' IN TYPEOF(fcs\
               face_surface.face_geometry\elementary_surface.position.
               location)))) )) = 0)) )) = 0)) )) = 0);
      wr4: (SIZEOF(QUERY ( fbrep <* QUERY ( it <* items | (
               'TECHNICAL_DATA_PACKAGING.FACETED_BREP' IN TYPEOF(it)) ) | (
               NOT (SIZEOF(QUERY ( csh <* msb_shells(fbrep) | (NOT (SIZEOF(
               QUERY ( fcs <* csh\connected_face_set.cfs_faces | (NOT (
               SIZEOF(QUERY ( bnds <* fcs.bounds | (
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                'TECHNICAL_DATA_PACKAGING.FACE_OUTER_BOUND' IN TYPEOF(bnds))
))
                = 1)) )) = 0)) )) = 0)) )) = 0);
      wr5: (SIZEOF(QUERY ( msb <* QUERY ( it <* items | (
                'TECHNICAL_DATA_PACKAGING.MANIFOLD_SOLID_BREP' IN
TYPEOF(it)) )
                 | ('TECHNICAL_DATA_PACKAGING.ORIENTED_CLOSED_SHELL' IN
                TYPEOF(msb\manifold_solid_brep.outer)) )) = 0);
      wr6: (SIZEOF(QUERY ( brv <* QUERY ( it <* items | (
                'TECHNICAL_DATA_PACKAGING.BREP_WITH_VOIDS' IN TYPEOF(it)) )
                 | (NOT (SIZEOF(QUERY ( csh <* brv\brep_with_voids.voids |
                csh\oriented_closed_shell.orientation )) = 0)) )) = 0);
      wr7: (SIZEOF(QUERY ( mi <* QUERY ( it <* items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT
              ('TECHNICAL_DATA_PACKAGING.FACETED_BREP_SHAPE_REPRESENTATION'
                IN TYPEOF(mi\mapped_item.mapping_source.
                mapped_representation))) )) = 0);
  END_ENTITY; -- faceted_brep_shape_representation

  ENTITY fill_area_style;
      name        : label;
      fill_styles : SET [1:?] OF fill_style_select;
    WHERE
      wr1: (SIZEOF(QUERY ( fill_style <* SELF.fill_styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'FILL_AREA_STYLE_COLOUR') IN
                TYPEOF(fill_style)) )) <= 1);
  END_ENTITY; -- fill_area_style

  ENTITY fill_area_style_colour;
      name        : label;
      fill_colour : colour;
  END_ENTITY; -- fill_area_style_colour

  ENTITY founded_item;
  END_ENTITY; -- founded_item

  ENTITY functionally_defined_transformation;
      name        : label;
      description : OPTIONAL text;
  END_ENTITY; -- functionally_defined_transformation

  ENTITY geometric_curve_set
    SUBTYPE OF (geometric_set);
    WHERE
      wr1: (SIZEOF(QUERY ( temp <* SELF\geometric_set.elements | (
                'TECHNICAL_DATA_PACKAGING.SURFACE' IN TYPEOF(temp)) )) = 0);
  END_ENTITY; -- geometric_curve_set

  ENTITY geometric_representation_context
    SUBTYPE OF (representation_context);
      coordinate_space_dimension : dimension_count;
  END_ENTITY; -- geometric_representation_context

  ENTITY geometric_representation_item
    SUPERTYPE OF (ONEOF (point,direction,vector,placement,
        cartesian_transformation_operator,curve,surface,edge_curve,
        face_surface,poly_loop,vertex_point,solid_model,boolean_result,
        sphere,right_circular_cone,right_circular_cylinder,torus,block,
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        right_angular_wedge,half_space_solid,shell_based_surface_model,
        face_based_surface_model,shell_based_wireframe_model,
        edge_based_wireframe_model,geometric_set))
    SUBTYPE OF (representation_item);
    DERIVE
      dim : dimension_count := dimension_of(SELF);
    WHERE
      wr1: (SIZEOF(QUERY ( using_rep <* using_representations(SELF) | (
               NOT (
               'TECHNICAL_DATA_PACKAGING.GEOMETRIC_REPRESENTATION_CONTEXT'
               IN TYPEOF(using_rep.context_of_items))) )) = 0);
  END_ENTITY; -- geometric_representation_item

  ENTITY geometric_set
    SUPERTYPE OF (geometric_curve_set)
    SUBTYPE OF (geometric_representation_item);
      elements : SET [1:?] OF geometric_set_select;
  END_ENTITY; -- geometric_set

  ENTITY geometrically_bounded_2d_wireframe_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1: (SELF.context_of_items\geometric_representation_context.
               coordinate_space_dimension = 2);
      wr2: (SIZEOF(QUERY ( item <* SELF.items | (NOT (SIZEOF(TYPEOF(item)
               * ['TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET',
               'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_2D',
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM']) = 1)) )) = 0);
      wr3: (SIZEOF(QUERY ( item <* SELF.items | (SIZEOF(TYPEOF(item) * [
               'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET',
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM']) = 1) )) >= 1);
      wr4: (SIZEOF(QUERY ( mi <* QUERY ( item <* SELF.items | (
               'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(item)) ) |
               (NOT (('TECHNICAL_DATA_PACKAGING.' +
               'GEOMETRICALLY_BOUNDED_2D_WIREFRAME_REPRESENTATION') IN
               TYPEOF(mi\mapped_item.mapping_source.mapped_-
representation)))
                )) = 0);
      wr5: (SIZEOF(QUERY ( gcs <* QUERY ( item <* SELF.items | (
               'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET' IN TYPEOF(
               item)) ) | (NOT (SIZEOF(QUERY ( elem <* gcs\geometric_set.
               elements | (NOT (SIZEOF(TYPEOF(elem) * [
               'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE',
               'TECHNICAL_DATA_PACKAGING.CIRCLE',
               'TECHNICAL_DATA_PACKAGING.COMPOSITE_CURVE',
               'TECHNICAL_DATA_PACKAGING.ELLIPSE',
               'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_2D',
               'TECHNICAL_DATA_PACKAGING.POINT',
               'TECHNICAL_DATA_PACKAGING.POLYLINE',
               'TECHNICAL_DATA_PACKAGING.TRIMMED_CURVE']) = 1)) )) = 0)) ))
               = 0);
      wr6: (SIZEOF(QUERY ( gcs <* QUERY ( item <* SELF.items | (
               'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET' IN TYPEOF(
               item)) ) | (NOT (SIZEOF(QUERY ( crv <* QUERY ( elem <* gcs\
               geometric_set.elements | ('TECHNICAL_DATA_PACKAGING.CURVE'
               IN TYPEOF(elem)) ) | (NOT valid_basis_curve_in_2d_wireframe(
               crv)) )) = 0)) )) = 0);
      wr7: (SIZEOF(QUERY ( gcs <* QUERY ( item <* SELF.items |
               ('TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET'
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                IN TYPEOF(item)) ) | (NOT (SIZEOF(QUERY ( pnt <*
                QUERY ( elem <* gcs\geometric_set.elements | (
                'TECHNICAL_DATA_PACKAGING.POINT' IN TYPEOF(elem)) ) | (NOT (
                SIZEOF(TYPEOF(pnt) * [
                'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE']) = 1)) )) = 0))
))
                = 0);
      wr8: (SIZEOF(QUERY ( gcs <* QUERY ( item <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET' IN TYPEOF(
                item)) ) | (NOT (SIZEOF(QUERY ( pl <* QUERY ( elem <* gcs\
                geometric_set.elements | (
                'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(elem)) ) | (
                NOT (SIZEOF(pl\polyline.points) > 2)) )) = 0)) )) = 0);
  END_ENTITY; -- geometrically_bounded_2d_wireframe_representation

  ENTITY geometrically_bounded_surface_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1: (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_SET',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] * TYPEOF(it))
                = 1)) )) = 0);
      wr2: (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_SET',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
                > 0);
      wr3: (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT ((('TECHNICAL_DATA_PACKAGING.' +
                'GEOMETRICALLY_BOUNDED_SURFACE_SHAPE_REPRESENTATION') IN
                TYPEOF(mi\mapped_item.mapping_source.mapped_representation))
                AND (SIZEOF(QUERY ( mr_it <* mi\mapped_item.mapping_source.
                mapped_representation.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_SET' IN TYPEOF(mr_it))
))
                > 0))) )) = 0);
      wr4: (SIZEOF(QUERY ( gs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_SET' IN TYPEOF(it)) ) |
                (NOT (SIZEOF(QUERY ( pnt <* QUERY ( gsel <* gs\geometric_set
                .elements | ('TECHNICAL_DATA_PACKAGING.POINT'
                IN TYPEOF(gsel)))
                 | (NOT gbsf_check_point(pnt)) )) = 0)) )) = 0);
      wr5: (SIZEOF(QUERY ( gs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_SET' IN TYPEOF(it)) ) |
                (NOT (SIZEOF(QUERY ( cv <* QUERY ( gsel <* gs\geometric_set.
                elements | ('TECHNICAL_DATA_PACKAGING.CURVE' IN
TYPEOF(gsel)) )
                 | (NOT gbsf_check_curve(cv)) )) = 0)) )) = 0);
      wr6: (SIZEOF(QUERY ( gs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_SET' IN TYPEOF(it)) ) |
                (NOT (SIZEOF(QUERY ( sf <* QUERY ( gsel <* gs\geometric_set.
                elements | ('TECHNICAL_DATA_PACKAGING.SURFACE' IN TYPEOF(
                gsel)) ) | (NOT gbsf_check_surface(sf)) )) = 0)) )) = 0);
      wr7: (SIZEOF(QUERY ( gs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_SET' IN TYPEOF(it)) ) |
                (SIZEOF(QUERY ( gsel <* gs\geometric_set.elements | (
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                'TECHNICAL_DATA_PACKAGING.SURFACE' IN TYPEOF(gsel)) )) > 0)
))
                > 0);
  END_ENTITY; -- geometrically_bounded_surface_shape_representation

  ENTITY geometrically_bounded_wireframe_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1: (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF(TYPEOF(it) * [
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET',
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM']) = 1)) )) = 0);
      wr2: (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF(TYPEOF(it) * [
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM']) = 1) )) >= 1);
      wr3: (SIZEOF(QUERY ( gcs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET' IN
TYPEOF(it)) )
                 | (NOT (SIZEOF(QUERY ( crv <* QUERY ( elem <* gcs\
                geometric_set.elements | ('TECHNICAL_DATA_PACKAGING.CURVE'
                IN TYPEOF(elem)) ) | (NOT
                valid_geometrically_bounded_wf_curve(crv)) )) = 0)) )) = 0);
      wr4: (SIZEOF(QUERY ( gcs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET' IN
TYPEOF(it)) )
                 | (NOT (SIZEOF(QUERY ( pnts <* QUERY ( elem <* gcs\
                geometric_set.elements | ('TECHNICAL_DATA_PACKAGING.POINT'
                IN TYPEOF(elem)) ) | (NOT
                valid_geometrically_bounded_wf_point(pnts)) )) = 0)) )) =
0);
      wr5: (SIZEOF(QUERY ( gcs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET' IN
TYPEOF(it)) )
                 | (NOT (SIZEOF(QUERY ( cnc <* QUERY ( elem <* gcs\
                geometric_set.elements | ('TECHNICAL_DATA_PACKAGING.CONIC'
                IN TYPEOF(elem)) ) | (NOT (
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D' IN TYPEOF(cnc\
                conic.position))) )) = 0)) )) = 0);
      wr6: (SIZEOF(QUERY ( gcs <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.GEOMETRIC_CURVE_SET' IN
TYPEOF(it)) )
                 | (NOT (SIZEOF(QUERY ( pline <* QUERY ( elem <* gcs\
                geometric_set.elements | (
                'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(elem)) ) | (
                NOT (SIZEOF(pline\polyline.points) > 2)) )) = 0)) )) = 0);
      wr7: (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT (('TECHNICAL_DATA_PACKAGING.' +
                'GEOMETRICALLY_BOUNDED_WIREFRAME_SHAPE_REPRESENTATION') IN
                TYPEOF(mi\mapped_item.mapping_source.mapped_-
representation)))
                 )) = 0);
  END_ENTITY; -- geometrically_bounded_wireframe_shape_representation

  ENTITY global_unit_assigned_context
    SUBTYPE OF (representation_context);
      units : SET [1:?] OF unit;
  END_ENTITY; -- global_unit_assigned_context
```

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```
ENTITY group;
    name        : label;
    description : OPTIONAL text;
  DERIVE
    id : identifier := get_id_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
END_ENTITY; -- group

ENTITY group_assignment
  ABSTRACT SUPERTYPE;
    assigned_group : group;
  DERIVE
    role : object_role := get_role(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
END_ENTITY; -- group_assignment

ENTITY group_relationship;
    name           : label;
    description    : OPTIONAL text;
    relating_group : group;
    related_group  : group;
END_ENTITY; -- group_relationship

ENTITY half_space_solid
  SUBTYPE OF (geometric_representation_item);
    base_surface   : surface;
    agreement_flag : BOOLEAN;
END_ENTITY; -- half_space_solid

ENTITY hyperbola
  SUBTYPE OF (conic);
    semi_axis      : positive_length_measure;
    semi_imag_axis : positive_length_measure;
END_ENTITY; -- hyperbola

ENTITY id_attribute;
    attribute_value : identifier;
    identified_item : id_attribute_select;
END_ENTITY; -- id_attribute

ENTITY identification_assignment
  ABSTRACT SUPERTYPE;
    assigned_id : identifier;
    role        : identification_role;
END_ENTITY; -- identification_assignment

ENTITY identification_assignment_relationship;
    name                                : label;
    description                         : OPTIONAL text;
    relating_identification_assignment : identification_assignment;
    related_identification_assignment  : identification_assignment;
END_ENTITY; -- identification_assignment_relationship

ENTITY identification_role;
    name        : label;
```

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```
    description : OPTIONAL text;
END_ENTITY; -- identification_role

ENTITY intersection_curve
  SUBTYPE OF (surface_curve);
  WHERE
    wr1: (SIZEOF(SELF\surface_curve.associated_geometry) = 2);
    wr2: (associated_surface(SELF\surface_curve.associated_geometry[1])
             <> associated_surface(SELF\surface_curve.associated_geometry
             [2]));
END_ENTITY; -- intersection_curve

ENTITY invisibility;
    invisible_items : SET [1:?] OF invisible_item;
END_ENTITY; -- invisibility

ENTITY item_defined_transformation;
    name             : label;
    description      : OPTIONAL text;
    transform_item_1 : representation_item;
    transform_item_2 : representation_item;
END_ENTITY; -- item_defined_transformation

ENTITY item_identified_representation_usage;
    name                : label;
    description         : OPTIONAL text;
    definition          : represented_definition;
    used_representation : representation;
    identified_item     : representation_item;
  WHERE
    wr1: (SELF.used_representation IN using_representations(SELF.
             identified_item));
END_ENTITY; -- item_identified_representation_usage

ENTITY language_assignment
  SUBTYPE OF (classification_assignment);
    items : SET [1:?] OF language_item;
END_ENTITY; -- language_assignment

ENTITY length_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.LENGTH_UNIT' IN TYPEOF(SELF\
             measure_with_unit.unit_component));
END_ENTITY; -- length_measure_with_unit

ENTITY length_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 1) AND (SELF\
             named_unit.dimensions.mass_exponent = 0) AND (SELF\
             named_unit.dimensions.time_exponent = 0) AND (SELF\
             named_unit.dimensions.electric_current_exponent = 0) AND (
             SELF\named_unit.dimensions.
             thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
             .dimensions.amount_of_substance_exponent = 0) AND (SELF\
             named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- length_unit
```

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```
ENTITY library_context
  SUBTYPE OF (application_context_element);
    library_reference : label;
END_ENTITY; -- library_context

ENTITY light_source
  SUPERTYPE OF (ONEOF (light_source_ambient,light_source_directional,
      light_source_positional,light_source_spot))
  SUBTYPE OF (geometric_representation_item);
    light_colour : colour;
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'STYLED_ITEM.ITEM')) = 0);
END_ENTITY; -- light_source

ENTITY light_source_ambient
  SUBTYPE OF (light_source);
END_ENTITY; -- light_source_ambient

ENTITY light_source_directional
  SUBTYPE OF (light_source);
    orientation : direction;
END_ENTITY; -- light_source_directional

ENTITY light_source_positional
  SUBTYPE OF (light_source);
    position             : cartesian_point;
    constant_attenuation : REAL;
    distance_attenuation : REAL;
END_ENTITY; -- light_source_positional

ENTITY light_source_spot
  SUBTYPE OF (light_source);
    position               : cartesian_point;
    orientation            : direction;
    concentration_exponent : REAL;
    constant_attenuation   : REAL;
    distance_attenuation   : REAL;
    spread_angle           : positive_plane_angle_measure;
END_ENTITY; -- light_source_spot

ENTITY line
  SUBTYPE OF (curve);
    pnt : cartesian_point;
    dir : vector;
  WHERE
    wr1: (dir.dim = pnt.dim);
END_ENTITY; -- line

ENTITY local_time;
    hour_component   : hour_in_day;
    minute_component : OPTIONAL minute_in_hour;
    second_component : OPTIONAL second_in_minute;
    zone             : coordinated_universal_time_offset;
  WHERE
    wr1: valid_time(SELF);
END_ENTITY; -- local_time
```

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```
  ENTITY loop
    SUPERTYPE OF (ONEOF (vertex_loop,edge_loop,poly_loop))
    SUBTYPE OF (topological_representation_item);
  END_ENTITY; -- loop

  ENTITY lot_effectivity
    SUBTYPE OF (effectivity);
      effectivity_lot_id   : identifier;
      effectivity_lot_size : measure_with_unit;
  END_ENTITY; -- lot_effectivity

  ENTITY luminous_intensity_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.LUMINOUS_INTENSITY_UNIT' IN TYPEOF(
                SELF\measure_with_unit.unit_component));
  END_ENTITY; -- luminous_intensity_measure_with_unit

  ENTITY luminous_intensity_unit
    SUBTYPE OF (named_unit);
    WHERE
      wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
                named_unit.dimensions.mass_exponent = 0) AND (SELF\
                named_unit.dimensions.time_exponent = 0) AND (SELF\
                named_unit.dimensions.electric_current_exponent = 0) AND (
                SELF\named_unit.dimensions.
                thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
                .dimensions.amount_of_substance_exponent = 0) AND (SELF\
                named_unit.dimensions.luminous_intensity_exponent = 1));
  END_ENTITY; -- luminous_intensity_unit

  ENTITY make_from_usage_option
    SUBTYPE OF (product_definition_usage);
      ranking           : INTEGER;
      ranking_rationale : text;
      quantity          : measure_with_unit;
    WHERE
      wr1: ((NOT ('NUMBER' IN TYPEOF(quantity.value_component))) OR (
                quantity.value_component > 0));
  END_ENTITY; -- make_from_usage_option

  ENTITY make_from_usage_option_with_reference_designator
    SUBTYPE OF (make_from_usage_option, assembly_component_usage);
  END_ENTITY; -- make_from_usage_option_with_reference_designator

  ENTITY manifold_solid_brep
    SUBTYPE OF (solid_model);
      outer : closed_shell;
  END_ENTITY; -- manifold_solid_brep

  ENTITY manifold_surface_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1 : (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL',
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] *
TYPEOF(it))
                 = 1)) )) = 0);
```

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```
      wr2 : (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL',
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
                 > 0);
      wr3 : (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                 NOT
            (('TECHNICAL_DATA_PACKAGING.MANIFOLD_SURFACE_SHAPE_-
REPRESENTATION'
                 IN TYPEOF(mi\mapped_item.mapping_source.
                 mapped_representation)) AND (SIZEOF(QUERY ( mr_it <* mi\
                 mapped_item.mapping_source.mapped_representation.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                 TYPEOF(mr_it)) )) > 0))) )) = 0);
      wr4 : (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( sh <* sbsm\
                 shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.OPEN_SHELL',
                 'TECHNICAL_DATA_PACKAGING.ORIENTED_CLOSED_SHELL',
                 'TECHNICAL_DATA_PACKAGING.CLOSED_SHELL'] * TYPEOF(sh)) =
1))
                  )) = 0)) )) = 0);
      wr5 : (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                 shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                 QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT (
                 SIZEOF(['TECHNICAL_DATA_PACKAGING.FACE_SURFACE',
                 'TECHNICAL_DATA_PACKAGING.ORIENTED_FACE'] * TYPEOF(fa)) =
1))
                  )) = 0)) )) = 0)) )) = 0);
      wr6 : (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                 shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                 QUERY ( f_sf <* QUERY ( fa <* cfs\connected_face_set.
                 cfs_faces | ('TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN
                 TYPEOF(fa)) ) | (NOT ((
                 'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
                 OR (SIZEOF(['TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE',
                 'TECHNICAL_DATA_PACKAGING.ELEMENTARY_SURFACE',
                 'TECHNICAL_DATA_PACKAGING.OFFSET_SURFACE',
                 'TECHNICAL_DATA_PACKAGING.SURFACE_REPLICA',
                 'TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE'] * TYPEOF(f_sf\
                 face_surface.face_geometry)) = 1))) )) = 0)) )) = 0)) )) =
                 0);
      wr7 : (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                 shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                 QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                 'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                 msf_surface_check(fa\face_surface.face_geometry))) )) = 0))
))
                 = 0)) )) = 0);
      wr8 : (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
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                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( bnds <* fa.bounds | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP',
                'TECHNICAL_DATA_PACKAGING.VERTEX_LOOP'] *
TYPEOF(bnds.bound))
                = 1)) )) = 0))) )) = 0)) )) = 0)) )) = 0);
      wr9 : (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fa.bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.edge_list | (
                NOT ('TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN TYPEOF(oe.
                edge_element))) )) = 0)) )) = 0))) )) = 0)) )) = 0)) )) =
0);
      wr10: (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fa.bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe_cv <* QUERY ( oe <* elp_fbnds\
                path.edge_list | ('TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN
                TYPEOF(oe.edge_element)) ) | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE',
                'TECHNICAL_DATA_PACKAGING.CONIC',
                'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA',
                'TECHNICAL_DATA_PACKAGING.LINE',
                'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D',
                'TECHNICAL_DATA_PACKAGING.PCURVE',
                'TECHNICAL_DATA_PACKAGING.POLYLINE',
                'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE'] * TYPEOF(oe_cv.
                edge_element\edge_curve.edge_geometry)) = 1)) )) = 0)) )) =
                 0))) )) = 0)) )) = 0)) )) = 0);
      wr11: (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fa.bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.edge_list | (
                NOT msf_curve_check(oe.edge_element\edge_curve.
                edge_geometry)) )) = 0)) )) = 0))) )) = 0)) )) = 0)) )) =
0);
      wr12: (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
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                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fa.bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.edge_list | (
                NOT (('TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(oe.
                edge_element.edge_start)) AND (
                'TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(oe.
                edge_element.edge_end)))) )) = 0)) )) = 0))) )) = 0)) )) =
                0)) )) = 0);
      wr13: (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* fa.bounds | (
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.bound))
)
                 | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.edge_list | (
                NOT ((SIZEOF(['TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT',
                'TECHNICAL_DATA_PACKAGING.DEGENERATE_PCURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_SURFACE'] * TYPEOF(oe.
                edge_element.edge_start\vertex_point.vertex_geometry)) = 1)
                AND (SIZEOF(['TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT',
                'TECHNICAL_DATA_PACKAGING.DEGENERATE_PCURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_SURFACE'] * TYPEOF(oe.
                edge_element.edge_end\vertex_point.vertex_geometry)) = 1)))
))
                = 0)) )) = 0))) )) = 0)) )) = 0)) )) = 0);
      wr14: (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( vlp_fbnds <* QUERY ( bnds <* fa.bounds | (
                'TECHNICAL_DATA_PACKAGING.VERTEX_LOOP'
                IN TYPEOF(bnds.bound)))
                 | (NOT ('TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(
                vlp_fbnds\vertex_loop.loop_vertex))) )) = 0))) )) = 0)) ))
                = 0)) )) = 0);
      wr15: (SIZEOF(QUERY ( sbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* sbsm\
                shell_based_surface_model.sbsm_boundary | (NOT (SIZEOF(
                QUERY ( fa <* cfs\connected_face_set.cfs_faces | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(fa)) OR
                (SIZEOF(QUERY ( vlp_fbnds <* QUERY ( bnds <* fa.bounds | (
                'TECHNICAL_DATA_PACKAGING.VERTEX_LOOP'
                IN TYPEOF(bnds.bound)))
                 | (NOT (SIZEOF(['TECHNICAL_DATA_PACKAGING.CARTESIAN_-
POINT',
                'TECHNICAL_DATA_PACKAGING.DEGENERATE_PCURVE',
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                'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_SURFACE'] * TYPEOF(
                vlp_fbnds\vertex_loop.loop_vertex\vertex_point.
                vertex_geometry)) = 1)) )) = 0))) )) = 0)) )) = 0)) )) =
0);
  END_ENTITY; -- manifold_surface_shape_representation

  ENTITY mapped_item
    SUBTYPE OF (representation_item);
      mapping_source : representation_map;
      mapping_target : representation_item;
    WHERE
      wr1: acyclic_mapped_representation(using_-
representations(SELF),[SELF]);
  END_ENTITY; -- mapped_item

  ENTITY mass_measure_with_unit
    SUBTYPE OF (measure_with_unit);
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.MASS_UNIT' IN TYPEOF(SELF\
               measure_with_unit.unit_component));
  END_ENTITY; -- mass_measure_with_unit

  ENTITY mass_unit
    SUBTYPE OF (named_unit);
    WHERE
      wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
               named_unit.dimensions.mass_exponent = 1) AND (SELF\
               named_unit.dimensions.time_exponent = 0) AND (SELF\
               named_unit.dimensions.electric_current_exponent = 0) AND (
               SELF\named_unit.dimensions.
               thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
               .dimensions.amount_of_substance_exponent = 0) AND (SELF\
               named_unit.dimensions.luminous_intensity_exponent = 0));
  END_ENTITY; -- mass_unit

  ENTITY material_designation;
      name        : label;
      definitions : SET [1:?] OF characterized_definition;
  END_ENTITY; -- material_designation

  ENTITY measure_qualification;
      name              : label;
      description       : text;
      qualified_measure : measure_with_unit;
      qualifiers        : SET [1:?] OF value_qualifier;
    WHERE
      wr1: (SIZEOF(QUERY ( temp <* qualifiers | (
               'TECHNICAL_DATA_PACKAGING.PRECISION_QUALIFIER' IN TYPEOF(
               temp)) )) < 2);
  END_ENTITY; -- measure_qualification

  ENTITY measure_representation_item
    SUBTYPE OF (representation_item, measure_with_unit);
  END_ENTITY; -- measure_representation_item

  ENTITY measure_with_unit
    SUPERTYPE OF (ONEOF (length_measure_with_unit,mass_measure_with_unit,
        time_measure_with_unit,electric_current_measure_with_unit,
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        thermodynamic_temperature_measure_with_unit,
        amount_of_substance_measure_with_unit,
        luminous_intensity_measure_with_unit,plane_angle_measure_with_unit,
        solid_angle_measure_with_unit,area_measure_with_unit,
        volume_measure_with_unit,ratio_measure_with_unit));
      value_component : measure_value;
      unit_component  : unit;
    WHERE
      wr1: valid_units(SELF);
  END_ENTITY; -- measure_with_unit

  ENTITY mechanical_design_geometric_presentation_area
    SUBTYPE OF (presentation_area);
    WHERE
      wr1: (SIZEOF(QUERY ( it1 <* SELF.items | (NOT ((
               'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it1))
               OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1))
               AND ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
               it1\mapped_item.mapping_source.mapped_representation))))) ))
               = 0);
      wr2: (SIZEOF(QUERY ( pv <* QUERY ( mi1 <* QUERY ( it1 <* SELF.items
                | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) )
                | ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
               mi1\mapped_item.mapping_source.mapped_representation)) ) | (
               NOT (SIZEOF(QUERY ( it2 <* pv\mapped_item.mapping_source.
               mapped_representation\representation.items | ((NOT ((
               'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it2))
               OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it2))
               AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
               'CAMERA_IMAGE_3D_WITH_SCALE') IN TYPEOF(it2))) AND (NOT (
               'TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(it2\
               mapped_item.mapping_source.mapped_representation)))))) OR ((
               ('TECHNICAL_DATA_PACKAGING.' + 'CAMERA_IMAGE_3D_WITH_SCALE')
               IN TYPEOF(it2)) AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
               'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION')
               IN TYPEOF(it2\mapped_item.mapping_source.
               mapped_representation))))) )) = 0)) )) = 0);
      wr3: ((SIZEOF(QUERY ( ps <* USEDIN(SELF\presentation_area,
               'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
               ps.size\planar_extent.size_in_x <= 0) OR (ps.size\
               planar_extent.size_in_y <= 0)) )) = 0) AND (SIZEOF(
               QUERY ( ais <* USEDIN(SELF\presentation_area,
               'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | (SIZEOF(
               QUERY ( ps <* USEDIN(ais,'TECHNICAL_DATA_PACKAGING.' +
               'PRESENTATION_SIZE.UNIT') | ((ps.size\planar_extent.
               size_in_x <= 0) OR (ps.size\planar_extent.size_in_y <= 0))
))
               > 0) )) = 0));
      wr4: (((SIZEOF(QUERY ( ps <* USEDIN(SELF\presentation_area,
               'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
               'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
               TYPEOF(ps.size.placement)) )) = 1) AND (SIZEOF(
               QUERY ( ps <* USEDIN(SELF\presentation_area,
               'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
               'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_3D') IN
               TYPEOF(ps.size.placement)) )) = 0)) OR ((SIZEOF(
               QUERY ( ais <* USEDIN(SELF\presentation_area,
               'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | (SIZEOF(
               QUERY ( ps <* USEDIN(ais,'TECHNICAL_DATA_PACKAGING.' +
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                'PRESENTATION_SIZE.UNIT') | (('TECHNICAL_DATA_PACKAGING.' +
                'AXIS2_PLACEMENT_2D') IN TYPEOF(ps.size.placement)) )) = 1)
))
                = 1) AND (SIZEOF(QUERY ( ais <* USEDIN(SELF\
                presentation_area,'TECHNICAL_DATA_PACKAGING.' +
                'AREA_IN_SET.AREA') | (SIZEOF(QUERY ( ps <* USEDIN(ais,
                'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
                'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_3D') IN
                TYPEOF(ps.size.placement)) )) = 0) )) = 1)));
  END_ENTITY; -- mechanical_design_geometric_presentation_area

  ENTITY mechanical_design_geometric_presentation_representation
    SUBTYPE OF (representation);
    WHERE
      wr1 : (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                 'TECHNICAL_DATA_PACKAGING.STYLED_ITEM',
                 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT',
                 'TECHNICAL_DATA_PACKAGING.CAMERA_MODEL_D3'] * TYPEOF(it)) =
                  1)) )) = 0);
      wr2 : (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                 NOT (SIZEOF(['TECHNICAL_DATA_PACKAGING.' +
                 'SHAPE_REPRESENTATION','TECHNICAL_DATA_PACKAGING.' +
                 'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION']
                 * TYPEOF(mi\mapped_item.mapping_source.
                 mapped_representation)) = 1)) )) = 0);
      wr3 : (SIZEOF(QUERY ( smi <* QUERY ( si <* QUERY ( it <* SELF.items
                  | ('TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) )
                  | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(si\
                 styled_item.item)) ) | (NOT (('TECHNICAL_DATA_PACKAGING.' +
                  'SHAPE_REPRESENTATION') IN TYPEOF(smi\styled_item.item\
                 mapped_item.mapping_source.mapped_representation))) )) =
0);
      wr4 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                 NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                 SIZEOF(QUERY ( pss <* psa.styles | (NOT (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.POINT_STYLE',
                 'TECHNICAL_DATA_PACKAGING.CURVE_STYLE',
                 'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE'] * TYPEOF(
                 pss)) = 1)) )) = 0)) )) = 0)) )) = 0);
      wr5 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                 NOT (SIZEOF(QUERY ( psbc <* QUERY ( psa <* si\styled_item.
                 styles | (('TECHNICAL_DATA_PACKAGING.' +
                 'PRESENTATION_STYLE_BY_CONTEXT') IN TYPEOF(psa)) ) | (NOT (
                 SIZEOF(['TECHNICAL_DATA_PACKAGING.' + 'REPRESENTATION_-
ITEM',
                 'TECHNICAL_DATA_PACKAGING.REPRESENTATION'] * TYPEOF(psbc\
                 presentation_style_by_context.style_context)) = 1)) )) =
0))
                  )) = 0);
      wr6 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                 NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                 SIZEOF(QUERY ( ps <* QUERY ( pss <* psa.styles | (
                 'TECHNICAL_DATA_PACKAGING.POINT_STYLE' IN TYPEOF(pss)) ) |
                 (NOT ((('TECHNICAL_DATA_PACKAGING.' +
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          'POSITIVE_LENGTH_MEASURE') IN TYPEOF(ps\point_style.
          marker_size)) AND (SIZEOF([
          'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
          'TECHNICAL_DATA_PACKAGING.' +
          'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(ps\point_style.
          marker_colour)) = 1))) )) = 0)) )) = 0)) )) = 0);
wr7 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
          'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
          NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
          SIZEOF(QUERY ( cs <* QUERY ( pss <* psa.styles | (
          'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(pss)) ) |
          (NOT ((SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
          'TECHNICAL_DATA_PACKAGING.' +
          'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(cs\curve_style.
          curve_colour)) = 1) AND (('TECHNICAL_DATA_PACKAGING.' +
          'POSITIVE_LENGTH_MEASURE') IN TYPEOF(cs\curve_style.
          curve_width)) AND (SIZEOF([
          'TECHNICAL_DATA_PACKAGING.CURVE_STYLE_FONT',
          'TECHNICAL_DATA_PACKAGING.' +
          'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(cs\
          curve_style.curve_font)) = 1))) )) = 0)) )) = 0)) )) = 0);
wr8 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
          'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
          NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
          SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
          'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
          pss)) ) | (NOT (('TECHNICAL_DATA_PACKAGING.' +
          'SURFACE_SIDE_STYLE') IN TYPEOF(ssu\surface_style_usage.
          style))) )) = 0)) )) = 0)) )) = 0);
wr9 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
          'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
          NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
          SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
          'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
          pss)) ) | (NOT (SIZEOF(QUERY ( sses <* ssu\
          surface_style_usage.style\surface_side_style.styles | (NOT
          (SIZEOF(['TECHNICAL_DATA_PACKAGING.' +
          'SURFACE_STYLE_PARAMETER_LINE','TECHNICAL_DATA_PACKAGING.'
          + 'SURFACE_STYLE_CONTROL_GRID','TECHNICAL_DATA_PACKAGING.'
          + 'SURFACE_STYLE_SILHOUETTE','TECHNICAL_DATA_PACKAGING.' +
          'SURFACE_STYLE_SEGMENTATION_CURVE',
          'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_FILL_AREA',
          'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_BOUNDARY'] *
          TYPEOF(sses)) = 1)) )) = 0)) )) = 0)) )) = 0)) )) = 0);
wr10: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
          'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
          NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
          SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
          'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
          pss)) ) | (NOT (SIZEOF(QUERY ( sspl <* QUERY ( sses <* ssu\
          surface_style_usage.style\surface_side_style.styles | ((
          'TECHNICAL_DATA_PACKAGING.' +
          'SURFACE_STYLE_PARAMETER_LINE') IN TYPEOF(sses)) ) | (NOT (
          ('TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(sspl\
          surface_style_parameter_line.style_of_parameter_lines)) AND
           (SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
          'TECHNICAL_DATA_PACKAGING.' +
          'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sspl\
          surface_style_parameter_line.style_of_parameter_lines\
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                curve_style.curve_colour)) = 1) AND ((
                'TECHNICAL_DATA_PACKAGING.' + 'POSITIVE_LENGTH_MEASURE') IN
                 TYPEOF(sspl\surface_style_parameter_line.
                style_of_parameter_lines\curve_style.curve_width)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sspl\
                surface_style_parameter_line.style_of_parameter_lines\
                curve_style.curve_font)) = 1))) )) = 0)) )) = 0)) )) = 0))
))
                = 0);
      wr11: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sscg <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_CONTROL_GRID')
                IN TYPEOF(sses)) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(sscg\
                surface_style_control_grid.style_of_control_grid)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sscg\
                surface_style_control_grid.style_of_control_grid\
                curve_style.curve_colour)) = 1) AND ((
                'TECHNICAL_DATA_PACKAGING.' + 'POSITIVE_LENGTH_MEASURE') IN
                 TYPEOF(sscg\surface_style_control_grid.
                style_of_control_grid\curve_style.curve_width)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sscg\
                surface_style_control_grid.style_of_control_grid\
                curve_style.curve_font)) = 1))) )) = 0)) )) = 0)) )) = 0))
))
                = 0);
      wr12: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sssh <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_SILHOUETTE')
                IN TYPEOF(sses)) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(sssh\
                surface_style_silhouette.style_of_silhouette)) AND (SIZEOF(
                ['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sssh\
                surface_style_silhouette.style_of_silhouette\curve_style.
                curve_colour)) = 1) AND (('TECHNICAL_DATA_PACKAGING.' +
                'POSITIVE_LENGTH_MEASURE') IN TYPEOF(sssh\
                surface_style_silhouette.style_of_silhouette\curve_style.
                curve_width)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sssh\
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                surface_style_silhouette.style_of_silhouette\curve_style.
                curve_font)) = 1))) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr13: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sssc <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' +
                'SURFACE_STYLE_SEGMENTATION_CURVE') IN TYPEOF(sses)) ) | (
                NOT (('TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(sssc
                \surface_style_segmentation_curve.
                style_of_segmentation_curve)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sssc\
                surface_style_segmentation_curve.
                style_of_segmentation_curve\curve_style.curve_colour)) = 1)
                AND (('TECHNICAL_DATA_PACKAGING.' +
                'POSITIVE_LENGTH_MEASURE') IN TYPEOF(sssc\
                surface_style_segmentation_curve.
                style_of_segmentation_curve\curve_style.curve_width)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sssc\
                surface_style_segmentation_curve.
                style_of_segmentation_curve\curve_style.curve_font)) = 1)))
))
                = 0)) )) = 0)) )) = 0)) )) = 0);
      wr14: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( ssbd <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_BOUNDARY') IN
                TYPEOF(sses)) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary\curve_style.
                curve_colour)) = 1) AND (('TECHNICAL_DATA_PACKAGING.' +
                'POSITIVE_LENGTH_MEASURE') IN TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary\curve_style.
                curve_width)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary\curve_style.
                curve_font)) = 1))) )) = 0)) )) = 0)) )) = 0)) )) = 0);
  END_ENTITY; -- mechanical_design_geometric_presentation_representation

  ENTITY mechanical_design_shaded_presentation_area
    SUBTYPE OF (presentation_area);
    WHERE
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      wr1: (SIZEOF(QUERY ( it1 <* SELF.items | (NOT ((
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it1))
                OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1))
                AND ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
                it1\mapped_item.mapping_source.mapped_representation))))) ))
                = 0);
      wr2: (SIZEOF(QUERY ( pv <* QUERY ( mi1 <* QUERY ( it1 <* SELF.items
                 | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) )
                 | ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
                mi1\mapped_item.mapping_source.mapped_representation)) ) | (
                NOT (SIZEOF(QUERY ( it2 <* pv\mapped_item.mapping_source.
                mapped_representation\presentation_view.items | ((NOT ((
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN TYPEOF(it2))
                OR (('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it2))
                AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
                'CAMERA_IMAGE_3D_WITH_SCALE') IN TYPEOF(it2))) AND (NOT (
                'TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(it2\
                mapped_item.mapping_source.mapped_representation)))))) OR ((
                ('TECHNICAL_DATA_PACKAGING.' + 'CAMERA_IMAGE_3D_WITH_SCALE')
                IN TYPEOF(it2)) AND (NOT (('TECHNICAL_DATA_PACKAGING.' +
                'MECHANICAL_DESIGN_SHADED_PRESENTATION_REPRESENTATION') IN

TYPEOF(it2\mapped_item.mapping_source.mapped_representation))))) ))
                = 0)) )) = 0);
      wr3: ((SIZEOF(QUERY ( ps <* USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.'
                + 'PRESENTATION_SIZE.UNIT') | (NOT ((ps.size\planar_extent.
                size_in_x > 0) AND (ps.size\planar_extent.size_in_y > 0)))
))
                = 0) AND (SIZEOF(QUERY ( pset <* QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | ((
                'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SET') IN TYPEOF(
                ais.in_set)) ) | (SIZEOF(QUERY ( psize <* USEDIN(pset,
                'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | (
                NOT ((psize.size\planar_extent.size_in_x > 0) AND (psize.
                size\planar_extent.size_in_y > 0))) )) = 0) )) = 0));
      wr4: ((SIZEOF(QUERY ( psize <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | ((
                'TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
                TYPEOF(psize.size.placement)) )) = 1) AND (SIZEOF(
                QUERY ( pset <* QUERY ( ais <* USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.' + 'AREA_IN_SET.AREA') | ((
                'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SET') IN TYPEOF(
                ais.in_set)) ) | (SIZEOF(QUERY ( psize <* USEDIN(pset,
                'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT') | (
                NOT (('TECHNICAL_DATA_PACKAGING.' + 'AXIS2_PLACEMENT_2D') IN
                 TYPEOF(psize.size.placement))) )) = 0) )) = 0));
      wr5: (SIZEOF(QUERY ( pv <* QUERY ( mi1 <* QUERY ( it1 <* SELF.items
                 | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it1)) )
                 | ('TECHNICAL_DATA_PACKAGING.PRESENTATION_VIEW' IN TYPEOF(
                mi1\mapped_item.mapping_source.mapped_representation)) ) | (
                NOT (SIZEOF(QUERY ( ci <* pv\mapped_item.mapping_source.
                mapped_representation\presentation_view.items | ((
                'TECHNICAL_DATA_PACKAGING.' +
                'CAMERA_IMAGE_3D_WITH_SCALE' IN TYPEOF(ci)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.' + 'CAMERA_MODEL_D3',
                'TECHNICAL_DATA_PACKAGING.' + 'CAMERA_MODEL_D3_WITH_HLHSR',
                'TECHNICAL_DATA_PACKAGING.' +
                'CAMERA_MODEL_WITH_LIGHT_SOURCES'] * TYPEOF(ci\
                camera_image_3d_with_scale.mapping_source.mapping_origin)) =
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                1)) )) = 0)) )) = 0);
  END_ENTITY; -- mechanical_design_shaded_presentation_area

  ENTITY mechanical_design_shaded_presentation_representation
    SUBTYPE OF (representation);
    WHERE
      wr1 : (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM',
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT',
                'TECHNICAL_DATA_PACKAGING.CAMERA_MODEL_D3'] * TYPEOF(it)) =
                 1)) )) = 0);
      wr2 : (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(['TECHNICAL_DATA_PACKAGING.' +
                'SHAPE_REPRESENTATION','TECHNICAL_DATA_PACKAGING.' +
                'MECHANICAL_DESIGN_SHADED_PRESENTATION_REPRESENTATION'] *
                TYPEOF(mi\mapped_item.mapping_source.mapped_-
representation))
                = 1)) )) = 0);
      wr3 : (SIZEOF(QUERY ( smi <* QUERY ( si <* QUERY ( it <* SELF.items
                 | ('TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) )
                 | ('TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(si\
                styled_item.item)) ) | (NOT (('TECHNICAL_DATA_PACKAGING.' +
                 'SHAPE_REPRESENTATION') IN TYPEOF(smi\styled_item.item\
                mapped_item.mapping_source.mapped_representation))) )) =
0);
      wr4 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( pss <* psa.styles | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.POINT_STYLE',
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE',
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE'] * TYPEOF(
                pss)) = 1)) )) = 0)) )) = 0)) )) = 0);
      wr5 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psbc <* QUERY ( psa <* si\styled_item.
                styles | (('TECHNICAL_DATA_PACKAGING.' +
                'PRESENTATION_STYLE_BY_CONTEXT') IN TYPEOF(psa)) ) | (NOT (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.REPRESENTATION_ITEM',
                'TECHNICAL_DATA_PACKAGING.REPRESENTATION'] * TYPEOF(psbc\
                presentation_style_by_context.style_context)) = 1)) )) =
0))
                 )) = 0);
      wr6 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ps <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.POINT_STYLE' IN TYPEOF(pss)) ) |
                (NOT (('TECHNICAL_DATA_PACKAGING.MARKER_TYPE' IN TYPEOF(ps\
                point_style.marker)) AND (
                'TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN
                TYPEOF(ps\point_style.marker_size)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(ps\point_style.
                marker_colour)) = 1))) )) = 0)) )) = 0)) )) = 0);
      wr7 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
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                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( cs <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(pss)) ) |
                (NOT ((SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(cs\curve_style.
                curve_colour)) = 1) AND (
                'TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN
                TYPEOF(cs\curve_style.curve_width)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.' + 'CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(cs\
                curve_style.curve_font)) = 1))) )) = 0)) )) = 0)) )) = 0);
      wr8 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (
                'TECHNICAL_DATA_PACKAGING.SURFACE_SIDE_STYLE' IN TYPEOF(ssu
                \surface_style_usage.style))) )) = 0)) )) = 0)) )) = 0);
      wr9 : (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | (NOT
                (SIZEOF(['TECHNICAL_DATA_PACKAGING.' +
                'SURFACE_STYLE_PARAMETER_LINE','TECHNICAL_DATA_PACKAGING.'
                + 'SURFACE_STYLE_CONTROL_GRID','TECHNICAL_DATA_PACKAGING.'
                + 'SURFACE_STYLE_SILHOUETTE','TECHNICAL_DATA_PACKAGING.' +
                'SURFACE_STYLE_SEGMENTATION_CURVE',
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_BOUNDARY',
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_FILL_AREA',
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_RENDERING'] *
                TYPEOF(sses)) = 1)) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr10: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( ssfa <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_FILL_AREA' IN
                TYPEOF(sses)) ) | (NOT (SIZEOF(QUERY ( fss <* ssfa\
                surface_style_fill_area.fill_area.fill_styles | (NOT (((
                'TECHNICAL_DATA_PACKAGING.' + 'FILL_AREA_STYLE_COLOUR') IN
                TYPEOF(fss)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(fss\
                fill_area_style_colour.fill_colour)) = 1))) )) = 0)) )) =
0))
                 )) = 0)) )) = 0)) )) = 0);
      wr11: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
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                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sspl <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' +
                'SURFACE_STYLE_PARAMETER_LINE') IN TYPEOF(sses)) ) | (NOT (
                (('TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(sspl\
                surface_style_parameter_line.style_of_parameter_lines)) AND
                 (SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sspl\
                surface_style_parameter_line.style_of_parameter_lines\
                curve_style.curve_colour)) = 1) AND (
                'TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN
                TYPEOF(sspl\surface_style_parameter_line.
                style_of_parameter_lines\curve_style.curve_width)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.' + 'CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sspl\
                surface_style_parameter_line.style_of_parameter_lines\
                curve_style.curve_font)) = 1)) OR ((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE_RENDERING' IN TYPEOF(
                sspl\surface_style_parameter_line.style_of_parameter_-
lines))
                AND (SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sspl\
                surface_style_parameter_line.style_of_parameter_lines\
                curve_style_rendering.rendering_properties.rendered_-
colour))
                = 1)))) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr12: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sscg <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_CONTROL_GRID')
                IN TYPEOF(sses)) ) | (NOT (((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(sscg\
                surface_style_control_grid.style_of_control_grid)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sscg\
                surface_style_control_grid.style_of_control_grid\
                curve_style.curve_colour)) = 1) AND (
                'TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN
                TYPEOF(sscg\surface_style_control_grid.
                style_of_control_grid\curve_style.curve_width)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.' + 'CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sscg\
                surface_style_control_grid.style_of_control_grid\
                curve_style.curve_font)) = 1)) OR ((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE_RENDERING' IN TYPEOF(
                sscg\surface_style_control_grid.style_of_control_grid)) AND
                 (SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
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                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sscg\
                surface_style_control_grid.style_of_control_grid\
                curve_style_rendering.rendering_properties.rendered_-
colour))
                = 1)))) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr13: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sssh <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_SILHOUETTE')
                IN TYPEOF(sses)) ) | (NOT (((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(sssh\
                surface_style_silhouette.style_of_silhouette)) AND (SIZEOF(
                ['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sssh\
                surface_style_silhouette.style_of_silhouette\curve_style.
                curve_colour)) = 1) AND (
                'TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN
                TYPEOF(sssh\surface_style_silhouette.style_of_silhouette\
                curve_style.curve_width)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.' + 'CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sssh\
                surface_style_silhouette.style_of_silhouette\curve_style.
                curve_font)) = 1)) OR ((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE_RENDERING' IN TYPEOF(
                sssh\surface_style_silhouette.style_of_silhouette)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sssh\
                surface_style_silhouette.style_of_silhouette\
                curve_style_rendering.rendering_properties.rendered_-
colour))
                = 1)))) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr14: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( sssc <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' +
                'SURFACE_STYLE_SEGMENTATION_CURVE') IN TYPEOF(sses)) ) | (
                NOT (('TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(
                sssc\surface_style_segmentation_curve.
                style_of_segmentation_curve)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sssc\
                surface_style_segmentation_curve.
                style_of_segmentation_curve\curve_style.curve_colour)) = 1)
                AND ('TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN
                TYPEOF(sssc\surface_style_segmentation_curve.
                style_of_segmentation_curve\curve_style.curve_width)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.' + 'CURVE_STYLE_FONT',
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                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(sssc\
                surface_style_segmentation_curve.
                style_of_segmentation_curve\curve_style.curve_font)) = 1))
                OR (('TECHNICAL_DATA_PACKAGING.CURVE_STYLE_RENDERING' IN
                TYPEOF(sssc\surface_style_segmentation_curve.
                style_of_segmentation_curve)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(sssc\
                surface_style_segmentation_curve.
                style_of_segmentation_curve\curve_style_rendering.
                rendering_properties.rendered_colour)) = 1)))) )) = 0)) ))
                = 0)) )) = 0)) )) = 0);
      wr15: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( ssbd <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_BOUNDARY') IN
                TYPEOF(sses)) ) | (NOT (((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE' IN TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary\curve_style.
                curve_colour)) = 1) AND (
                'TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN
                TYPEOF(ssbd\surface_style_boundary.style_of_boundary\
                curve_style.curve_width)) AND (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.' + 'CURVE_STYLE_FONT',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] * TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary\curve_style.
                curve_font)) = 1)) OR ((
                'TECHNICAL_DATA_PACKAGING.CURVE_STYLE_RENDERING' IN TYPEOF(
                ssbd\surface_style_boundary.style_of_boundary)) AND (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(ssbd\
                surface_style_boundary.style_of_boundary\
                curve_style_rendering.rendering_properties.rendered_-
colour))
                = 1)))) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr16: (SIZEOF(QUERY ( si <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.STYLED_ITEM' IN TYPEOF(it)) ) | (
                NOT (SIZEOF(QUERY ( psa <* si\styled_item.styles | (NOT (
                SIZEOF(QUERY ( ssu <* QUERY ( pss <* psa.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                pss)) ) | (NOT (SIZEOF(QUERY ( ssre <* QUERY ( sses <* ssu\
                surface_style_usage.style\surface_side_style.styles | ((
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_RENDERING') IN
                 TYPEOF(sses)) ) | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.COLOUR_RGB',
                'TECHNICAL_DATA_PACKAGING.' +
                'DRAUGHTING_PRE_DEFINED_COLOUR'] * TYPEOF(ssre\
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                surface_style_rendering.surface_colour)) = 1)) )) = 0)) ))
                = 0)) )) = 0)) )) = 0);
  END_ENTITY; -- mechanical_design_shaded_presentation_representation

  ENTITY name_attribute;
      attribute_value : label;
      named_item      : name_attribute_select;
  END_ENTITY; -- name_attribute

  ENTITY named_unit
    SUPERTYPE OF (ONEOF (si_unit,conversion_based_unit,
        context_dependent_unit) ANDOR ONEOF (length_unit,mass_unit,
        time_unit,electric_current_unit,thermodynamic_temperature_unit,
        amount_of_substance_unit,luminous_intensity_unit,plane_angle_unit,
        solid_angle_unit,area_unit,volume_unit,ratio_unit));
      dimensions : dimensional_exponents;
  END_ENTITY; -- named_unit

  ENTITY next_assembly_usage_occurrence
    SUBTYPE OF (assembly_component_usage);
  END_ENTITY; -- next_assembly_usage_occurrence

  ENTITY non_manifold_surface_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1 : (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] *
TYPEOF(it))
                = 1)) )) = 0);
      wr2 : (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL',
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
                > 0);
      wr3 : (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT ((('TECHNICAL_DATA_PACKAGING.' +
                'NON_MANIFOLD_SURFACE_SHAPE_REPRESENTATION') IN TYPEOF(mi\
                mapped_item.mapping_source.mapped_representation)) AND (
                SIZEOF(QUERY ( mr_it <* mi\mapped_item.mapping_source.
                mapped_representation.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(mr_it)) )) > 0))) )) = 0);
      wr4 : (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( fa <* cfs.cfs_faces | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE',
                'TECHNICAL_DATA_PACKAGING.ORIENTED_FACE'] * TYPEOF(fa)) =
1))
                 )) = 0)) )) = 0)) )) = 0);
      wr5 : (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
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                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
                oriented_face.face_element))) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
                OR (SIZEOF(['TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE',
                'TECHNICAL_DATA_PACKAGING.ELEMENTARY_SURFACE',
                'TECHNICAL_DATA_PACKAGING.OFFSET_SURFACE',
                'TECHNICAL_DATA_PACKAGING.SURFACE_REPLICA',
                'TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE'] * TYPEOF(f_sf\
                face_surface.face_geometry)) = 1))) )) = 0)) )) = 0)) )) =
                0);
      wr6 : (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
                oriented_face.face_element))) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
                OR nmsf_surface_check(f_sf\face_surface.face_geometry))) ))
                = 0)) )) = 0)) )) = 0);
      wr7 : (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
                oriented_face.face_element))) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
                OR (SIZEOF(QUERY ( bnds <* f_sf.bounds | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.EDGE_LOOP',
                'TECHNICAL_DATA_PACKAGING.VERTEX_LOOP'] *
TYPEOF(bnds.bound))
                = 1)) )) = 0))) )) = 0)) )) = 0)) )) = 0);
      wr8 : (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
                oriented_face.face_element))) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
                OR (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* f_sf.bounds
                 | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.
                edge_list | (NOT ('TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN
                TYPEOF(oe.edge_element))) )) = 0)) )) = 0))) )) = 0)) )) =
                0)) )) = 0);
      wr9 : (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
                oriented_face.face_element))) ) | (NOT ((
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            'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
            OR (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* f_sf.bounds
             | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
            bound)) ) | (NOT (SIZEOF(QUERY ( oe_cv <* QUERY ( oe <*
            elp_fbnds\path.edge_list | (
            'TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN TYPEOF(oe.
            edge_element)) ) | (NOT (SIZEOF([
            'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE',
            'TECHNICAL_DATA_PACKAGING.CONIC',
            'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA',
            'TECHNICAL_DATA_PACKAGING.LINE',
            'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D',
            'TECHNICAL_DATA_PACKAGING.PCURVE',
            'TECHNICAL_DATA_PACKAGING.POLYLINE',
            'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE'] * TYPEOF(oe_cv.
            edge_element\edge_curve.edge_geometry)) = 1)) )) = 0)) )) =
             0))) )) = 0)) )) = 0)) )) = 0);
wr10: (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
            'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
            TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
            face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
            QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
            'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
            'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
            oriented_face.face_element))) ) | (NOT ((
            'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
            OR (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* f_sf.bounds
             | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
            bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.
            edge_list | (NOT nmsf_curve_check(oe.edge_element\
            edge_curve.edge_geometry)) )) = 0)) )) = 0))) )) = 0)) )) =
             0)) )) = 0);
wr11: (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
            'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
            TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
            face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
            QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
            'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
            'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
            oriented_face.face_element))) ) | (NOT ((
            'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
            OR (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* f_sf.bounds
             | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
            bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.
            edge_list | (NOT (('TECHNICAL_DATA_PACKAGING.VERTEX_POINT'
            IN TYPEOF(oe.edge_element.edge_start)) AND (
            'TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(oe.
            edge_element.edge_end)))) )) = 0)) )) = 0))) )) = 0)) )) =
            0)) )) = 0);
wr12: (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
            'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
            TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
            face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
            QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
            'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
            'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
            oriented_face.face_element))) ) | (NOT ((
            'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
            OR (SIZEOF(QUERY ( elp_fbnds <* QUERY ( bnds <* f_sf.bounds
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                 | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (SIZEOF(QUERY ( oe <* elp_fbnds\path.
                edge_list | (NOT ((SIZEOF([
                'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT',
                'TECHNICAL_DATA_PACKAGING.DEGENERATE_PCURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_SURFACE'] * TYPEOF(oe.
                edge_element.edge_start\vertex_point.vertex_geometry)) = 1)
                AND (SIZEOF(['TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT',
                'TECHNICAL_DATA_PACKAGING.DEGENERATE_PCURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_SURFACE'] * TYPEOF(oe.
                edge_element.edge_end\vertex_point.vertex_geometry)) = 1)))
))
                = 0)) )) = 0))) )) = 0)) )) = 0)) )) = 0);
      wr13: (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
                oriented_face.face_element))) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
                OR (SIZEOF(QUERY ( vlp_fbnds <* QUERY ( bnds <* f_sf.bounds
                 | ('TECHNICAL_DATA_PACKAGING.VERTEX_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT ('TECHNICAL_DATA_PACKAGING.VERTEX_POINT'
                IN TYPEOF(vlp_fbnds\vertex_loop.loop_vertex))) )) = 0))) ))
                = 0)) )) = 0)) )) = 0);
      wr14: (SIZEOF(QUERY ( fbsm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.FACE_BASED_SURFACE_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( cfs <* fbsm\
                face_based_surface_model.fbsm_faces | (NOT (SIZEOF(
                QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | ((
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa)) OR (
                'TECHNICAL_DATA_PACKAGING.FACE_SURFACE' IN TYPEOF(fa\
                oriented_face.face_element))) ) | (NOT ((
                'TECHNICAL_DATA_PACKAGING.ADVANCED_FACE' IN TYPEOF(f_sf))
                OR (SIZEOF(QUERY ( vlp_fbnds <* QUERY ( bnds <* f_sf.bounds
                 | ('TECHNICAL_DATA_PACKAGING.VERTEX_LOOP' IN TYPEOF(bnds.
                bound)) ) | (NOT (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT',
                'TECHNICAL_DATA_PACKAGING.DEGENERATE_PCURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE',
                'TECHNICAL_DATA_PACKAGING.POINT_ON_SURFACE'] * TYPEOF(
                vlp_fbnds\vertex_loop.loop_vertex\vertex_point.
                vertex_geometry)) = 1)) )) = 0))) )) = 0)) )) = 0)) )) =
0);
  END_ENTITY; -- non_manifold_surface_shape_representation

  ENTITY object_role;
      name        : label;
      description : OPTIONAL text;
  END_ENTITY; -- object_role

  ENTITY offset_curve_2d
    SUBTYPE OF (curve);
      basis_curve    : curve;
      distance       : length_measure;
```

```
    self_intersect : LOGICAL;
  WHERE
    wr1: (basis_curve.dim = 2);
END_ENTITY; -- offset_curve_2d

ENTITY offset_curve_3d
  SUBTYPE OF (curve);
    basis_curve    : curve;
    distance       : length_measure;
    self_intersect : LOGICAL;
    ref_direction  : direction;
  WHERE
    wr1: ((basis_curve.dim = 3) AND (ref_direction.dim = 3));
END_ENTITY; -- offset_curve_3d

ENTITY offset_surface
  SUBTYPE OF (surface);
    basis_surface  : surface;
    distance       : length_measure;
    self_intersect : LOGICAL;
END_ENTITY; -- offset_surface

ENTITY open_shell
  SUBTYPE OF (connected_face_set);
END_ENTITY; -- open_shell

ENTITY organization;
    id          : OPTIONAL identifier;
    name        : label;
    description : OPTIONAL text;
END_ENTITY; -- organization

ENTITY organization_assignment
  ABSTRACT SUPERTYPE;
    assigned_organization : organization;
    role                  : organization_role;
END_ENTITY; -- organization_assignment

ENTITY organization_relationship;
    name                  : label;
    description           : OPTIONAL text;
    relating_organization : organization;
    related_organization  : organization;
END_ENTITY; -- organization_relationship

ENTITY organization_role;
    name : label;
  DERIVE
    description : text := get_description_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- organization_role

ENTITY organizational_address
  SUBTYPE OF (address);
    organizations : SET [1:?] OF organization;
    description   : OPTIONAL text;
END_ENTITY; -- organizational_address
```

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```
  ENTITY organizational_project;
      name                      : label;
      description               : OPTIONAL text;
      responsible_organizations : SET [1:?] OF organization;
    DERIVE
      id : identifier := get_id_value(SELF);
    WHERE
      wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
               'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
  END_ENTITY; -- organizational_project

  ENTITY organizational_project_assignment
    ABSTRACT SUPERTYPE;
      assigned_organizational_project : organizational_project;
      role                            : organizational_project_role;
  END_ENTITY; -- organizational_project_assignment

  ENTITY organizational_project_relationship;
      name                            : label;
      description                     : OPTIONAL text;
      relating_organizational_project : organizational_project;
      related_organizational_project  : organizational_project;
  END_ENTITY; -- organizational_project_relationship

  ENTITY organizational_project_role;
      name        : label;
      description : OPTIONAL text;
  END_ENTITY; -- organizational_project_role

  ENTITY oriented_closed_shell
    SUBTYPE OF (closed_shell);
      closed_shell_element : closed_shell;
      orientation          : BOOLEAN;
    DERIVE
      SELF\connected_face_set.cfs_faces : SET [1:?] OF face :=
                                             conditional_reverse(SELF.
                                             orientation,SELF.
                                             closed_shell_element.cfs_-
faces);
    WHERE
      wr1: (NOT ('TECHNICAL_DATA_PACKAGING.ORIENTED_CLOSED_SHELL' IN
               TYPEOF(SELF.closed_shell_element)));
  END_ENTITY; -- oriented_closed_shell

  ENTITY oriented_edge
    SUBTYPE OF (edge);
      edge_element : edge;
      orientation  : BOOLEAN;
    DERIVE
      SELF\edge.edge_start : vertex := boolean_choose(SELF.orientation,
                                SELF.edge_element.edge_start,SELF.
                                edge_element.edge_end);
      SELF\edge.edge_end   : vertex := boolean_choose(SELF.orientation,
                                SELF.edge_element.edge_end,SELF.
                                edge_element.edge_start);
    WHERE
      wr1: (NOT ('TECHNICAL_DATA_PACKAGING.ORIENTED_EDGE' IN TYPEOF(SELF.
               edge_element)));
  END_ENTITY; -- oriented_edge
```

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```
ENTITY oriented_face
  SUBTYPE OF (face);
    face_element : face;
    orientation  : BOOLEAN;
  DERIVE
    SELF\face.bounds : SET [1:?] OF face_bound := conditional_reverse(
                          SELF.orientation,SELF.face_element.bounds);
  WHERE
    wr1: (NOT ('TECHNICAL_DATA_PACKAGING.ORIENTED_FACE' IN TYPEOF(SELF.
              face_element)));
END_ENTITY; -- oriented_face

ENTITY oriented_open_shell
  SUBTYPE OF (open_shell);
    open_shell_element : open_shell;
    orientation        : BOOLEAN;
  DERIVE
    SELF\connected_face_set.cfs_faces : SET [1:?] OF face :=
                                          conditional_reverse(SELF.
                                          orientation,SELF.
                                          open_shell_element.cfs_faces);
  WHERE
    wr1: (NOT ('TECHNICAL_DATA_PACKAGING.ORIENTED_OPEN_SHELL' IN TYPEOF(
              SELF.open_shell_element)));
END_ENTITY; -- oriented_open_shell

ENTITY oriented_path
  SUBTYPE OF (path);
    path_element : path;
    orientation  : BOOLEAN;
  DERIVE
    SELF\path.edge_list : LIST [1:?] OF UNIQUE oriented_edge :=
                             conditional_reverse(SELF.orientation,SELF.
                             path_element.edge_list);
  WHERE
    wr1: (NOT ('TECHNICAL_DATA_PACKAGING.ORIENTED_PATH' IN TYPEOF(SELF.
              path_element)));
END_ENTITY; -- oriented_path

ENTITY other_list_table_representation
  SUBTYPE OF (representation);
END_ENTITY; -- other_list_table_representation

ENTITY outer_boundary_curve
  SUBTYPE OF (boundary_curve);
END_ENTITY; -- outer_boundary_curve

ENTITY over_riding_styled_item
  SUBTYPE OF (styled_item);
    over_ridden_style : styled_item;
END_ENTITY; -- over_riding_styled_item

ENTITY parabola
  SUBTYPE OF (conic);
    focal_dist : length_measure;
  WHERE
    wr1: (focal_dist <> 0);
END_ENTITY; -- parabola
```

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ENTITY parametric_representation_context
  SUBTYPE OF (representation_context);
END_ENTITY; -- parametric_representation_context

ENTITY path
  SUPERTYPE OF (ONEOF (edge_loop,oriented_path))
  SUBTYPE OF (topological_representation_item);
    edge_list : LIST [1:?] OF UNIQUE oriented_edge;
  WHERE
    wr1: path_head_to_tail(SELF);
END_ENTITY; -- path

ENTITY pcurve
  SUBTYPE OF (curve);
    basis_surface      : surface;
    reference_to_curve : definitional_representation;
  WHERE
    wr1: (SIZEOF(reference_to_curve\representation.items) = 1);
    wr2: ('TECHNICAL_DATA_PACKAGING.CURVE' IN TYPEOF(reference_to_curve\
             representation.items[1]));
    wr3: (reference_to_curve\representation.items[1]\
             geometric_representation_item.dim = 2);
END_ENTITY; -- pcurve

ENTITY person;
    id            : identifier;
    last_name     : OPTIONAL label;
    first_name    : OPTIONAL label;
    middle_names  : OPTIONAL LIST [1:?] OF label;
    prefix_titles : OPTIONAL LIST [1:?] OF label;
    suffix_titles : OPTIONAL LIST [1:?] OF label;
  WHERE
    wr1: (EXISTS(last_name) OR EXISTS(first_name));
END_ENTITY; -- person

ENTITY person_and_organization;
    the_person       : person;
    the_organization : organization;
  DERIVE
    name        : label := get_name_value(SELF);
    description : text := get_description_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'NAME_ATTRIBUTE.NAMED_ITEM')) <= 1);
    wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- person_and_organization

ENTITY person_and_organization_assignment
  ABSTRACT SUPERTYPE;
    assigned_person_and_organization : person_and_organization;
    role                             : person_and_organization_role;
END_ENTITY; -- person_and_organization_assignment

ENTITY person_and_organization_role;
    name : label;
  DERIVE
    description : text := get_description_value(SELF);
  WHERE
```

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```
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- person_and_organization_role

ENTITY personal_address
  SUBTYPE OF (address);
    people      : SET [1:?] OF person;
    description : OPTIONAL text;
END_ENTITY; -- personal_address

ENTITY placement
  SUPERTYPE OF (ONEOF (axis1_placement,axis2_placement_2d,
      axis2_placement_3d))
  SUBTYPE OF (geometric_representation_item);
    location : cartesian_point;
END_ENTITY; -- placement

ENTITY planar_box
  SUBTYPE OF (planar_extent);
    placement : axis2_placement;
END_ENTITY; -- planar_box

ENTITY planar_extent
  SUBTYPE OF (geometric_representation_item);
    size_in_x : length_measure;
    size_in_y : length_measure;
END_ENTITY; -- planar_extent

ENTITY plane
  SUBTYPE OF (elementary_surface);
END_ENTITY; -- plane

ENTITY plane_angle_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.PLANE_ANGLE_UNIT' IN TYPEOF(SELF\
              measure_with_unit.unit_component));
END_ENTITY; -- plane_angle_measure_with_unit

ENTITY plane_angle_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
              named_unit.dimensions.mass_exponent = 0) AND (SELF\
              named_unit.dimensions.time_exponent = 0) AND (SELF\
              named_unit.dimensions.electric_current_exponent = 0) AND (
              SELF\named_unit.dimensions.
              thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
              .dimensions.amount_of_substance_exponent = 0) AND (SELF\
              named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- plane_angle_unit

ENTITY point
  SUPERTYPE OF (ONEOF (cartesian_point,point_on_curve,point_on_surface,
      point_replica,degenerate_pcurve))
  SUBTYPE OF (geometric_representation_item);
END_ENTITY; -- point
```

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```
ENTITY point_on_curve
  SUBTYPE OF (point);
    basis_curve     : curve;
    point_parameter : parameter_value;
END_ENTITY; -- point_on_curve

ENTITY point_on_surface
  SUBTYPE OF (point);
    basis_surface     : surface;
    point_parameter_u : parameter_value;
    point_parameter_v : parameter_value;
END_ENTITY; -- point_on_surface

ENTITY point_replica
  SUBTYPE OF (point);
    parent_pt      : point;
    transformation : cartesian_transformation_operator;
  WHERE
    wr1: (transformation.dim = parent_pt.dim);
    wr2: acyclic_point_replica(SELF,parent_pt);
END_ENTITY; -- point_replica

ENTITY point_style;
    name          : label;
    marker        : marker_select;
    marker_size   : size_select;
    marker_colour : colour;
END_ENTITY; -- point_style

ENTITY poly_loop
  SUBTYPE OF (loop, geometric_representation_item);
    polygon : LIST [3:?] OF UNIQUE cartesian_point;
END_ENTITY; -- poly_loop

ENTITY polyline
  SUBTYPE OF (bounded_curve);
    points : LIST [2:?] OF cartesian_point;
END_ENTITY; -- polyline

ENTITY pre_defined_character_glyph
  SUBTYPE OF (pre_defined_item);
END_ENTITY; -- pre_defined_character_glyph

ENTITY pre_defined_colour
  SUBTYPE OF (pre_defined_item, colour);
END_ENTITY; -- pre_defined_colour

ENTITY pre_defined_curve_font
  SUBTYPE OF (pre_defined_item);
END_ENTITY; -- pre_defined_curve_font

ENTITY pre_defined_item;
    name : label;
END_ENTITY; -- pre_defined_item

ENTITY pre_defined_text_font
  SUBTYPE OF (pre_defined_item);
END_ENTITY; -- pre_defined_text_font
```

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```
  ENTITY precision_qualifier;
      precision_value : INTEGER;
  END_ENTITY; -- precision_qualifier

  ENTITY presentation_area
    SUBTYPE OF (presentation_representation);
    WHERE
      wr1: ((SIZEOF(QUERY ( ais <* USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.'
                + 'AREA_IN_SET.AREA') | (SIZEOF(USEDIN(ais,
                'TECHNICAL_DATA_PACKAGING.' + 'PRESENTATION_SIZE.UNIT')) =
1)
                 )) > 0) OR (SIZEOF(USEDIN(SELF,
                'TECHNICAL_DATA_PACKAGING.' +
                'PRESENTATION_SIZE.UNIT')) = 1));
  END_ENTITY; -- presentation_area

  ENTITY presentation_representation
    SUBTYPE OF (representation);
    WHERE
      wr1: (SELF\representation.context_of_items\
                geometric_representation_context.coordinate_space_dimension
                = 2);
      wr2: ('TECHNICAL_DATA_PACKAGING.GEOMETRIC_REPRESENTATION_CONTEXT' IN
                 TYPEOF(SELF\representation.context_of_items));
  END_ENTITY; -- presentation_representation

  ENTITY presentation_set;
    INVERSE
      areas : SET [1:?] OF area_in_set FOR in_set;
  END_ENTITY; -- presentation_set

  ENTITY presentation_size;
      unit : presentation_size_assignment_select;
      size : planar_box;
    WHERE
      wr1: ((('TECHNICAL_DATA_PACKAGING.PRESENTATION_REPRESENTATION' IN
                TYPEOF(SELF.unit)) AND item_in_context(SELF.size,SELF.unit\
                representation.context_of_items)) OR ((
                'TECHNICAL_DATA_PACKAGING.AREA_IN_SET' IN TYPEOF(SELF.unit))
                AND (SIZEOF(QUERY ( ais <* SELF.unit\area_in_set.in_set.
                areas | (NOT item_in_context(SELF.size,ais.area\
                representation.context_of_items)) )) = 0)));
  END_ENTITY; -- presentation_size

  ENTITY presentation_style_assignment;
      styles : SET [1:?] OF presentation_style_select;
    WHERE
      wr1: (SIZEOF(QUERY ( style1 <* SELF.styles | (NOT (SIZEOF(
                QUERY ( style2 <* (SELF.styles - style1) | (NOT ((TYPEOF(
                style1) <> TYPEOF(style2)) OR (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.' + 'SURFACE_STYLE_USAGE',
                'TECHNICAL_DATA_PACKAGING.' + 'EXTERNALLY_DEFINED_STYLE'] *
                TYPEOF(style1)) = 1))) )) = 0)) )) = 0);
      wr2: (SIZEOF(QUERY ( style1 <* SELF.styles | (
                'TECHNICAL_DATA_PACKAGING.SURFACE_STYLE_USAGE' IN TYPEOF(
                style1)) )) <= 2);
  END_ENTITY; -- presentation_style_assignment
```

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```
ENTITY presentation_style_by_context
  SUBTYPE OF (presentation_style_assignment);
    style_context : style_context_select;
END_ENTITY; -- presentation_style_by_context

ENTITY presentation_view
  SUBTYPE OF (presentation_representation);
END_ENTITY; -- presentation_view

ENTITY presented_item
  ABSTRACT SUPERTYPE;
END_ENTITY; -- presented_item

ENTITY presented_item_representation;
    presentation : presentation_representation_select;
    item         : presented_item;
END_ENTITY; -- presented_item_representation

ENTITY process_product_association;
    name            : label;
    description     : text;
    defined_product : characterized_product_definition;
    process         : product_definition_process;
END_ENTITY; -- process_product_association

ENTITY product;
    id                 : identifier;
    name               : label;
    description        : OPTIONAL text;
    frame_of_reference : SET [1:?] OF product_context;
END_ENTITY; -- product

ENTITY product_category;
    name        : label;
    description : OPTIONAL text;
  DERIVE
    id : identifier := get_id_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
END_ENTITY; -- product_category

ENTITY product_category_relationship;
    name         : label;
    description  : OPTIONAL text;
    category     : product_category;
    sub_category : product_category;
  WHERE
    wr1: acyclic_product_category_relationship(SELF,[SELF.sub_category]);
END_ENTITY; -- product_category_relationship

ENTITY product_concept;
    id             : identifier;
    name           : label;
    description    : OPTIONAL text;
    market_context : product_concept_context;
  UNIQUE
    ur1 : id;
END_ENTITY; -- product_concept
```

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```
ENTITY product_concept_context
  SUBTYPE OF (application_context_element);
    market_segment_type : label;
END_ENTITY; -- product_concept_context

ENTITY product_context
  SUBTYPE OF (application_context_element);
    discipline_type : label;
END_ENTITY; -- product_context

ENTITY product_definition;
    id                 : identifier;
    description        : OPTIONAL text;
    formation          : product_definition_formation;
    frame_of_reference : product_definition_context;
  DERIVE
    name : label := get_name_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'NAME_ATTRIBUTE.NAMED_ITEM')) <= 1);
END_ENTITY; -- product_definition

ENTITY product_definition_context
  SUBTYPE OF (application_context_element);
    life_cycle_stage : label;
END_ENTITY; -- product_definition_context

ENTITY product_definition_context_association;
    definition         : product_definition;
    frame_of_reference : product_definition_context;
    role               : product_definition_context_role;
END_ENTITY; -- product_definition_context_association

ENTITY product_definition_context_role;
    name        : label;
    description : OPTIONAL text;
END_ENTITY; -- product_definition_context_role

ENTITY product_definition_effectivity
  SUBTYPE OF (effectivity);
    usage : product_definition_relationship;
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'EFFECTIVITY_ASSIGNMENT.ASSIGNED_EFFECTIVITY')) = 0);
END_ENTITY; -- product_definition_effectivity

ENTITY product_definition_formation;
    id          : identifier;
    description : OPTIONAL text;
    of_product  : product;
  UNIQUE
    ur1 : id, of_product;
END_ENTITY; -- product_definition_formation

ENTITY product_definition_formation_relationship;
    id                                    : identifier;
    name                                  : label;
    description                           : OPTIONAL text;
    relating_product_definition_formation : product_definition_formation;
```

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```
    related_product_definition_formation  : product_definition_formation;
END_ENTITY; -- product_definition_formation_relationship

ENTITY product_definition_formation_with_specified_source
  SUBTYPE OF (product_definition_formation);
    make_or_buy : source;
END_ENTITY; -- product_definition_formation_with_specified_source

ENTITY product_definition_occurrence_relationship;
    name             : label;
    description      : OPTIONAL text;
    occurrence       : product_definition;
    occurrence_usage : assembly_component_usage;
  WHERE
    wr1: (occurrence_usage.relating_product_definition :<>: occurrence);
    wr2: (occurrence_usage.related_product_definition :<>: occurrence);
    wr3: (occurrence.formation :=: occurrence_usage.
             related_product_definition.formation);
END_ENTITY; -- product_definition_occurrence_relationship

ENTITY product_definition_process
  SUBTYPE OF (action);
    identification : identifier;
  INVERSE
    product_definitions : SET [1:?] OF process_product_association FOR
                                 process;
END_ENTITY; -- product_definition_process

ENTITY product_definition_relationship;
    id                          : identifier;
    name                        : label;
    description                 : OPTIONAL text;
    relating_product_definition : product_definition;
    related_product_definition  : product_definition;
END_ENTITY; -- product_definition_relationship

ENTITY product_definition_shape
  SUBTYPE OF (property_definition);
  UNIQUE
    ur1 : definition;
  WHERE
    wr1: (SIZEOF([
             'TECHNICAL_DATA_PACKAGING.CHARACTERIZED_PRODUCT_DEFINITION',
             'TECHNICAL_DATA_PACKAGING.CHARACTERIZED_OBJECT'] * TYPEOF(
             SELF\property_definition.definition)) > 0);
END_ENTITY; -- product_definition_shape

ENTITY product_definition_substitute;
    description           : OPTIONAL text;
    context_relationship  : product_definition_relationship;
    substitute_definition : product_definition;
  DERIVE
    name : label := get_name_value(SELF);
  WHERE
    wr1: (context_relationship.related_product_definition :<>:
             substitute_definition);
    wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'NAME_ATTRIBUTE.NAMED_ITEM')) <= 1);
END_ENTITY; -- product_definition_substitute
```

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```
ENTITY product_definition_usage
  SUPERTYPE OF (ONEOF (make_from_usage_option,assembly_component_usage))
  SUBTYPE OF (product_definition_relationship);
  UNIQUE
    ur1 : id, relating_product_definition, related_product_definition;
  WHERE
    wr1: acyclic_product_definition_relationship(SELF,[SELF\
             product_definition_relationship.related_product_definition],
             'TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_USAGE');
END_ENTITY; -- product_definition_usage

ENTITY product_definition_with_associated_documents
  SUBTYPE OF (product_definition);
    documentation_ids : SET [1:?] OF document;
END_ENTITY; -- product_definition_with_associated_documents

ENTITY product_related_product_category
  SUBTYPE OF (product_category);
    products : SET [1:?] OF product;
END_ENTITY; -- product_related_product_category

ENTITY product_relationship;
    id               : identifier;
    name             : label;
    description      : OPTIONAL text;
    relating_product : product;
    related_product  : product;
END_ENTITY; -- product_relationship

ENTITY promissory_usage_occurrence
  SUBTYPE OF (assembly_component_usage);
END_ENTITY; -- promissory_usage_occurrence

ENTITY property_definition;
    name        : label;
    description : OPTIONAL text;
    definition  : characterized_definition;
  DERIVE
    id : identifier := get_id_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
END_ENTITY; -- property_definition

ENTITY property_definition_relationship;
    name                        : label;
    description                 : text;
    relating_property_definition : property_definition;
    related_property_definition  : property_definition;
END_ENTITY; -- property_definition_relationship

ENTITY property_definition_representation;
    definition          : represented_definition;
    used_representation : representation;
  DERIVE
    description : text := get_description_value(SELF);
    name        : label := get_name_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
```

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```
              'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
    wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'NAME_ATTRIBUTE.NAMED_ITEM')) <= 1);
END_ENTITY; -- property_definition_representation

ENTITY qualified_representation_item
  SUBTYPE OF (representation_item);
    qualifiers : SET [1:?] OF value_qualifier;
  WHERE
    wr1: (SIZEOF(QUERY ( temp <* qualifiers | (
              'TECHNICAL_DATA_PACKAGING.PRECISION_QUALIFIER' IN TYPEOF(
              temp)) )) < 2);
END_ENTITY; -- qualified_representation_item

ENTITY quantified_assembly_component_usage
  SUBTYPE OF (assembly_component_usage);
    quantity : measure_with_unit;
  WHERE
    wr1: ((NOT ('NUMBER' IN TYPEOF(quantity.value_component))) OR (
              quantity.value_component > 0));
END_ENTITY; -- quantified_assembly_component_usage

ENTITY quasi_uniform_curve
  SUBTYPE OF (b_spline_curve);
END_ENTITY; -- quasi_uniform_curve

ENTITY quasi_uniform_surface
  SUBTYPE OF (b_spline_surface);
END_ENTITY; -- quasi_uniform_surface

ENTITY ratio_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.RATIO_UNIT' IN TYPEOF(SELF\
              measure_with_unit.unit_component));
END_ENTITY; -- ratio_measure_with_unit

ENTITY ratio_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
              named_unit.dimensions.mass_exponent = 0) AND (SELF\
              named_unit.dimensions.time_exponent = 0) AND (SELF\
              named_unit.dimensions.electric_current_exponent = 0) AND (
              SELF\named_unit.dimensions.
              thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
              .dimensions.amount_of_substance_exponent = 0) AND (SELF\
              named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- ratio_unit

ENTITY rational_b_spline_curve
  SUBTYPE OF (b_spline_curve);
    weights_data : LIST [2:?] OF REAL;
  DERIVE
    weights : ARRAY [0:upper_index_on_control_points] OF REAL :=
                  list_to_array(weights_data,0,
                  upper_index_on_control_points);
  WHERE
    wr1: (SIZEOF(weights_data) = SIZEOF(SELF\b_spline_curve.
```

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```
              control_points_list));
    wr2: curve_weights_positive(SELF);
END_ENTITY; -- rational_b_spline_curve

ENTITY rational_b_spline_surface
  SUBTYPE OF (b_spline_surface);
    weights_data : LIST [2:?] OF LIST [2:?] OF REAL;
  DERIVE
    weights : ARRAY [0:u_upper] OF ARRAY [0:v_upper] OF REAL :=
                  make_array_of_array(weights_data,0,u_upper,0,v_upper);
  WHERE
    wr1: ((SIZEOF(weights_data) = SIZEOF(SELF\b_spline_surface.
              control_points_list)) AND (SIZEOF(weights_data[1]) = SIZEOF(
              SELF\b_spline_surface.control_points_list[1])));
    wr2: surface_weights_positive(SELF);
END_ENTITY; -- rational_b_spline_surface

ENTITY rectangular_composite_surface
  SUBTYPE OF (bounded_surface);
    segments : LIST [1:?] OF LIST [1:?] OF surface_patch;
  DERIVE
    n_u : INTEGER := SIZEOF(segments);
    n_v : INTEGER := SIZEOF(segments[1]);
  WHERE
    wr1: ([] = QUERY ( s <* segments | (n_v <> SIZEOF(s)) ));
    wr2: constraints_rectangular_composite_surface(SELF);
END_ENTITY; -- rectangular_composite_surface

ENTITY rectangular_trimmed_surface
  SUBTYPE OF (bounded_surface);
    basis_surface : surface;
    u1            : parameter_value;
    u2            : parameter_value;
    v1            : parameter_value;
    v2            : parameter_value;
    usense        : BOOLEAN;
    vsense        : BOOLEAN;
  WHERE
    wr1: (u1 <> u2);
    wr2: (v1 <> v2);
    wr3: ((('TECHNICAL_DATA_PACKAGING.ELEMENTARY_SURFACE' IN TYPEOF(
              basis_surface)) AND (NOT ('TECHNICAL_DATA_PACKAGING.PLANE'
              IN TYPEOF(basis_surface)))) OR (
              'TECHNICAL_DATA_PACKAGING.SURFACE_OF_REVOLUTION' IN TYPEOF(
              basis_surface)) OR (usense = (u2 > u1)));
    wr4: (('TECHNICAL_DATA_PACKAGING.SPHERICAL_SURFACE' IN TYPEOF(
              basis_surface)) OR (
              'TECHNICAL_DATA_PACKAGING.TOROIDAL_SURFACE' IN TYPEOF(
              basis_surface)) OR (vsense = (v2 > v1)));
END_ENTITY; -- rectangular_trimmed_surface

ENTITY reparametrised_composite_curve_segment
  SUBTYPE OF (composite_curve_segment);
    param_length : parameter_value;
  WHERE
    wr1: (param_length > 0);
END_ENTITY; -- reparametrised_composite_curve_segment
```

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```
ENTITY representation;
    name             : label;
    items            : SET [1:?] OF representation_item;
    context_of_items : representation_context;
  DERIVE
    id          : identifier := get_id_value(SELF);
    description : text := get_description_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
    wr2: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
             'DESCRIPTION_ATTRIBUTE.DESCRIBED_ITEM')) <= 1);
END_ENTITY; -- representation

ENTITY representation_context;
    context_identifier : identifier;
    context_type       : text;
  INVERSE
    representations_in_context : SET [1:?] OF representation FOR
                                     context_of_items;
END_ENTITY; -- representation_context

ENTITY representation_item;
    name : label;
  WHERE
    wr1: (SIZEOF(using_representations(SELF)) > 0);
END_ENTITY; -- representation_item

ENTITY representation_item_relationship;
    name                        : label;
    description                 : OPTIONAL text;
    relating_representation_item : representation_item;
    related_representation_item  : representation_item;
END_ENTITY; -- representation_item_relationship

ENTITY representation_map;
    mapping_origin        : representation_item;
    mapped_representation : representation;
  INVERSE
    map_usage : SET [1:?] OF mapped_item FOR mapping_source;
  WHERE
    wr1: item_in_context(SELF.mapping_origin,SELF.mapped_representation.
             context_of_items);
END_ENTITY; -- representation_map

ENTITY representation_relationship;
    name        : label;
    description : OPTIONAL text;
    rep_1       : representation;
    rep_2       : representation;
END_ENTITY; -- representation_relationship

ENTITY revolved_face_solid
  SUBTYPE OF (swept_face_solid);
    axis  : axis1_placement;
    angle : plane_angle_measure;
  DERIVE
    axis_line : line := dummy_gri || curve() || line(axis.location,
```

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```
                    dummy_gri || vector(axis.z,1));
END_ENTITY; -- revolved_face_solid

ENTITY right_angular_wedge
  SUBTYPE OF (geometric_representation_item);
    position : axis2_placement_3d;
    x        : positive_length_measure;
    y        : positive_length_measure;
    z        : positive_length_measure;
    ltx      : length_measure;
  WHERE
    wr1: ((0 <= ltx) AND (ltx < x));
END_ENTITY; -- right_angular_wedge

ENTITY right_circular_cone
  SUBTYPE OF (geometric_representation_item);
    position   : axis1_placement;
    height     : positive_length_measure;
    radius     : length_measure;
    semi_angle : plane_angle_measure;
  WHERE
    wr1: (radius >= 0);
END_ENTITY; -- right_circular_cone

ENTITY right_circular_cylinder
  SUBTYPE OF (geometric_representation_item);
    position : axis1_placement;
    height   : positive_length_measure;
    radius   : positive_length_measure;
END_ENTITY; -- right_circular_cylinder

ENTITY role_association;
    role           : object_role;
    item_with_role : role_select;
END_ENTITY; -- role_association

ENTITY seam_curve
  SUBTYPE OF (surface_curve);
  WHERE
    wr1: (SIZEOF(SELF\surface_curve.associated_geometry) = 2);
    wr2: (associated_surface(SELF\surface_curve.associated_geometry[1])
             = associated_surface(SELF\surface_curve.associated_geometry[
             2]));
    wr3: ('TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(SELF\surface_curve
             .associated_geometry[1]));
    wr4: ('TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(SELF\surface_curve
             .associated_geometry[2]));
END_ENTITY; -- seam_curve

ENTITY security_classification;
    name           : label;
    purpose        : text;
    security_level : security_classification_level;
END_ENTITY; -- security_classification

ENTITY security_classification_assignment
  ABSTRACT SUPERTYPE;
    assigned_security_classification : security_classification;
  DERIVE
```

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    role : object_role := get_role(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'ROLE_ASSOCIATION.ITEM_WITH_ROLE')) <= 1);
END_ENTITY; -- security_classification_assignment

ENTITY security_classification_level;
    name : label;
END_ENTITY; -- security_classification_level

ENTITY serial_numbered_effectivity
  SUBTYPE OF (effectivity);
    effectivity_start_id : identifier;
    effectivity_end_id   : OPTIONAL identifier;
END_ENTITY; -- serial_numbered_effectivity

ENTITY shape_aspect;
    name                 : label;
    description          : OPTIONAL text;
    of_shape             : product_definition_shape;
    product_definitional : LOGICAL;
  DERIVE
    id : identifier := get_id_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
END_ENTITY; -- shape_aspect

ENTITY shape_aspect_relationship;
    name                  : label;
    description           : OPTIONAL text;
    relating_shape_aspect : shape_aspect;
    related_shape_aspect  : shape_aspect;
  DERIVE
    id : identifier := get_id_value(SELF);
  WHERE
    wr1: (SIZEOF(USEDIN(SELF,'TECHNICAL_DATA_PACKAGING.' +
              'ID_ATTRIBUTE.IDENTIFIED_ITEM')) <= 1);
END_ENTITY; -- shape_aspect_relationship

ENTITY shape_representation
  SUBTYPE OF (representation);
END_ENTITY; -- shape_representation

ENTITY shell_based_surface_model
  SUBTYPE OF (geometric_representation_item);
    sbsm_boundary : SET [1:?] OF shell;
  WHERE
    wr1: constraints_geometry_shell_based_surface_model(SELF);
END_ENTITY; -- shell_based_surface_model

ENTITY shell_based_wireframe_model
  SUBTYPE OF (geometric_representation_item);
    sbwm_boundary : SET [1:?] OF shell;
  WHERE
    wr1: constraints_geometry_shell_based_wireframe_model(SELF);
END_ENTITY; -- shell_based_wireframe_model
```

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```
  ENTITY shell_based_wireframe_shape_representation
    SUBTYPE OF (shape_representation);
    WHERE
      wr1 : (SIZEOF(QUERY ( it <* SELF.items | (NOT (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL',
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM',
                 'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT_3D'] *
TYPEOF(it))
                 = 1)) )) = 0);
      wr2 : (SIZEOF(QUERY ( it <* SELF.items | (SIZEOF([
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL',
                 'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM'] * TYPEOF(it)) = 1)
))
                 >= 1);
      wr3 : (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( ws <* QUERY ( sb <*
                 sbwm\shell_based_wireframe_model.sbwm_boundary | (
                 'TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(sb)) ) | (
                 NOT (SIZEOF(QUERY ( eloop <* QUERY ( wsb <* ws\wire_shell.
                 wire_shell_extent | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP'
                 IN TYPEOF(wsb)) ) | (NOT (SIZEOF(QUERY ( el <* eloop\path.
                 edge_list | (NOT ('TECHNICAL_DATA_PACKAGING.EDGE_CURVE' IN
                 TYPEOF(el.edge_element))) )) = 0)) )) = 0)) )) = 0)) )) =
0);
      wr4 : (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( ws <* QUERY ( sb <*
                 sbwm\shell_based_wireframe_model.sbwm_boundary | (
                 'TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(sb)) ) | (
                 NOT (SIZEOF(QUERY ( eloop <* QUERY ( wsb <* ws\wire_shell.
                 wire_shell_extent | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP'
                 IN TYPEOF(wsb)) ) | (NOT (SIZEOF(QUERY ( pline_el <*
                 QUERY ( el <* eloop\path.edge_list | (
                 'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(el.
                 edge_element\edge_curve.edge_geometry)) ) | (NOT (SIZEOF(
                 pline_el.edge_element\edge_curve.edge_geometry\polyline.
                 points) > 2)) )) = 0)) )) = 0)) )) = 0)) )) = 0);
      wr5 : (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( ws <* QUERY ( sb <*
                 sbwm\shell_based_wireframe_model.sbwm_boundary | (
                 'TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(sb)) ) | (
                 NOT (SIZEOF(QUERY ( eloop <* QUERY ( wsb <* ws\wire_shell.
                 wire_shell_extent | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP'
                 IN TYPEOF(wsb)) ) | (NOT (SIZEOF(QUERY ( el <* eloop\path.
                 edge_list | (NOT valid_wireframe_edge_curve(el.edge_element
                 \edge_curve.edge_geometry)) )) = 0)) )) = 0)) )) = 0)) )) =
                  0);
      wr6 : (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                 'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                 TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( ws <* QUERY ( sb <*
                 sbwm\shell_based_wireframe_model.sbwm_boundary | (
                 'TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(sb)) ) | (
                 NOT (SIZEOF(QUERY ( eloop <* QUERY ( wsb <* ws\wire_shell.
                 wire_shell_extent | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP'
                 IN TYPEOF(wsb)) ) | (NOT (SIZEOF(QUERY ( el <* eloop\path.
                 edge_list | (NOT (('TECHNICAL_DATA_PACKAGING.VERTEX_POINT'
                 IN TYPEOF(el.edge_element.edge_start)) AND (
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                'TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(el.
                edge_element.edge_end)))) )) = 0)) )) = 0)) )) = 0)) )) =
0);
      wr7 : (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( ws <* QUERY ( sb <*
                sbwm\shell_based_wireframe_model.sbwm_boundary | (
                'TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(sb)) ) | (
                NOT (SIZEOF(QUERY ( eloop <* QUERY ( wsb <* ws\wire_shell.
                wire_shell_extent | ('TECHNICAL_DATA_PACKAGING.EDGE_LOOP'
                IN TYPEOF(wsb)) ) | (NOT (SIZEOF(QUERY ( el <* eloop\path.
                edge_list | (NOT (valid_wireframe_vertex_point(el.
                edge_element.edge_start\vertex_point.vertex_geometry) AND
                valid_wireframe_vertex_point(el.edge_element.edge_end\
                vertex_point.vertex_geometry))) )) = 0)) )) = 0)) )) = 0))
))
                = 0);
      wr8 : (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( ws <* QUERY ( sb <*
                sbwm\shell_based_wireframe_model.sbwm_boundary | (
                'TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(sb)) ) | (
                NOT (SIZEOF(QUERY ( vloop <* QUERY ( wsb <* ws\wire_shell.
                wire_shell_extent | ('TECHNICAL_DATA_PACKAGING.VERTEX_LOOP'
                IN TYPEOF(wsb)) ) | (NOT (
                'TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(vloop\
                vertex_loop.loop_vertex))) )) = 0)) )) = 0)) )) = 0);
      wr9 : (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( ws <* QUERY ( sb <*
                sbwm\shell_based_wireframe_model.sbwm_boundary | (
                'TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(sb)) ) | (
                NOT (SIZEOF(QUERY ( vloop <* QUERY ( wsb <* ws\wire_shell.
                wire_shell_extent | ('TECHNICAL_DATA_PACKAGING.VERTEX_LOOP'
                IN TYPEOF(wsb)) ) | (NOT valid_wireframe_vertex_point(vloop
                \vertex_loop.loop_vertex\vertex_point.vertex_geometry)) ))
                = 0)) )) = 0)) )) = 0);
      wr10: (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( vs <* QUERY ( sb <*
                sbwm\shell_based_wireframe_model.sbwm_boundary | (
                'TECHNICAL_DATA_PACKAGING.VERTEX_SHELL' IN TYPEOF(sb)) ) |
                (NOT ('TECHNICAL_DATA_PACKAGING.VERTEX_POINT' IN TYPEOF(vs\
                vertex_shell.vertex_shell_extent.loop_vertex))) )) = 0)) ))
                = 0);
      wr11: (SIZEOF(QUERY ( sbwm <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.SHELL_BASED_WIREFRAME_MODEL' IN
                TYPEOF(it)) ) | (NOT (SIZEOF(QUERY ( vs <* QUERY ( sb <*
                sbwm\shell_based_wireframe_model.sbwm_boundary | (
                'TECHNICAL_DATA_PACKAGING.VERTEX_SHELL' IN TYPEOF(sb)) ) |
                (NOT valid_wireframe_vertex_point(vs\vertex_shell.
                vertex_shell_extent.loop_vertex\vertex_point.
                vertex_geometry)) )) = 0)) )) = 0);
      wr12: (SIZEOF(QUERY ( mi <* QUERY ( it <* SELF.items | (
                'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(it)) ) | (
                NOT (('TECHNICAL_DATA_PACKAGING.' +
                'SHELL_BASED_WIREFRAME_SHAPE_REPRESENTATION') IN TYPEOF(mi\
                mapped_item.mapping_source.mapped_representation))) )) =
0);
```

```
    wr13: (SELF.context_of_items\geometric_representation_context.
              coordinate_space_dimension = 3);
END_ENTITY; -- shell_based_wireframe_shape_representation

ENTITY si_unit
  SUBTYPE OF (named_unit);
    prefix : OPTIONAL si_prefix;
    name   : si_unit_name;
  DERIVE
    SELF\named_unit.dimensions : dimensional_exponents :=
                                     dimensions_for_si_unit(name);
END_ENTITY; -- si_unit

ENTITY solid_angle_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.SOLID_ANGLE_UNIT' IN TYPEOF(SELF\
            measure_with_unit.unit_component));
END_ENTITY; -- solid_angle_measure_with_unit

ENTITY solid_angle_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
            named_unit.dimensions.mass_exponent = 0) AND (SELF\
            named_unit.dimensions.time_exponent = 0) AND (SELF\
            named_unit.dimensions.electric_current_exponent = 0) AND (
            SELF\named_unit.dimensions.
            thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
            .dimensions.amount_of_substance_exponent = 0) AND (SELF\
            named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- solid_angle_unit

ENTITY solid_model
  SUPERTYPE OF (ONEOF (csg_solid,manifold_solid_brep,swept_face_solid,
      solid_replica))
  SUBTYPE OF (geometric_representation_item);
END_ENTITY; -- solid_model

ENTITY solid_replica
  SUBTYPE OF (solid_model);
    parent_solid   : solid_model;
    transformation : cartesian_transformation_operator_3d;
  WHERE
    wr1: acyclic_solid_replica(SELF,parent_solid);
END_ENTITY; -- solid_replica

ENTITY specified_higher_usage_occurrence
  SUBTYPE OF (assembly_component_usage);
    upper_usage : assembly_component_usage;
    next_usage  : next_assembly_usage_occurrence;
  UNIQUE
    ur1 : upper_usage, next_usage;
  WHERE
    wr1: (SELF :<>: upper_usage);
    wr2: (SELF\product_definition_relationship.
            relating_product_definition :=: upper_usage.
            relating_product_definition);
    wr3: (SELF\product_definition_relationship.
```

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                related_product_definition :=: next_usage.
                related_product_definition);
      wr4: ((upper_usage.related_product_definition :=: next_usage.
                relating_product_definition) OR (SIZEOF(QUERY ( pdr <*
                USEDIN(upper_usage.related_product_definition,
                'TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_RELATIONSHIP.'
                + 'RELATED_PRODUCT_DEFINITION') | (pdr.
                relating_product_definition :=: next_usage.
                relating_product_definition) )) = 1));
      wr5: (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.NEXT_ASSEMBLY_USAGE_OCCURRENCE',
                'TECHNICAL_DATA_PACKAGING.SPECIFIED_HIGHER_USAGE_-
OCCURRENCE']
                * TYPEOF(upper_usage)) = 1);
  END_ENTITY; -- specified_higher_usage_occurrence

  ENTITY sphere
    SUBTYPE OF (geometric_representation_item);
      radius : positive_length_measure;
      centre : point;
  END_ENTITY; -- sphere

  ENTITY spherical_surface
    SUBTYPE OF (elementary_surface);
      radius : positive_length_measure;
  END_ENTITY; -- spherical_surface

  ENTITY styled_item
    SUBTYPE OF (representation_item);
      styles : SET [1:?] OF presentation_style_assignment;
      item   : representation_item;
    WHERE
      wr1: ((SIZEOF(SELF.styles) = 1) XOR (SIZEOF(QUERY ( pres_style <*
                SELF.styles | (NOT (('TECHNICAL_DATA_PACKAGING.' +
                'PRESENTATION_STYLE_BY_CONTEXT') IN TYPEOF(pres_style))) ))
                = 0));
  END_ENTITY; -- styled_item

  ENTITY surface
    SUPERTYPE OF (ONEOF (elementary_surface,swept_surface,bounded_surface,
        offset_surface,surface_replica))
    SUBTYPE OF (geometric_representation_item);
  END_ENTITY; -- surface

  ENTITY surface_curve
    SUPERTYPE OF (ONEOF (intersection_curve,seam_curve) ANDOR
        bounded_surface_curve)
    SUBTYPE OF (curve);
      curve_3d              : curve;
      associated_geometry   : LIST [1:2] OF pcurve_or_surface;
      master_representation : preferred_surface_curve_representation;
    DERIVE
      basis_surface : SET [1:2] OF surface := get_basis_surface(SELF);
    WHERE
      wr1: (curve_3d.dim = 3);
      wr2: (('TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(
                associated_geometry[1])) OR (master_representation <>
                pcurve_s1));
      wr3: (('TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(
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```
              associated_geometry[2])) OR (master_representation <>
              pcurve_s2));
    wr4: (NOT ('TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(curve_3d)));
END_ENTITY; -- surface_curve

ENTITY surface_of_linear_extrusion
  SUBTYPE OF (swept_surface);
    extrusion_axis : vector;
END_ENTITY; -- surface_of_linear_extrusion

ENTITY surface_of_revolution
  SUBTYPE OF (swept_surface);
    axis_position : axis1_placement;
  DERIVE
    axis_line : line := dummy_gri || curve() || line(axis_position.
                    location,dummy_gri || vector(axis_position.z,1));
END_ENTITY; -- surface_of_revolution

ENTITY surface_patch
  SUBTYPE OF (founded_item);
    parent_surface : bounded_surface;
    u_transition   : transition_code;
    v_transition   : transition_code;
    u_sense        : BOOLEAN;
    v_sense        : BOOLEAN;
  INVERSE
    using_surfaces : BAG [1:?] OF rectangular_composite_surface FOR
                        segments;
  WHERE
    wr1: (NOT ('TECHNICAL_DATA_PACKAGING.CURVE_BOUNDED_SURFACE' IN
              TYPEOF(parent_surface)));
END_ENTITY; -- surface_patch

ENTITY surface_rendering_properties;
    rendered_colour : colour;
END_ENTITY; -- surface_rendering_properties

ENTITY surface_replica
  SUBTYPE OF (surface);
    parent_surface : surface;
    transformation : cartesian_transformation_operator_3d;
  WHERE
    wr1: acyclic_surface_replica(SELF,parent_surface);
END_ENTITY; -- surface_replica

ENTITY surface_side_style;
    name   : label;
    styles : SET [1:7] OF surface_style_element_select;
  WHERE
    wr1: (SIZEOF(QUERY ( style1 <* SELF.styles | (SIZEOF(
              QUERY ( style2 <* (SELF.styles - style1) | (TYPEOF(style1) =
               TYPEOF(style2)) )) > 0) )) = 0);
END_ENTITY; -- surface_side_style

ENTITY surface_style_boundary;
    style_of_boundary : curve_or_render;
END_ENTITY; -- surface_style_boundary
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ENTITY surface_style_control_grid;
    style_of_control_grid : curve_or_render;
END_ENTITY; -- surface_style_control_grid

ENTITY surface_style_fill_area;
    fill_area : fill_area_style;
END_ENTITY; -- surface_style_fill_area

ENTITY surface_style_parameter_line;
    style_of_parameter_lines : curve_or_render;
    direction_counts         : SET [1:2] OF direction_count_select;
  WHERE
    wr1: ((HIINDEX(SELF.direction_counts) = 1) XOR (TYPEOF(SELF.
             direction_counts[1]) <> TYPEOF(SELF.direction_counts[2])));
END_ENTITY; -- surface_style_parameter_line

ENTITY surface_style_reflectance_ambient;
    ambient_reflectance : REAL;
END_ENTITY; -- surface_style_reflectance_ambient

ENTITY surface_style_reflectance_ambient_diffuse
  SUBTYPE OF (surface_style_reflectance_ambient);
    diffuse_reflectance : REAL;
END_ENTITY; -- surface_style_reflectance_ambient_diffuse

ENTITY surface_style_reflectance_ambient_diffuse_specular
  SUBTYPE OF (surface_style_reflectance_ambient_diffuse);
    specular_reflectance : REAL;
    specular_exponent    : REAL;
    specular_colour      : colour;
END_ENTITY; -- surface_style_reflectance_ambient_diffuse_specular

ENTITY surface_style_rendering;
    rendering_method : shading_surface_method;
    surface_colour   : colour;
END_ENTITY; -- surface_style_rendering

ENTITY surface_style_rendering_with_properties
  SUBTYPE OF (surface_style_rendering);
    properties : SET [1:2] OF rendering_properties_select;
  WHERE
    wr1: ((HIINDEX(SELF.properties) = 1) XOR (TYPEOF(SELF.properties[1])
             <> TYPEOF(SELF.properties[2])));
END_ENTITY; -- surface_style_rendering_with_properties

ENTITY surface_style_segmentation_curve;
    style_of_segmentation_curve : curve_or_render;
END_ENTITY; -- surface_style_segmentation_curve

ENTITY surface_style_silhouette;
    style_of_silhouette : curve_or_render;
END_ENTITY; -- surface_style_silhouette

ENTITY surface_style_transparent;
    transparency : REAL;
  WHERE
    wr1: ((0 <= transparency) AND (transparency <= 1));
END_ENTITY; -- surface_style_transparent
```

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  ENTITY surface_style_usage;
      side  : surface_side;
      style : surface_side_style_select;
  END_ENTITY; -- surface_style_usage

  ENTITY swept_face_solid
    SUPERTYPE OF (ONEOF (extruded_face_solid,revolved_face_solid))
    SUBTYPE OF (solid_model);
      swept_face : face_surface;
    WHERE
      wr1: ('TECHNICAL_DATA_PACKAGING.PLANE' IN TYPEOF(swept_face.
                face_geometry));
  END_ENTITY; -- swept_face_solid

  ENTITY swept_surface
    SUPERTYPE OF (ONEOF (surface_of_linear_extrusion,surface_of_-
revolution))
    SUBTYPE OF (surface);
      swept_curve : curve;
  END_ENTITY; -- swept_surface

  ENTITY symbol_representation
    SUBTYPE OF (representation);
  END_ENTITY; -- symbol_representation

  ENTITY text_literal
    SUBTYPE OF (geometric_representation_item);
      literal   : presentable_text;
      placement : axis2_placement;
      alignment : text_alignment;
      path      : text_path;
      font      : font_select;
  END_ENTITY; -- text_literal

  ENTITY text_string_representation
    SUBTYPE OF (representation);
    WHERE
      wr1: (SIZEOF(QUERY ( item <* SELF\representation.items | (SIZEOF([
                'TECHNICAL_DATA_PACKAGING.TEXT_LITERAL',
                'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT',
                'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT_CHARACTER',
                'TECHNICAL_DATA_PACKAGING.DEFINED_CHARACTER_GLYPH',
                'TECHNICAL_DATA_PACKAGING.COMPOSITE_TEXT',
                'TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT'] * TYPEOF(item))
                = 0) )) = 0);
      wr2: (SIZEOF(QUERY ( item <* SELF\representation.items | (NOT (
                SIZEOF(['TECHNICAL_DATA_PACKAGING.TEXT_LITERAL',
                'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT',
                'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT_CHARACTER',
                'TECHNICAL_DATA_PACKAGING.DEFINED_CHARACTER_GLYPH',
                'TECHNICAL_DATA_PACKAGING.COMPOSITE_TEXT'] * TYPEOF(item)) =
                 0)) )) >= 1);
      wr3: (SIZEOF(QUERY ( a2p <* QUERY ( item <* SELF\representation.
                items | ('TECHNICAL_DATA_PACKAGING.AXIS2_PLACEMENT' IN
                TYPEOF(item)) ) | (NOT ((SIZEOF(QUERY ( at <*
                QUERY ( item <* SELF\representation.items | ((
                'TECHNICAL_DATA_PACKAGING.' + 'ANNOTATION_TEXT') IN TYPEOF(
                item)) ) | (at\mapped_item.mapping_target :=: a2p) )) >= 1)
                OR (SIZEOF(QUERY ( atc <* QUERY ( item <* SELF\
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              representation.items | (('TECHNICAL_DATA_PACKAGING.' +
              'ANNOTATION_TEXT_CHARACTER') IN TYPEOF(item)) ) | (atc\
              mapped_item.mapping_target :=: a2p) )) >= 1))) )) = 0);
END_ENTITY; -- text_string_representation

ENTITY text_style;
    name                  : label;
    character_appearance : character_style_select;
END_ENTITY; -- text_style

ENTITY text_style_for_defined_font;
    text_colour : colour;
END_ENTITY; -- text_style_for_defined_font

ENTITY thermodynamic_temperature_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.THERMODYNAMIC_TEMPERATURE_UNIT' IN
              TYPEOF(SELF\measure_with_unit.unit_component));
END_ENTITY; -- thermodynamic_temperature_measure_with_unit

ENTITY thermodynamic_temperature_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
              named_unit.dimensions.mass_exponent = 0) AND (SELF\
              named_unit.dimensions.time_exponent = 0) AND (SELF\
              named_unit.dimensions.electric_current_exponent = 0) AND (
              SELF\named_unit.dimensions.
              thermodynamic_temperature_exponent = 1) AND (SELF\named_unit
              .dimensions.amount_of_substance_exponent = 0) AND (SELF\
              named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- thermodynamic_temperature_unit

ENTITY time_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.TIME_UNIT' IN TYPEOF(SELF\
              measure_with_unit.unit_component));
END_ENTITY; -- time_measure_with_unit

ENTITY time_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 0) AND (SELF\
              named_unit.dimensions.mass_exponent = 0) AND (SELF\
              named_unit.dimensions.time_exponent = 1) AND (SELF\
              named_unit.dimensions.electric_current_exponent = 0) AND (
              SELF\named_unit.dimensions.
              thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
              .dimensions.amount_of_substance_exponent = 0) AND (SELF\
              named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- time_unit

ENTITY topological_representation_item
  SUPERTYPE OF (ONEOF (vertex,edge,face_bound,face,vertex_shell,
      wire_shell,connected_edge_set,connected_face_set,loop ANDOR path))
  SUBTYPE OF (representation_item);
END_ENTITY; -- topological_representation_item
```

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ENTITY toroidal_surface
  SUBTYPE OF (elementary_surface);
    major_radius : positive_length_measure;
    minor_radius : positive_length_measure;
END_ENTITY; -- toroidal_surface

ENTITY torus
  SUBTYPE OF (geometric_representation_item);
    position     : axis1_placement;
    major_radius : positive_length_measure;
    minor_radius : positive_length_measure;
  WHERE
    wr1: (major_radius > minor_radius);
END_ENTITY; -- torus

ENTITY trimmed_curve
  SUBTYPE OF (bounded_curve);
    basis_curve           : curve;
    trim_1                : SET [1:2] OF trimming_select;
    trim_2                : SET [1:2] OF trimming_select;
    sense_agreement       : BOOLEAN;
    master_representation : trimming_preference;
  WHERE
    wr1: ((HIINDEX(trim_1) = 1) OR
          (TYPEOF(trim_1[1]) <> TYPEOF(trim_1[2])));
    wr2: ((HIINDEX(trim_2) = 1) OR
          (TYPEOF(trim_2[1]) <> TYPEOF(trim_2[2])));
END_ENTITY; -- trimmed_curve

ENTITY type_qualifier;
    name : label;
END_ENTITY; -- type_qualifier

ENTITY uniform_curve
  SUBTYPE OF (b_spline_curve);
END_ENTITY; -- uniform_curve

ENTITY uniform_surface
  SUBTYPE OF (b_spline_surface);
END_ENTITY; -- uniform_surface

ENTITY vector
  SUBTYPE OF (geometric_representation_item);
    orientation : direction;
    magnitude   : length_measure;
  WHERE
    wr1: (magnitude >= 0);
END_ENTITY; -- vector

ENTITY vertex
  SUBTYPE OF (topological_representation_item);
END_ENTITY; -- vertex

ENTITY vertex_loop
  SUBTYPE OF (loop);
    loop_vertex : vertex;
END_ENTITY; -- vertex_loop
```

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```
ENTITY vertex_point
  SUBTYPE OF (vertex, geometric_representation_item);
    vertex_geometry : point;
END_ENTITY; -- vertex_point

ENTITY vertex_shell
  SUBTYPE OF (topological_representation_item);
    vertex_shell_extent : vertex_loop;
END_ENTITY; -- vertex_shell

ENTITY view_volume
  SUBTYPE OF (founded_item);
    projection_type            : central_or_parallel;
    projection_point           : cartesian_point;
    view_plane_distance        : length_measure;
    front_plane_distance       : length_measure;
    front_plane_clipping       : BOOLEAN;
    back_plane_distance        : length_measure;
    back_plane_clipping        : BOOLEAN;
    view_volume_sides_clipping : BOOLEAN;
    view_window                : planar_box;
END_ENTITY; -- view_volume

ENTITY volume_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
    wr1: ('TECHNICAL_DATA_PACKAGING.VOLUME_UNIT' IN TYPEOF(SELF\
             measure_with_unit.unit_component));
END_ENTITY; -- volume_measure_with_unit

ENTITY volume_unit
  SUBTYPE OF (named_unit);
  WHERE
    wr1: ((SELF\named_unit.dimensions.length_exponent = 3) AND (SELF\
             named_unit.dimensions.mass_exponent = 0) AND (SELF\
             named_unit.dimensions.time_exponent = 0) AND (SELF\
             named_unit.dimensions.electric_current_exponent = 0) AND (
             SELF\named_unit.dimensions.
             thermodynamic_temperature_exponent = 0) AND (SELF\named_unit
             .dimensions.amount_of_substance_exponent = 0) AND (SELF\
             named_unit.dimensions.luminous_intensity_exponent = 0));
END_ENTITY; -- volume_unit

ENTITY wire_shell
  SUBTYPE OF (topological_representation_item);
    wire_shell_extent : SET [1:?] OF loop;
  WHERE
    wr1: (NOT mixed_loop_type_set(wire_shell_extent));
END_ENTITY; -- wire_shell

RULE access_file_requires_external_identification FOR (document_file);

  LOCAL
    df     : SET OF document_file;
    aeia   : BAG OF applied_external_identification_assignment;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  df := document_file;
  REPEAT i := 1 TO SIZEOF(df) BY 1;
```

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```
      IF df[i]\document.description = 'access data file' THEN
        aeia := USEDIN(df[i],'TECHNICAL_DATA_PACKAGING.' +
            'APPLIED_EXTERNAL_IDENTIFICATION_ASSIGNMENT.ITEMS');
        IF SIZEOF(aeia) < 1 THEN
          result := FALSE;
        END_IF;
      END_IF;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- access_file_requires_external_identification

  RULE approval_requires_approval_date_time FOR (approval,
            approval_date_time);

  WHERE
    wr1: (SIZEOF(QUERY ( app <* approval | (NOT (SIZEOF(QUERY ( adt <*
            approval_date_time | (app :=: adt.dated_approval) )) = 1)) ))
            = 0);

  END_RULE; -- approval_requires_approval_date_time

  RULE approval_requires_approval_person_organization FOR (approval,
            approval_person_organization);

  WHERE
    wr1: (SIZEOF(QUERY ( app <* approval | (NOT (SIZEOF(QUERY ( apo <*
            approval_person_organization | (app :=: apo.
            authorized_approval) )) >= 1)) )) = 0);

  END_RULE; -- approval_requires_approval_person_organization

  RULE change_identification_restricts_executed_action FOR (
            executed_action);

    LOCAL
      acta   : BAG OF action_assignment;
      found  : BOOLEAN := FALSE;
      exeact : SET OF executed_action;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    exeact := executed_action;
    REPEAT i := 1 TO SIZEOF(exeact) BY 1;
      IF exeact[i].description = 'change identification' THEN
        acta := USEDIN(exeact[i],
            'TECHNICAL_DATA_PACKAGING.ACTION_ASSIGNMENT.ASSIGNED_ACTION');
        found := FALSE;
        REPEAT j := 1 TO SIZEOF(acta) BY 1;
          IF EXISTS(acta[j].role) THEN
            IF (acta[j].role.name = 'change identification') XOR (acta[j].
                role.name = 'revision history') THEN
              found := TRUE;
            END_IF;
          END_IF;
        END_REPEAT;
        IF NOT found THEN
          result := FALSE;
```

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```
          ESCAPE;
        END_IF;
      END_IF;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- change_identification_restricts_executed_action

  RULE compatible_dimension FOR (cartesian_point, direction,
             representation_context, geometric_representation_context);

  WHERE
    wr1: (SIZEOF(QUERY ( x <* cartesian_point | (SIZEOF(QUERY ( y <*
             geometric_representation_context | (item_in_context(x,y) AND (
             HIINDEX(x.coordinates) <> y.coordinate_space_dimension)) )) >
             0) )) = 0);
    wr2: (SIZEOF(QUERY ( x <* direction | (SIZEOF(QUERY ( y <*
             geometric_representation_context | (item_in_context(x,y) AND (
             HIINDEX(x.direction_ratios) <> y.coordinate_space_dimension))
))
             > 0) )) = 0);

  END_RULE; -- compatible_dimension

  RULE contract_submission_requires_date_and_organization FOR (
             applied_contract_assignment);

    LOCAL
      found  : BOOLEAN;
      ada    : BAG OF applied_date_assignment;
      adta   : BAG OF applied_date_and_time_assignment;
      apc    : SET OF applied_contract_assignment;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    apc := applied_contract_assignment;
    REPEAT i := 1 TO SIZEOF(apc) BY 1;
      IF EXISTS(apc[i]\contract_assignment.role) THEN
        IF apc[i]\contract_assignment.role.name = 'contract submission'
             THEN
          adta := USEDIN(apc[i],'TECHNICAL_DATA_PACKAGING.' +
              'APPLIED_DATE_AND_TIME_ASSIGNMENT.ITEMS');
          found := FALSE;
          REPEAT j := 1 TO SIZEOF(adta) BY 1;
            IF EXISTS(adta[j]\date_and_time_assignment.role) THEN
              IF adta[j]\date_and_time_assignment.role.name =
                  'date and time of submission' THEN
                found := TRUE;
              END_IF;
            END_IF;
          END_REPEAT;
          IF NOT found THEN
            result := FALSE;
            ESCAPE;
          END_IF;
          ada := USEDIN(apc[i],'TECHNICAL_DATA_PACKAGING.' +
              'APPLIED_DATE_ASSIGNMENT.ITEMS');
          found := FALSE;
```

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```
          REPEAT j := 1 TO SIZEOF(ada) BY 1;
            IF EXISTS(ada[j]\date_assignment.role) THEN
              IF ada[j]\date_assignment.role.name = 'date of submission'
                   THEN
                found := TRUE;
              END_IF;
            END_IF;
          END_REPEAT;
          IF NOT found THEN
            result := FALSE;
            ESCAPE;
          END_IF;
        END_IF;
      END_IF;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- contract_submission_requires_date_and_organization

  RULE data_definition_entry_string_restrict_for_superseded_element FOR (
             product_definition);

    LOCAL
      pdca    : SET OF product_definition_context_association;
      result1 : BOOLEAN;
      result2 : BOOLEAN;
      found   : BOOLEAN;
      pd      : SET OF product_definition;
      pdf     : product_definition_formation;
      pdc     : product_definition_context;
    END_LOCAL;
    result1 := TRUE;
    result2 := TRUE;
    pd := product_definition;
    REPEAT i := 1 TO SIZEOF(pd) BY 1;
      found := FALSE;
      pdca := USEDIN(pd[i],'TECHNICAL_DATA_PACKAGING.' +
          'PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.DEFINITION');
      REPEAT j := 1 TO SIZEOF(pdca) BY 1;
        pdc := pdca[j].frame_of_reference;
        IF pdc\application_context_element.name IN ['document version',
            'a representation of a document version',
            'data definition entry','indentured data list entry'] THEN
          found := TRUE;
        END_IF;
      END_REPEAT;
      IF found THEN
        IF SIZEOF(QUERY ( pdr <* USEDIN(pd[i],'TECHNICAL_DATA_PACKAGING.'
            + 'PRODUCT_DEFINITION_RELATIONSHIP.' +
            'RELATED_PRODUCT_DEFINITION') | (pdr.name =
            'superseded element') )) > 1 THEN
          result1 := FALSE;
        END_IF;
        pdf := pd[i].formation;
        IF SIZEOF(QUERY ( pdfr <* USEDIN(pdf,'TECHNICAL_DATA_PACKAGING.' +
             'PRODUCT_DEFINITION_FORMATION_RELATIONSHIP.' +
            'RELATED_PRODUCT_DEFINITION_FORMATION') | (pdfr.name =
```

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```
          'superseded version') )) > 1 THEN
        result2 := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result1;
  wr2: result2;

END_RULE; -- data_definition_entry_string_restrict_for_superseded_element

RULE data_definition_exchange_categorized_as_document FOR (
           product_related_product_category);

  LOCAL
    prds   : SET OF product := [];
    prpc   : SET OF product_related_product_category;
    pc     : SET OF product_category;
    pdf    : BAG OF product_definition_formation;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  prpc := QUERY ( v <* product_related_product_category | (v.name =
      'data definition exchange') );
  REPEAT i := 1 TO SIZEOF(prpc) BY 1;
    prds := prpc[i].products;
    REPEAT j := 1 TO SIZEOF(prds) BY 1;
      pdf := USEDIN(prds[j],'TECHNICAL_DATA_PACKAGING.' +
          'PRODUCT_DEFINITION_FORMATION.OF_PRODUCT');
      IF SIZEOF(pdf) > 0 THEN
        pc := product_category_graph_members(prpc[i]);
        IF SIZEOF(QUERY ( v <* pc | (v.name = 'document') )) < 1 THEN
          result := FALSE;
        END_IF;
      END_IF;
    END_REPEAT;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- data_definition_exchange_categorized_as_document

RULE data_definition_exchange_restrict_to_one_presentation FOR (
           product_related_product_category);

  LOCAL
    prds   : SET OF product := [];
    prpc   : SET OF product_related_product_category;
    pdf    : BAG OF product_definition_formation;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  prpc := product_related_product_category;
  REPEAT i := 1 TO SIZEOF(prpc) BY 1;
    IF prpc[i]\product_category.name = 'data definition exchange' THEN
      prds := prds + prpc[i].products;
    END_IF;
  END_REPEAT;
  REPEAT i := 1 TO SIZEOF(prds) BY 1;
```

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```
      pdf := USEDIN(prds[i],'TECHNICAL_DATA_PACKAGING.'+
      'PRODUCT_DEFINITION_FORMATION.OF_PRODUCT');
      REPEAT j := 1 TO SIZEOF(pdf) BY 1;
        IF SIZEOF(USEDIN(pdf[j],'TECHNICAL_DATA_PACKAGING.' +
            'APPLIED_PRESENTED_ITEM.ITEMS')) > 1 THEN
          result := FALSE;
        END_IF;
      END_REPEAT;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- data_definition_exchange_restrict_to_one_presentation

  RULE dependent_instantiable_named_unit FOR (named_unit);

    LOCAL
      nu     : SET OF named_unit;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    nu := named_unit;
    REPEAT i := 1 TO SIZEOF(nu) BY 1;
      IF SIZEOF(USEDIN(nu[i],'')) < 1 THEN
        result := FALSE;
      END_IF;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- dependent_instantiable_named_unit

  RULE distribution_notice_approval_requires_supporting_data FOR (
             applied_approval_assignment);

    LOCAL
      ap     : approval;
      aca    : BAG OF applied_classification_assignment;
      found  : BOOLEAN;
      aaa    : SET OF applied_approval_assignment;
      apo    : BAG OF approval_person_organization;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    aaa := applied_approval_assignment;
    REPEAT i := 1 TO SIZEOF(aaa) BY 1;
      IF EXISTS(aaa[i].role) THEN
        IF aaa[i].role.name = 'distribution notice' THEN
          ap := aaa[i].assigned_approval;
          found := FALSE;
          IF LENGTH(ap.level) > 0 THEN
            found := TRUE;
          END_IF;
          apo := USEDIN(ap,'TECHNICAL_DATA_PACKAGING.'+
          'APPROVAL_PERSON_ORGANIZATION.AUTHORIZED_APPROVAL');
          REPEAT j := 1 TO SIZEOF(apo) BY 1;
            IF apo[j].role.role = 'distribution authorization' THEN
              found := TRUE;
            END_IF;
```

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```
        END_REPEAT;
        aca := USEDIN(ap,'TECHNICAL_DATA_PACKAGING.'+
        'APPLIED_CLASSIFICATION_ASSIGNMENT.ITEMS');
        REPEAT j := 1 TO SIZEOF(aca) BY 1;
          IF EXISTS(aca[j]\classification_assignment.role) THEN
            IF (aca[j]\classification_assignment.role.name =
                'distribution notice code') AND (
                'TECHNICAL_DATA_PACKAGING.CLASS' IN TYPEOF(aca[j]\
                classification_assignment.assigned_class)) THEN
              found := TRUE;
            END_IF;
          END_IF;
        END_REPEAT;
        IF NOT found THEN
          result := FALSE;
        END_IF;
      END_IF;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- distribution_notice_approval_requires_supporting_data

RULE document_product_equivalence_existence_rule FOR (
           applied_document_reference);

  LOCAL
    doc    : document;
    dpa    : BAG OF document_product_association;
    found  : BOOLEAN := FALSE;
    dt     : label;
    adr    : SET OF applied_document_reference;
    pfd    : product_or_formation_or_definition;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  adr := applied_document_reference;
  REPEAT i := 1 TO SIZEOF(adr) BY 1;
    doc := adr[i]\document_reference.assigned_document;
    dt := doc.kind.product_data_type;
    dpa := USEDIN(doc,'TECHNICAL_DATA_PACKAGING.' +
        'DOCUMENT_PRODUCT_ASSOCIATION.RELATING_DOCUMENT');
    REPEAT j := 1 TO SIZEOF(dpa) BY 1;
      IF 'TECHNICAL_DATA_PACKAGING.DOCUMENT_PRODUCT_EQUIVALENCE' IN
          TYPEOF(dpa[j]) THEN
        found := TRUE;
        pfd := dpa[j].related_product;
        IF 'TECHNICAL_DATA_PACKAGING.PRODUCT' IN TYPEOF(pfd) THEN
          IF dt <> 'configuration controlled document' THEN
            result := FALSE;
          END_IF;
        ELSE
          IF 'TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION' IN
              TYPEOF(pfd) THEN
            IF dt <> 'configuration controlled document version' THEN
              result := FALSE;
            END_IF;
          ELSE
```

```
            IF 'TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION' IN TYPEOF(
                pfd) THEN
              IF dt <> 'configuration controlled document definition'
                   THEN
                result := FALSE;
              END_IF;
            ELSE
              result := FALSE;
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_REPEAT;
    IF NOT found THEN
      result := FALSE;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- document_product_equivalence_existence_rule

RULE document_requires_person_organization FOR (
           product_related_product_category);

  LOCAL
    prds   : SET OF product := [];
    prpc   : SET OF product_related_product_category;
    pdf    : BAG OF product_definition_formation;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  prpc := product_related_product_category;
  REPEAT i := 1 TO SIZEOF(prpc) BY 1;
    IF prpc[i]\product_category.name = 'document' THEN
      prds := prds + prpc[i].products;
    END_IF;
  END_REPEAT;
  REPEAT i := 1 TO SIZEOF(prds) BY 1;
    pdf := USEDIN(prds[i],'TECHNICAL_DATA_PACKAGING.'+
    'PRODUCT_DEFINITION_FORMATION.OF_PRODUCT');
    REPEAT j := 1 TO SIZEOF(pdf) BY 1;
      IF (SIZEOF(USEDIN(pdf[j],'TECHNICAL_DATA_PACKAGING.' +
          'APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT.ITEMS')) + SIZEOF(
          USEDIN(pdf[j],'TECHNICAL_DATA_PACKAGING.' +
          'APPLIED_ORGANIZATION_ASSIGNMENT.ITEMS'))) < 1 THEN
        result := FALSE;
      END_IF;
    END_REPEAT;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- document_requires_person_organization

RULE drawing_suffix_number_combination_identification_constraint FOR (
           product_relationship);
```

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```
  LOCAL
    prpc    : BAG OF product_related_product_category;
    p       : product;
    tresult : BOOLEAN;
    pr      : SET OF product_relationship;
    result  : BOOLEAN := TRUE;
  END_LOCAL;
  pr := QUERY ( v <* product_relationship | (v.name =
      'drawing suffix number combination') );
  REPEAT i := 1 TO SIZEOF(pr) BY 1;
    p := pr[i].relating_product;
    prpc := USEDIN(p,'TECHNICAL_DATA_PACKAGING.'+
    'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
    REPEAT j := 1 TO SIZEOF(prpc) BY 1;
      IF prpc[j]\product_category.name = 'document' THEN
        result := FALSE;
      END_IF;
    END_REPEAT;
    p := pr[i].related_product;
    prpc := USEDIN(p,'TECHNICAL_DATA_PACKAGING.'+
    'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
    tresult := FALSE;
    REPEAT j := 1 TO SIZEOF(prpc) BY 1;
      IF prpc[j]\product_category.name = 'document' THEN
        tresult := TRUE;
      END_IF;
    END_REPEAT;
    IF NOT tresult THEN
      result := FALSE;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- drawing_suffix_number_combination_identification_constraint

RULE exchange_reason_existence_required FOR (property_definition);

  LOCAL
    dri    : descriptive_representation_item;
    prpd   : SET OF property_definition;
    repi   : representation;
    result : BOOLEAN := TRUE;
    prdr   : BAG OF property_definition_representation;
  END_LOCAL;
  prpd := property_definition;
  REPEAT i := 1 TO SIZEOF(prpd) BY 1;
    IF prpd[i].name = 'data definition exchange header' THEN
      result := FALSE;
      prdr := USEDIN(prpd[i],'TECHNICAL_DATA_PACKAGING.' +
          'PROPERTY_DEFINITION_REPRESENTATION.DEFINITION');
      REPEAT j := 1 TO SIZEOF(prdr) BY 1;
        repi := prdr[j].used_representation;
        IF NOT (repi.name = 'exchange reason') THEN
          ESCAPE;
        ELSE
          REPEAT k := 1 TO SIZEOF(repi.items) BY 1;
            IF 'TECHNICAL_DATA_PACKAGING.DESCRIPTIVE_REPRESENTATION_ITEM'
```

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```
                IN TYPEOF(repi.items[k]) THEN
              dri := repi.items[k];
              IF (dri.name = 'exchange purpose') XOR (dri.name =
                  'base exchange reason') THEN
                result := TRUE;
                ESCAPE;
              END_IF;
            END_IF;
          END_REPEAT;
        END_IF;
      END_REPEAT;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- exchange_reason_existence_required

RULE existence_dependent_drawing_sheet_revision FOR (
           drawing_sheet_revision);

  LOCAL
    pir    : BAG OF presented_item_representation;
    prpc   : BAG OF product_related_product_category;
    dsr    : SET OF drawing_sheet_revision;
    pdf    : SET OF product_definition_formation;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  dsr := drawing_sheet_revision;
  REPEAT i := 1 TO SIZEOF(dsr) BY 1;
    pir := USEDIN(dsr[i],'TECHNICAL_DATA_PACKAGING.' +
        'PRESENTED_ITEM_REPRESENTATION.PRESENTATION');
    IF SIZEOF(pir) < 1 THEN
      result := FALSE;
    END_IF;
    REPEAT j := 1 TO SIZEOF(pir) BY 1;
      pdf := pir[j].item\applied_presented_item.items;
      IF SIZEOF(pdf) < 1 THEN
        result := FALSE;
      END_IF;
      REPEAT k := 1 TO SIZEOF(pdf) BY 1;
        prpc := USEDIN(pdf[k].of_product,'TECHNICAL_DATA_PACKAGING.' +
            'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
        IF SIZEOF(prpc) < 1 THEN
          result := FALSE;
        END_IF;
        REPEAT l := 1 TO SIZEOF(prpc) BY 1;
          IF prpc[l]\product_category.name <> 'sheet' THEN
            result := FALSE;
          END_IF;
        END_REPEAT;
      END_REPEAT;
    END_REPEAT;
  END_REPEAT;

WHERE
```

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```
  wr1: result;

END_RULE; -- existence_dependent_drawing_sheet_revision

RULE file_format_restricted_to_one_data_definition_entry FOR (
            product_definition);
  LOCAL
    propd  : BAG OF property_definition;
    pd     : SET OF product_definition;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  pd := product_definition;
  REPEAT i := 1 TO SIZEOF(pd) BY 1;
    IF (pd[i].frame_of_reference.name = 'document version') XOR (pd[i].
        frame_of_reference.name =
        'a representation of a document version') THEN
      propd := USEDIN(pd[i],
          'TECHNICAL_DATA_PACKAGING.PROPERTY_DEFINITION.DEFINITION');
      IF SIZEOF(QUERY ( p <* propd | (p.name = 'document format') )) > 1
           THEN
        result := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;
WHERE
  wr1: result;
END_RULE; -- file_format_restricted_to_one_data_definition_entry

RULE header_configuration_restricts_property_definition FOR (
            property_definition);

  LOCAL
    found  : BOOLEAN;
    pd     : SET OF property_definition;
    apa    : BAG OF applied_approval_assignment;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  pd := QUERY ( v <* property_definition | (v.name LIKE '* header') );
  REPEAT i := 1 TO SIZEOF(pd) BY 1;
    found := FALSE;
    apa := USEDIN(pd[i],
        'TECHNICAL_DATA_PACKAGING.APPLIED_APPROVAL_ASSIGNMENT.ITEMS');
    REPEAT j := 1 TO SIZEOF(apa) BY 1;
      IF EXISTS(apa[j]\approval_assignment.role) THEN
        IF (apa[j]\approval_assignment.role.name =
            'release authentication') OR (apa[j]\approval_assignment.role
            .name = 'data usage rights') THEN
          found := TRUE;
        END_IF;
      END_IF;
    END_REPEAT;
    IF SIZEOF(USEDIN(pd[i],'TECHNICAL_DATA_PACKAGING.' +
        'PROPERTY_DEFINITION_REPRESENTATION.DEFINITION')) > 0 THEN
      found := TRUE;
    END_IF;
    IF NOT found THEN
      result := FALSE;
    END_IF;
  END_REPEAT;
```

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```
  WHERE
    wr1: result;

  END_RULE; -- header_configuration_restricts_property_definition

  RULE identification_of_sheet_constraint FOR (
             product_definition_formation);

    LOCAL
      prpc   : BAG OF product_related_product_category;
      found  : BOOLEAN;
      pc     : SET OF product_category;
      pdf    : SET OF product_definition_formation;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    pdf := product_definition_formation;
    REPEAT i := 1 TO SIZEOF(pdf) BY 1;
      prpc := USEDIN(pdf[i].of_product,'TECHNICAL_DATA_PACKAGING.' +
          'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
      REPEAT j := 1 TO SIZEOF(prpc) BY 1;
        IF prpc[j]\product_category.name = 'sheet' THEN
          pc := product_category_graph_members(prpc[j]);
          found := FALSE;
          REPEAT k := 1 TO SIZEOF(pc) BY 1;
            IF pc[k].name = 'document' THEN
              found := TRUE;
            END_IF;
          END_REPEAT;
          IF NOT found THEN
            result := FALSE;
            ESCAPE;
          END_IF;
        END_IF;
      END_REPEAT;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- identification_of_sheet_constraint

  RULE indentured_data_list_identification_constraint FOR (
             product_definition_formation);

    LOCAL
      prpc   : BAG OF product_related_product_category;
      pc     : SET OF product_category;
      pdf    : SET OF product_definition_formation;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    pdf := product_definition_formation;
    REPEAT i := 1 TO SIZEOF(pdf) BY 1;
      prpc := USEDIN(pdf[i].of_product,'TECHNICAL_DATA_PACKAGING.' +
          'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
      REPEAT j := 1 TO SIZEOF(prpc) BY 1;
        IF prpc[j]\product_category.name = 'indentured data list' THEN
          pc := product_category_graph_members(prpc[j]);
          result := FALSE;
          REPEAT k := 1 TO SIZEOF(pc) BY 1;
```

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```
          IF pc[k].name = 'document' THEN
            result := TRUE;
          END_IF;
        END_REPEAT;
        IF result = FALSE THEN
          ESCAPE;
        END_IF;
      END_IF;
    END_REPEAT;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- indentured_data_list_identification_constraint

RULE indentured_level_tag_identification_constraint FOR (
           property_definition_representation);

  LOCAL
    pdr    : SET OF property_definition_representation;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  pdr := property_definition_representation;
  REPEAT i := 1 TO SIZEOF(pdr) BY 1;
    IF pdr[i].used_representation.name = 'indentured level tag' THEN
      IF NOT ((pdr[i].definition.name = 'dde entry property') XOR (pdr[i]
          .definition.name = 'idl entry property')) THEN
        result := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- indentured_level_tag_identification_constraint

RULE indentured_list_method_identification_constraint FOR
             (applied_document_reference);

  LOCAL
    prpc   : BAG OF product_related_product_category;
    d      : document;
    p      : product;
    dpa    : BAG OF document_product_association;
    adr    : SET OF applied_document_reference;
    pfd    : product_or_formation_or_definition;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  adr := applied_document_reference;
  REPEAT i := 1 TO SIZEOF(adr) BY 1;
    IF EXISTS(adr[i]\document_reference.role) THEN
      IF (adr[i]\document_reference.role.name = 'indentured by document')
          OR (adr[i]\document_reference.role.name = 'indentured by item')
          OR (adr[i]\document_reference.role.name =
          'indentured by item and document') THEN
        d := adr[i]\document_reference.assigned_document;
        dpa := USEDIN(d,
```

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```
                        'TECHNICAL_DATA_PACKAGING.' +
                        'DOCUMENT_PRODUCT_ASSOCIATION.RELATING_DOCUMENT');
        REPEAT j := 1 TO SIZEOF(dpa) BY 1;
          pfd := dpa[j].related_product;
          IF 'TECHNICAL_DATA_PACKAGING.PRODUCT' IN TYPEOF(pfd) THEN
            p := pfd;
          ELSE
            IF 'TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION'
                IN TYPEOF(pfd) THEN
              p := pfd\product_definition_formation.of_product;
            ELSE
              IF 'TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION' IN
                  TYPEOF(pfd) THEN
                p := pfd\product_definition.formation.of_product;
              ELSE
                p := ?;
              END_IF;
            END_IF;
          END_IF;
          result := FALSE;
          prpc := USEDIN(p,
                         'TECHNICAL_DATA_PACKAGING.' +
                         'PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS');
          REPEAT k := 1 TO SIZEOF(prpc) BY 1;
            IF (prpc[k].name = 'data definition exchange') OR (prpc[k].
                name = 'indentured data list') THEN
              result := TRUE;
            END_IF;
          END_REPEAT;
        END_REPEAT;
      END_IF;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- indentured_list_method_identification_constraint

RULE item_source_information_identification_constraint FOR (
           property_definition);

  LOCAL
    prpd   : SET OF property_definition;
    result : BOOLEAN := TRUE;
    prdr   : BAG OF property_definition_representation;
  END_LOCAL;
  prpd := property_definition;
  REPEAT i := 1 TO SIZEOF(prpd) BY 1;
    IF prpd[i].name = 'source information' THEN
      result := FALSE;
      prdr := USEDIN(prpd[i],'TECHNICAL_DATA_PACKAGING.' +
          'PROPERTY_DEFINITION_REPRESENTATION.DEFINITION');
      REPEAT j := 1 TO SIZEOF(prdr) BY 1;
        IF prdr[j].used_representation.name = 'source information type'
             THEN
          result := TRUE;
        END_IF;
      END_REPEAT;
```

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```
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- item_source_information_identification_constraint

RULE notation_type_identification_constraint FOR (representation);

  LOCAL
    note   : SET OF representation;
    result : BOOLEAN;
  END_LOCAL;
  note := QUERY ( rep <* representation | (rep.name = 'notation') );
  result := FALSE;
  REPEAT i := 1 TO SIZEOF(note) BY 1;
    REPEAT j := 1 TO SIZEOF(note[i].items) BY 1;
      IF 'TECHNICAL_DATA_PACKAGING.DESCRIPTIVE_REPRESENTATION_ITEM' IN
          TYPEOF(note[i].items[j]) THEN
        result := TRUE;
        ESCAPE;
      END_IF;
    END_REPEAT;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- notation_type_identification_constraint

RULE product_requires_person_organization FOR
           (product_definition_formation);

  LOCAL
    apos   : BAG OF applied_person_and_organization_assignment;
    found  : BOOLEAN;
    apoa   : BAG OF applied_organization_assignment;
    pdf    : SET OF product_definition_formation;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  pdf := product_definition_formation;
  REPEAT i := 1 TO SIZEOF(pdf) BY 1;
    apos := USEDIN(pdf[i],'TECHNICAL_DATA_PACKAGING.' +
        'APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT.ITEMS');
    found := FALSE;
    REPEAT j := 1 TO SIZEOF(apos) BY 1;
      IF EXISTS(apos[j].role) THEN
        IF (apos[j].role.name = 'id owner') OR (apos[j].role.name =
            'creator') THEN
          found := TRUE;
        END_IF;
      END_IF;
    END_REPEAT;
    IF found THEN
      result := TRUE;
      ESCAPE;
    END_IF;
    apoa := USEDIN(pdf[i],'TECHNICAL_DATA_PACKAGING.' +
```

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```
          'APPLIED_ORGANIZATION_ASSIGNMENT.ITEMS');
      REPEAT j := 1 TO SIZEOF(apoa) BY 1;
        IF EXISTS(apoa[j].role) THEN
          IF (apoa[j].role.name = 'id owner') OR (apoa[j].role.name =
              'creator') THEN
            found := TRUE;
          END_IF;
        END_IF;
      END_REPEAT;
      IF NOT found THEN
        result := FALSE;
        ESCAPE;
      END_IF;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- product_requires_person_organization

  RULE reference_document_requires_subcategorization FOR
             (product_related_product_category);

    LOCAL
      prpc   : SET OF product_related_product_category;
      pcr    : BAG OF product_category_relationship;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    prpc := QUERY ( v <* product_related_product_category | (v\
        product_category.name = 'reference document') );
    REPEAT i := 1 TO SIZEOF(prpc) BY 1;
      pcr := USEDIN(prpc[i],'TECHNICAL_DATA_PACKAGING.'+
      'PRODUCT_CATEGORY_RELATIONSHIP.CATEGORY');
      IF SIZEOF(pcr) < 1 THEN
        result := FALSE;
      END_IF;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- reference_document_requires_subcategorization

  RULE release_authentication_string_restriction FOR (approval);

    LOCAL
      ar      : STRING := 'release authentication';
      result1 : BOOLEAN := TRUE;
      result2 : BOOLEAN := TRUE;
      found   : BOOLEAN;
      aaa     : BAG OF applied_approval_assignment;
      adt     : BAG OF approval_date_time;
      appr    : SET OF approval;
      apo     : BAG OF approval_person_organization;
    END_LOCAL;
    appr := approval;
    REPEAT i := 1 TO SIZEOF(appr) BY 1;
      aaa := USEDIN(appr[i],'TECHNICAL_DATA_PACKAGING.' +
          'APPROVAL_ASSIGNMENT.ASSIGNED_APPROVAL');
```

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```
    found := FALSE;
    REPEAT j := 1 TO SIZEOF(aaa) BY 1;
      IF EXISTS(aaa[j]\approval_assignment.role) THEN
        IF aaa[j].role.name = ar THEN
          found := TRUE;
        END_IF;
      END_IF;
    END_REPEAT;
    IF found THEN
      apo := USEDIN(appr[i],'TECHNICAL_DATA_PACKAGING.' +
          'APPROVAL_PERSON_ORGANIZATION.AUTHORIZED_APPROVAL');
      found := FALSE;
      REPEAT j := 1 TO SIZEOF(apo) BY 1;
        IF EXISTS(apo[j].role) THEN
          IF apo[j].role.role = ar THEN
            found := TRUE;
          END_IF;
        END_IF;
      END_REPEAT;
      IF NOT found THEN
        result1 := FALSE;
      END_IF;
      adt := USEDIN(appr[i],'TECHNICAL_DATA_PACKAGING.' +
          'APPROVAL_DATE_TIME.DATED_APPROVAL');
      found := FALSE;
      REPEAT j := 1 TO SIZEOF(adt) BY 1;
        IF EXISTS(adt[j].role) THEN
          IF adt[j].role.name = ar THEN
            found := TRUE;
          END_IF;
        END_IF;
      END_REPEAT;
      IF NOT found THEN
        result2 := FALSE;
      END_IF;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result1;
  wr2: result2;

END_RULE; -- release_authentication_string_restriction

RULE security_classification_date_string_restriction FOR
           (applied_security_classification_assignment);

  LOCAL
    asca    : SET OF applied_security_classification_assignment;
    tresult : BOOLEAN;
    ada     : BAG OF applied_date_assignment;
    adta    : BAG OF applied_date_and_time_assignment;
    result  : BOOLEAN := TRUE;
  END_LOCAL;
  asca := applied_security_classification_assignment;
  REPEAT i := 1 TO SIZEOF(asca) BY 1;
    adta := USEDIN(asca[i],'TECHNICAL_DATA_PACKAGING.' +
        'APPLIED_DATE_AND_TIME_ASSIGNMENT.ITEMS');
    tresult := FALSE;
```

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```
      REPEAT j := 1 TO SIZEOF(adta) BY 1;
        REPEAT k := 1 TO SIZEOF(adta[j].items) BY 1;
          IF adta[j].items[k] = asca[i] THEN
            IF EXISTS(adta[j]\date_and_time_assignment.role) THEN
              IF adta[j]\date_and_time_assignment.role.name =
                  'classification date' THEN
                tresult := TRUE;
              END_IF;
            END_IF;
            result := result AND tresult;
          END_IF;
        END_REPEAT;
      END_REPEAT;
      ada := USEDIN(asca[i],'TECHNICAL_DATA_PACKAGING.' +
          'APPLIED_DATE_ASSIGNMENT.ITEMS');
      REPEAT j := 1 TO SIZEOF(ada) BY 1;
        REPEAT k := 1 TO SIZEOF(ada[j].items) BY 1;
          IF ada[j].items[k] = asca[i] THEN
            IF EXISTS(ada[j]\date_assignment.role) THEN
              IF ada[j]\date_assignment.role.name = 'classification date'
                   THEN
                tresult := TRUE;
              END_IF;
            END_IF;
            result := result AND tresult;
          END_IF;
        END_REPEAT;
      END_REPEAT;
    END_REPEAT;

  WHERE
    wr1: result;

  END_RULE; -- security_classification_date_string_restriction

  RULE simple_list_of_elements_constraint FOR (applied_document_reference);

    LOCAL
      dri    : SET OF document_reference_item;
      adr    : SET OF applied_document_reference;
      result : BOOLEAN := TRUE;
    END_LOCAL;
    adr := applied_document_reference;
    REPEAT i := 1 TO SIZEOF(adr) BY 1;
      IF EXISTS(adr[i]\document_reference.role) THEN
        IF adr[i]\document_reference.role.name = 'list of elements' THEN
          dri := adr[i].items;
          IF SIZEOF(dri) < 1 THEN
            result := FALSE;
          END_IF;
          REPEAT j := 1 TO SIZEOF(dri) BY 1;
            IF NOT (
                'TECHNICAL_DATA_PACKAGING.PRODUCT_DEFINITION_FORMATION' IN
                TYPEOF(dri[j])) THEN
              result := FALSE;
            END_IF;
          END_REPEAT;
        END_IF;
      END_IF;
```

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```
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- simple_list_of_elements_constraint

RULE simple_list_of_files_constraint FOR (applied_document_reference);

  LOCAL
    drt    : SET OF document_representation_type;
    dri    : SET OF document_reference_item;
    adr    : SET OF applied_document_reference;
    nameok : BOOLEAN;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  adr := applied_document_reference;
  REPEAT i := 1 TO SIZEOF(adr) BY 1;
    IF EXISTS(adr[i]\document_reference.role) THEN
      IF adr[i]\document_reference.role.name = 'list of files' THEN
        dri := adr[i].items;
        IF SIZEOF(dri) < 1 THEN
          result := FALSE;
        END_IF;
        REPEAT j := 1 TO SIZEOF(dri) BY 1;
          IF NOT ('TECHNICAL_DATA_PACKAGING.DOCUMENT_FILE' IN TYPEOF(dri
              [j])) THEN
            result := FALSE;
          END_IF;
          drt := dri[j].representation_types;
          nameok := FALSE;
          REPEAT k := 1 TO SIZEOF(drt) BY 1;
            IF (drt[k].name = 'digital') OR (drt[k].name = 'physical')
                 THEN
              nameok := TRUE;
            END_IF;
          END_REPEAT;
          IF NOT nameok THEN
            result := FALSE;
          END_IF;
        END_REPEAT;
      END_IF;
    END_IF;
  END_REPEAT;

WHERE
  wr1: result;

END_RULE; -- simple_list_of_files_constraint

RULE text_literal_alignment_baseline_constraint FOR (text_literal);

WHERE
  wr1: (SIZEOF(QUERY ( t <* text_literal | (NOT (t.alignment IN ['left',
           'center','right'])) )) = 0);

END_RULE; -- text_literal_alignment_baseline_constraint
```

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```
  RULE text_literal_font_requires_externally_defined_text_font FOR (
             text_literal);

  WHERE
    wr1: (SIZEOF(QUERY ( t <* text_literal | (NOT (
             'TECHNICAL_DATA_PACKAGING.EXTERNALLY_DEFINED_TEXT_FONT' IN
             TYPEOF(t.font))) )) = 0);

  END_RULE; -- text_literal_font_requires_externally_defined_text_font

  FUNCTION acyclic_composite_text(
               start_composite: composite_text;
               child_text: SET [1:?] OF text_or_character
      ): LOGICAL;

    LOCAL
      i                      : INTEGER;
      local_annotation_text : SET [0:?] OF annotation_text;
      local_composite_text  : SET [0:?] OF composite_text;
      local_children        : SET [0:?] OF text_or_character;
    END_LOCAL;
    local_composite_text := QUERY ( child <* child_text | (
        'TECHNICAL_DATA_PACKAGING.COMPOSITE_TEXT' IN TYPEOF(child)) );
    IF SIZEOF(local_composite_text) > 0 THEN
      REPEAT i := 1 TO HIINDEX(local_composite_text) BY 1;
        IF start_composite :=: local_composite_text[i] THEN
          RETURN(FALSE);
        END_IF;
      END_REPEAT;
    END_IF;
    local_children := child_text;
    IF SIZEOF(local_composite_text) > 0 THEN
      REPEAT i := 1 TO HIINDEX(local_composite_text) BY 1;
        local_children := local_children + local_composite_text[i].
            collected_text;
      END_REPEAT;
    END_IF;
    local_annotation_text := QUERY ( child <* child_text | (
        'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT' IN TYPEOF(child)) );
    IF SIZEOF(local_annotation_text) > 0 THEN
      REPEAT i := 1 TO HIINDEX(local_annotation_text) BY 1;
        local_children := local_children + QUERY ( item <*
            local_annotation_text[i]\mapped_item.mapping_source.
            mapped_representation.items | (SIZEOF([
            'TECHNICAL_DATA_PACKAGING.ANNOTATION_TEXT',
            'TECHNICAL_DATA_PACKAGING.COMPOSITE_TEXT'] * TYPEOF(item)) > 0)
);
      END_REPEAT;
    END_IF;
    IF local_children :<>: child_text THEN
      RETURN(acyclic_composite_text(start_composite,local_children));
    ELSE
      RETURN(TRUE);
    END_IF;

  END_FUNCTION; -- acyclic_composite_text

  FUNCTION acyclic_curve_replica(
               rep: curve_replica;
```

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```
              parent: curve
    ): BOOLEAN;
  IF NOT ('TECHNICAL_DATA_PACKAGING.CURVE_REPLICA' IN TYPEOF(parent))
       THEN
    RETURN(TRUE);
  END_IF;
  IF parent :=: rep THEN
    RETURN(FALSE);
  ELSE
    RETURN(acyclic_curve_replica(rep,parent\curve_replica.parent_curve));
  END_IF;

END_FUNCTION; -- acyclic_curve_replica

FUNCTION acyclic_mapped_representation(
              parent_set: SET OF representation;
              children_set: SET OF representation_item
    ): BOOLEAN;

  LOCAL
    x : SET OF representation_item;
    y : SET OF representation_item;
  END_LOCAL;
  x := QUERY ( z <* children_set | (
      'TECHNICAL_DATA_PACKAGING.MAPPED_ITEM' IN TYPEOF(z)) );
  IF SIZEOF(x) > 0 THEN
    REPEAT i := 1 TO HIINDEX(x) BY 1;
      IF x[i]\mapped_item.mapping_source.mapped_representation IN
          parent_set THEN
        RETURN(FALSE);
      END_IF;
      IF NOT acyclic_mapped_representation(parent_set + x[i]\mapped_item
          .mapping_source.mapped_representation,x[i]\mapped_item.
          mapping_source.mapped_representation.items) THEN
        RETURN(FALSE);
      END_IF;
    END_REPEAT;
  END_IF;
  x := children_set - x;
  IF SIZEOF(x) > 0 THEN
    REPEAT i := 1 TO HIINDEX(x) BY 1;
      y := QUERY ( z <* bag_to_set(USEDIN(x[i],'')) | (
          'TECHNICAL_DATA_PACKAGING.REPRESENTATION_ITEM' IN TYPEOF(z)) );
      IF NOT acyclic_mapped_representation(parent_set,y) THEN
        RETURN(FALSE);
      END_IF;
    END_REPEAT;
  END_IF;
  RETURN(TRUE);

END_FUNCTION; -- acyclic_mapped_representation

FUNCTION acyclic_point_replica(
              rep: point_replica;
              parent: point
    ): BOOLEAN;
  IF NOT ('TECHNICAL_DATA_PACKAGING.POINT_REPLICA' IN TYPEOF(parent))
       THEN
    RETURN(TRUE);
```

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```
    END_IF;
    IF parent :=: rep THEN
      RETURN(FALSE);
    ELSE
      RETURN(acyclic_point_replica(rep,parent\point_replica.parent_pt));
    END_IF;

  END_FUNCTION; -- acyclic_point_replica

  FUNCTION acyclic_product_category_relationship(
               relation: product_category_relationship;
               children: SET OF product_category
      ): BOOLEAN;

    LOCAL
      x              : SET OF product_category_relationship;
      local_children : SET OF product_category;
    END_LOCAL;
    REPEAT i := 1 TO HIINDEX(children) BY 1;
      IF relation.category :=: children[i] THEN
        RETURN(FALSE);
      END_IF;
    END_REPEAT;
    x := bag_to_set(USEDIN(relation.category,'TECHNICAL_DATA_PACKAGING.' +
         'PRODUCT_CATEGORY_RELATIONSHIP.SUB_CATEGORY'));
    local_children := children + relation.category;
    IF SIZEOF(x) > 0 THEN
      REPEAT i := 1 TO HIINDEX(x) BY 1;
        IF NOT acyclic_product_category_relationship(x[i],local_children)
             THEN
          RETURN(FALSE);
        END_IF;
      END_REPEAT;
    END_IF;
    RETURN(TRUE);

  END_FUNCTION; -- acyclic_product_category_relationship

  FUNCTION acyclic_product_definition_relationship(
               relation: product_definition_relationship;
               relatives: SET [1:?] OF product_definition;
               specific_relation: STRING
      ): BOOLEAN;

    LOCAL
      x : SET OF product_definition_relationship;
    END_LOCAL;
    IF relation.relating_product_definition IN relatives THEN
      RETURN(FALSE);
    END_IF;
    x := QUERY ( pd <* bag_to_set(USEDIN(relation.
        relating_product_definition,'TECHNICAL_DATA_PACKAGING.' +
        'PRODUCT_DEFINITION_RELATIONSHIP.' + 'RELATED_PRODUCT_DEFINITION'))
         | (specific_relation IN TYPEOF(pd)) );
    REPEAT i := 1 TO HIINDEX(x) BY 1;
      IF NOT acyclic_product_definition_relationship(x[i],relatives +
          relation.relating_product_definition,specific_relation) THEN
        RETURN(FALSE);
      END_IF;
```

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```
  END_REPEAT;
  RETURN(TRUE);

END_FUNCTION; -- acyclic_product_definition_relationship

FUNCTION acyclic_solid_replica(
             rep: solid_replica;
             parent: solid_model
    ): BOOLEAN;
  IF NOT ('TECHNICAL_DATA_PACKAGING.SOLID_REPLICA' IN TYPEOF(parent))
       THEN
    RETURN(TRUE);
  END_IF;
  IF parent :=: rep THEN
    RETURN(FALSE);
  ELSE
    RETURN(acyclic_solid_replica(rep,parent\solid_replica.parent_solid));
  END_IF;

END_FUNCTION; -- acyclic_solid_replica

FUNCTION acyclic_surface_replica(
             rep: surface_replica;
             parent: surface
    ): BOOLEAN;
  IF NOT ('TECHNICAL_DATA_PACKAGING.SURFACE_REPLICA' IN TYPEOF(parent))
       THEN
    RETURN(TRUE);
  END_IF;
  IF parent :=: rep THEN
    RETURN(FALSE);
  ELSE
    RETURN(acyclic_surface_replica(rep,parent\surface_replica.
        parent_surface));
  END_IF;

END_FUNCTION; -- acyclic_surface_replica

FUNCTION aspect_ratio(
             p: planar_box
    ): positive_ratio_measure;
  RETURN(p.size_in_x / p.size_in_y);

END_FUNCTION; -- aspect_ratio

FUNCTION associated_surface(
             arg: pcurve_or_surface
    ): surface;

  LOCAL
    surf : surface;
  END_LOCAL;
  IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(arg) THEN
    surf := arg.basis_surface;
  ELSE
    surf := arg;
  END_IF;
```

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```
    RETURN(surf);

  END_FUNCTION; -- associated_surface

  FUNCTION bag_to_set(
               the_bag: BAG OF GENERIC:intype
      ): SET OF GENERIC:intype;

    LOCAL
      the_set : SET OF GENERIC:intype := [];
    END_LOCAL;
    IF SIZEOF(the_bag) > 0 THEN
      REPEAT i := 1 TO HIINDEX(the_bag) BY 1;
        the_set := the_set + the_bag[i];
      END_REPEAT;
    END_IF;
    RETURN(the_set);

  END_FUNCTION; -- bag_to_set

  FUNCTION base_axis(
               dim: INTEGER;
               axis1, axis2, axis3: direction
      ): LIST [2:3] OF direction;

    LOCAL
      u      : LIST [2:3] OF direction;
      d1     : direction;
      d2     : direction;
      factor : REAL;
    END_LOCAL;
    IF dim = 3 THEN
      d1 := NVL(normalise(axis3),dummy_gri || direction([0,0,1]));
      d2 := first_proj_axis(d1,axis1);
      u := [d2,second_proj_axis(d1,d2,axis2),d1];
    ELSE
      IF EXISTS(axis1) THEN
        d1 := normalise(axis1);
        u := [d1,orthogonal_complement(d1)];
        IF EXISTS(axis2) THEN
          factor := dot_product(axis2,u[2]);
          IF factor < 0 THEN
            u[2].direction_ratios[1] := -u[2].direction_ratios[1];
            u[2].direction_ratios[2] := -u[2].direction_ratios[2];
          END_IF;
        END_IF;
      ELSE
        IF EXISTS(axis2) THEN
          d1 := normalise(axis2);
          u := [orthogonal_complement(d1),d1];
          u[1].direction_ratios[1] := -u[1].direction_ratios[1];
          u[1].direction_ratios[2] := -u[1].direction_ratios[2];
        ELSE
          u := [dummy_gri || direction([1,0]),dummy_gri ||
direction([0,1])];
        END_IF;
      END_IF;
    END_IF;
```

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```
  RETURN(u);

END_FUNCTION; -- base_axis

FUNCTION boolean_choose(
             b: BOOLEAN;
             choice1, choice2: GENERIC:item
    ): GENERIC:item;
  IF b THEN
    RETURN(choice1);
  ELSE
    RETURN(choice2);
  END_IF;

END_FUNCTION; -- boolean_choose

FUNCTION build_2axes(
             ref_direction: direction
    ): LIST [2:2] OF direction;

  LOCAL
    d : direction := NVL(normalise(ref_direction),dummy_gri ||
         direction([1,0]));
  END_LOCAL;
  RETURN([d,orthogonal_complement(d)]);

END_FUNCTION; -- build_2axes

FUNCTION build_axes(
             axis, ref_direction: direction
    ): LIST [3:3] OF direction;

  LOCAL
    d1 : direction;
    d2 : direction;
  END_LOCAL;
  d1 := NVL(normalise(axis),dummy_gri || direction([0,0,1]));
  d2 := first_proj_axis(d1,ref_direction);
  RETURN([d2,normalise(cross_product(d1,d2)).orientation,d1]);

END_FUNCTION; -- build_axes

FUNCTION closed_shell_reversed(
             a_shell: closed_shell
    ): oriented_closed_shell;

  LOCAL
    the_reverse : oriented_closed_shell;
  END_LOCAL;
  IF 'TECHNICAL_DATA_PACKAGING.ORIENTED_CLOSED_SHELL' IN TYPEOF(a_shell)
       THEN
    the_reverse := dummy_tri || connected_face_set(a_shell\
        connected_face_set.cfs_faces) || closed_shell() ||
        oriented_closed_shell(a_shell\oriented_closed_shell.
        closed_shell_element,NOT a_shell\oriented_closed_shell.
        orientation);
  ELSE
    the_reverse := dummy_tri || connected_face_set(a_shell\
        connected_face_set.cfs_faces) || closed_shell() ||
```

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```
          oriented_closed_shell(a_shell,FALSE);
    END_IF;
    RETURN(the_reverse);

  END_FUNCTION; -- closed_shell_reversed

  FUNCTION conditional_reverse(
               p: BOOLEAN;
               an_item: reversible_topology
      ): reversible_topology;
    IF p THEN
      RETURN(an_item);
    ELSE
      RETURN(topology_reversed(an_item));
    END_IF;

  END_FUNCTION; -- conditional_reverse

  FUNCTION constraints_composite_curve_on_surface(
               c: composite_curve_on_surface
      ): BOOLEAN;

    LOCAL
      n_segments : INTEGER := SIZEOF(c.segments);
    END_LOCAL;
    REPEAT k := 1 TO n_segments BY 1;
      IF (NOT ('TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(c\
          composite_curve.segments[k].parent_curve))) AND (NOT (
          'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE' IN TYPEOF(c\
          composite_curve.segments[k].parent_curve))) AND (NOT (
          'TECHNICAL_DATA_PACKAGING.COMPOSITE_CURVE_ON_SURFACE' IN TYPEOF(c
          \composite_curve.segments[k].parent_curve))) THEN
        RETURN(FALSE);
      END_IF;
    END_REPEAT;
    RETURN(TRUE);

  END_FUNCTION; -- constraints_composite_curve_on_surface

  FUNCTION constraints_geometry_shell_based_surface_model(
               m: shell_based_surface_model
      ): BOOLEAN;

    LOCAL
      result : BOOLEAN := TRUE;
    END_LOCAL;
    REPEAT j := 1 TO SIZEOF(m.sbsm_boundary) BY 1;
      IF (NOT ('TECHNICAL_DATA_PACKAGING.OPEN_SHELL' IN TYPEOF(m.
          sbsm_boundary[j]))) AND (NOT (
          'TECHNICAL_DATA_PACKAGING.CLOSED_SHELL' IN TYPEOF(m.sbsm_boundary
          [j]))) THEN
        result := FALSE;
        RETURN(result);
      END_IF;
    END_REPEAT;
    RETURN(result);

  END_FUNCTION; -- constraints_geometry_shell_based_surface_model
```

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```
FUNCTION constraints_geometry_shell_based_wireframe_model(
             m: shell_based_wireframe_model
    ): BOOLEAN;

  LOCAL
    result : BOOLEAN := TRUE;
  END_LOCAL;
  REPEAT j := 1 TO SIZEOF(m.sbwm_boundary) BY 1;
    IF (NOT ('TECHNICAL_DATA_PACKAGING.WIRE_SHELL' IN TYPEOF(m.
        sbwm_boundary[j]))) AND (NOT (
        'TECHNICAL_DATA_PACKAGING.VERTEX_SHELL' IN TYPEOF(m.sbwm_boundary
        [j]))) THEN
      result := FALSE;
      RETURN(result);
    END_IF;
  END_REPEAT;
  RETURN(result);

END_FUNCTION; -- constraints_geometry_shell_based_wireframe_model

FUNCTION constraints_param_b_spline(
             degree, up_knots, up_cp: INTEGER;
             knot_mult: LIST OF INTEGER;
             knots: LIST OF parameter_value
    ): BOOLEAN;

  LOCAL
    k      : INTEGER;
    sum    : INTEGER;
    result : BOOLEAN := TRUE;
  END_LOCAL;
  sum := knot_mult[1];
  REPEAT i := 2 TO up_knots BY 1;
    sum := sum + knot_mult[i];
  END_REPEAT;
  IF (degree < 1) OR (up_knots < 2) OR (up_cp < degree) OR (sum <> (
      degree + up_cp + 2)) THEN
    result := FALSE;
    RETURN(result);
  END_IF;
  k := knot_mult[1];
  IF (k < 1) OR (k > (degree + 1)) THEN
    result := FALSE;
    RETURN(result);
  END_IF;
  REPEAT i := 2 TO up_knots BY 1;
    IF (knot_mult[i] < 1) OR (knots[i] <= knots[i - 1]) THEN
      result := FALSE;
      RETURN(result);
    END_IF;
    k := knot_mult[i];
    IF (i < up_knots) AND (k > degree) THEN
      result := FALSE;
      RETURN(result);
    END_IF;
    IF (i = up_knots) AND (k > (degree + 1)) THEN
      result := FALSE;
      RETURN(result);
    END_IF;
```

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```
    END_REPEAT;
    RETURN(result);

  END_FUNCTION; -- constraints_param_b_spline

  FUNCTION constraints_rectangular_composite_surface(
                s: rectangular_composite_surface
      ): BOOLEAN;
    REPEAT i := 1 TO s.n_u BY 1;
      REPEAT j := 1 TO s.n_v BY 1;
        IF NOT (('TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE' IN TYPEOF(s.
            segments[i][j].parent_surface)) OR (
            'TECHNICAL_DATA_PACKAGING.RECTANGULAR_TRIMMED_SURFACE' IN
            TYPEOF(s.segments[i][j].parent_surface))) THEN
          RETURN(FALSE);
        END_IF;
      END_REPEAT;
    END_REPEAT;
    REPEAT i := 1 TO s.n_u - 1 BY 1;
      REPEAT j := 1 TO s.n_v BY 1;
        IF s.segments[i][j].u_transition = discontinuous THEN
          RETURN(FALSE);
        END_IF;
      END_REPEAT;
    END_REPEAT;
    REPEAT i := 1 TO s.n_u BY 1;
      REPEAT j := 1 TO s.n_v - 1 BY 1;
        IF s.segments[i][j].v_transition = discontinuous THEN
          RETURN(FALSE);
        END_IF;
      END_REPEAT;
    END_REPEAT;
    RETURN(TRUE);

  END_FUNCTION; -- constraints_rectangular_composite_surface

  FUNCTION cross_product(
                arg1, arg2: direction
      ): vector;

    LOCAL
      v2     : LIST [3:3] OF REAL;
      v1     : LIST [3:3] OF REAL;
      mag    : REAL;
      res    : direction;
      result : vector;
    END_LOCAL;
    IF (NOT EXISTS(arg1)) OR (arg1.dim = 2) OR (NOT EXISTS(arg2)) OR (arg2
        .dim = 2) THEN
      RETURN(?);
    ELSE
      BEGIN
        v1 := normalise(arg1).direction_ratios;
        v2 := normalise(arg2).direction_ratios;
        res := dummy_gri || direction([(v1[2] * v2[3]) - (v1[3] * v2[2]),(
            v1[3] * v2[1]) - (v1[1] * v2[3]),(v1[1] * v2[2]) - (v1[2] * v2[
            1])]);
        mag := 0;
        REPEAT i := 1 TO 3 BY 1;
```

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```
        mag := mag + (res.direction_ratios[i] * res.direction_ratios[i]);
      END_REPEAT;
      IF mag > 0 THEN
        result := dummy_gri || vector(res,SQRT(mag));
      ELSE
        result := dummy_gri || vector(arg1,0);
      END_IF;
      RETURN(result);
    END;
  END_IF;

END_FUNCTION; -- cross_product

FUNCTION curve_weights_positive(
             b: rational_b_spline_curve
    ): BOOLEAN;

  LOCAL
    result : BOOLEAN := TRUE;
  END_LOCAL;
  REPEAT i := 0 TO b.upper_index_on_control_points BY 1;
    IF b.weights[i] <= 0 THEN
      result := FALSE;
      RETURN(result);
    END_IF;
  END_REPEAT;
  RETURN(result);

END_FUNCTION; -- curve_weights_positive

FUNCTION derive_dimensional_exponents(
             x: unit
    ): dimensional_exponents;

  LOCAL
    result : dimensional_exponents := dimensional_exponents(0,0,0,0,0,0,
              0);
  END_LOCAL;
  IF 'TECHNICAL_DATA_PACKAGING.DERIVED_UNIT' IN TYPEOF(x) THEN
    REPEAT i := LOINDEX(x.elements) TO HIINDEX(x.elements) BY 1;
      result.length_exponent := result.length_exponent + (x.elements[i].
          exponent * x.elements[i].unit.dimensions.length_exponent);
      result.mass_exponent := result.mass_exponent + (x.elements[i].
          exponent * x.elements[i].unit.dimensions.mass_exponent);
      result.time_exponent := result.time_exponent + (x.elements[i].
          exponent * x.elements[i].unit.dimensions.time_exponent);
      result.electric_current_exponent := result.
          electric_current_exponent + (x.elements[i].exponent * x.
          elements[i].unit.dimensions.electric_current_exponent);
      result.thermodynamic_temperature_exponent := result.
          thermodynamic_temperature_exponent + (x.elements[i].exponent *
          x.elements[i].unit.dimensions.
          thermodynamic_temperature_exponent);
      result.amount_of_substance_exponent := result.
          amount_of_substance_exponent + (x.elements[i].exponent * x.
          elements[i].unit.dimensions.amount_of_substance_exponent);
      result.luminous_intensity_exponent := result.
          luminous_intensity_exponent + (x.elements[i].exponent * x.
          elements[i].unit.dimensions.luminous_intensity_exponent);
```

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```
      END_REPEAT;
    ELSE
      result := x.dimensions;
    END_IF;
    RETURN(result);

  END_FUNCTION; -- derive_dimensional_exponents

  FUNCTION dimension_of(
              item: geometric_representation_item
      ): dimension_count;

    LOCAL
      x : SET OF representation;
      y : representation_context;
    END_LOCAL;
    x := using_representations(item);
    y := x[1].context_of_items;
    RETURN(y\geometric_representation_context.coordinate_space_dimension);

  END_FUNCTION; -- dimension_of

  FUNCTION dimensions_for_si_unit(
              n: si_unit_name
      ): dimensional_exponents;
    CASE n OF
      metre         :         RETURN(dimensional_exponents(1,0,0,0,0,0,0));
      gram          :         RETURN(dimensional_exponents(0,1,0,0,0,0,0));
      second        :         RETURN(dimensional_exponents(0,0,1,0,0,0,0));
      ampere        :         RETURN(dimensional_exponents(0,0,0,1,0,0,0));
      kelvin        :         RETURN(dimensional_exponents(0,0,0,0,1,0,0));
      mole          :         RETURN(dimensional_exponents(0,0,0,0,0,1,0));
      candela       :         RETURN(dimensional_exponents(0,0,0,0,0,0,1));
      radian        :         RETURN(dimensional_exponents(0,0,0,0,0,0,0));
      steradian     :         RETURN(dimensional_exponents(0,0,0,0,0,0,0));
      hertz         :         RETURN(dimensional_-
exponents(0,0,-1,0,0,0,0));
      newton        :         RETURN(dimensional_-
exponents(1,1,-2,0,0,0,0));
      pascal        :         RETURN(dimensional_-
exponents(-1,1,-2,0,0,0,0));
      joule         :         RETURN(dimensional_-
exponents(2,1,-2,0,0,0,0));
      watt          :         RETURN(dimensional_-
exponents(2,1,-3,0,0,0,0));
      coulomb       :         RETURN(dimensional_exponents(0,0,1,1,0,0,0));
      volt          :         RETURN(dimensional_-
exponents(2,1,-3,-1,0,0,0));
      farad         :         RETURN(dimensional_-
exponents(-2,-1,4,1,0,0,0));
      ohm           :         RETURN(dimensional_-
exponents(2,1,-3,-2,0,0,0));
      siemens       :         RETURN(dimensional_-
exponents(-2,-1,3,2,0,0,0));
      weber         :         RETURN(dimensional_-
exponents(2,1,-2,-1,0,0,0));
      tesla         :         RETURN(dimensional_-
exponents(0,1,-2,-1,0,0,0));
```

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```
      henry          :          RETURN(dimensional_-
exponents(2,1,-2,-2,0,0,0));
      degree_celsius  :           RETURN(dimensional_-
exponents(0,0,0,0,1,0,0));
      lumen          :          RETURN(dimensional_exponents(0,0,0,0,0,0,1));
      lux            :          RETURN(dimensional_-
exponents(-2,0,0,0,0,0,1));
      becquerel      :          RETURN(dimensional_-
exponents(0,0,-1,0,0,0,0));
      gray           :          RETURN(dimensional_-
exponents(2,0,-2,0,0,0,0));
      sievert        :          RETURN(dimensional_-
exponents(2,0,-2,0,0,0,0));
      OTHERWISE      :          RETURN(?);
      END_CASE;

  END_FUNCTION; -- dimensions_for_si_unit

  FUNCTION dot_product(
              arg1, arg2: direction
      ): REAL;

    LOCAL
      ndim   : INTEGER;
      scalar : REAL;
      vec1   : direction;
      vec2   : direction;
    END_LOCAL;
    IF (NOT EXISTS(arg1)) OR (NOT EXISTS(arg2)) THEN
      scalar := ?;
    ELSE
      IF arg1.dim <> arg2.dim THEN
        scalar := ?;
      ELSE
        BEGIN
          vec1 := normalise(arg1);
          vec2 := normalise(arg2);
          ndim := arg1.dim;
          scalar := 0;
          REPEAT i := 1 TO ndim BY 1;
            scalar := scalar + (vec1.direction_ratios[i] * vec2.
                direction_ratios[i]);
          END_REPEAT;
        END;
      END_IF;
    END_IF;
    RETURN(scalar);

  END_FUNCTION; -- dot_product

  FUNCTION edge_reversed(
              an_edge: edge
      ): oriented_edge;

    LOCAL
      the_reverse : oriented_edge;
    END_LOCAL;
    IF 'TECHNICAL_DATA_PACKAGING.ORIENTED_EDGE' IN TYPEOF(an_edge) THEN
      the_reverse := dummy_tri || edge(an_edge.edge_end,an_edge.edge_start)
```

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```
          || oriented_edge(an_edge\oriented_edge.edge_element,NOT an_edge\
          oriented_edge.orientation);
    ELSE
      the_reverse := dummy_tri || edge(an_edge.edge_end,an_edge.edge_start)
          || oriented_edge(an_edge,FALSE);
    END_IF;
    RETURN(the_reverse);

  END_FUNCTION; -- edge_reversed

  FUNCTION face_bound_reversed(
               a_face_bound: face_bound
      ): face_bound;

    LOCAL
      the_reverse : face_bound;
    END_LOCAL;
    IF 'TECHNICAL_DATA_PACKAGING.FACE_OUTER_BOUND' IN TYPEOF(a_face_bound)
         THEN
      the_reverse := dummy_tri || face_bound(a_face_bound\face_bound.bound,
          NOT a_face_bound\face_bound.orientation) || face_outer_bound();
    ELSE
      the_reverse := dummy_tri || face_bound(a_face_bound.bound,NOT
          a_face_bound.orientation);
    END_IF;
    RETURN(the_reverse);

  END_FUNCTION; -- face_bound_reversed

  FUNCTION face_reversed(
               a_face: face
      ): oriented_face;

    LOCAL
      the_reverse : oriented_face;
    END_LOCAL;
    IF 'TECHNICAL_DATA_PACKAGING.ORIENTED_FACE' IN TYPEOF(a_face) THEN
      the_reverse := dummy_tri || face(set_of_topology_reversed(a_face.
          bounds)) || oriented_face(a_face\oriented_face.face_element,NOT
          a_face\oriented_face.orientation);
    ELSE
      the_reverse := dummy_tri || face(set_of_topology_reversed(a_face.
          bounds)) || oriented_face(a_face,FALSE);
    END_IF;
    RETURN(the_reverse);

  END_FUNCTION; -- face_reversed

  FUNCTION first_proj_axis(
               z_axis, arg: direction
      ): direction;

    LOCAL
      x_vec  : vector;
      v      : direction;
      z      : direction;
      x_axis : direction;
    END_LOCAL;
    IF NOT EXISTS(z_axis) THEN
```

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```
    RETURN(?);
  ELSE
    z := normalise(z_axis);
    IF NOT EXISTS(arg) THEN
      IF z.direction_ratios <> [1,0,0] THEN
        v := dummy_gri || direction([1,0,0]);
      ELSE
        v := dummy_gri || direction([0,1,0]);
      END_IF;
    ELSE
      IF arg.dim <> 3 THEN
        RETURN(?);
      END_IF;
      IF cross_product(arg,z).magnitude = 0 THEN
        RETURN(?);
      ELSE
        v := normalise(arg);
      END_IF;
    END_IF;
    x_vec := scalar_times_vector(dot_product(v,z),z);
    x_axis := vector_difference(v,x_vec).orientation;
    x_axis := normalise(x_axis);
  END_IF;
  RETURN(x_axis);

END_FUNCTION; -- first_proj_axis

FUNCTION gbsf_check_curve(
             cv: curve
    ): BOOLEAN;
  IF SIZEOF(['TECHNICAL_DATA_PACKAGING.BOUNDED_CURVE',
      'TECHNICAL_DATA_PACKAGING.CONIC',
      'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA',
      'TECHNICAL_DATA_PACKAGING.LINE',
      'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D'] * TYPEOF(cv)) > 1 THEN
    RETURN(FALSE);
  ELSE
    IF SIZEOF(['TECHNICAL_DATA_PACKAGING.CIRCLE',
        'TECHNICAL_DATA_PACKAGING.ELLIPSE'] * TYPEOF(cv)) = 1 THEN
      RETURN(TRUE);
    ELSE
      IF (('TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE' IN TYPEOF(cv)) AND
          (cv\b_spline_curve.self_intersect = FALSE)) OR (cv\
          b_spline_curve.self_intersect = UNKNOWN) THEN
        RETURN(TRUE);
      ELSE
        IF (('TECHNICAL_DATA_PACKAGING.COMPOSITE_CURVE' IN TYPEOF(cv))
            AND (cv\composite_curve.self_intersect = FALSE)) OR (cv\
            composite_curve.self_intersect = UNKNOWN) THEN
          RETURN(SIZEOF(QUERY ( seg <* cv\composite_curve.segments | (
               NOT gbsf_check_curve(seg.parent_curve)) )) = 0);
        ELSE
          IF 'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA' IN TYPEOF(cv)
               THEN
            RETURN(gbsf_check_curve(cv\curve_replica.parent_curve));
          ELSE
            IF ('TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D' IN TYPEOF(cv))
                AND ((cv\offset_curve_3d.self_intersect = FALSE) OR (cv\
                offset_curve_3d.self_intersect = UNKNOWN)) AND (NOT (
```

```
                'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(cv.
                basis_curve))) THEN
              RETURN(gbsf_check_curve(cv\offset_curve_3d.basis_curve));
            ELSE
              IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(cv) THEN
                RETURN(gbsf_check_curve(cv\pcurve.reference_to_curve\
                    representation.items[1]) AND gbsf_check_surface(cv\
                    pcurve.basis_surface));
              ELSE
                IF 'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(cv)
                     THEN
                  IF SIZEOF(cv\polyline.points) >= 3 THEN
                    RETURN(TRUE);
                  END_IF;
                ELSE
                  IF 'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE' IN TYPEOF(
                      cv) THEN
                    IF gbsf_check_curve(cv\surface_curve.curve_3d) THEN
                      REPEAT i := 1 TO SIZEOF(cv\surface_curve.
                          associated_geometry) BY 1;
                        IF 'TECHNICAL_DATA_PACKAGING.SURFACE' IN TYPEOF(
                            cv\surface_curve.associated_geometry[i])
                             THEN
                          IF NOT gbsf_check_surface(cv\surface_curve.
                              associated_geometry[i]) THEN
                            RETURN(FALSE);
                          END_IF;
                        ELSE
                          IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN
                              TYPEOF(cv\surface_curve.associated_geometry
                              [i]) THEN
                            IF NOT gbsf_check_curve(cv\surface_curve.
                                associated_geometry[i]) THEN
                              RETURN(FALSE);
                            END_IF;
                          END_IF;
                        END_IF;
                      END_REPEAT;
                      RETURN(TRUE);
                    END_IF;
                  ELSE
                    IF 'TECHNICAL_DATA_PACKAGING.TRIMMED_CURVE' IN
                        TYPEOF(cv) THEN
                      IF SIZEOF(['TECHNICAL_DATA_PACKAGING.LINE',
                          'TECHNICAL_DATA_PACKAGING.PARABOLA',
                          'TECHNICAL_DATA_PACKAGING.HYPERBOLA'] * TYPEOF(
                          cv\trimmed_curve.basis_curve)) = 1 THEN
                        RETURN(TRUE);
                      ELSE
                        RETURN(gbsf_check_curve(cv\trimmed_curve.
                            basis_curve));
                      END_IF;
                    END_IF;
                  END_IF;
                END_IF;
              END_IF;
            END_IF;
          END_IF;
        END_IF;
```

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```
      END_IF;
    END_IF;
  END_IF;
  RETURN(FALSE);

END_FUNCTION; -- gbsf_check_curve

FUNCTION gbsf_check_point(
             pnt: point
    ): BOOLEAN;
  IF 'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT' IN TYPEOF(pnt) THEN
    RETURN(TRUE);
  ELSE
    IF 'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE' IN TYPEOF(pnt) THEN
      RETURN(gbsf_check_curve(pnt\point_on_curve.basis_curve));
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.POINT_ON_SURFACE' IN TYPEOF(pnt)
           THEN
        RETURN(gbsf_check_surface(pnt\point_on_surface.basis_surface));
      ELSE
        IF 'TECHNICAL_DATA_PACKAGING.DEGENERATE_PCURVE' IN TYPEOF(pnt)
             THEN
          RETURN(gbsf_check_curve(pnt\degenerate_pcurve.
              reference_to_curve\representation.items[1]) AND
              gbsf_check_surface(pnt\degenerate_pcurve.basis_surface));
        END_IF;
      END_IF;
    END_IF;
  END_IF;
  RETURN(FALSE);

END_FUNCTION; -- gbsf_check_point

FUNCTION gbsf_check_surface(
             sf: surface
    ): BOOLEAN;
  IF (('TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE' IN TYPEOF(sf)) AND (
      sf\b_spline_surface.self_intersect = FALSE)) OR (sf\
      b_spline_surface.self_intersect = UNKNOWN) THEN
    RETURN(TRUE);
  ELSE
    IF SIZEOF(['TECHNICAL_DATA_PACKAGING.SPHERICAL_SURFACE',
        'TECHNICAL_DATA_PACKAGING.TOROIDAL_SURFACE'] * TYPEOF(sf)) = 1
         THEN
      RETURN(TRUE);
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.CURVE_BOUNDED_SURFACE' IN TYPEOF(sf)
           THEN
        IF SIZEOF(['TECHNICAL_DATA_PACKAGING.CONICAL_SURFACE',
            'TECHNICAL_DATA_PACKAGING.CYLINDRICAL_SURFACE',
            'TECHNICAL_DATA_PACKAGING.PLANE'] * TYPEOF(sf\
            curve_bounded_surface.basis_surface)) = 1 THEN
          RETURN(SIZEOF(QUERY ( bcurve <* sf\curve_bounded_surface.
              boundaries | (NOT gbsf_check_curve(bcurve)) )) = 0);
        ELSE
          IF gbsf_check_surface(sf\curve_bounded_surface.basis_surface)
               THEN
            RETURN(SIZEOF(QUERY ( bcurve <* sf\curve_bounded_surface.
                boundaries | (NOT gbsf_check_curve(bcurve)) )) = 0);
```

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```
          END_IF;
        END_IF;
      ELSE
        IF (('TECHNICAL_DATA_PACKAGING.OFFSET_SURFACE' IN TYPEOF(sf))
            AND (sf\offset_surface.self_intersect = FALSE)) OR (sf\
            offset_surface.self_intersect = UNKNOWN) THEN
          RETURN(gbsf_check_surface(sf\offset_surface.basis_surface));
        ELSE
          IF 'TECHNICAL_DATA_PACKAGING.RECTANGULAR_COMPOSITE_SURFACE' IN
               TYPEOF(sf) THEN
            REPEAT i := 1 TO SIZEOF(sf\rectangular_composite_surface.
                segments) BY 1;
              REPEAT j := 1 TO SIZEOF(sf\rectangular_composite_surface.
                  segments[i]) BY 1;
                IF NOT gbsf_check_surface(sf\
                    rectangular_composite_surface.segments[i][j].
                    parent_surface) THEN
                  RETURN(FALSE);
                END_IF;
              END_REPEAT;
            END_REPEAT;
            RETURN(TRUE);
          ELSE
            IF 'TECHNICAL_DATA_PACKAGING.RECTANGULAR_TRIMMED_SURFACE' IN
                 TYPEOF(sf) THEN
              IF SIZEOF(['TECHNICAL_DATA_PACKAGING.CONICAL_SURFACE',
                  'TECHNICAL_DATA_PACKAGING.CYLINDRICAL_SURFACE',
                  'TECHNICAL_DATA_PACKAGING.PLANE'] * TYPEOF(sf\
                  rectangular_trimmed_surface.basis_surface)) = 1 THEN
                RETURN(TRUE);
              ELSE
                RETURN(gbsf_check_surface(sf\rectangular_trimmed_surface
                    .basis_surface));
              END_IF;
            ELSE
              IF 'TECHNICAL_DATA_PACKAGING.SURFACE_REPLICA' IN TYPEOF(sf)
                   THEN
                RETURN(gbsf_check_surface(sf\surface_replica.
                    parent_surface));
              ELSE
                IF 'TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE' IN TYPEOF(sf)
                     THEN
                  RETURN(gbsf_check_curve(sf\swept_surface.swept_curve));
                END_IF;
              END_IF;
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_IF;
    RETURN(FALSE);

  END_FUNCTION; -- gbsf_check_surface

  FUNCTION get_basis_surface(
               c: curve_on_surface
      ): SET [0:2] OF surface;
```

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```
  LOCAL
    surfs : SET [0:2] OF surface;
    n     : INTEGER;
  END_LOCAL;
  surfs := [];
  IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(c) THEN
    surfs := [c\pcurve.basis_surface];
  ELSE
    IF 'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE' IN TYPEOF(c) THEN
      n := SIZEOF(c\surface_curve.associated_geometry);
      REPEAT i := 1 TO n BY 1;
        surfs := surfs + associated_surface(c\surface_curve.
            associated_geometry[i]);
      END_REPEAT;
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.COMPOSITE_CURVE_ON_SURFACE' IN TYPEOF(c)
       THEN
    n := SIZEOF(c\composite_curve.segments);
    surfs := get_basis_surface(c\composite_curve.segments[1].
        parent_curve);
    IF n > 1 THEN
      REPEAT i := 2 TO n BY 1;
        surfs := surfs * get_basis_surface(c\composite_curve.segments[i]
            .parent_curve);
      END_REPEAT;
    END_IF;
  END_IF;
  RETURN(surfs);

END_FUNCTION; -- get_basis_surface

FUNCTION get_description_value(
             obj: description_attribute_select
    ): text;

  LOCAL
    description_bag : BAG OF description_attribute := USEDIN(obj,
                        'TECHNICAL_DATA_PACKAGING.' +
                        'DESCRIPTION_ATTRIBUTE.' + 'DESCRIBED_ITEM');
  END_LOCAL;
  IF SIZEOF(description_bag) = 1 THEN
    RETURN(description_bag[1].attribute_value);
  ELSE
    RETURN(?);
  END_IF;

END_FUNCTION; -- get_description_value

FUNCTION get_id_value(
             obj: id_attribute_select
    ): identifier;

  LOCAL
    id_bag : BAG OF id_attribute := USEDIN(obj,
               'TECHNICAL_DATA_PACKAGING.' + 'ID_ATTRIBUTE.' +
               'IDENTIFIED_ITEM');
  END_LOCAL;
  IF SIZEOF(id_bag) = 1 THEN
```

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```
      RETURN(id_bag[1].attribute_value);
    ELSE
      RETURN(?);
    END_IF;

  END_FUNCTION; -- get_id_value

  FUNCTION get_name_value(
               obj: name_attribute_select
      ): label;

    LOCAL
      name_bag : BAG OF name_attribute := USEDIN(obj,
                   'TECHNICAL_DATA_PACKAGING.' + 'NAME_ATTRIBUTE.' +
                   'NAMED_ITEM');
    END_LOCAL;
    IF SIZEOF(name_bag) = 1 THEN
      RETURN(name_bag[1].attribute_value);
    ELSE
      RETURN(?);
    END_IF;

  END_FUNCTION; -- get_name_value

  FUNCTION get_role(
               obj: role_select
      ): object_role;

    LOCAL
      role_bag : BAG OF role_association := USEDIN(obj,
                   'TECHNICAL_DATA_PACKAGING.' + 'ROLE_ASSOCIATION.' +
                   'ITEM_WITH_ROLE');
    END_LOCAL;
    IF SIZEOF(role_bag) = 1 THEN
      RETURN(role_bag[1].role);
    ELSE
      RETURN(?);
    END_IF;

  END_FUNCTION; -- get_role

  FUNCTION item_in_context(
               item: representation_item;
               cntxt: representation_context
      ): BOOLEAN;

    LOCAL
      y : BAG OF representation_item;
    END_LOCAL;
    IF SIZEOF(USEDIN(item,'TECHNICAL_DATA_PACKAGING.REPRESENTATION.ITEMS')
        * cntxt.representations_in_context) > 0 THEN
      RETURN(TRUE);
    ELSE
      y := QUERY ( z <* USEDIN(item,'') | (
          'TECHNICAL_DATA_PACKAGING.REPRESENTATION_ITEM' IN TYPEOF(z)) );
      IF SIZEOF(y) > 0 THEN
        REPEAT i := 1 TO HIINDEX(y) BY 1;
          IF item_in_context(y[i],cntxt) THEN
            RETURN(TRUE);
```

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```
        END_IF;
      END_REPEAT;
    END_IF;
  END_IF;
  RETURN(FALSE);

END_FUNCTION; -- item_in_context

FUNCTION leap_year(
             year: year_number
    ): BOOLEAN;
  IF (((year MOD 4) = 0) AND ((year MOD 100) <> 0)) OR ((year MOD 400) =
       0) THEN
    RETURN(TRUE);
  ELSE
    RETURN(FALSE);
  END_IF;

END_FUNCTION; -- leap_year

FUNCTION list_face_loops(
             f: face
    ): LIST [0:?] OF loop;

  LOCAL
    loops : LIST [0:?] OF loop := [];
  END_LOCAL;
  REPEAT i := 1 TO SIZEOF(f.bounds) BY 1;
    loops := loops + f.bounds[i].bound;
  END_REPEAT;
  RETURN(loops);

END_FUNCTION; -- list_face_loops

FUNCTION list_of_topology_reversed(
             a_list: list_of_reversible_topology_item
    ): list_of_reversible_topology_item;
  LOCAL
    the_reverse : list_of_reversible_topology_item;
  END_LOCAL;
  the_reverse := [];
  REPEAT i := 1 TO SIZEOF(a_list) BY 1;
    the_reverse := topology_reversed(a_list[i]) + the_reverse;
  END_REPEAT;
  RETURN(the_reverse);
END_FUNCTION; -- list_of_topology_reversed

FUNCTION list_to_array(
             lis: LIST [0:?] OF GENERIC:t;
             low, u: INTEGER
    ): ARRAY[low:u] OF GENERIC:t;

  LOCAL
    n   : INTEGER;
    res : ARRAY [low:u] OF GENERIC:t;
  END_LOCAL;
  n := SIZEOF(lis);
  IF n <> ((u - low) + 1) THEN
    RETURN(?);
```

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```
    ELSE
      res := [lis[1],n];
      REPEAT i := 2 TO n BY 1;
        res[(low + i) - 1] := lis[i];
      END_REPEAT;
      RETURN(res);
    END_IF;

  END_FUNCTION; -- list_to_array

  FUNCTION list_to_set(
                l: LIST [0:?] OF GENERIC:t
      ): SET OF GENERIC:t;

    LOCAL
      s : SET OF GENERIC:t := [];
    END_LOCAL;
    REPEAT i := 1 TO SIZEOF(l) BY 1;
      s := s + l[i];
    END_REPEAT;
    RETURN(s);

  END_FUNCTION; -- list_to_set

  FUNCTION make_array_of_array(
                lis: LIST [1:?] OF LIST [1:?] OF GENERIC:t;
                low1, u1, low2, u2: INTEGER
      ): ARRAY[low1:u1] OF ARRAY[low2:u2] OF GENERIC:t;

    LOCAL
      res : ARRAY [low1:u1] OF ARRAY [low2:u2] OF GENERIC:t;
    END_LOCAL;
    IF ((u1 - low1) + 1) <> SIZEOF(lis) THEN
      RETURN(?);
    END_IF;
    IF ((u2 - low2) + 1) <> SIZEOF(lis[1]) THEN
      RETURN(?);
    END_IF;
    res := [list_to_array(lis[1],low2,u2),(u1 - low1) + 1];
    REPEAT i := 2 TO HIINDEX(lis) BY 1;
      IF ((u2 - low2) + 1) <> SIZEOF(lis[i]) THEN
        RETURN(?);
      END_IF;
      res[(low1 + i) - 1] := list_to_array(lis[i],low2,u2);
    END_REPEAT;
    RETURN(res);

  END_FUNCTION; -- make_array_of_array

  FUNCTION mixed_loop_type_set(
                l: SET [0:?] OF loop
      ): LOGICAL;

    LOCAL
      poly_loop_type : LOGICAL;
    END_LOCAL;
    IF SIZEOF(l) <= 1 THEN
      RETURN(FALSE);
    END_IF;
```

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```
  poly_loop_type := 'TECHNICAL_DATA_PACKAGING.POLY_LOOP' IN TYPEOF(l[1]);
  REPEAT i := 2 TO SIZEOF(l) BY 1;
    IF ('TECHNICAL_DATA_PACKAGING.POLY_LOOP' IN TYPEOF(l[i])) <>
        poly_loop_type THEN
      RETURN(TRUE);
    END_IF;
  END_REPEAT;
  RETURN(FALSE);

END_FUNCTION; -- mixed_loop_type_set

FUNCTION msb_shells(
             brep: manifold_solid_brep
    ): SET [1:?] OF closed_shell;
  IF SIZEOF(QUERY ( msbtype <* TYPEOF(brep) | (msbtype LIKE
      '*BREP_WITH_VOIDS') )) >= 1 THEN
    RETURN(brep\brep_with_voids.voids + brep.outer);
  ELSE
    RETURN([brep.outer]);
  END_IF;

END_FUNCTION; -- msb_shells

FUNCTION msf_curve_check(
             cv: curve
    ): BOOLEAN;
  IF SIZEOF(['TECHNICAL_DATA_PACKAGING.BOUNDED_CURVE',
      'TECHNICAL_DATA_PACKAGING.CONIC',
      'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA',
      'TECHNICAL_DATA_PACKAGING.LINE',
      'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D'] * TYPEOF(cv)) > 1 THEN
    RETURN(FALSE);
  ELSE
    IF (('TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE' IN TYPEOF(cv)) AND (
        cv\b_spline_curve.self_intersect = FALSE)) OR (cv\b_spline_curve.
        self_intersect = UNKNOWN) THEN
      RETURN(TRUE);
    ELSE
      IF SIZEOF(['TECHNICAL_DATA_PACKAGING.CONIC',
          'TECHNICAL_DATA_PACKAGING.LINE'] * TYPEOF(cv)) = 1 THEN
        RETURN(TRUE);
      ELSE
        IF 'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA' IN TYPEOF(cv) THEN
          RETURN(msf_curve_check(cv\curve_replica.parent_curve));
        ELSE
          IF ('TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D' IN TYPEOF(cv))
              AND ((cv\offset_curve_3d.self_intersect = FALSE) OR (cv\
              offset_curve_3d.self_intersect = UNKNOWN)) AND (NOT (
              'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(cv.
              basis_curve))) THEN
            RETURN(msf_curve_check(cv\offset_curve_3d.basis_curve));
          ELSE
            IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(cv) THEN
              RETURN(msf_curve_check(cv\pcurve.reference_to_curve\
                  representation.items[1]) AND msf_surface_check(cv\
                  pcurve.basis_surface));
            ELSE
              IF 'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE' IN TYPEOF(cv)
                   THEN
```

```
                  IF msf_curve_check(cv\surface_curve.curve_3d) THEN
                    REPEAT i := 1 TO SIZEOF(cv\surface_curve.
                        associated_geometry) BY 1;
                      IF 'TECHNICAL_DATA_PACKAGING.SURFACE' IN TYPEOF(cv\
                          surface_curve.associated_geometry[i]) THEN
                        IF NOT msf_surface_check(cv\surface_curve.
                            associated_geometry[i]) THEN
                          RETURN(FALSE);
                        END_IF;
                      ELSE
                        IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(cv\
                            surface_curve.associated_geometry[i]) THEN
                          IF NOT msf_curve_check(cv\surface_curve.
                              associated_geometry[i]) THEN
                            RETURN(FALSE);
                          END_IF;
                        END_IF;
                      END_IF;
                    END_REPEAT;
                    RETURN(TRUE);
                  END_IF;
                ELSE
                  IF 'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(cv)
                       THEN
                    IF SIZEOF(cv\polyline.points) >= 3 THEN
                      RETURN(TRUE);
                    END_IF;
                  END_IF;
                END_IF;
              END_IF;
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_IF;
    RETURN(FALSE);

  END_FUNCTION; -- msf_curve_check

  FUNCTION msf_surface_check(
                surf: surface
      ): BOOLEAN;
    IF 'TECHNICAL_DATA_PACKAGING.ELEMENTARY_SURFACE' IN TYPEOF(surf) THEN
      RETURN(TRUE);
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE' IN TYPEOF(surf) THEN
        RETURN(msf_curve_check(surf\swept_surface.swept_curve));
      ELSE
        IF (('TECHNICAL_DATA_PACKAGING.OFFSET_SURFACE' IN TYPEOF(surf))
            AND (surf\offset_surface.self_intersect = FALSE)) OR (surf\
            offset_surface.self_intersect = UNKNOWN) THEN
          RETURN(msf_surface_check(surf\offset_surface.basis_surface));
        ELSE
          IF 'TECHNICAL_DATA_PACKAGING.SURFACE_REPLICA' IN TYPEOF(surf)
               THEN
            RETURN(msf_surface_check(surf\surface_replica.parent_surface));
          ELSE
            IF (('TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE' IN TYPEOF(
                surf)) AND (surf\b_spline_surface.self_intersect = FALSE))
```

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```
              OR (surf\b_spline_surface.self_intersect = UNKNOWN) THEN
            RETURN(TRUE);
          END_IF;
        END_IF;
      END_IF;
    END_IF;
  END_IF;
  RETURN(FALSE);

END_FUNCTION; -- msf_surface_check

FUNCTION nmsf_curve_check(
              cv: curve
    ): BOOLEAN;
  IF SIZEOF(['TECHNICAL_DATA_PACKAGING.BOUNDED_CURVE',
      'TECHNICAL_DATA_PACKAGING.CONIC',
      'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA',
      'TECHNICAL_DATA_PACKAGING.LINE',
      'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D'] * TYPEOF(cv)) > 1 THEN
    RETURN(FALSE);
  ELSE
    IF (('TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE' IN TYPEOF(cv)) AND (
        cv\b_spline_curve.self_intersect = FALSE)) OR (cv\b_spline_curve.
        self_intersect = UNKNOWN) THEN
      RETURN(TRUE);
    ELSE
      IF SIZEOF(['TECHNICAL_DATA_PACKAGING.CONIC',
          'TECHNICAL_DATA_PACKAGING.LINE'] * TYPEOF(cv)) = 1 THEN
        RETURN(TRUE);
      ELSE
        IF 'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA' IN TYPEOF(cv) THEN
          RETURN(nmsf_curve_check(cv\curve_replica.parent_curve));
        ELSE
          IF ('TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D' IN TYPEOF(cv))
              AND ((cv\offset_curve_3d.self_intersect = FALSE) OR (cv\
              offset_curve_3d.self_intersect = UNKNOWN)) AND (NOT (
              'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(cv.
              basis_curve))) THEN
            RETURN(nmsf_curve_check(cv\offset_curve_3d.basis_curve));
          ELSE
            IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(cv) THEN
              RETURN(nmsf_curve_check(cv\pcurve.reference_to_curve\
                  representation.items[1]) AND nmsf_surface_check(cv\
                  pcurve.basis_surface));
            ELSE
              IF 'TECHNICAL_DATA_PACKAGING.SURFACE_CURVE' IN TYPEOF(cv)
                   THEN
                IF nmsf_curve_check(cv\surface_curve.curve_3d) THEN
                  REPEAT i := 1 TO SIZEOF(cv\surface_curve.
                      associated_geometry) BY 1;
                    IF 'TECHNICAL_DATA_PACKAGING.SURFACE' IN TYPEOF(cv\
                        surface_curve.associated_geometry[i]) THEN
                      IF NOT nmsf_surface_check(cv\surface_curve.
                          associated_geometry[i]) THEN
                        RETURN(FALSE);
                      END_IF;
                    ELSE
                      IF 'TECHNICAL_DATA_PACKAGING.PCURVE' IN TYPEOF(cv\
                          surface_curve.associated_geometry[i]) THEN
```

```
                          IF NOT nmsf_curve_check(cv\surface_curve.
                              associated_geometry[i]) THEN
                            RETURN(FALSE);
                          END_IF;
                        END_IF;
                      END_IF;
                    END_REPEAT;
                    RETURN(TRUE);
                  END_IF;
                ELSE
                  IF 'TECHNICAL_DATA_PACKAGING.POLYLINE' IN TYPEOF(cv)
                       THEN
                    IF SIZEOF(cv\polyline.points) >= 3 THEN
                      RETURN(TRUE);
                    END_IF;
                  END_IF;
                END_IF;
              END_IF;
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_IF;
    RETURN(FALSE);

  END_FUNCTION; -- nmsf_curve_check

  FUNCTION nmsf_surface_check(
                surf: surface
      ): BOOLEAN;
    IF 'TECHNICAL_DATA_PACKAGING.ELEMENTARY_SURFACE' IN TYPEOF(surf) THEN
      RETURN(TRUE);
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.SWEPT_SURFACE' IN TYPEOF(surf) THEN
        RETURN(nmsf_curve_check(surf\swept_surface.swept_curve));
      ELSE
        IF (('TECHNICAL_DATA_PACKAGING.OFFSET_SURFACE' IN TYPEOF(surf))
            AND (surf\offset_surface.self_intersect = FALSE)) OR (surf\
            offset_surface.self_intersect = UNKNOWN) THEN
          RETURN(nmsf_surface_check(surf\offset_surface.basis_surface));
        ELSE
          IF 'TECHNICAL_DATA_PACKAGING.SURFACE_REPLICA' IN TYPEOF(surf)
               THEN
            RETURN(nmsf_surface_check(surf\surface_replica.parent_-
surface));
          ELSE
            IF (('TECHNICAL_DATA_PACKAGING.B_SPLINE_SURFACE' IN TYPEOF(
                surf)) AND (surf\b_spline_surface.self_intersect = FALSE))
                OR (surf\b_spline_surface.self_intersect = UNKNOWN) THEN
              RETURN(TRUE);
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_IF;
    RETURN(FALSE);

  END_FUNCTION; -- nmsf_surface_check
```

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```
FUNCTION normalise(
             arg: vector_or_direction
    ): vector_or_direction;

  LOCAL
    ndim   : INTEGER;
    v      : direction;
    vec    : vector;
    mag    : REAL;
    result : vector_or_direction;
  END_LOCAL;
  IF NOT EXISTS(arg) THEN
    result := ?;
  ELSE
    ndim := arg.dim;
    IF 'TECHNICAL_DATA_PACKAGING.VECTOR' IN TYPEOF(arg) THEN
      BEGIN
        v := dummy_gri || direction(arg.orientation.direction_ratios);
        IF arg.magnitude = 0 THEN
          RETURN(?);
        ELSE
          vec := dummy_gri || vector(v,1);
        END_IF;
      END;
    ELSE
      v := dummy_gri || direction(arg.direction_ratios);
    END_IF;
    mag := 0;
    REPEAT i := 1 TO ndim BY 1;
      mag := mag + (v.direction_ratios[i] * v.direction_ratios[i]);
    END_REPEAT;
    IF mag > 0 THEN
      mag := SQRT(mag);
      REPEAT i := 1 TO ndim BY 1;
        v.direction_ratios[i] := v.direction_ratios[i] / mag;
      END_REPEAT;
      IF 'TECHNICAL_DATA_PACKAGING.VECTOR' IN TYPEOF(arg) THEN
        vec.orientation := v;
        result := vec;
      ELSE
        result := v;
      END_IF;
    ELSE
      RETURN(?);
    END_IF;
  END_IF;
  RETURN(result);

END_FUNCTION; -- normalise

FUNCTION open_shell_reversed(
             a_shell: open_shell
    ): oriented_open_shell;

  LOCAL
    the_reverse : oriented_open_shell;
  END_LOCAL;
  IF 'TECHNICAL_DATA_PACKAGING.ORIENTED_OPEN_SHELL' IN TYPEOF(a_shell)
       THEN
```

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```
      the_reverse := dummy_tri || connected_face_set(a_shell\
          connected_face_set.cfs_faces) || open_shell() ||
          oriented_open_shell(a_shell\oriented_open_shell.
          open_shell_element,NOT a_shell\oriented_open_shell.orientation);
    ELSE
      the_reverse := dummy_tri || connected_face_set(a_shell\
          connected_face_set.cfs_faces) || open_shell() ||
          oriented_open_shell(a_shell,FALSE);
    END_IF;
    RETURN(the_reverse);

  END_FUNCTION; -- open_shell_reversed

  FUNCTION orthogonal_complement(
               vec: direction
      ): direction;

    LOCAL
      result : direction;
    END_LOCAL;
    IF (vec.dim <> 2) OR (NOT EXISTS(vec)) THEN
      RETURN(?);
    ELSE
      result := dummy_gri || direction([-vec.direction_ratios[2],vec.
          direction_ratios[1]]);
      RETURN(result);
    END_IF;

  END_FUNCTION; -- orthogonal_complement

  FUNCTION path_head_to_tail(
               a_path: path
      ): LOGICAL;

    LOCAL
      n : INTEGER;
      p : BOOLEAN := TRUE;
    END_LOCAL;
    n := SIZEOF(a_path.edge_list);
    REPEAT i := 2 TO n BY 1;
      p := p AND (a_path.edge_list[i - 1].edge_end :=: a_path.edge_list[i]
          .edge_start);
    END_REPEAT;
    RETURN(p);

  END_FUNCTION; -- path_head_to_tail

  FUNCTION path_reversed(
               a_path: path
      ): oriented_path;

    LOCAL
      the_reverse : oriented_path;
    END_LOCAL;
    IF 'TECHNICAL_DATA_PACKAGING.ORIENTED_PATH' IN TYPEOF(a_path) THEN
      the_reverse := dummy_tri || path(list_of_topology_reversed(a_path.
          edge_list)) || oriented_path(a_path\oriented_path.path_element,
          NOT a_path\oriented_path.orientation);
    ELSE
```

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```
    the_reverse := dummy_tri || path(list_of_topology_reversed(a_path.
        edge_list)) || oriented_path(a_path,FALSE);
  END_IF;
  RETURN(the_reverse);

END_FUNCTION; -- path_reversed

FUNCTION product_category_graph_members(
             p: product_category
    ): SET OF product_category;

  LOCAL
    pcr    : BAG OF product_category_relationship;
    result : SET OF product_category := [];
  END_LOCAL;
  pcr := USEDIN(p,
      'TECHNICAL_DATA_PACKAGING.PRODUCT_CATEGORY_RELATIONSHIP.CATEGORY');
  IF SIZEOF(pcr) > 0 THEN
    result := result + p;
    REPEAT i := 1 TO SIZEOF(pcr) BY 1;
      result := result + product_category_graph_members(pcr[i].
          sub_category);
    END_REPEAT;
  END_IF;
  pcr := USEDIN(p,
               'TECHNICAL_DATA_PACKAGING.' +
               'PRODUCT_CATEGORY_RELATIONSHIP.SUB_CATEGORY');
  IF SIZEOF(pcr) > 0 THEN
    result := result + p;
    REPEAT i := 1 TO SIZEOF(pcr) BY 1;
      result := result + product_category_graph_members(pcr[i].category);
    END_REPEAT;
  END_IF;
  RETURN(result);

END_FUNCTION; -- product_category_graph_members

FUNCTION scalar_times_vector(
             scalar: REAL;
             vec: vector_or_direction
    ): vector;

  LOCAL
    v      : direction;
    mag    : REAL;
    result : vector;
  END_LOCAL;
  IF (NOT EXISTS(scalar)) OR (NOT EXISTS(vec)) THEN
    RETURN(?);
  ELSE
    IF 'TECHNICAL_DATA_PACKAGING.VECTOR' IN TYPEOF(vec) THEN
      v := dummy_gri || direction(vec.orientation.direction_ratios);
      mag := scalar * vec.magnitude;
    ELSE
      v := dummy_gri || direction(vec.direction_ratios);
      mag := scalar;
    END_IF;
    IF mag < 0 THEN
      REPEAT i := 1 TO SIZEOF(v.direction_ratios) BY 1;
```

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```
          v.direction_ratios[i] := -v.direction_ratios[i];
        END_REPEAT;
        mag := -mag;
      END_IF;
      result := dummy_gri || vector(normalise(v),mag);
    END_IF;
    RETURN(result);

  END_FUNCTION; -- scalar_times_vector

  FUNCTION second_proj_axis(
               z_axis, x_axis, arg: direction
      ): direction;

    LOCAL
      temp   : vector;
      v      : direction;
      y_axis : vector;
    END_LOCAL;
    IF NOT EXISTS(arg) THEN
      v := dummy_gri || direction([0,1,0]);
    ELSE
      v := arg;
    END_IF;
    temp := scalar_times_vector(dot_product(v,z_axis),z_axis);
    y_axis := vector_difference(v,temp);
    temp := scalar_times_vector(dot_product(v,x_axis),x_axis);
    y_axis := vector_difference(y_axis,temp);
    y_axis := normalise(y_axis);
    RETURN(y_axis.orientation);

  END_FUNCTION; -- second_proj_axis

  FUNCTION set_of_topology_reversed(
               a_set: set_of_reversible_topology_item
      ): set_of_reversible_topology_item;

    LOCAL
      the_reverse : set_of_reversible_topology_item;
    END_LOCAL;
    the_reverse := [];
    REPEAT i := 1 TO SIZEOF(a_set) BY 1;
      the_reverse := the_reverse + topology_reversed(a_set[i]);
    END_REPEAT;
    RETURN(the_reverse);

  END_FUNCTION; -- set_of_topology_reversed

  FUNCTION shell_reversed(
               a_shell: shell
      ): shell;
    IF 'TECHNICAL_DATA_PACKAGING.OPEN_SHELL' IN TYPEOF(a_shell) THEN
      RETURN(open_shell_reversed(a_shell));
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.CLOSED_SHELL' IN TYPEOF(a_shell) THEN
        RETURN(closed_shell_reversed(a_shell));
      ELSE
        RETURN(?);
      END_IF;
```

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```
  END_IF;

END_FUNCTION; -- shell_reversed

FUNCTION surface_weights_positive(
             b: rational_b_spline_surface
    ): BOOLEAN;

  LOCAL
    result : BOOLEAN := TRUE;
  END_LOCAL;
  REPEAT i := 0 TO b.u_upper BY 1;
    REPEAT j := 0 TO b.v_upper BY 1;
      IF b.weights[i][j] <= 0 THEN
        result := FALSE;
        RETURN(result);
      END_IF;
    END_REPEAT;
  END_REPEAT;
  RETURN(result);

END_FUNCTION; -- surface_weights_positive

FUNCTION topology_reversed(
             an_item: reversible_topology
    ): reversible_topology;
  IF 'TECHNICAL_DATA_PACKAGING.EDGE' IN TYPEOF(an_item) THEN
    RETURN(edge_reversed(an_item));
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.PATH' IN TYPEOF(an_item) THEN
    RETURN(path_reversed(an_item));
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.FACE_BOUND' IN TYPEOF(an_item) THEN
    RETURN(face_bound_reversed(an_item));
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.FACE' IN TYPEOF(an_item) THEN
    RETURN(face_reversed(an_item));
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.SHELL' IN TYPEOF(an_item) THEN
    RETURN(shell_reversed(an_item));
  END_IF;
  IF 'SET' IN TYPEOF(an_item) THEN
    RETURN(set_of_topology_reversed(an_item));
  END_IF;
  IF 'LIST' IN TYPEOF(an_item) THEN
    RETURN(list_of_topology_reversed(an_item));
  END_IF;
  RETURN(?);

END_FUNCTION; -- topology_reversed

FUNCTION using_items(
             item: founded_item_select;
             checked_items: SET OF founded_item_select
    ): SET OF founded_item_select;

  LOCAL
    next_items      : SET OF founded_item_select;
    new_check_items : SET OF founded_item_select;
```

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```
      result_items    : SET OF founded_item_select;
    END_LOCAL;
    result_items := [];
    new_check_items := checked_items + item;
    next_items := QUERY ( z <* bag_to_set(USEDIN(item,'')) | ((
        'TECHNICAL_DATA_PACKAGING.REPRESENTATION_ITEM' IN TYPEOF(z)) OR (
        'TECHNICAL_DATA_PACKAGING.FOUNDED_ITEM' IN TYPEOF(z))) );
    IF SIZEOF(next_items) > 0 THEN
      REPEAT i := 1 TO HIINDEX(next_items) BY 1;
        IF NOT (next_items[i] IN new_check_items) THEN
          result_items := result_items + next_items[i] + using_items(
              next_items[i],new_check_items);
        END_IF;
      END_REPEAT;
    END_IF;
    RETURN(result_items);

  END_FUNCTION; -- using_items

  FUNCTION using_representations(
               item: founded_item_select
      ): SET OF representation;

    LOCAL
      results            : SET OF representation;
      intermediate_items : SET OF founded_item_select;
      result_bag         : BAG OF representation;
    END_LOCAL;
    results := [];
    result_bag := USEDIN(item,
        'TECHNICAL_DATA_PACKAGING.REPRESENTATION.ITEMS');
    IF SIZEOF(result_bag) > 0 THEN
      REPEAT i := 1 TO HIINDEX(result_bag) BY 1;
        results := results + result_bag[i];
      END_REPEAT;
    END_IF;
    intermediate_items := using_items(item,[]);
    IF SIZEOF(intermediate_items) > 0 THEN
      REPEAT i := 1 TO HIINDEX(intermediate_items) BY 1;
        result_bag := USEDIN(intermediate_items[i],
            'TECHNICAL_DATA_PACKAGING.REPRESENTATION.ITEMS');
        IF SIZEOF(result_bag) > 0 THEN
          REPEAT j := 1 TO HIINDEX(result_bag) BY 1;
            results := results + result_bag[j];
          END_REPEAT;
        END_IF;
      END_REPEAT;
    END_IF;
    RETURN(results);

  END_FUNCTION; -- using_representations

  FUNCTION valid_basis_curve_in_2d_wireframe(
               crv: curve
      ): BOOLEAN;
    IF SIZEOF(['TECHNICAL_DATA_PACKAGING.POLYLINE',
        'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE',
        'TECHNICAL_DATA_PACKAGING.ELLIPSE',
        'TECHNICAL_DATA_PACKAGING.CIRCLE'] * TYPEOF(crv)) = 1 THEN
```

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```
      RETURN(TRUE);
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.TRIMMED_CURVE' IN TYPEOF(crv) THEN
        IF SIZEOF(['TECHNICAL_DATA_PACKAGING.LINE',
            'TECHNICAL_DATA_PACKAGING.PARABOLA',
            'TECHNICAL_DATA_PACKAGING.HYPERBOLA'] * TYPEOF(crv\
            trimmed_curve.basis_curve)) = 1 THEN
          RETURN(TRUE);
        ELSE
          RETURN(valid_basis_curve_in_2d_wireframe(crv\trimmed_curve.
              basis_curve));
        END_IF;
      ELSE
        IF 'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_2D' IN TYPEOF(crv) THEN
          RETURN(valid_basis_curve_in_2d_wireframe(crv\offset_curve_2d.
              basis_curve));
        ELSE
          IF 'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA' IN TYPEOF(crv) THEN
            RETURN(valid_basis_curve_in_2d_wireframe(crv\curve_replica.
                parent_curve));
          ELSE
            IF 'TECHNICAL_DATA_PACKAGING.COMPOSITE_CURVE' IN TYPEOF(crv)
                 THEN
              RETURN(SIZEOF(QUERY ( ccs <* crv\composite_curve.segments |
                  (NOT valid_basis_curve_in_2d_wireframe(ccs.parent_curve))
))
                  = 0);
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_IF;
    RETURN(FALSE);

  END_FUNCTION; -- valid_basis_curve_in_2d_wireframe

  FUNCTION valid_calendar_date(
              date: calendar_date
      ): LOGICAL;
    CASE date.month_component OF
      1 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 31));
      2 :         BEGIN
          IF leap_year(date.year_component) THEN
            RETURN((1 <= date.day_component) AND (date.day_component <=
29));
          ELSE
            RETURN((1 <= date.day_component) AND (date.day_component <=
28));
          END_IF;
        END;
      3 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 31));
      4 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 30));
      5 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 31));
      6 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 30));
```

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```
      7 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 31));
      8 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 31));
      9 :         RETURN((1 <= date.day_component) AND (date.day_component
            <= 30));
      10  :         RETURN((1 <= date.day_component) AND (date.
            day_component <= 31));
      11  :         RETURN((1 <= date.day_component) AND (date.
            day_component <= 30));
      12  :         RETURN((1 <= date.day_component) AND (date.
            day_component <= 31));
      END_CASE;
    RETURN(FALSE);

  END_FUNCTION; -- valid_calendar_date

  FUNCTION valid_geometrically_bounded_wf_curve(
               crv: curve
      ): BOOLEAN;
    IF SIZEOF(['TECHNICAL_DATA_PACKAGING.POLYLINE',
        'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE',
        'TECHNICAL_DATA_PACKAGING.ELLIPSE',
        'TECHNICAL_DATA_PACKAGING.CIRCLE'] * TYPEOF(crv)) = 1 THEN
      RETURN(TRUE);
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.TRIMMED_CURVE' IN TYPEOF(crv) THEN
        IF SIZEOF(['TECHNICAL_DATA_PACKAGING.LINE',
            'TECHNICAL_DATA_PACKAGING.PARABOLA',
            'TECHNICAL_DATA_PACKAGING.HYPERBOLA'] * TYPEOF(crv\
            trimmed_curve.basis_curve)) = 1 THEN
          RETURN(TRUE);
        ELSE
          RETURN(valid_geometrically_bounded_wf_curve(crv\trimmed_curve.
              basis_curve));
        END_IF;
      ELSE
        IF 'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D' IN TYPEOF(crv) THEN
          RETURN(valid_geometrically_bounded_wf_curve(crv\offset_curve_3d.
              basis_curve));
        ELSE
          IF 'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA' IN TYPEOF(crv) THEN
            RETURN(valid_geometrically_bounded_wf_curve(crv\curve_replica.
                parent_curve));
          ELSE
            IF 'TECHNICAL_DATA_PACKAGING.COMPOSITE_CURVE' IN TYPEOF(crv)
                 THEN
              RETURN(SIZEOF(QUERY ( ccs <* crv\composite_curve.segments |
                  (NOT valid_geometrically_bounded_wf_curve(ccs.
                  parent_curve)) )) = 0);
            END_IF;
          END_IF;
        END_IF;
      END_IF;
    END_IF;
    RETURN(FALSE);

  END_FUNCTION; -- valid_geometrically_bounded_wf_curve
```

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```
FUNCTION valid_geometrically_bounded_wf_point(
             pnt: point
    ): BOOLEAN;
  IF 'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT' IN TYPEOF(pnt) THEN
    RETURN(TRUE);
  ELSE
    IF 'TECHNICAL_DATA_PACKAGING.POINT_ON_CURVE' IN TYPEOF(pnt) THEN
      RETURN(valid_geometrically_bounded_wf_curve(pnt\point_on_curve.
          basis_curve));
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.POINT_REPLICA' IN TYPEOF(pnt) THEN
        RETURN(valid_geometrically_bounded_wf_point(pnt\point_replica.
            parent_pt));
      END_IF;
    END_IF;
  END_IF;
  RETURN(FALSE);

END_FUNCTION; -- valid_geometrically_bounded_wf_point

FUNCTION valid_time(
             time: local_time
    ): BOOLEAN;
  IF EXISTS(time.second_component) THEN
    RETURN(EXISTS(time.minute_component));
  ELSE
    RETURN(TRUE);
  END_IF;

END_FUNCTION; -- valid_time

FUNCTION valid_units(
             m: measure_with_unit
    ): BOOLEAN;
  IF 'TECHNICAL_DATA_PACKAGING.LENGTH_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(1,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.MASS_MEASURE' IN TYPEOF(m.value_component)
       THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,1,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.TIME_MEASURE' IN TYPEOF(m.value_component)
       THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,1,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.ELECTRIC_CURRENT_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,1,0,0,0) THEN
```

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```
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.THERMODYNAMIC_TEMPERATURE_MEASURE' IN
      TYPEOF(m.value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,0,1,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.AMOUNT_OF_SUBSTANCE_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,0,0,1,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.LUMINOUS_INTENSITY_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,0,0,0,1) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.PLANE_ANGLE_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.SOLID_ANGLE_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.AREA_MEASURE' IN TYPEOF(m.value_component)
       THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(2,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.VOLUME_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(3,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.RATIO_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
```

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```
  IF 'TECHNICAL_DATA_PACKAGING.POSITIVE_LENGTH_MEASURE' IN TYPEOF(m.
      value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(1,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  IF 'TECHNICAL_DATA_PACKAGING.POSITIVE_PLANE_ANGLE_MEASURE' IN TYPEOF(m
      .value_component) THEN
    IF derive_dimensional_exponents(m.unit_component) <>
        dimensional_exponents(0,0,0,0,0,0,0) THEN
      RETURN(FALSE);
    END_IF;
  END_IF;
  RETURN(TRUE);

END_FUNCTION; -- valid_units

FUNCTION valid_wireframe_edge_curve(
             crv: curve
    ): BOOLEAN;
  IF SIZEOF(['TECHNICAL_DATA_PACKAGING.LINE',
      'TECHNICAL_DATA_PACKAGING.CONIC',
      'TECHNICAL_DATA_PACKAGING.B_SPLINE_CURVE',
      'TECHNICAL_DATA_PACKAGING.POLYLINE'] * TYPEOF(crv)) = 1 THEN
    RETURN(TRUE);
  ELSE
    IF 'TECHNICAL_DATA_PACKAGING.CURVE_REPLICA' IN TYPEOF(crv) THEN
      RETURN(valid_wireframe_edge_curve(crv\curve_replica.parent_curve));
    ELSE
      IF 'TECHNICAL_DATA_PACKAGING.OFFSET_CURVE_3D' IN TYPEOF(crv) THEN
        RETURN(valid_wireframe_edge_curve(crv\offset_curve_3d.
            basis_curve));
      END_IF;
    END_IF;
  END_IF;
  RETURN(FALSE);

END_FUNCTION; -- valid_wireframe_edge_curve

FUNCTION valid_wireframe_vertex_point(
             pnt: point
    ): BOOLEAN;
  IF 'TECHNICAL_DATA_PACKAGING.CARTESIAN_POINT' IN TYPEOF(pnt) THEN
    RETURN(TRUE);
  ELSE
    IF 'TECHNICAL_DATA_PACKAGING.POINT_REPLICA' IN TYPEOF(pnt) THEN
      RETURN(valid_wireframe_vertex_point(pnt\point_replica.parent_pt));
    END_IF;
  END_IF;
  RETURN(FALSE);

END_FUNCTION; -- valid_wireframe_vertex_point

FUNCTION vector_difference(
             arg1, arg2: vector_or_direction
    ): vector;

  LOCAL
```

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```
      ndim   : INTEGER;
      mag2   : REAL;
      mag1   : REAL;
      mag    : REAL;
      res    : direction;
      vec1   : direction;
      vec2   : direction;
      result : vector;
    END_LOCAL;
    IF (NOT EXISTS(arg1)) OR (NOT EXISTS(arg2)) OR (arg1.dim <> arg2.dim)
         THEN
      RETURN(?);
    ELSE
      BEGIN
        IF 'TECHNICAL_DATA_PACKAGING.VECTOR' IN TYPEOF(arg1) THEN
          mag1 := arg1.magnitude;
          vec1 := arg1.orientation;
        ELSE
          mag1 := 1;
          vec1 := arg1;
        END_IF;
        IF 'TECHNICAL_DATA_PACKAGING.VECTOR' IN TYPEOF(arg2) THEN
          mag2 := arg2.magnitude;
          vec2 := arg2.orientation;
        ELSE
          mag2 := 1;
          vec2 := arg2;
        END_IF;
        vec1 := normalise(vec1);
        vec2 := normalise(vec2);
        ndim := SIZEOF(vec1.direction_ratios);
        mag := 0;
        res := dummy_gri || direction(vec1.direction_ratios);
        REPEAT i := 1 TO ndim BY 1;
          res.direction_ratios[i] := (mag1 * vec1.direction_ratios[i]) + (
              mag2 * vec2.direction_ratios[i]);
          mag := mag + (res.direction_ratios[i] * res.direction_ratios[i]);
        END_REPEAT;
        IF mag > 0 THEN
          result := dummy_gri || vector(res,SQRT(mag));
        ELSE
          result := dummy_gri || vector(vec1,0);
        END_IF;
      END;
    END_IF;
    RETURN(result);

  END_FUNCTION; -- vector_difference

END_SCHEMA; -- technical_data_packaging
```

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Annex B
(normative)

AIM short names of entities

Table B.1 provides the short names of entities specified in the AIM of this part of ISO 10303. Requirements on the use of the short names are found in the implementation methods included in ISO 10303.

Table B.1 - AIM short names of entites

Entity name	Short name
ACTION	ACTION
ACTION_ASSIGNMENT	ACTASS
ACTION_METHOD	ACTMTH
ACTION_METHOD_WITH_ASSOCIATED_DOCUMENTS	AMWAD
ACTION_PROPERTY	ACTPRP
ACTION_PROPERTY_REPRESENTATION	ACPRRP
ACTION_RELATIONSHIP	ACTRLT
ACTION_STATUS	ACTSTT
ADDRESS	ADDRSS
ADVANCED_BREP_SHAPE_REPRESENTATION	ABSR
ADVANCED_FACE	ADVFC
ALTERNATE_PRODUCT_RELATIONSHIP	ALPRRL
AMOUNT_OF_SUBSTANCE_MEASURE_WITH_UNIT	AOSMWU
AMOUNT_OF_SUBSTANCE_UNIT	AOSU
ANNOTATION_CURVE_OCCURRENCE	ANCROC
ANNOTATION_OCCURRENCE	ANNOCC
ANNOTATION_POINT_OCCURRENCE	ANPNOC
ANNOTATION_TEXT	ANNTXT
ANNOTATION_TEXT_CHARACTER	ANTXCH
ANNOTATION_TEXT_OCCURRENCE	ANTXOC
APPLICATION_CONTEXT	APPCNT
APPLICATION_CONTEXT_ELEMENT	APCNEL
APPLICATION_CONTEXT_RELATIONSHIP	APCNRL
APPLICATION_PROTOCOL_DEFINITION	APPRDF
APPLIED_ACTION_ASSIGNMENT	APACAS
APPLIED_APPROVAL_ASSIGNMENT	APAPAS
APPLIED_CLASSIFICATION_ASSIGNMENT	APCLAS
APPLIED_CONTRACT_ASSIGNMENT	APCNAS
APPLIED_DATE_AND_TIME_ASSIGNMENT	ADATA
APPLIED_DATE_ASSIGNMENT	APDTAS

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
APPLIED_DOCUMENT_REFERENCE	APDCRF
APPLIED_DOCUMENT_USAGE_CONSTRAINT_ASSIGNMENT	ADUCA
APPLIED_EFFECTIVITY_ASSIGNMENT	APEFAS
APPLIED_EFFECTIVITY_CONTEXT_ASSIGNMENT	AECO
APPLIED_EXTERNAL_IDENTIFICATION_ASSIGNMENT	AEIA
APPLIED_GROUP_ASSIGNMENT	APGRAS
APPLIED_IDENTIFICATION_ASSIGNMENT	APIDAS
APPLIED_ORGANIZATION_ASSIGNMENT	APORAS
APPLIED_ORGANIZATIONAL_PROJECT_ASSIGNMENT	AOPA
APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT	APAOA
APPLIED_PRESENTED_ITEM	APPRIT
APPLIED_SECURITY_CLASSIFICATION_ASSIGNMENT	ASCA
APPROVAL	APPRVL
APPROVAL_ASSIGNMENT	APPASS
APPROVAL_DATE_TIME	APDTTM
APPROVAL_PERSON_ORGANIZATION	APPROR
APPROVAL_RELATIONSHIP	APPRLT
APPROVAL_ROLE	APPRL
APPROVAL_STATUS	APPSTT
AREA_DEPENDENT_ANNOTATION_REPRESENTATION	ADAR
AREA_IN_SET	ARINST
AREA_MEASURE_WITH_UNIT	AMWU
AREA_UNIT	ARUNT
ASSEMBLY_COMPONENT_USAGE	ASCMUS
ASSEMBLY_COMPONENT_USAGE_SUBSTITUTE	ACUS
ASSEMBLY_COMPONENT_USAGE_SUBSTITUTE_WITH_RANKING	ACUSWR
AXIS1_PLACEMENT	AX1PLC
AXIS2_PLACEMENT_2D	A2PL2D
AXIS2_PLACEMENT_3D	A2PL3D
B_SPLINE_CURVE	BSPCR
B_SPLINE_CURVE_WITH_KNOTS	BSCWK
B_SPLINE_SURFACE	BSPSR
B_SPLINE_SURFACE_WITH_KNOTS	BSSWK
BACKGROUND_COLOUR	BCKCLR
BEZIER_CURVE	BZRCRV
BEZIER_SURFACE	BZRSRF
BLOCK	BLOCK
BOOLEAN_RESULT	BLNRSL

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
BOUNDARY_CURVE	BNDCR
BOUNDED_CURVE	BNDCRV
BOUNDED_PCURVE	BNDPCR
BOUNDED_SURFACE	BNDSRF
BOUNDED_SURFACE_CURVE	BNSRCR
BOX_DOMAIN	BXDMN
BOXED_HALF_SPACE	BXHLSP
BREP_WITH_VOIDS	BRWTVD
CALENDAR_DATE	CLNDT
CAMERA_IMAGE	CMRIMG
CAMERA_IMAGE_3D_WITH_SCALE	CI3WS
CAMERA_MODEL	CMRMDL
CAMERA_MODEL_D3	CMMDD3
CAMERA_MODEL_D3_WITH_HLHSR	CMDWH
CAMERA_MODEL_WITH_LIGHT_SOURCES	CMWLS
CAMERA_USAGE	CMRUSG
CARTESIAN_POINT	CRTPNT
CARTESIAN_TRANSFORMATION_OPERATOR	CRTROP
CARTESIAN_TRANSFORMATION_OPERATOR_3D	CTO3
CHARACTER_GLYPH_STYLE_OUTLINE	CGO
CHARACTER_GLYPH_STYLE_STROKE	CGS
CHARACTER_GLYPH_SYMBOL	CHGLSY
CHARACTERIZED_OBJECT	CHROBJ
CIRCLE	CIRCLE
CLASS	CLASS
CLASS_SYSTEM	CLS1
CLASSIFICATION_ASSIGNMENT	CLSASS
CLASSIFICATION_ROLE	CLSRL
CLOSED_SHELL	CLSSHL
COLOUR	COLOUR
COLOUR_RGB	CLRRGB
COLOUR_SPECIFICATION	CLRSPC
COMPOSITE_CURVE	CMPCRV
COMPOSITE_CURVE_ON_SURFACE	CCOS
COMPOSITE_CURVE_SEGMENT	CMCRSG
COMPOSITE_TEXT	COMTXT
COMPOUND_REPRESENTATION_ITEM	CMRPIT
CONFIGURATION_DESIGN	CNFDSG

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
CONFIGURATION_EFFECTIVITY	CNFEFF
CONFIGURATION_ITEM	CNFITM
CONIC	CONIC
CONICAL_SURFACE	CNCSRF
CONNECTED_EDGE_SET	CNEDST
CONNECTED_FACE_SET	CNFCST
CONTEXT_DEPENDENT_UNIT	CNDPUN
CONTRACT	CNTRCT
CONTRACT_ASSIGNMENT	CNTASS
CONTRACT_RELATIONSHIP	CNTRLT
CONTRACT_TYPE	CNTTYP
CONVERSION_BASED_UNIT	CNBSUN
COORDINATED_UNIVERSAL_TIME_OFFSET	CUTO
CSG_SHAPE_REPRESENTATION	CSSHRP
CSG_SOLID	CSGSLD
CURVE	CURVE
CURVE_BOUNDED_SURFACE	CRBNSR
CURVE_REPLICA	CRVRPL
CURVE_STYLE	CRVSTY
CURVE_STYLE_FONT	CRSTFN
CURVE_STYLE_FONT_PATTERN	CSFP
CURVE_STYLE_RENDERING	CRSTRN
CYLINDRICAL_SURFACE	CYLSRF
DATE	DATE
DATE_AND_TIME	DTANTM
DATE_AND_TIME_ASSIGNMENT	DATA
DATE_ASSIGNMENT	DTASS
DATE_ROLE	DTRL
DATE_TIME_ROLE	DTTMRL
DATED_EFFECTIVITY	DTDEFF
DEFINED_CHARACTER_GLYPH	DFCHGL
DEFINITIONAL_REPRESENTATION	DFNRPR
DEGENERATE_PCURVE	DGNPCR
DEGENERATE_TOROIDAL_SURFACE	DGTRSR
DERIVED_UNIT	DRVUNT
DERIVED_UNIT_ELEMENT	DRUNEL
DESCRIPTION_ ATTRIBUTE	DSCATT
DESCRIPTIVE_REPRESENTATION_ITEM	DSRPIT

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
DESIGN_MAKE_FROM_RELATIONSHIP	DMFR
DIMENSIONAL_EXPONENTS	DMNEXP
DIRECTION	DRCTN
DOCUMENT	DCMNT
DOCUMENT_FILE	DCMFL
DOCUMENT_PRODUCT_ASSOCIATION	DCP1
DOCUMENT_PRODUCT_EQUIVALENCE	DCPREQ
DOCUMENT_REFERENCE	DCMRFR
DOCUMENT_RELATIONSHIP	DCMRLT
DOCUMENT_REPRESENTATION_TYPE	DCRPTY
DOCUMENT_TYPE	DCMTYP
DOCUMENT_USAGE_CONSTRAINT	DCUSCN
DOCUMENT_USAGE_CONSTRAINT_ASSIGNMENT	DUCA
DOCUMENT_USAGE_ROLE	DCUSRL
DRAUGHTING_APPROVAL_ASSIGNMENT	DRAPAS
DRAUGHTING_CALLOUT	DRGCLL
DRAUGHTING_DRAWING_REVISION	DRDRRV
DRAUGHTING_PRE_DEFINED_COLOUR	DPDC
DRAUGHTING_PRE_DEFINED_CURVE_FONT	DPDCF
DRAUGHTING_TITLE	DRGTTL
DRAWING_DEFINITION	DRWDFN
DRAWING_REVISION	DRWRVS
DRAWING_SHEET_REVISION	DRSHRV
EDGE	EDGE
EDGE_BASED_WIREFRAME_MODEL	EBWM
EDGE_BASED_WIREFRAME_SHAPE_REPRESENTATION	EBWSR
EDGE_CURVE	EDGCRV
EDGE_LOOP	EDGLP
EFFECTIVITY	EFFCTV
EFFECTIVITY_ASSIGNMENT	EFFASS
EFFECTIVITY_CONTEXT_ASSIGNMENT	EFC0
EFFECTIVITY_CONTEXT_ROLE	EFCNRL
EFFECTIVITY_RELATIONSHIP	EFFRLT
ELECTRIC_CURRENT_MEASURE_WITH_UNIT	ECMWU
ELECTRIC_CURRENT_UNIT	ELCRUN
ELEMENTARY_BREP_SHAPE_REPRESENTATION	EBSR
ELEMENTARY_SURFACE	ELMSRF
ELLIPSE	ELLPS

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
EVALUATED_DEGENERATE_PCURVE	EVDGPC
EXECUTED_ACTION	EXCACT
EXTERNAL_IDENTIFICATION_ASSIGNMENT	EXIDAS
EXTERNAL_SOURCE	EXTSRC
EXTERNALLY_DEFINED_CHARACTER_GLYPH	EDCG
EXTERNALLY_DEFINED_ITEM	EXDFIT
EXTERNALLY_DEFINED_PLANAR_BOX	EDPB
EXTERNALLY_DEFINED_STYLE	EXDFST
EXTERNALLY_DEFINED_SYMBOL	EXDFSY
EXTERNALLY_DEFINED_SYMBOL_AND_PLACEMENT	EDSAP
EXTERNALLY_DEFINED_TEXT_FONT	EDTF
EXTRUDED_FACE_SOLID	EXFCSL
FACE	FACE
FACE_BASED_SURFACE_MODEL	FBSM
FACE_BOUND	FCBND
FACE_OUTER_BOUND	FCOTBN
FACE_SURFACE	FCSRF
FACETED_BREP	FCTBR
FACETED_BREP_SHAPE_REPRESENTATION	FBSR
FILL_AREA_STYLE	FLARST
FILL_AREA_STYLE_COLOUR	FASC
FOUNDED_ITEM	FNDITM
FUNCTIONALLY_DEFINED_TRANSFORMATION	FNDFTR
GEOMETRIC_CURVE_SET	GMCRST
GEOMETRIC_REPRESENTATION_CONTEXT	GMRPCN
GEOMETRIC_REPRESENTATION_ITEM	GMRPIT
GEOMETRIC_SET	GMTST
GEOMETRICALLY_BOUNDED_2D_WIREFRAME_REPRESENTATION	GB2WR
GEOMETRICALLY_BOUNDED_SURFACE_SHAPE_REPRESENTATION	GBSSR
GEOMETRICALLY_BOUNDED_WIREFRAME_SHAPE_REPRESENTATION	GBWSR
GLOBAL_UNIT_ASSIGNED_CONTEXT	GUAC
GROUP	GROUP
GROUP_ASSIGNMENT	GRPASS
GROUP_RELATIONSHIP	GRPRLT
HALF_SPACE_SOLID	HLSPSL
HYPERBOLA	HYPRBL
ID_ATTRIBUTE	IDATT
IDENTIFICATION_ASSIGNMENT	IDNASS

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
IDENTIFICATION_ASSIGNMENT_RELATIONSHIP	IDASRL
IDENTIFICATION_ROLE	IDNRL
INTERSECTION_CURVE	INTCRV
INVISIBILITY	INVSBL
ITEM_DEFINED_TRANSFORMATION	ITDFTR
ITEM_IDENTIFIED_REPRESENTATION_USAGE	IIRU
LANGUAGE_ASSIGNMENT	LNGASS
LENGTH_MEASURE_WITH_UNIT	LMWU
LENGTH_UNIT	LNGUNT
LIBRARY_CONTEXT	LBRCNT
LIGHT_SOURCE	LGHSRC
LIGHT_SOURCE_AMBIENT	LGSRAM
LIGHT_SOURCE_DIRECTIONAL	LGSRDR
LIGHT_SOURCE_POSITIONAL	LGSRPS
LIGHT_SOURCE_SPOT	LGSRSP
LINE	LINE
LOCAL_TIME	LCLTM
LOOP	LOOP
LOT_EFFECTIVITY	LTEFF
LUMINOUS_INTENSITY_MEASURE_WITH_UNIT	LIMWU
LUMINOUS_INTENSITY_UNIT	LMINUN
MAKE_FROM_USAGE_OPTION	MFUO
MAKE_FROM_USAGE_OPTION_WITH_REFERENCE_DESIGNATOR	MFUOWR
MANIFOLD_SOLID_BREP	MNSLBR
MANIFOLD_SURFACE_SHAPE_REPRESENTATION	MSSR
MAPPED_ITEM	MPPITM
MASS_MEASURE_WITH_UNIT	MMWU
MASS_UNIT	MSSUNT
MATERIAL_DESIGNATION	MTRDSG
MEASURE_QUALIFICATION	MSRQLF
MEASURE_REPRESENTATION_ITEM	MSRPIT
MEASURE_WITH_UNIT	MSWTUN
MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_AREA	MDGPA
MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION	MDGPR
MECHANICAL_DESIGN_SHADED_PRESENTATION_AREA	MDSPA
MECHANICAL_DESIGN_SHADED_PRESENTATION_REPRESENTATION	MDSPR
NAME_ATTRIBUTE	NMATT
NAMED_UNIT	NMDUNT

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
NEXT_ASSEMBLY_USAGE_OCCURRENCE	NAUO
NON_MANIFOLD_SURFACE_SHAPE_REPRESENTATION	NMSSR
OBJECT_ROLE	OBJRL
OFFSET_CURVE_2D	OFCR2D
OFFSET_CURVE_3D	OFCR3D
OFFSET_SURFACE	OFFSRF
OPEN_SHELL	OPNSHL
ORGANIZATION	ORGNZT
ORGANIZATION_ASSIGNMENT	ORGASS
ORGANIZATION_RELATIONSHIP	ORGRLT
ORGANIZATION_ROLE	ORGRL
ORGANIZATIONAL_ADDRESS	ORGADD
ORGANIZATIONAL_PROJECT	ORGPRJ
ORGANIZATIONAL_PROJECT_ASSIGNMENT	ORPRAS
ORGANIZATIONAL_PROJECT_RELATIONSHIP	ORP0
ORGANIZATIONAL_PROJECT_ROLE	ORPRRL
ORIENTED_CLOSED_SHELL	ORCLSH
ORIENTED_EDGE	ORNEDG
ORIENTED_FACE	ORNFC
ORIENTED_OPEN_SHELL	OROPSH
ORIENTED_PATH	ORNPTH
OTHER_LIST_TABLE_REPRESENTATION	OLTR
OUTER_BOUNDARY_CURVE	OTBNCR
OVER_RIDING_STYLED_ITEM	ORSI
PARABOLA	PRBL
PARAMETRIC_REPRESENTATION_CONTEXT	PRRPCN
PATH	PATH
PCURVE	PCURVE
PERSON	PERSON
PERSON_AND_ORGANIZATION	PRANOR
PERSON_AND_ORGANIZATION_ASSIGNMENT	PAOA
PERSON_AND_ORGANIZATION_ROLE	PAOR
PERSONAL_ADDRESS	PRSADD
PLACEMENT	PLCMNT
PLANAR_BOX	PLNBX
PLANAR_EXTENT	PLNEXT
PLANE	PLANE
PLANE_ANGLE_MEASURE_WITH_UNIT	PAMWU

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
PLANE_ANGLE_UNIT	PLANUN
POINT	POINT
POINT_ON_CURVE	PNONCR
POINT_ON_SURFACE	PNONSR
POINT_REPLICA	PNTRPL
POINT_STYLE	PNTSTY
POLY_LOOP	PLYLP
POLYLINE	PLYLN
PRE_DEFINED_CHARACTER_GLYPH	PDCG
PRE_DEFINED_COLOUR	PRDFCL
PRE_DEFINED_CURVE_FONT	PDCF
PRE_DEFINED_ITEM	PRDFIT
PRE_DEFINED_TEXT_FONT	PDTF
PRECISION_QUALIFIER	PRCQLF
PRESENTATION_AREA	PRSAR
PRESENTATION_REPRESENTATION	PRSRPR
PRESENTATION_SET	PRSST
PRESENTATION_SIZE	PRSSZ
PRESENTATION_STYLE_ASSIGNMENT	PRSTAS
PRESENTATION_STYLE_BY_CONTEXT	PSBC
PRESENTATION_VIEW	PRSVW
PRESENTED_ITEM	PRSITM
PRESENTED_ITEM_REPRESENTATION	PRITRP
PROCESS_PRODUCT_ASSOCIATION	PRPRAS
PRODUCT	PRDCT
PRODUCT_CATEGORY	PRDCTG
PRODUCT_CATEGORY_RELATIONSHIP	PRCTRL
PRODUCT_CONCEPT	PRDCNC
PRODUCT_CONCEPT_CONTEXT	PRCNCN
PRODUCT_CONTEXT	PRDCNT
PRODUCT_DEFINITION	PRDDFN
PRODUCT_DEFINITION_CONTEXT	PRDFCN
PRODUCT_DEFINITION_CONTEXT_ASSOCIATION	PDCA
PRODUCT_DEFINITION_CONTEXT_ROLE	PDCR
PRODUCT_DEFINITION_EFFECTIVITY	PRDFEF
PRODUCT_DEFINITION_FORMATION	PRDFFR
PRODUCT_DEFINITION_FORMATION_RELATIONSHIP	PDFR
PRODUCT_DEFINITION_FORMATION_WITH_SPECIFIED_SOURCE	PDFWSS

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
PRODUCT_DEFINITION_OCCURRENCE_RELATIONSHIP	PDOR
PRODUCT_DEFINITION_PROCESS	PRDFPR
PRODUCT_DEFINITION_RELATIONSHIP	PRDFRL
PRODUCT_DEFINITION_SHAPE	PRDFSH
PRODUCT_DEFINITION_SUBSTITUTE	PRDFSB
PRODUCT_DEFINITION_USAGE	PRDFUS
PRODUCT_DEFINITION_WITH_ASSOCIATED_DOCUMENTS	PDWAD
PRODUCT_RELATED_PRODUCT_CATEGORY	PRPC
PRODUCT_RELATIONSHIP	PRDRLT
PROMISSORY_USAGE_OCCURRENCE	PRUSOC
PROPERTY_DEFINITION	PRPDFN
PROPERTY_DEFINITION_RELATIONSHIP	PRDFR
PROPERTY_DEFINITION_REPRESENTATION	PRDFRP
QUALIFIED_REPRESENTATION_ITEM	QLRPIT
QUANTIFIED_ASSEMBLY_COMPONENT_USAGE	QACU
QUASI_UNIFORM_CURVE	QSUNCR
QUASI_UNIFORM_SURFACE	QSUNSR
RATIO_MEASURE_WITH_UNIT	RMWU
RATIO_UNIT	RTUNT
RATIONAL_B_SPLINE_CURVE	RBSC
RATIONAL_B_SPLINE_SURFACE	RBSS
RECTANGULAR_COMPOSITE_SURFACE	RCCMSR
RECTANGULAR_TRIMMED_SURFACE	RCTRSR
REPARAMETRISED_COMPOSITE_CURVE_SEGMENT	RCCS
REPRESENTATION	RPRSNT
REPRESENTATION_CONTEXT	RPRCNT
REPRESENTATION_ITEM	RPRITM
REPRESENTATION_ITEM_RELATIONSHIP	RPITRL
REPRESENTATION_MAP	RPRMP
REPRESENTATION_RELATIONSHIP	RPRRLT
REVOLVED_FACE_SOLID	RVFCSL
RIGHT_ANGULAR_WEDGE	RGANWD
RIGHT_CIRCULAR_CONE	RGCRCN
RIGHT_CIRCULAR_CYLINDER	RGCRCY
ROLE_ASSOCIATION	RLASS
SEAM_CURVE	SMCRV
SECURITY_CLASSIFICATION	SCRCLS
SECURITY_CLASSIFICATION_ASSIGNMENT	SCCLAS

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Table B.1 - AIM short names of entities (continued)

Entity name	Short name
SECURITY_CLASSIFICATION_LEVEL	SCCLLV
SERIAL_NUMBERED_EFFECTIVITY	SRNMEF
SHAPE_ASPECT	SHPASP
SHAPE_ASPECT_RELATIONSHIP	SHASRL
SHAPE_REPRESENTATION	SHPRPR
SHELL_BASED_SURFACE_MODEL	SBSM
SHELL_BASED_WIREFRAME_MODEL	SBWM
SHELL_BASED_WIREFRAME_SHAPE_REPRESENTATION	SBWSR
SI_UNIT	SUNT
SOLID_ANGLE_MEASURE_WITH_UNIT	SAMWU
SOLID_ANGLE_UNIT	SLANUN
SOLID_MODEL	SLDMDL
SOLID_REPLICA	SLDRPL
SPECIFIED_HIGHER_USAGE_OCCURRENCE	SHUO
SPHERE	SPHERE
SPHERICAL_SURFACE	SPHSRF
STYLED_ITEM	STYITM
SURFACE	SRFC
SURFACE_CURVE	SRFCRV
SURFACE_OF_LINEAR_EXTRUSION	SL
SURFACE_OF_REVOLUTION	SROFRV
SURFACE_PATCH	SRFPTC
SURFACE_RENDERING_PROPERTIES	SRRNPR
SURFACE_REPLICA	SRFRPL
SURFACE_SIDE_STYLE	SRSDST
SURFACE_STYLE_BOUNDARY	SRSTBN
SURFACE_STYLE_CONTROL_GRID	SSCG
SURFACE_STYLE_FILL_AREA	SSFA
SURFACE_STYLE_PARAMETER_LINE	SSPL
SURFACE_STYLE_REFLECTANCE_AMBIENT	SSRA
SURFACE_STYLE_REFLECTANCE_AMBIENT_DIFFUSE	SSRAD
SURFACE_STYLE_REFLECTANCE_AMBIENT_DIFFUSE_SPECULAR	SSRADS
SURFACE_STYLE_RENDERING	SRSTRN
SURFACE_STYLE_RENDERING_WITH_PROPERTIES	SSRWP
SURFACE_STYLE_SEGMENTATION_CURVE	SSSC
SURFACE_STYLE_SILHOUETTE	SRSTSL
SURFACE_STYLE_TRANSPARENT	SRSTTR
SURFACE_STYLE_USAGE	SRSTUS

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Table B.1 - AIM short names of entities (concluded)

Entity name	Short name
SWEPT_FACE_SOLID	SWFCSL
SWEPT_SURFACE	SWPSRF
SYMBOL_REPRESENTATION	SYMRPR
TEXT_LITERAL	TXTLTR
TEXT_STRING_REPRESENTATION	TXSRP
TEXT_STYLE	TXTSTY
TEXT_STYLE_FOR_DEFINED_FONT	TSFDF
THERMODYNAMIC_TEMPERATURE_MEASURE_WITH_UNIT	TTMWU
THERMODYNAMIC_TEMPERATURE_UNIT	THTMUN
TIME_MEASURE_WITH_UNIT	TMWU
TIME_UNIT	TMUNT
TOPOLOGICAL_REPRESENTATION_ITEM	TPRPIT
TOROIDAL_SURFACE	TRDSRF
TORUS	TORUS
TRIMMED_CURVE	TRMCRV
TYPE_QUALIFIER	TYPQLF
UNIFORM_CURVE	UNFCRV
UNIFORM_SURFACE	UNFSRF
VECTOR	VECTOR
VERTEX	VERTEX
VERTEX_LOOP	VRTLP
VERTEX_POINT	VRTPNT
VERTEX_SHELL	VRTSHL
VIEW_VOLUME	VWVLM
VOLUME_MEASURE_WITH_UNIT	VMWU
VOLUME_UNIT	VLMUNT
WIRE_SHELL	WRSHL

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Annex C
(normative)

Implementation method specific requirements

C.1 Exchange Structure

The implementation method defines what types of exchange behavior are required with respect to this part of ISO 10303. Conformance to this part of ISO 10303 shall be realized in an exchange structure. The file format shall be encoded according to the syntax and EXPRESS language mapping defined in ISO 10303-21 and in the AIM defined in annex A of this part of ISO 10303. The header exchange structure shall identify use of this part of ISO 10303 by the schema name technical_data_packaging.

C.2 Exchange structure for drawings and sheets with Identification Conformance Classes

C.2.1 Exchange structure for this part of ISO 10303

When this part of ISO 10303 is implemented independently of ISO 10303-201 or ISO 10303-202, the AIM constructs in figure C.1 shall be used in the implementation. Using this implementation method for this part of ISO 10303 does not utilize ISO 10303-505 constructs.

The left half of Figure C.1 is for the relationship between two documents, **product**. The **product_-definition_formation_relationship.relating_document** is the drawing. The **product_relation -ship.related_document** is the sheet of the drawing. The **product_relationship.name** is 'drawing membership'.

The right half of Figure C.1 is for the relationship between two document_versions, **product_definition_-formation**s. The **product_definition_formation_relationship.relating_document** is the drawing. The **product_definition_formation_relationship.related_document** is the sheet of the drawing. The **product_definition_formation_relationship.name** is 'drawing membership'.

NOTE The graphical representation in Figure C.1 is presented in EXPRESS-G.

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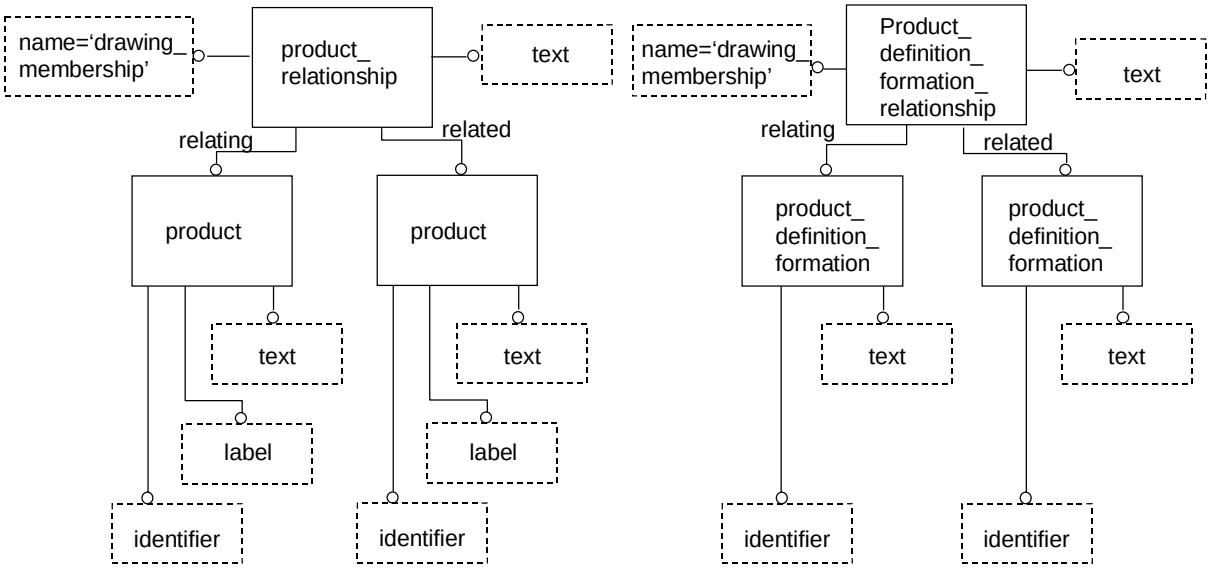

Figure C.1 - Exchange structure without ISO 10303-201 or ISO 10303-202

C.2.2 Exchange structure with ISO 10303-201 or ISO 10303-202 as sheet

When this part of ISO 10303 identifies a drawing and ISO 10303-201 or ISO 10303-202 identifies sheets of the drawing, the AIM constructs in Figure C.2 shall be used in the implementation. Using this implementation method for this part of ISO 10303 utilizes constructs in ISO 10303-505.

The ISO 10303-505 constructs that are utilized in Figure C.2 are the following:

— **drawing_sheet_revision**.

One of the product_definition_formation constructs in Figure C.2 identify the drawing. The **drawing_-sheet_revision** construct and the other product_defintition_formation in Figure C.2 identifies the sheet in the drawing.

NOTE The graphical representation in Figure C.2 is presented in EXPRESS-G.

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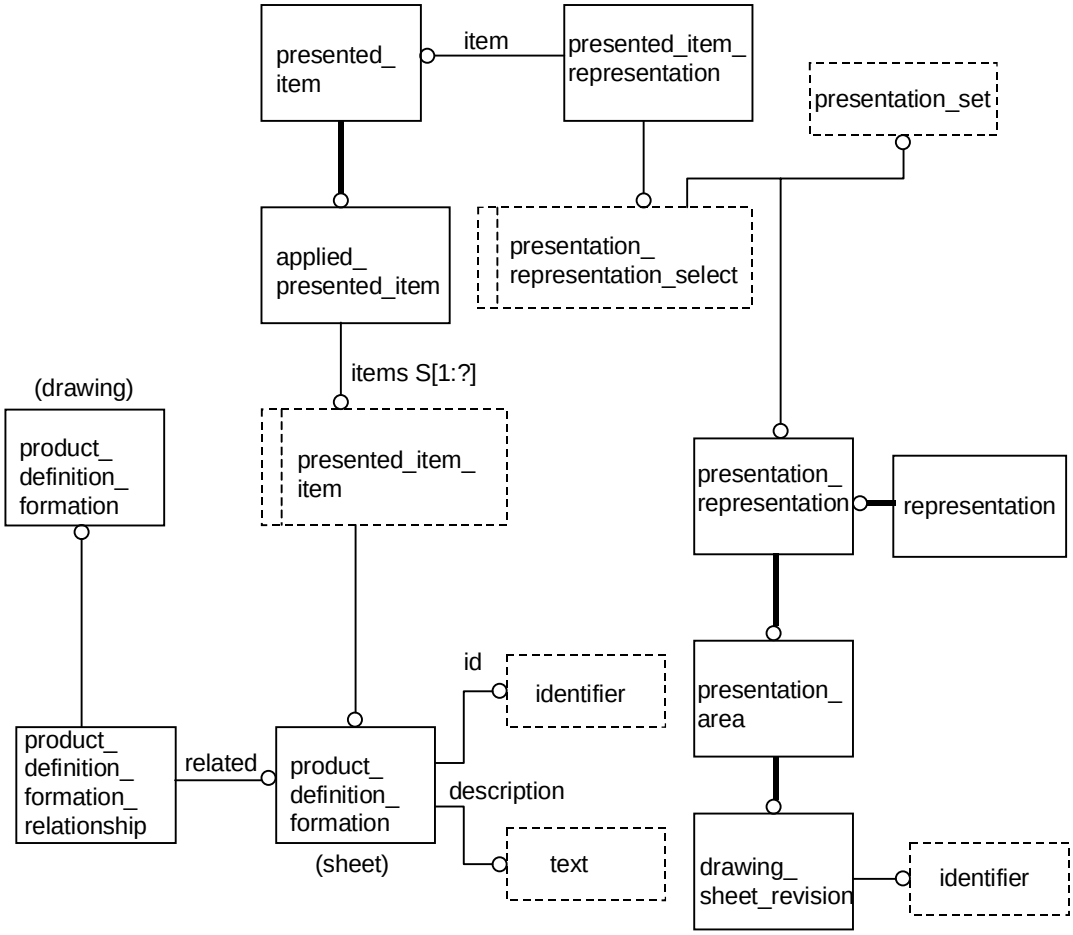

Figure C.2 - Exchange structure with ISO 10303-505 as sheet

C.2.3 Exchange structure with ISO 10303-201 or ISO 10303-202 as drawing

When ISO 10303-201 or ISO 10303-202 identifies a drawing and this part of ISO 10303 identifies sheets of that drawing, the AIM constructs in Figure C.3 shall be used in the implementation. Using this implementation method for this part of ISO 10303 utilizes constructs in ISO 10303-505.

The ISO 10303-505 constructs that are utilized in Figure C.3 are the following:

— **draughting_drawing_revision**;

— **drawing_version**.

The **draughting_drawing_revision** and **product_definition_formation** constructs in Figure C.3 identify the drawing. An o**ther pro**duct_**definition_forma**tion construct in Figure C.3 identifies the sheet information in the drawing.

NOTE The graphical representation in Figure C.3 is presented in EXPRESS-G.

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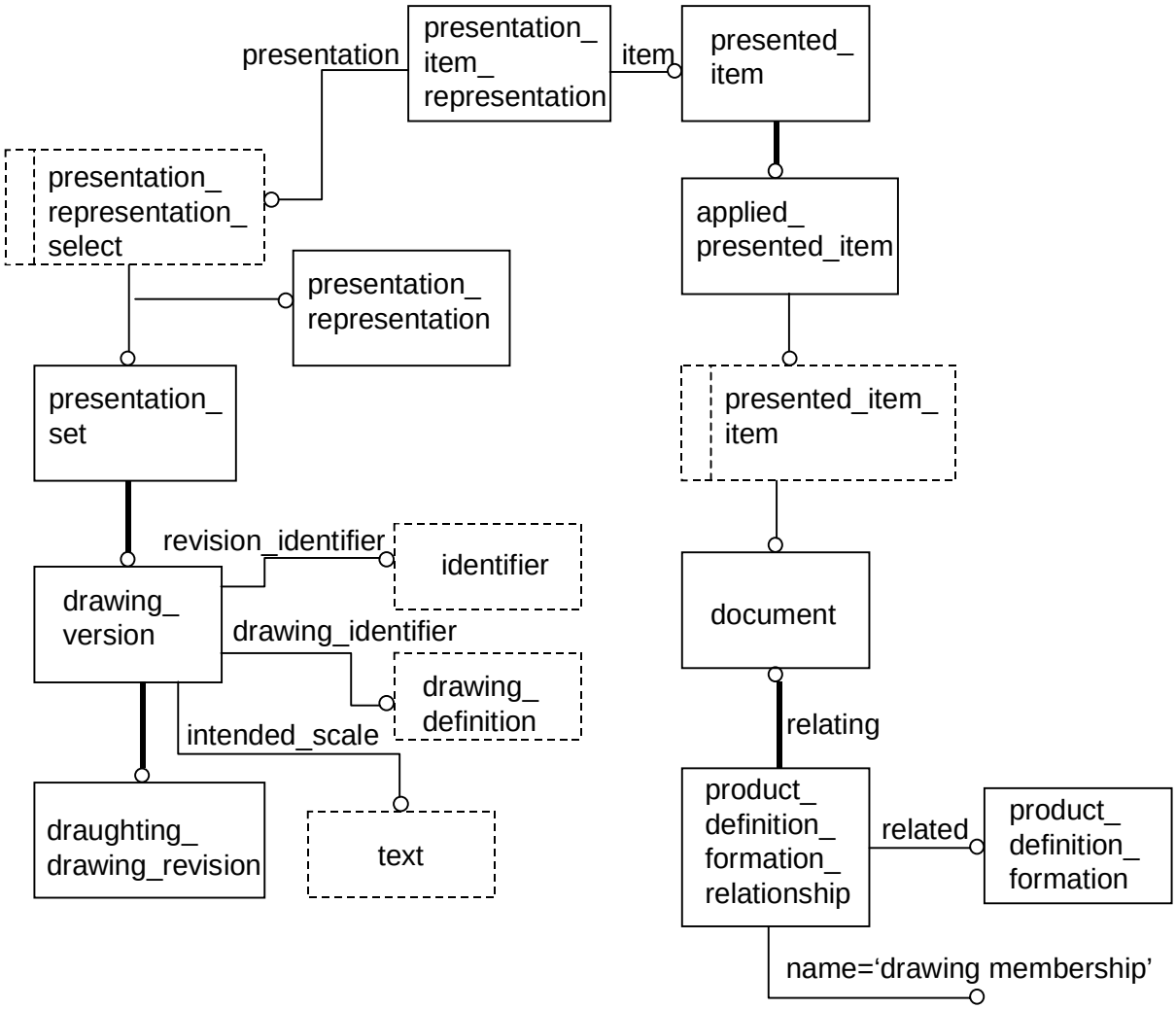

Figure C.3 - Exchange structure with ISO 10303-505 as drawing

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Annex D
(normative)

Protocol implementation conformance statement (PICS) proforma

This clause lists the optional elements of this part of ISO 10303. An implementation may choose to support any combination of these optional elements. However, certain combinations of options are likely to be implemented together. These combinations are called conformance classes and are described in this annex.

This annex is in the form of a questionnaire. This questionnaire is intended to be filled out by the implementor and may be used in preparation for conformance testing by a testing laboratory. The completed PICS proforma is referred to as a PICS.

Fourteen conformance classes are identified in this part of ISO 10303. A conforming implementation shall support at least one conformance class. Each class specifies a subset of ISO 10303-232 AIM constructs. These classes are detailed in clause 6 of ISO 10303-232.

Questions:

1. Please provide an identifier for the product or system for which conformance is claimed:

   Product name and current version number:_____

2. Please indicate the implementation method chosen:

   — ISO 10303-21 Exchange Structure -- preprocessor
   Preprocessor name and current version number:_____

   — ISO 10303-21 Exchange Structure -- postprocessor
   Postprocessor name and current version number:_____

3. Please indicate the classes for which conformance is claimed:

___ Class 1: Data definition exchange (DDE) for files;

___ Class 2: Data definition exchange (DDE) for technical data package elements;

___ Class 3: Data definition exchange (DDE) for indentured methods;

___ Class 4: Parts list;

___ Class 5: Data list;

___ Class 6: Indentured data list;

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___ Class 7: Index list;

___ Class 8: Other list;

___ Class 9: List with presentation and the following:

- ___ Class 1: Data definition exchange (DDE) for files;
- ___ Class 2: Data definition exchange (DDE) for technical data package elements;
- ___ Class 3: Data definition exchange (DDE) for indentured methods;
- ___ Class 4: Parts list (PL);
- ___ Class 5: Data list (DL);
- ___ Class 6: Indentured data list (IDL);
- ___ Class 7: Index list (IL);
- ___ Class 8: Other list (OL);

___ Class 10: Reference document identification and drawing identification;

___ Class 11: Reference document identification and drawing identification with ISO 10303-201 and ISO 10303-202 drawing presentation identification;

___ Class 12: Product data set (PDS) without presentation format;

___ Class 13: Product data set (PDS) with shading;

___ Class 14: Product data set (PDS) with presentation format.

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Annex E
(normative)

Information object registration

E.1 Document identification

To provide for unambiguous identification of an information object in an open system, the object identifier

{ iso standard 10303 part(232) version(1) }

is assigned to this part of ISO 10303. The meaning of this value is defined in ISO/IEC 8824-1 and is described in ISO 10303-1.

E.2 Schema identification

To provide for unambiguous identification of the schema specifications given in this application protocol technical_data_packaging in an open information system, object identifiers are assigned as follows:

{ iso standard 10303 part(232) version(1) object(1) technical-data-packaging-schema(1) }

is assigned to the technical_data_packaging expanded schema (see annex A);

{ iso standard 10303 part(232) version(1) object(1) technical-data-packaging-schema(2) }

is assigned to the technical_data_packaging short form schema (see 5.2).

The meaning of these values is defined in ISO/IEC 8824-1, and is described in ISO 10303-1.

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Annex F
(informative)

Application activity model

The application activity model (AAM) is provided as an aid to understanding the scope and information requirements defined in this application protocol. The model is presented as a set of figures that contain the activity diagrams and a set of definitions of the activities and their data. The application activity model is given in Figures F.1 through F.17. Activities and data flows that are out of scope are marked with an asterisk for the definitions.

The viewpoint of the application activity model is from the engineer that has developed the Technical Data Package and from the engineer that must utilize the Technical Data Package in the operation and support of the product.

The original AAM [14] for this part of ISO 10303 was for an aerospace manufacturer composite structural part. From the original AAM, there has been refinement at the higher level to encompass the operations and support aspects of the product and some generalization at the lower levels to accommodate all technical data packages. The activities for an aerospace manufacturer are more detail and involve more supporting activities than most industrial practices for TDP preparation. Thus, the industrial TDP preparation practices will be accommodated.

Product Data Management (PDM) Systems product and document configuration activities are implied in many of the AAM activities. A key aspect of the scope of this part of ISO 10303 is to support configuration controlled exchange for technical data among PDM systems.

The AAM in this annex is focused on the activities that are used to create, format, and manage a product's full design and disclosure description, plus the activities that receive and utilize this information. Within this focus, this part of ISO 10303 will provide a link between ISO 10303-203 and ISO 10303-202. The ISO 10303-201 and ISO 10303-202 AAMs are focused on the act of capturing the geometric drawing without respect to what the product is. ISO 10303-203 is focused on capturing the configuration and geometric information of the product design without respect to the geometric drawing.

The AAM presented in ISO 10303-201 and ISO 10303-202 are representative of a designer who is required to document only the geometric aspects of a drawing and the annotation for that geometry. The ISO 10303-201 and ISO 10303-202 AAMs do not preclude the documentation of associated lists (e.g., parts list, data list, and index list) information that is typically considered within a documentation package for a product, but they do not explicitly require the capture of that information nor do they capture that information in an intelligent manner. This part of ISO 10303 does capture associated lists in an intelligent computer interpretable manner, plus provides equivalent ISO 10303-201 and ISO 10303-202 capabilities, that are incoporated into an overall technical data package.

The AAM presented in ISO 10303-203 is also representative of a viewpoint from a designer. The ISO 10303-203 AAM highlights the capture of the product structure, the engineering change history, and the nominal shape of the product. However, ISO 10303-203 does not address tolerancing and drawing presentation (these are addressed in ISO10303-201 and ISO 10303-202).

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This part of ISO 10303 will also capture the product structure, the engineering change history, and the nominal shape of a product, plus provide that information from a document configuration view.

F.1 Application activity model definitions

The following terms are used in the application activity model. Terms marked with an asterisk are outside the scope of this application protocol.

The definitions given in this annex do not supersede the definitions given in the main body of the text.

F.1.1
Acquire and Review Procurement Data
assimilates the technical aspects of the procurement data and reviews the technical aspects of the procurement data for completeness, consistency, currency, and applicability to a procurement of the Product

F.1.2
Analyze Requirements and Develop Modification
the analysis of the modification requirements, including field changes, and development of an initial modification for the Product plan for the Product.

NOTE This activity also determines if a modification satisfies the modification requirements and approves the modification for use in the field.

F.1.3 Anomaly Reports *
documentation analyzing the rejection of production parts for feedback to design and production planning

F.1.4
Apply Product Dimensions & Tolerances
the attachment of all the necessary dimensions and tolerances to the geometry of the drawing

F.1.5
Approved Modifications
the Product modifications that have been approved for manufacture and deployment to the field

F.1.6
Approved Modifications & Product Data
the Product modifications and Product data that has been approved for manufacture and deployment to the field

F.1.7
Approved Procurement Data
the technical aspects of the procurement data for a Product that has been approved for competitive procurement

F.1.8
Approved Product Data
the Product data that has been approved for manufacture of the modified Product

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F.1.9
Approved Product Data List
list of product data that have been approved to be used in the list next life cycle step

F.1.10
Approved Product Reqs.
the functional and cross-functional requirements that have been reviewed and approved as being specific to a Product

NOTE They include the technical performance constraints of the various functions along with the envelope features that are desired. The pertinent functions are from the Manage, Design, Build, and Support activities.

F.1.11
Archive Product Data*
the off-line storage of all product models, drawings, and referenced documentation for future use or as part of a disaster recovery program

F.1.12
Attach Product Engineering Notes
the attachment of all the Product engineering notes on the drawing

NOTE They specify process specifications, change notes, material callouts, etc.

F.1.13
Authorized Procurement Data
the technical and business procurement data that is authorized to be released for competitive procurement

F.1.14
Available Procurement Data
the procurement data that was available for a Product

F.1.15
Build and QA a Product*
the conversion of a design into a finished product and quality assurance functions that assure that the product meets requirements

NOTE This is usually an iterative function, continuing substantially throughout the product's life cycle. It receives the design from design functions and outputs the products, spare and repair parts, and technical data on each instance of the product.

F.1.16
Build Product Associated Lists
the building of the Associated Lists that accompany the Product design

EXAMPLE for a structural part - a parts list, a data list(s), an application list, indentured data list

F.1.17
Build Product Model & Drawing Tree
the building of a model/drawing tree that specifies the combinations of items used to create the Product

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F.1.18
Changes due to Manufacturing Site Limitations
the changes to the Product information due to limitations of the Customer's manufacturing organization (e.g., lack of equipment)

F.1.19
Changes due to Production
the changes to the Product information due to manufacturing limitations (e.g., blemishes and schedule) that will still allow use of the Product

F.1.20
Changes due to Production Process Development
the changes to the Product information due to limitations of processes within the Customer's manufacturing organization (e.g., high tolerance requirements)

F.1.21
Collect, Review, Define & Distr. Product Reqs.*
the collecting, reviewing, defining, and distributing structural, cross-functional engineering, build, QA, and logistic support requirements of the Product

F.1.22
Collected Product Baseline Data
all the referenced documentation (i.e., specifications, standards, and other referenced documents) called out on the face of the drawing, along with all the required input geometry, system, and drawing data

F.1.23
Collected Product Baseline Drawing Data
all the drawing data from the selected Product preliminary design, test data, and producibility and maintainability studies

F.1.24
Collected Product Baseline Geometry
all the selected Product preliminary design geometry and other associated producibility and maintainability studies geometry

F.1.25
Collected Product Baseline Ref. Docs.
all the referenced documentation (i.e., specifications, standards, and other referenced documents) called out on the face of the drawing

F.1.26
Collected Product Baseline System Data*
the standard features of the available CAD systems' hardware and software configurations

F.1.27
Company & Customer Review Stds
the documentation that ensures that the model has satisfied certain company and customer standards for quality and completeness

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F.1.28
Competed Spares
the Product that will be competitively competed for manufacture

F.1.29
Conduct Product Prelim. Design & Analysis
the designing and anlysis of various Product concepts in order to trade performance, cost, and producibility parameters for selecting an optimum Product concept

F.1.30
Conduct Product Prototype Tests & Eval.*
all the physical and electronically simulated tests and evaluation of Product prototypes

F.1.31
Config Data
the configuration information of the product

F.1.32
Constraints of Selected Systems*
the limitations of the selected systems

EXAMPLE the limitations of data producing systems to output specific types of product data

F.1.33
Control Production*
plans the allocation of manufacturing resources to tasks defined in the manufacturing plan and produces detail shop authorization, including material, to perform the manufacture of the Product

F.1.34
Create Detail Product Design
the creation of the detail Product design based on inputs from the preliminary design phase and concurrent analyses

F.1.35
Create Product 2-D Layout*
the creation of the Product 2-D layout view geometry using conventional 2-D drawing entities within the selected construction planes

F.1.36
Create Product 3-D Wireframe*
the creation of the Product 3-D wireframe geometry using conventional 3-D drawing entities

F.1.37
Create Product Drawing Data
the creation of all the Product drawing data from the geometry and engineering specifications inputs using the selected systems

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F.1.38
Create Product Informational Drawings
the creation of all supplemental drawings used in the development of the design

EXAMPLE logic diagrams or printed circuit board schematics, wiring diagrams, mechanical schematics, loading diagrams, etc

NOTE These drawings may or may not be considered deliverable under the terms of the development contract and therefore may have varying degrees of formalness or drawing completeness

F.1.39
Create Product Layouts & Models
the creation of all of the necessary Product geometry layouts and models from the various inputs and prepare the data for transfer to other functions

F.1.40
Create Product Surface*
the creation of the Product surface geometry using conventional surface modeling entities

F.1.41
Create Product Solid Model*
the creation of the Product solid geometry using conventional or specialized solid entities

F.1.42
Data Lists
the listings of all engineering drawings, associated lists, specifications, standards, and subordinate data lists pertaining to the item to which the data list applies

F.1.43
Define Production Processes
the detail process steps and raw material requirements to manufacture a Product within the Customer's organization

F.1.44
Design and Analyze a Product
the complete design and analysis life cycle from the pre-proposal phase to product support in the field

F.1.45
Des. Reqs. Chgs. *
the changes from design activity resulting preliminary and detail design analysis

F.1.46
Design Staff & Tools*
personnel and tools from the contractor, the customer, and materials supplies

F.1.47
Det. Des. Reqs. Chgs.*
changes based on the analysis, producibility, and maintainability results

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F.1.48
Detail Process Plan*
the detail process documentation of the process that is used to control the manufacture of a Product within the Customer's organization

EXAMPLE what types of machines for what processes

F.1.49
Detail Product Design Data
all the models, drawings, and parts list that make up the Product

F.1.50
Detail Product Item Drawings
all the design details of the subcomponents and assembly of the Product

F.1.51
Detail Product Test Reqs.*
the Product test requirements based on the design and analysis of the Product

F.1.52
Develop & Provide Product Materials*
the material suppliers' process of creating stock material for manufacturers

NOTE Basic material properties and allowables are addressed here.

F.1.53
Develop Modification Product Data
the development of the technical Product data for an initial prototype of the modified Product

NOTE This includes product data related to manufacture of the Product and to installation of the Product.

F.1.54
Develop Modifications
develop modifications due to excess field problems with the Product, with a change in requirements for use of the Product, field requested enhancements to the Product

F.1.55
Develop, Procure, Build, Use and Maintain a Product
the entire life cycle of a Government or Commercial Industry Product as viewed from the combined activity groupings of needs analysis and procurement; product development and fabrication by contractors, subcontractors, and raw material suppliers; and product use and maintenance

F.1.56
Develop Product Needs & Procurement*
the Customer's analysis of the Product requirements based on the customer's needs and the state of Product technologies, along with the procurement process throughout the life cycle as managed by the Customer

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F.1.57
Develop Prototype
manufactures the prototype of the Product for testing

F.1.58
Dimensioned & Noted Product Details
the dimensioned, toleranced, and noted Product details as they would appear on a completed detail drawing

F.1.59
Dimensioned Product Details
the dimensioned and toleranced Product details as they would appear on the drawing

F.1.60
Dwg Prep Stds
documentation that determines how the Product models and administrative data are all presented in a standard format on a drawing

F.1.61
Exchange Prelim. Design Data*
exchanging preliminary design data with development partners, customers, and other off-site facilities for the purpose of reviewing developed design data or off-loading design tasks

F.1.62
Exchange Pre-Release Detail Design Data*
exchanging pre-release detail design data with development partners, customers, and other off-site facilities for the purpose of reviewing developed design data, off-loading design tasks, or exchanging the data as a deliverable product

F.1.63
Exchange Post-Release Detail Design Data
exchanging post-release detail design data with development partners, customers, and other off-site facilities for the purpose of reviewing developed design data or exchanging the data as a deliverable product

NOTE The data may be used to document/qualify the configuration of the product or used to support logistics functions.

F.1.64
Field Maintenance Changes & Revision History
the reviewed field/maintenance changes that result from in-field use of the Product and the history of these changes in the field

F.1.65
Field/Maint. Changes
the reviewed field/maintenance changes that result from in-field use of the Product

F.1.66
Field Changes*
the reviewed field changes that result from in-field use of the Product

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F.1.67
Indentured Data List
the listing of all the engineering drawings, associated lists, and referenced documents pertaining to the level of product data package which applies

F.1.68
Field Product

the physical product that has been used in its field of operation

NOTE The product may or may not be usable.

F.1.69
Index List
the listing of all the data lists pertaining to the level of product data package which applies

F.1.70
Integrate & Prepare Product Assembly Drawings
integrate and prepare all of the items that make up the Product into an integrated assembly drawing

F.1.71
List Prep. Stds.
the national and company development standards, or the contractual requirements for list development, that define and regulate list format and content

F.1.72
Local Manufacture
the support activity for manufacture of additional Product within the Customer's organization

F.1.73
Maintain Native Format Detail Design Data*
sustain the detail design data elements developed for a product in the native systems in which the data was developed

NOTE The data is maintained in these systems for use by users and automated applications until the time when it is no longer useful or cost-effective to keep the data in the system.

F.1.74
Manage a Product Development*
managing all the resources specific to the Product through the design, build, and support functions

NOTE This includes people, budgets, tools, materials, etc.

F.1.75
Manage Config. of Product Data*
the configuration management of all the data produced in the design development of the Product

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F.1.76
Manage, Design, Build and Support a Product
the resource management, designing, building, and supporting of a typical Product, as done at the prime contracting company

F.1.77
Manufacturing Authorization*
the authorization to proceed in the manufacture of a Product

NOTE This includes work order information, quantity, schedule, etc.

F.1.78
Manufacturing Plan*
the overall Customer organization plan for manufacture of a product

F.1.79
Material Properties
the properties of the Product material that are used in the development of the modified Product Data

F.1.80
Material Specs & Reqs
definition of material composition, form, and performance requirements, along with orders procuring the material

F.1.81
Missing Procurement Data
the technical aspects of the procurement data that are missing and have to be present for manufacture of a Product

F.1.82
Model Prep Stds
documentation that describes how the Product models are all prepared to a minimum standard for the preparation of the geometry and associated engineering notes for the Product

F.1.83
Model & Dwg. Prep. Stds*
documentation that describes how the Product Models and Drawings are all prepared to a minimum standard for the preparation of the geometry and associated engineering notes for the Product

F.1.84
Modification Installation Plan*
the plan for installation of the modified prototype Product

F.1.85
Modified Product Test Results*
the results of the installation and testing of the modified prototype Product

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F.1.86
Modification Test Plan Requirements*
the requirements for the testing of the Product

F.1.87
Modified Procurement Data
the technical aspects of the procurement data that were modified due to repair, modification, or change in requirements

F.1.88
Modified Product *
the Product that has been modified due to repair, change in requirements, or request for Product enhancement from the field

F.1.89
Modified Product Data
the Product data that has been modified for manufacture of a modified Product prototype

F.1.90
Mods
collection of information that is used to facilitate the creation of a modification to the Product

F.1.91
Mods to be Manufactured Locally
modifications to the Product that are to be manufactured within the Customer's organization

F.1.92
Mods to be Procured
modifications to the Product that are to be procured through competitive procurement

F.1.93
Non-Competed Spares
the identification of the Product that will be manufactured within the Customer's organization and will not be competitively competed for manufacture

F.1.94
Operate Product
the operation of the Product in the field

F.1.95
Other Lists
other lists which are prepared as part of the product data package

EXAMPLE wire lists, route lists, application lists, etc.

F.1.96
Parts List
documentation listing the parts and bulk materials (except those materials that support a process) used in the item

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F.1.97
Perform Cross-Funct. Product Reviews & CDR Functions*
the performance of the necessary cross-functional and customer design reviews to support the critical design review phase

F.1.98
Perform Product Detail Design & Analysis
creating and evaluating the Product design description and documenting it in sufficient detail to meet the desired performance, cost, and production goals

F.1.99
Perform Production Design & Anal. Support
testing the selected preliminary Product design concept and developing it in sufficient detail to meet the desired performance, cost, and production goods

F.1.100
Perform Production Processes
performs the actual manufacture of the Product within the Customer's organization

F.1.101
Perform Repairs
repairing the Product based on usage of the product in the field

F.1.102
Plan for Product Operation and Support
the planning of operation and support of the Product in the field

F.1.103
Pre-Rel. Product Design Data
the pre-released production support design and analysis data of the Product

F.1.104
Pre-Rel. Product Prelim. Data
the Product preliminary design and analysis data befre it is formally released by the owning organization

F.1.105
Prelim. Des. Reqs. Chgs.*
documentation of the preliminary design requirements changes based on the analysis, producibility, and maintainability results

F.1.106
Prelim. Funct. Reqs.*
the preliminary performance criteria the Product must meet

F.1.107
Prelim. Product Test Reqs.
the preliminary Product test requirements based on the preliminary design and analysis of the Product

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F.1.108
Prepare and Collect Baseline Product Design Data*
the development of all necessary referenced documentation not already in existence and the collection of the referenced documentation and all other baseline design information required to develop a design of the product

EXAMPLE standard part drawings, material and process specifications, company fabrication standards, the selected preliminary design, test data, producibility, maintainability studies, etc.

F.1.109
Prepare & Coordinate Signature Process
coordination of the distributing and collection of drawings that are to be reviewed and signed off by each reviewer

F.1.110
Prepare & Release Product AMRs*
the preparation of the Advanced Material Requests (AMR)s the engineering function sp long lead time material will be in inventory when needed

F.1.111
Prepare Data Lists
the development of a tabulation of all engineering drawings, associated lists, specifications, standards, and subordinate data lists pertaining to the item to which the data list applies and essential in-house documents necessary to meet the technical design disclosure requirements except for those in-house documents referenced parenthetically

F.1.112
Prepare Detail Product Item Drawings
creation of the drawing that contains the detail description of a product

F.1.113
Prepare Indentured Data List
tabulates all the associated lists and reference documents for a given drawing

NOTE As an alternative to the preparation of Data Lists and an Index List, an Indentured Data List may be prepared. Optionally, the Indentured Data List may tabulate all the associated lists and referenced documents for each part number identified within a given drawing. As with the index list, the Indentured Data List may reflect a listing of a single product data package or several product data packages.

F.1.114
Prepare Index List
the preparation of a tabulation of the data lists

NOTE The index list may reflect a listing of a single product data package (i.e., a drawing and its immediate associated data/documents) or several product data packages. Other index lists may be prepared. However index lists which reflect tabulations other than data lists are prepared and treated under Activity A223245, "Prepare Other Lists".

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F.1.115
Prepare Parts Lists
the preparation of a tabulation of all parts and bulk materials (except those materials that support a process) used in the item

NOTE Referenced documents may also be tabulated on parts lists. Items listed on subordinate assembly parts lists or specified in a referenced document are not repeated in the using assembly parts list unless it is necessary to limit options permitted by the subordinate document. In-house documents for in-house use only, may be referenced parenthetically.

F.1.116
Prepare Other Lists
the preparation of other lists which are prepared as part of the product data package

NOTE preparation of other lists include wire lists, route lists, application lists, etc.

F.1.117
Prepare Procurement Package
assimilates the technical and business procurement data, coordinates with the Product procurement requirements, and prepares a procurement package for competitive procurement

F.1.118
Prepare Product Data for Use
archiving for future reference, converted to a transfer format in preparation for data exchange with downstream activities, or maintained in native format for reference by downstream activity usage & maintenance functions

F.1.119
Prepare Product Details
the preparation of the Product details to resolve the interfaces, joints, size, and the development of the detail part drawings

F.1.120
Prepare Product Installation Drawings
the preparation of the other subassemblies or assemblies that the Product is used on are shown on specific installation drawings

F.1.121
Prepare Product Models & Drawings
the preparation of the Product models and drawings using the reviewed design inputs and creating the necessary outputs for other functional uses

F.1.122
Procure Spares and Manage Procurement
manages the process of competitive and non-competitive procurement of a Product and distribution of the additional Product to the field

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F.1.123
Procured Product
the actual procured Product

F.1.124
Procured Products & Information
the as-built Products and Information as purchased from outside associates or subcontractors

NOTE It includes not only the procured products, but also their respective drawings and material information such as stock, material properties, etc.

F.1.125
Product*
the as-built Product development

F.1.126
Product 2-D Layout
the 2-axis general layout and spatial arrangement views of the Product

F.1.127
Product 3-D Wireframe
a 3-D view of the Product features using conventional 3-D modeling entities that show the edges

F.1.128
Product AMRs*
the Advanced Material Requests by engineering of Product components that will be in inventory for the build cycle

F.1.129
Product Analysis Constraints*
constraints or limitations based on the analysis done on the Product

EXAMPLE strength limits for structural parts

F.1.130
Product Analysis Dwg. Changes
the changes that are recommended due to the analysis is reflected as redline marks to the design drawings

F.1.131
Product As-Built Definition Package
the as-built configuration management data of the Product

F.1.132
Product Assembly Drawings
pictorial showing how the detail component items are positioned in an assembly

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F.1.133
Product Associated Lists
lists consisting of component constituent, part relationship, and document relationship tabulations that help to define the Product

EXAMPLE Parts List, Application List, Data List

F.1.134
Product Budget & Schedule
the projected cost and time it will take to develop the Product

F.1.135
Product Build Changes
changes that occur during the production process of the Product

F.1.136
Product Bus. Mgmt. Data
all the budget, cost, schedule, and people data used in the Product development

NOTE This also includes information such as contract number, design activity, etc.

F.1.137
Product Component Interface*
all the component interfaces that mate with the Product

F.1.138
Product Contract
the business arrangement for the Product development as received from the customer

F.1.139
Product Data Modification Requirements
the requirements for modification of the Product data in the development of a modification and subsequent use in a prototype modified Product

F.1.140
Product Design Data
all the configuration managed design and analysis information that occurs for preliminary, detail, and production support phases of the Product

F.1.141
Product Design History*
all the similar design activities that have created data that is similar to the Product

F.1.142
Product Details
all the design data required of the Product as a result of mating interfaces and joints, and internal design, and manufacturing considerations

NOTE This all takes the form of drawings and parts lists that are distributed to other user functions.

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F.1.143
Product Dev. Info.
all technical design data, business management data, and logistics support data used in the design, fabrication, and logistics support of the Product

F.1.144
Product Dev. Standards
the documentation of the national and company product development standards that apply to the Product

F.1.145
Product Dev. & Maintenance Techniques*
documentation of processes and methods for Product Development, Maintenance, and Material Development

F.1.146
Product Development Techniques*
processes and methods involved in the design, analysis, and build procedures and specifications used within Industry

F.1.147
Product Drawings
all the necessary component and assembly drawings

NOTE They include informational, component, assembly, and installation drawings

F.1.148
Product Informational Drawings
supplemental drawings such as schematics and diagrams

F.1.149
Product Installation Drawings
drawings that show how the Product is installed in other assemblies

F.1.150
Product Layouts & Models
all the two dimensional geometry required of the design and the appropriate geometry required of the design.

F.1.151
Product Maintenance Techniques*
the Maintenance Techniques as practiced in the field

F.1.152
Product Material Allowables
the characteristics of representative material and shape combinations of items within a Product

EXAMPLE strength or fatigue properties for structural parts

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F.1.153
Product Material Development Techniques*
processes and methods as practiced by the material suppliers

F.1.154
Product Material Properties
the properties of the material that is used in the manufacture of a Product

F.1.155
Product Model & Dwg. Tree
the hierarchical relationships of the drawings and models of the Product

F.1.156
Product Models & Drawings
all the geometry and associated engineering notes for the Product

F.1.157
Product Modification Requirements*
modification requirements as dictated from use of the Product in the field, repair, or support requirements

F.1.158
Product Plan*
the plan for operating and maintaining the product in the field

F.1.159
Product Prelim. Build System Descr.*
description showing the system view of the manufacturing activities and resources needed to support the production of the Product

F.1.160
Product Prelim. Bus. System Descr.*
description containing the system relationships of the budget, schedule, and costs of a preliminary Product

F.1.161
Product Prelim. Design Sys. Descr.
description showing the functional, geometrical, and fit-up as of a preliminary Product using a graphical/ textual system engineering language

F.1.162
Product Preliminary Logistics System Description*
description showing the system view of the relationship between the logistics engineering, reliability and maintainability, spares, and training systems of a preliminary Product design

F.1.163
Product Producibility & Log Data & Build Changes
the as-built configuration management data of the Product that must be incorporated into the documentation of the designed Product

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F.1.164
Product Prototypes*
of all the pre-production physical or electronic models of the Product

F.1.165
Product Raw Material*
the raw material for the Product

NOTE The raw material may be another Product or may be stock material.

F.1.166
Product Raw Materials & Material Properties
all of the raw materials as received from the material supplier

NOTE These are for the item(s) of the Product. It includes the properties of the material as well as the rough material: stock.

F.1.167
Product Review Data*
data that has been or is about to be reviewed by the customer

F.1.168
Product Solid Model
the graphical representation of the Product using boundary representation (B-REP) or constructive solid geometry (CSG) elements

F.1.169
Product Surface
the graphical rendering of the boundary faces of the part using surface geometry elements

F.1.170
Product Spares*
Production Parts which have been procured or manufactured for logistical and maintenance support of a product

F.1.171
Product Support Logistics Data*
of all the logistics engineering, reliability and maintainability, technical and maintenance, documents, and spares data needed to support the Product

F.1.172
Product Support Logistics Data & Build Changes
all the logistics engineering, reliability and maintainability, technical and maintenance, documents, and spares data needed to support the Product

NOTE It also includes any required changes that must be incorporated into the documentation of the designed Product so that appropriate support can be achieved.

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F.1.173
Product Test Data*
all of the test data from the verification tests of the product and its subcomponents

F.1.174
Production Part*
the final manufactured component, assembly, or product that has been produced

F.1.175
Production Status*
the status of shop machinery, personnel, schedule, and other data related to the shop floor completing the manufacture of the Product

F.1.176
Prototype Product*
the prototype product that is to be installed and tested for possible use in the field

F.1.177
Receive, Review, and Plan Manufacturing Requirements*
assimilates the manufacturing requirements and plans for manufacture of the Product within the Customer's organization

F.1.178
Reference Documentation
all specifications, national and company standards, and all other documents which can be referenced from the face of a drawing and are necessary for completing the Product's design disclosure

EXAMPLE Material and process specifications, drawing interpretation and fabrication practices, engineering instructions

F.1.179
Referenced Documents
all specifications, national and company standards, and all other documents which are referenced from the face of a drawing and are necessary for completing the Product's design disclosure

EXAMPLE Material and process specifications, drawing interpretation and fabrication practices, engineering instructions

F.1.180
Review Product Baseline Geom. Data & Select Construction Planes*
the review of all the different forms (paper, translated, native) of Product baseline geometry and select the Product construction planes that render the desired views of the Product for top, front, side, or cross-section details

F.1.181
Reviewed 2-D Baseline Geometry
the data that was received from design support sources which support the geometry development by the Product

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F.1.182
Reviewed 3-D Baseline Geometry
the data that was received from design support sources which support the geometry development by the Product

F.1.183
Select & Detail Product Views
the selection and detailing of the necessary Product views based on the typical top, front, side, and cross-sections needed to show the desired features

F.1.184
Select & Prepare Model/Draft. System*
the selection and preparation of the modeling/drafting geometry system to be used for the detail design phase of the Product

F.1.185
Selected Dwg. Sys.*
the selected drawing system needed to support the detail design stage

F.1.186
Selected Mod./Dwg. Sys.*
the selected modeling system and drawing system needed to support the detail design stage

F.1.187
Selected Modeling Sys.*
the selected modeling system needed to support the detail design stage

F.1.188
Selected Product Construction Planes
the associated cartesian axes of the top, front, side, or cross-section views desired of the Product

F.1.189
Selected Product Prelim. Des.
the Product preliminary design selected from the various concepts that were evaluated against one another

F.1.190
Selected Product Views
the top, front, side, and cross-section views necessary to show the geometric features

F.1.191
Selected Sys. Constraints*
the inherent drafting or modeling technique constraints of the design toolset

F.1.192
Selected View Constraints
the construction planes of the top, front, side, or cross-sections that are location dependent

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F.1.193
Shop Work Order*
the shop authorization to proceed with the manufacture of a Product

NOTE It includes the detail process plan, quantity, schedule, etc.

F.1.194
Spares Procurement
the support activity for procurement of additional Product to support the operation of the Product in the field

F.1.195
Spares to be Manufactured
the identification of the Product and the quantity of product that is to be manufactured within the Customer's organization

F.1.196
Staff & Tools*
personnel and tools from the contractor, the customer, and materials supplier

F.1.197
Support Logistics of a Product*
logistics engineering, reliability and maintainability design studies, technical and maintenance documents, spares, and training systems that the Product repairs

F.1.198
Support Product
the support of the Product outside of the field activities

F.1.199
Tested Product Prototype*
all the pre-production physical or electronic models of the Product that have been tested

F.1.200
Update Product Drawing & Model Data*
the update of the Product drawings and models based on the changes to the Product

F.1.201
Updated Product Models & Drawings
the updated Product drawings and models that have incorporated the most recent design changes

F.1.202
Use & Maintain a Product
the Customer's use and maintenance of a Product

NOTE It also includes repair, redesign, and modification activities of a Product at the servicing location.

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F.1.203
Useable Product*
the product in a useable condition

NOTE The product may have undergone revision, repair, retrofit, and/or maintenance. The product may be a spare.

F.1.204
Used Product*
the Product as a result of use in the field

F.1.205
Validate, Revise, and Store Procurement Data
validates that the technical aspects of the procurement data is valid for a particular procurement, modifies the technical aspects of the procurement data (if appropriate), stores the technical procurement data, determines if the procurement will be competitive or non-competitive, and approves the technical content of the procurement data for a Product

NOTE If data is missing or not useable, this activity initiates remedial action to acquire the required data.

F.2 Application activity model abbreviations

The following abbreviations are used in the diagrams:

AAM Application Activity Model;

AMR Advanced Material Requests;

Anal. Analysis;

AP Application Protocol;

Bus. Business;

CDR Critical Design Review;

Chgs. Changes;

Config. Configuration;

Des. Design;

Descr. Description;

Det. Detail;

Dev. Development;

Docs. Documents;

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Dwg.	Drawing;
Eval.	Evaluation;
Funct.	Functional;
IML	Inner Mold Line;
Info.	Information;
Maint.	Maintenance;
Matl.	Material;
M/D/B/S	Manage/Design/Build/Support;
Mgmt.	Management;
Mod.	Modeling;
Mods.	Modifications;
M&P	Materials & Processes;
OML	Outer Mold Line;
PDES	Product Data Exchange using STEP;
Prelim.	Preliminary;
Prep.	Preparation;
Prop.	Property;
QA	Quality Assurance;
Rel.	Released;
Reqs.	Requirements;
Stds.	Standards;
STEP	STandard for the Exchange of Product model data;
Sys.	System;
TDP	Technical Data Package;
Tol.	Tolerance.

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F.3 Application activity model diagrams

The application activity model diagrams are given in Figures F.1 through F.17. The graphical form of the application activity model is presented in the IDEF0 activity modeling format. Activities and data flows that are out of scope are marked with a dashed box or a dashed line, respectively.

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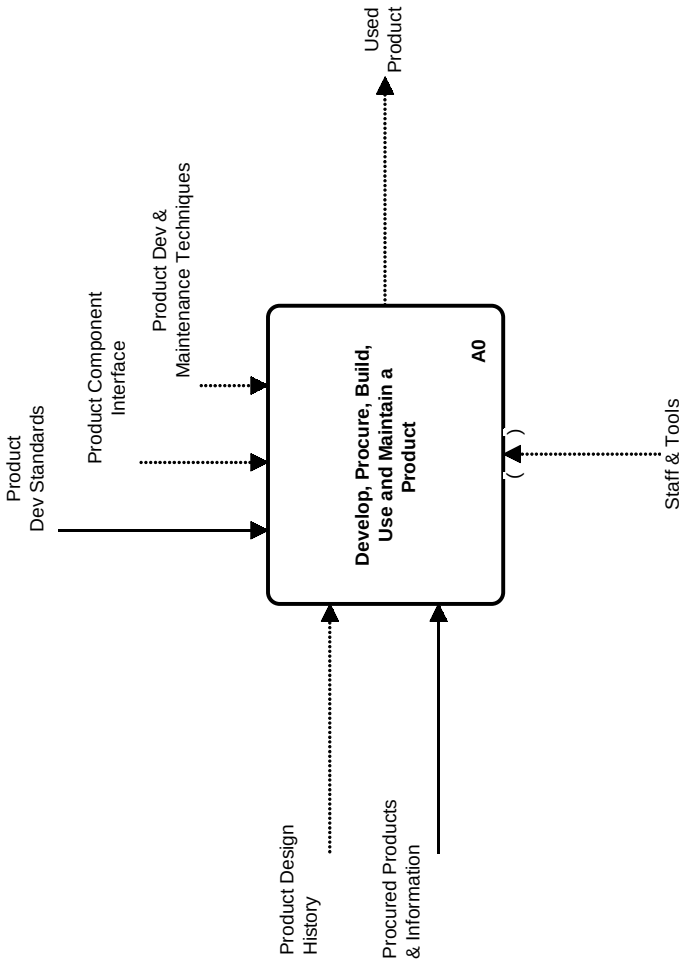

Figure F.1 - A-0: develop, procure, build, use, and maintain a product

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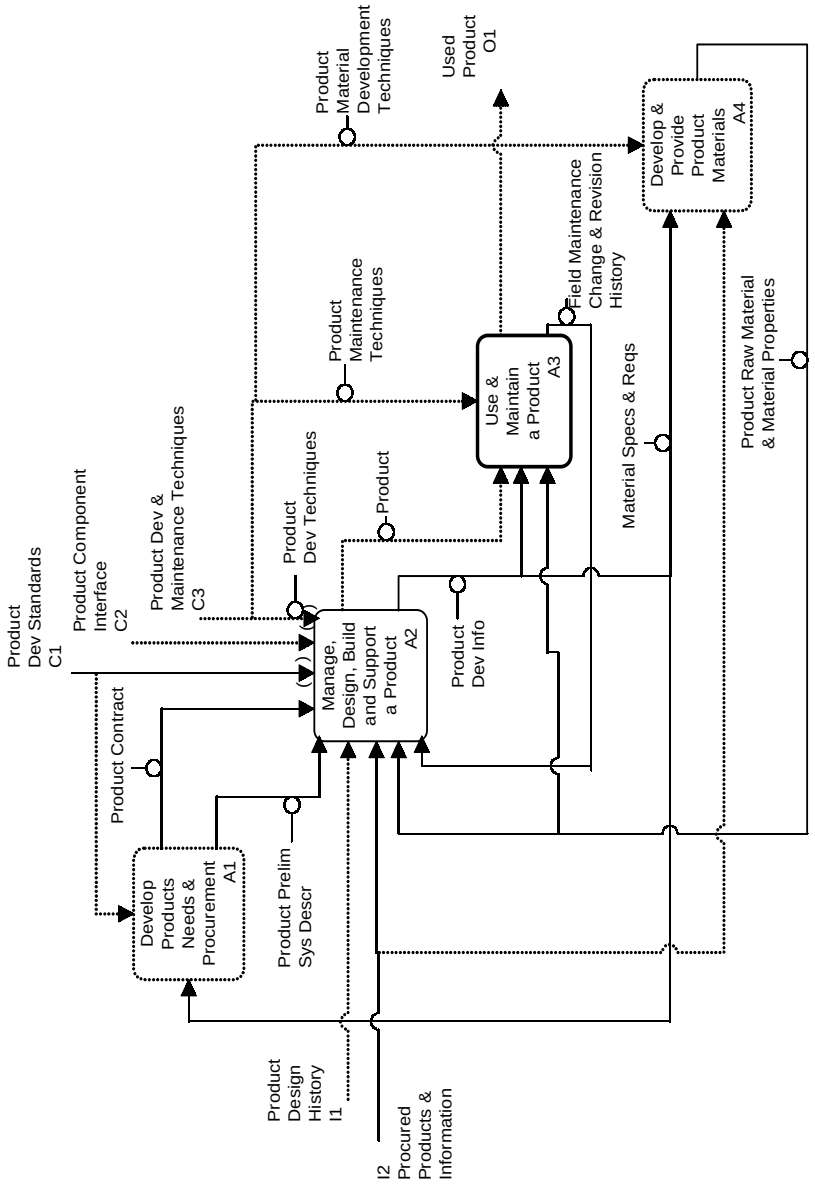

Figure F.2 - A0: develop, procure, build, use, and maintain a product

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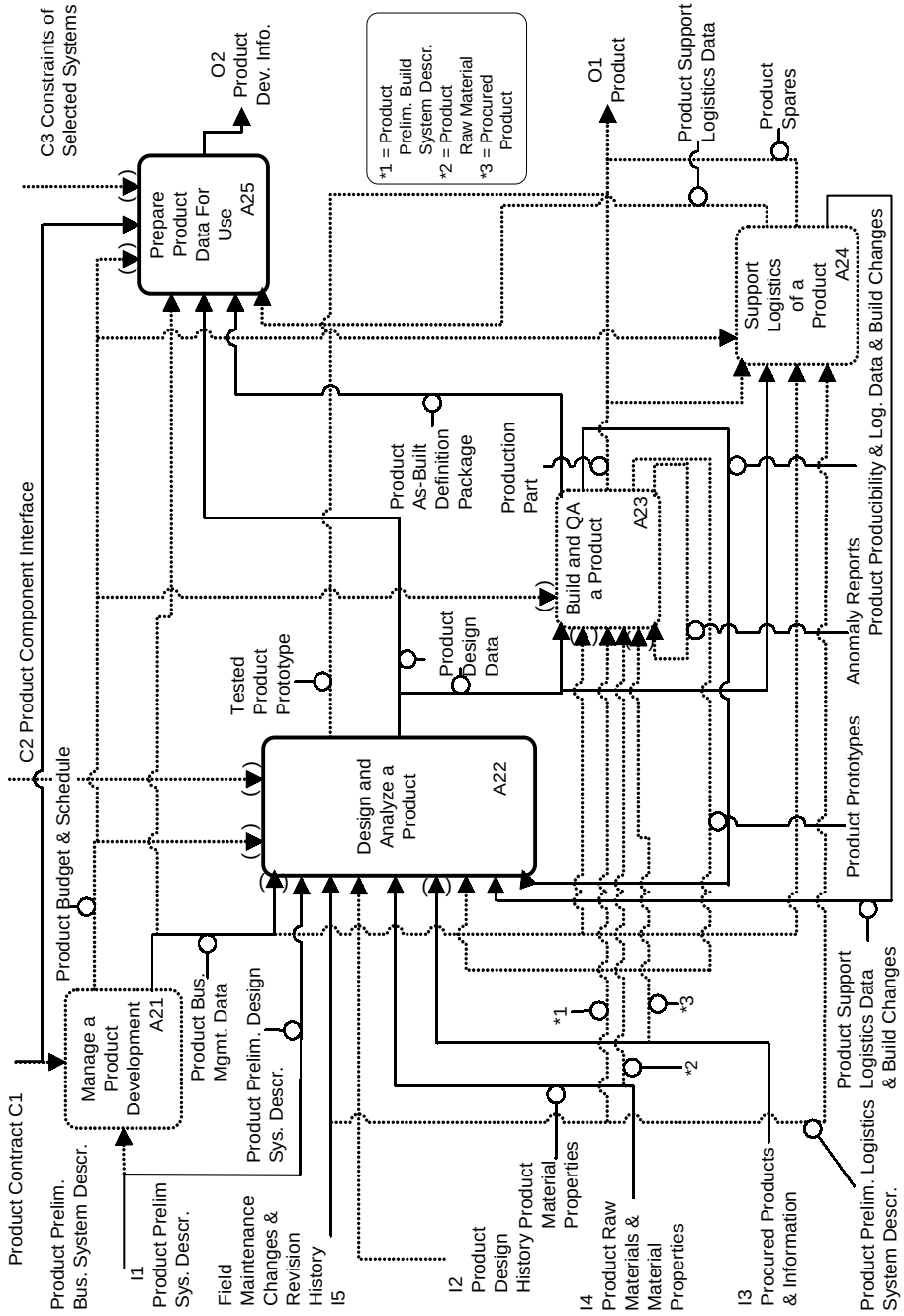

Figure F.3 - A2: manage, design, and support a product

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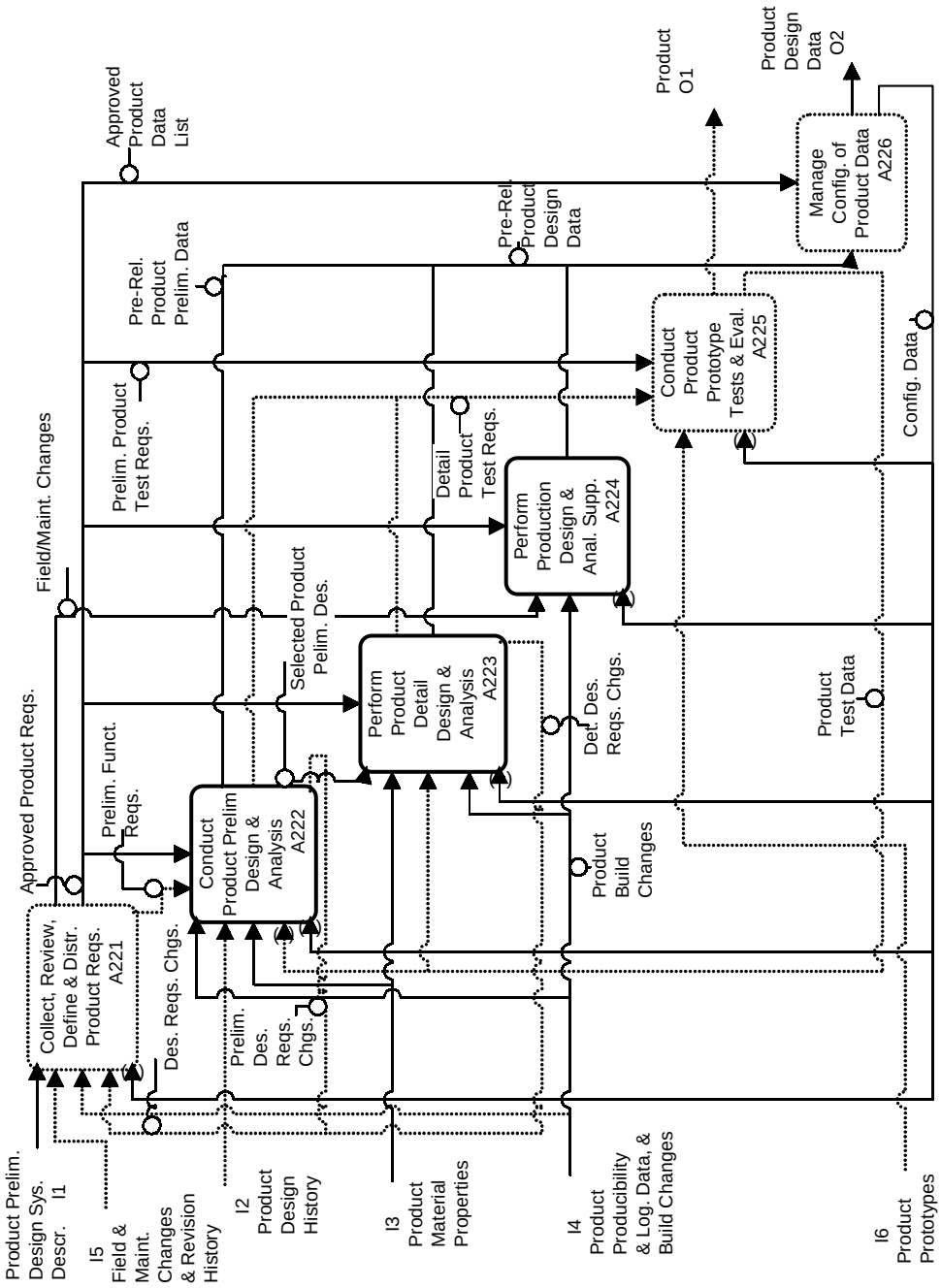

Figure F.4 - A22: design and analyze a product

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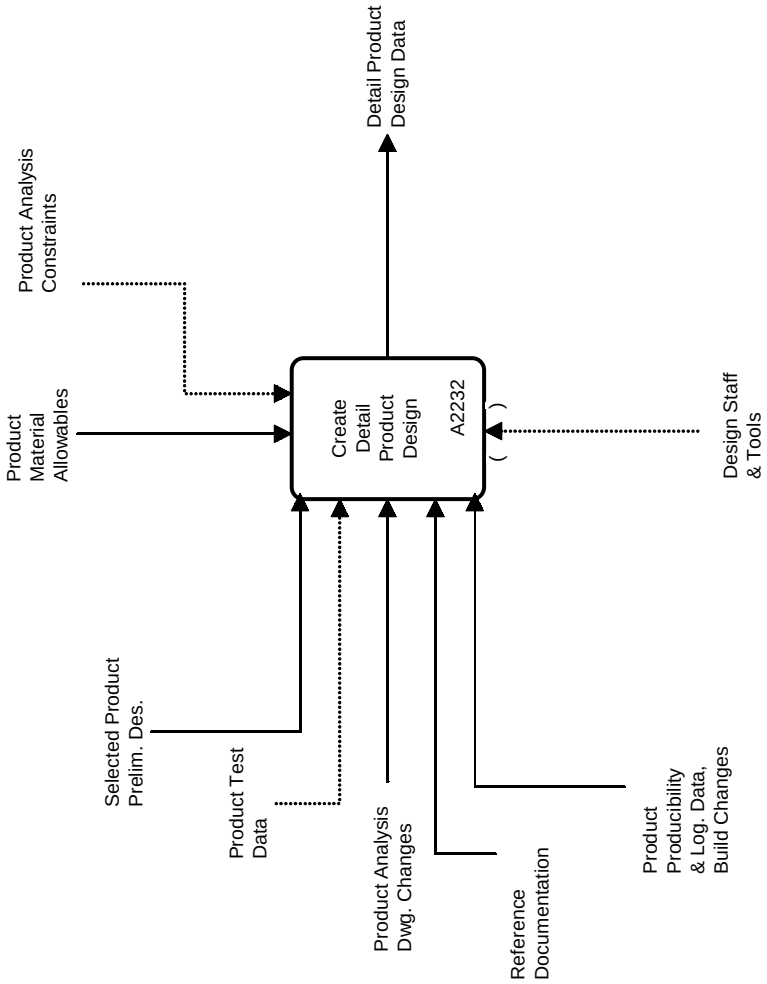

Figure F.5 - A223: perform product detail and design analysis

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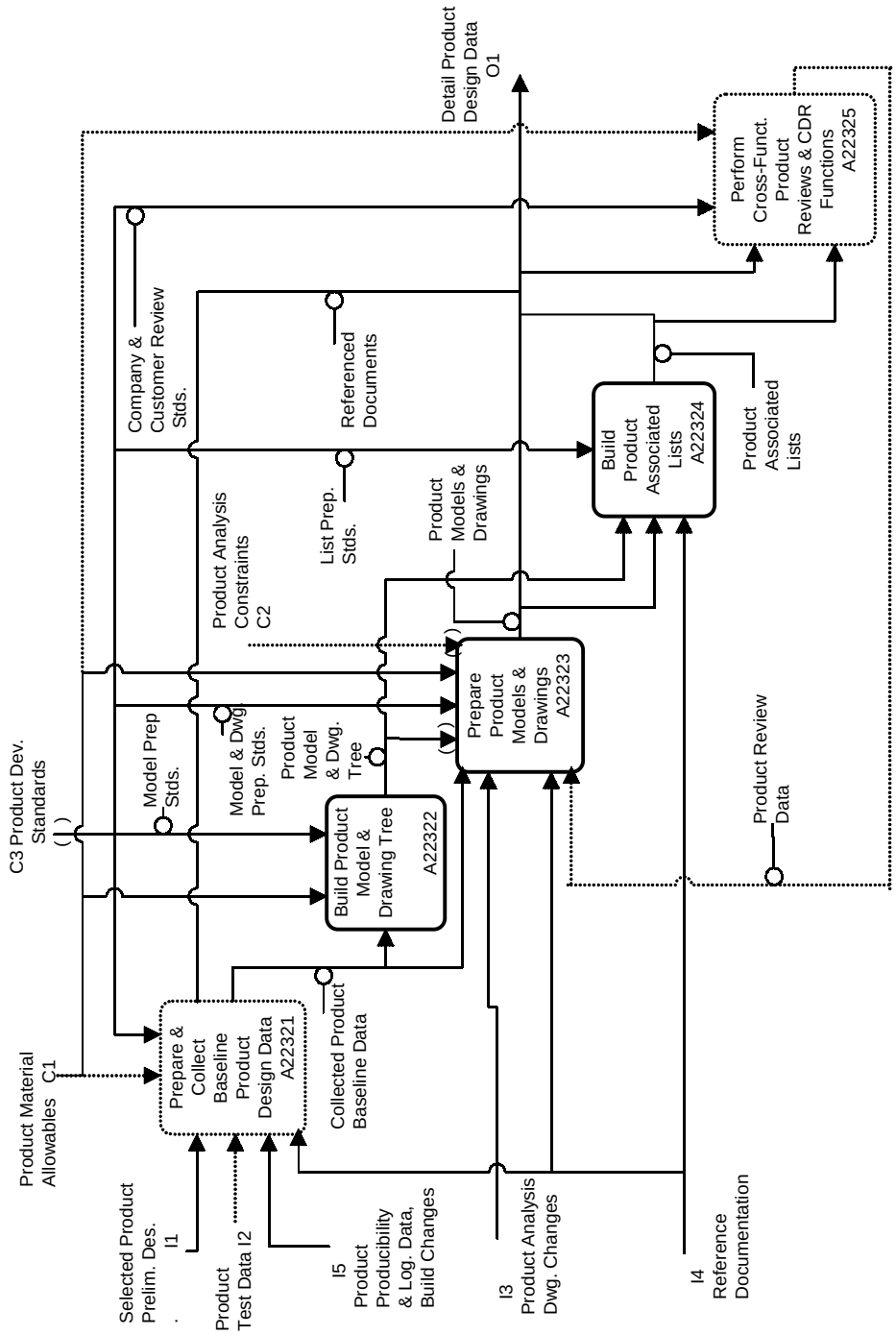

Figure F.6 - A2232: create detail product design

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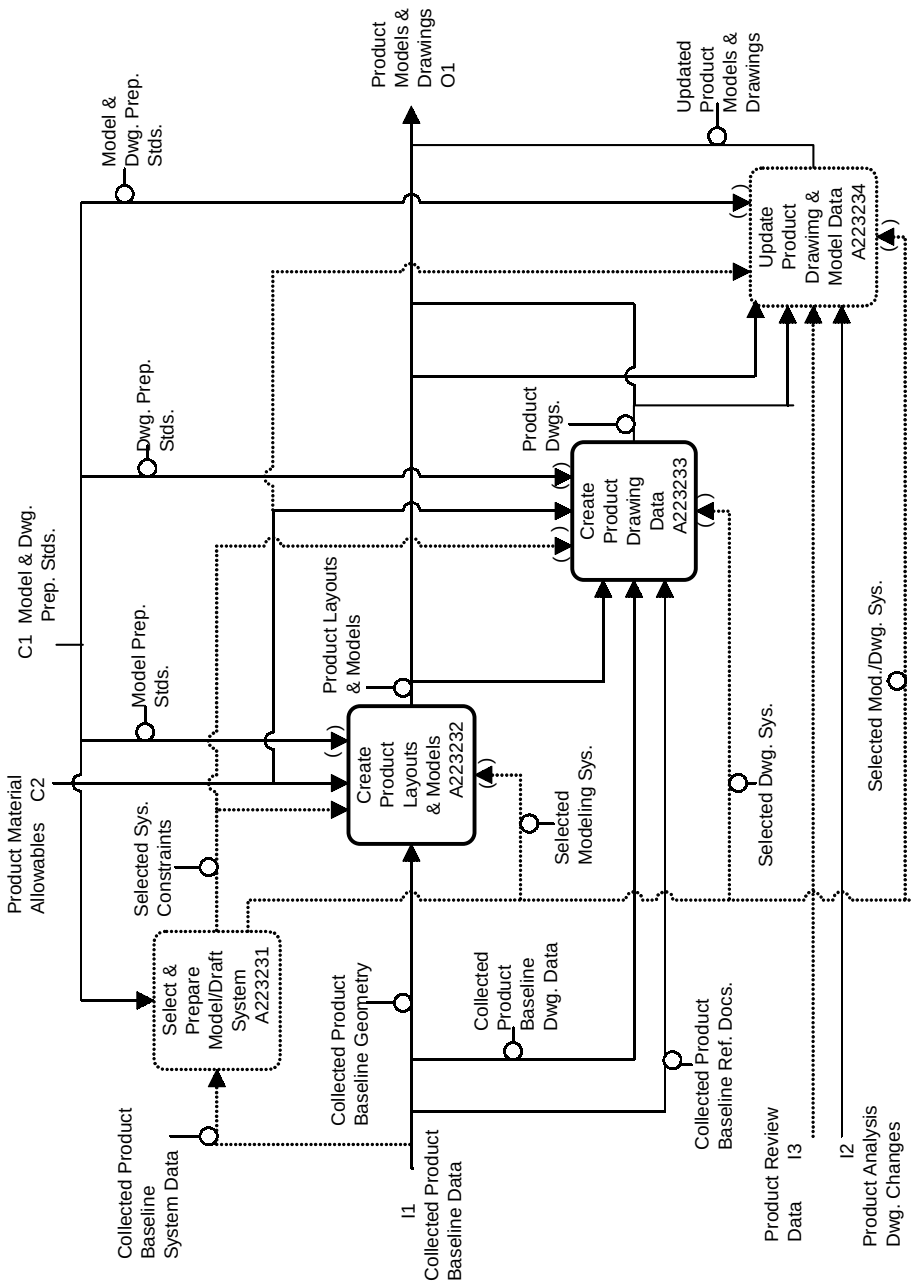

Figure F.7 - A22323: prepare product models and drawings

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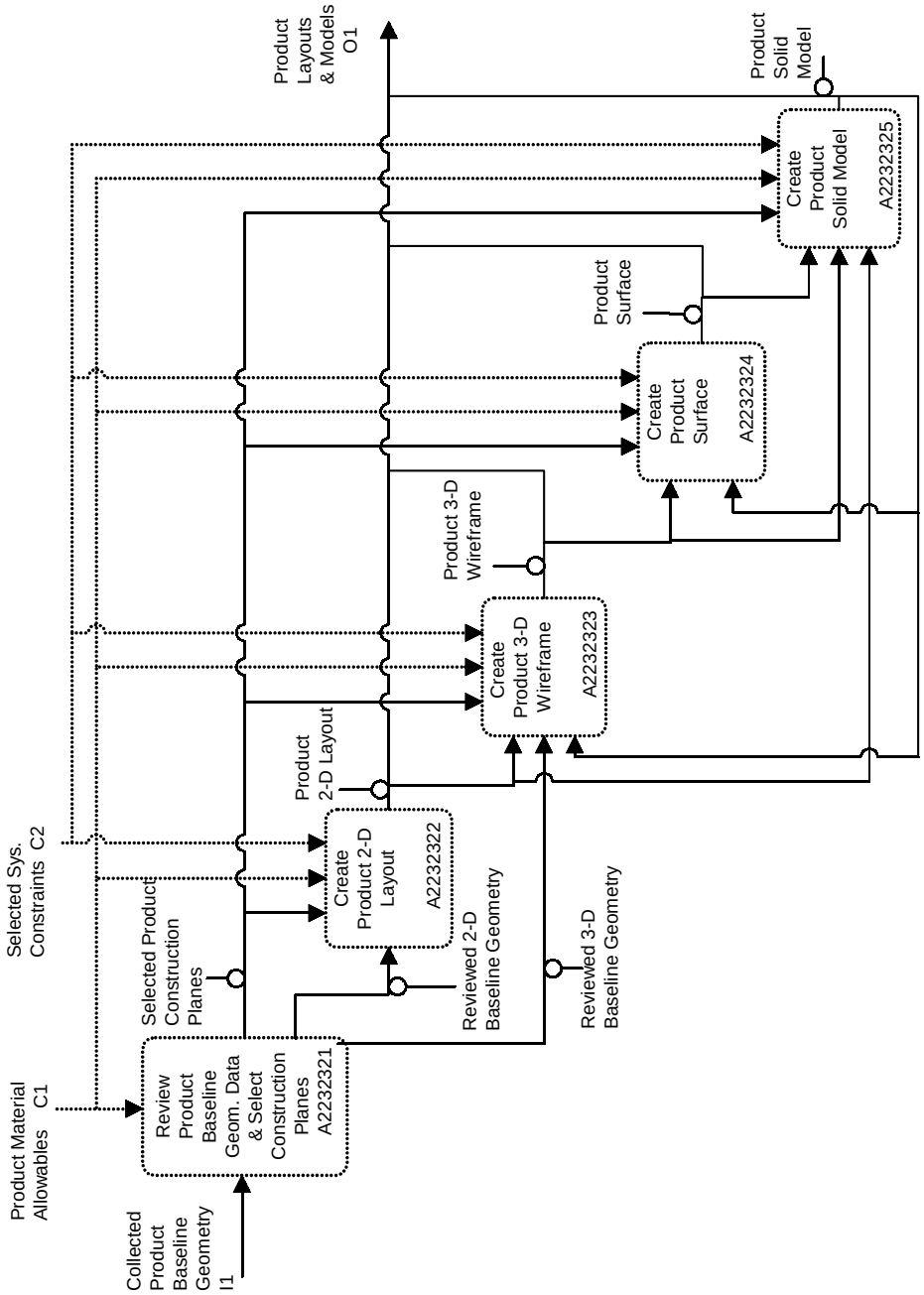

Figure F.8 - A223232: create product layouts and models

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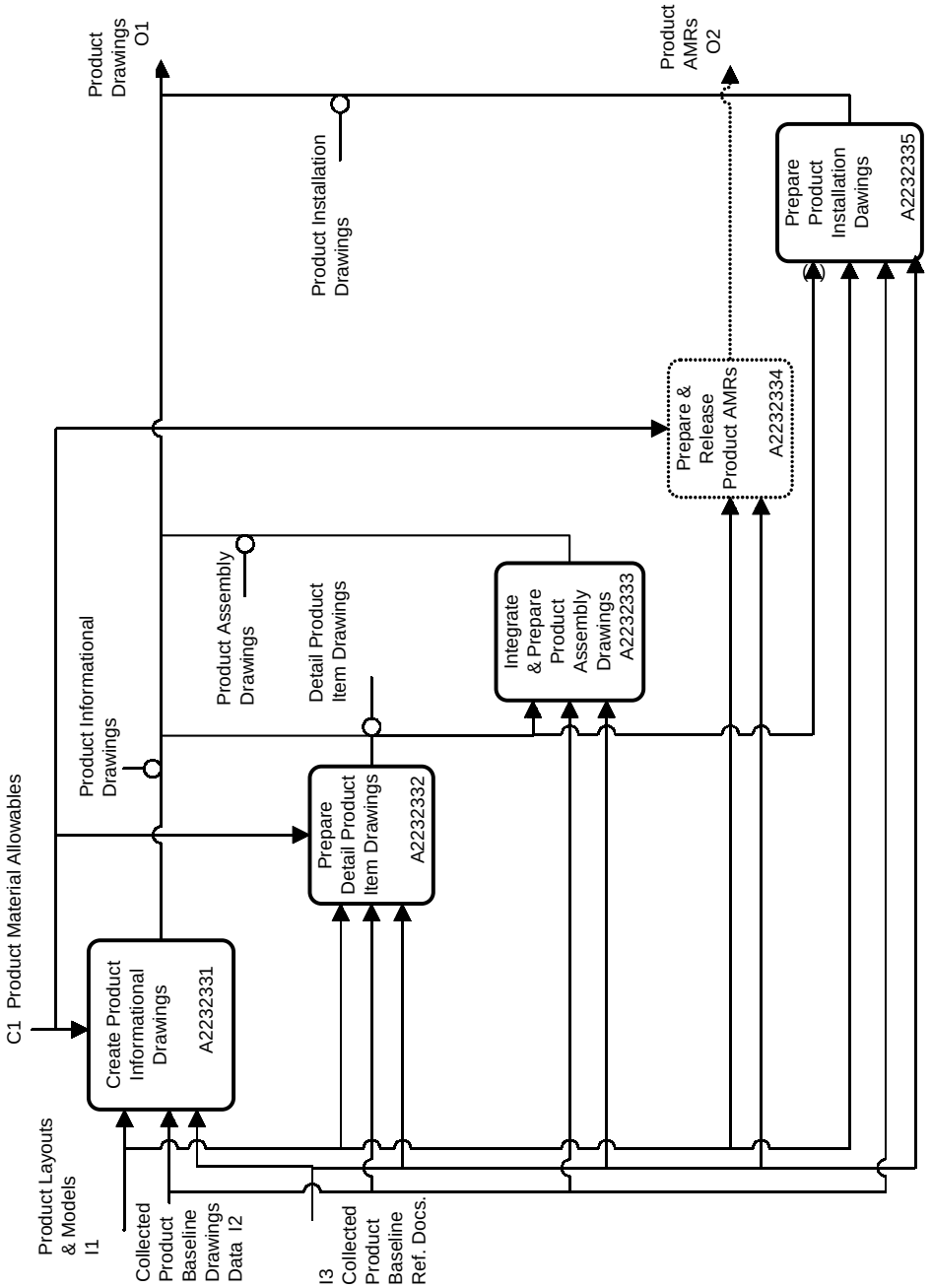

Figure F.9 - A223233: create product drawing data

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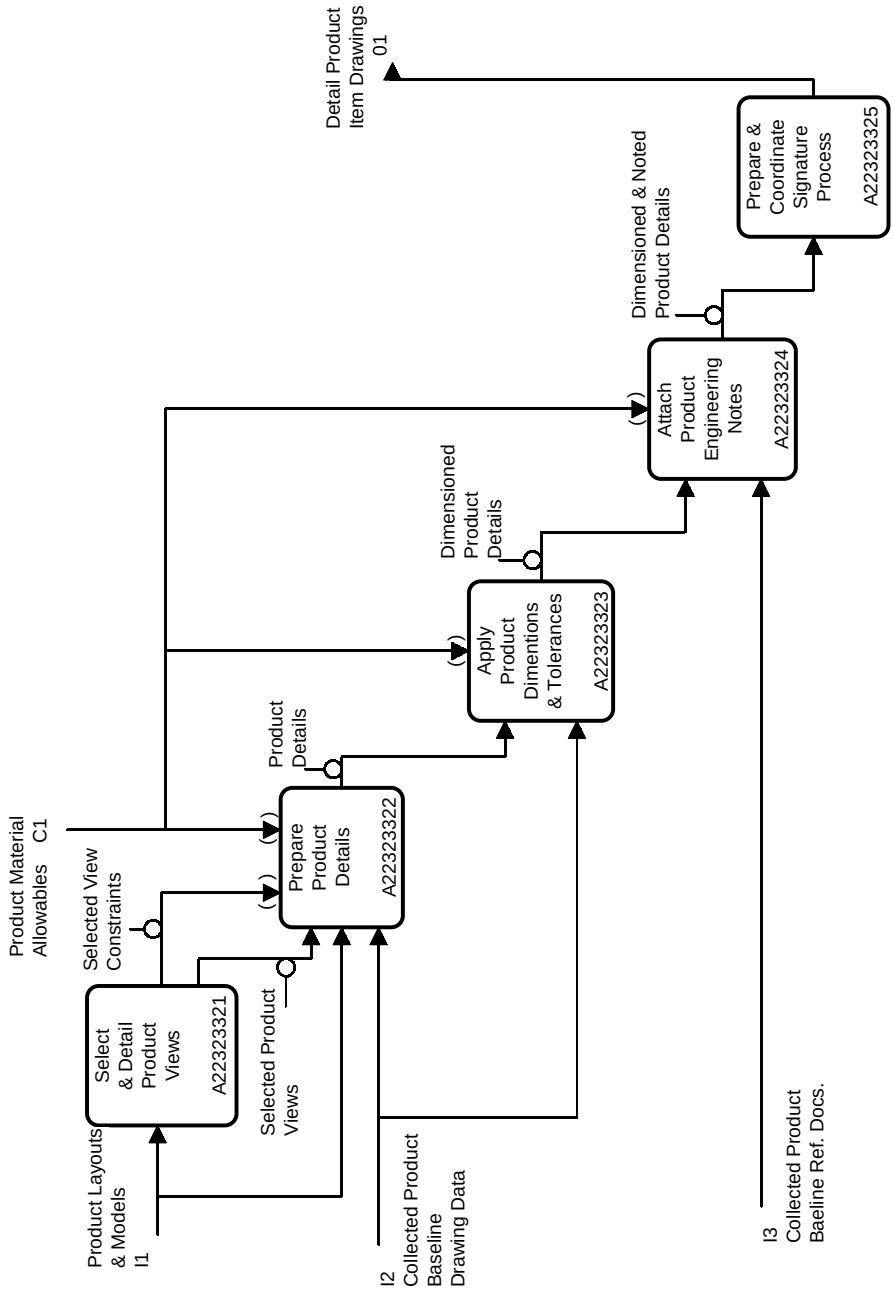

Figure F.10 - A2232332: prepare detail product item drawings

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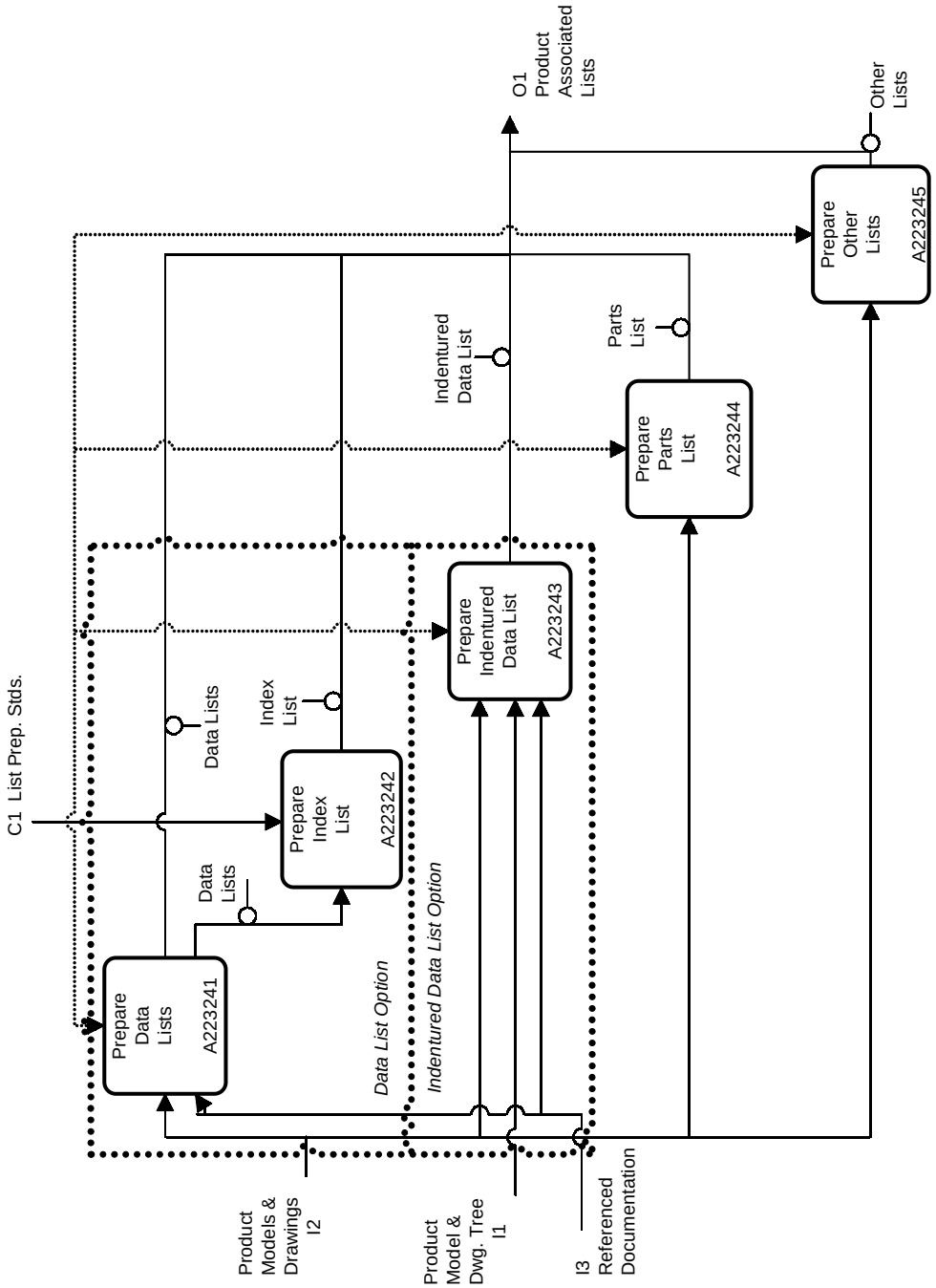

Figure F.11 - A22324: build product associated lists

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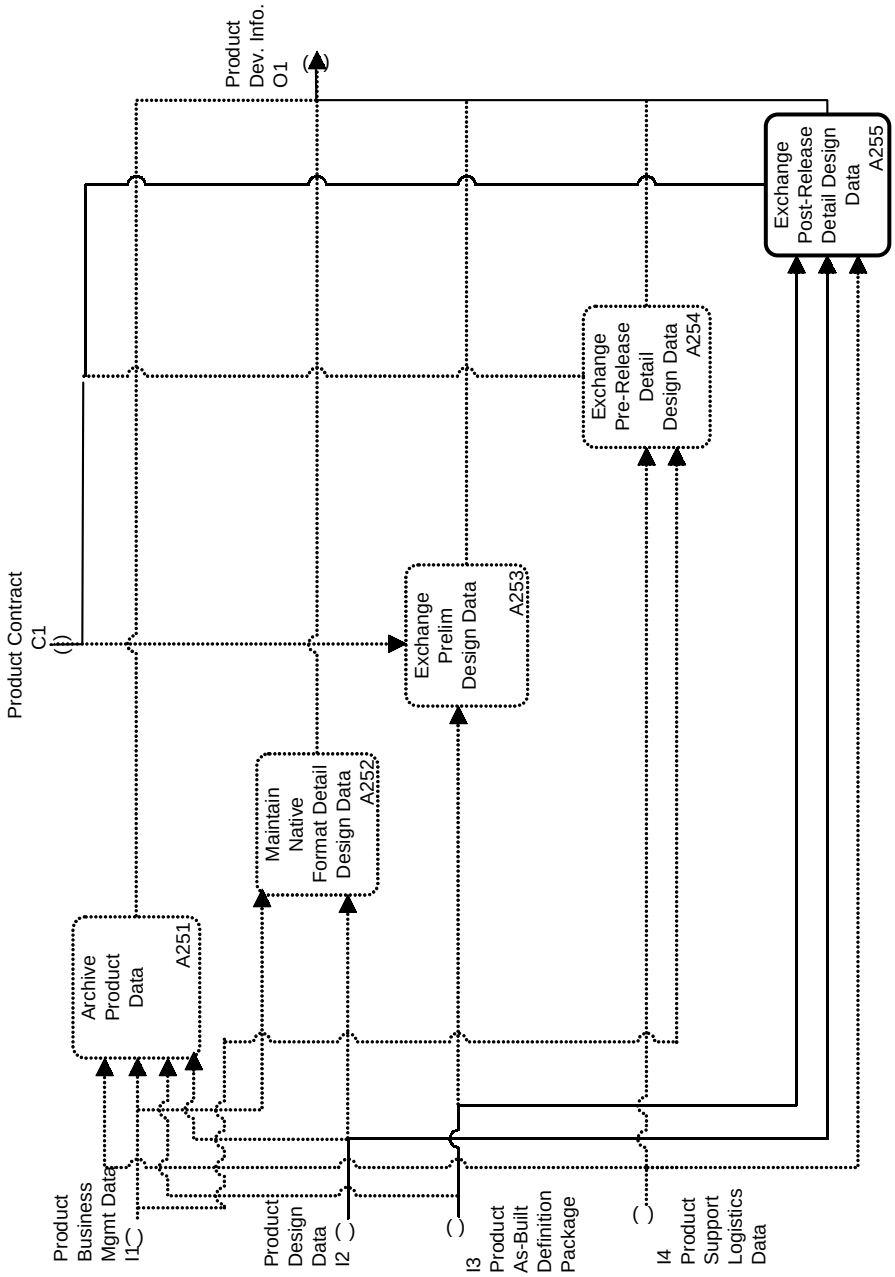

Figure F.12 - A24: prepare product data for use

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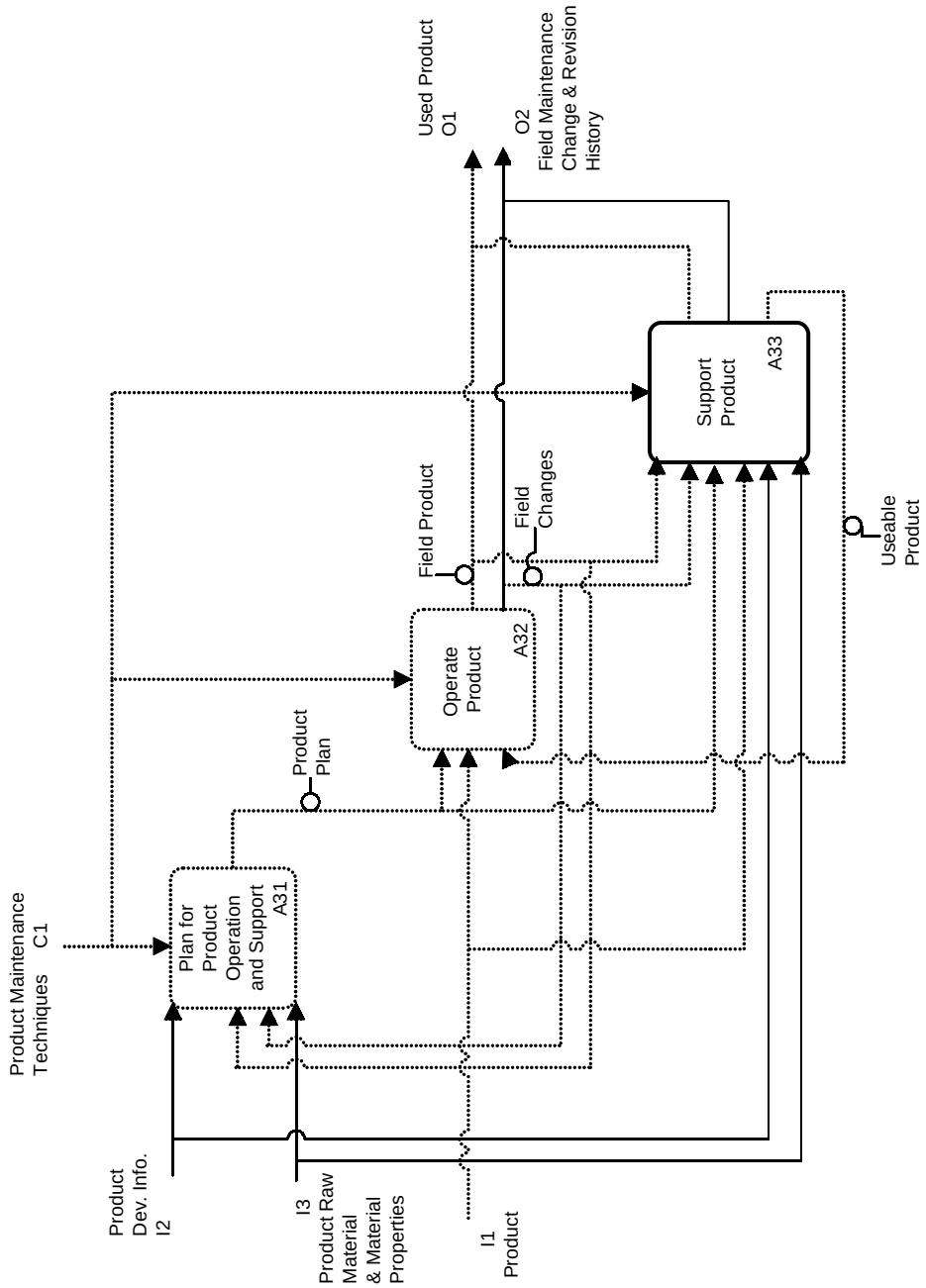

Figure F.13 - A3: use and maintain a product

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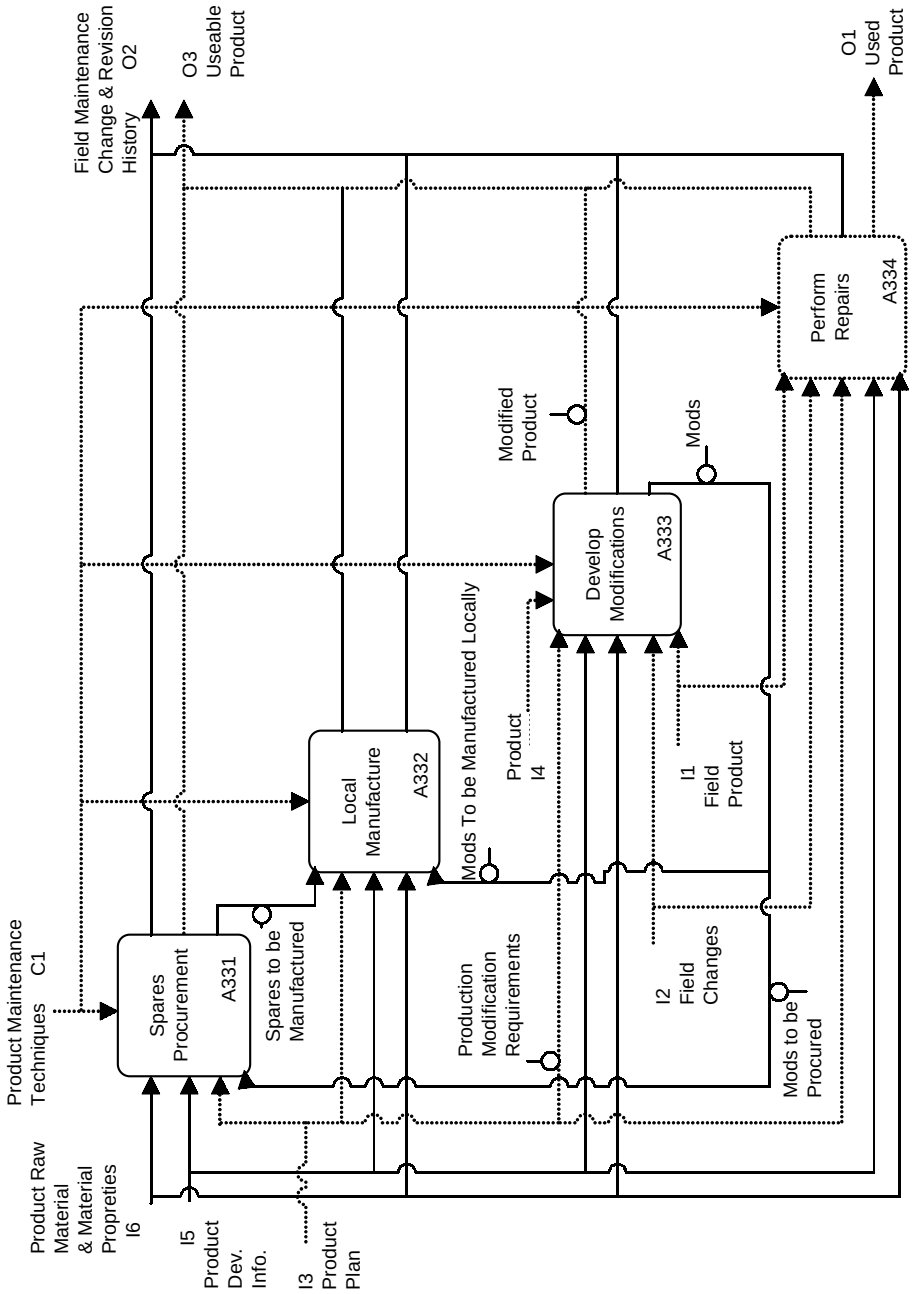

Figure F.14 - A33: support product

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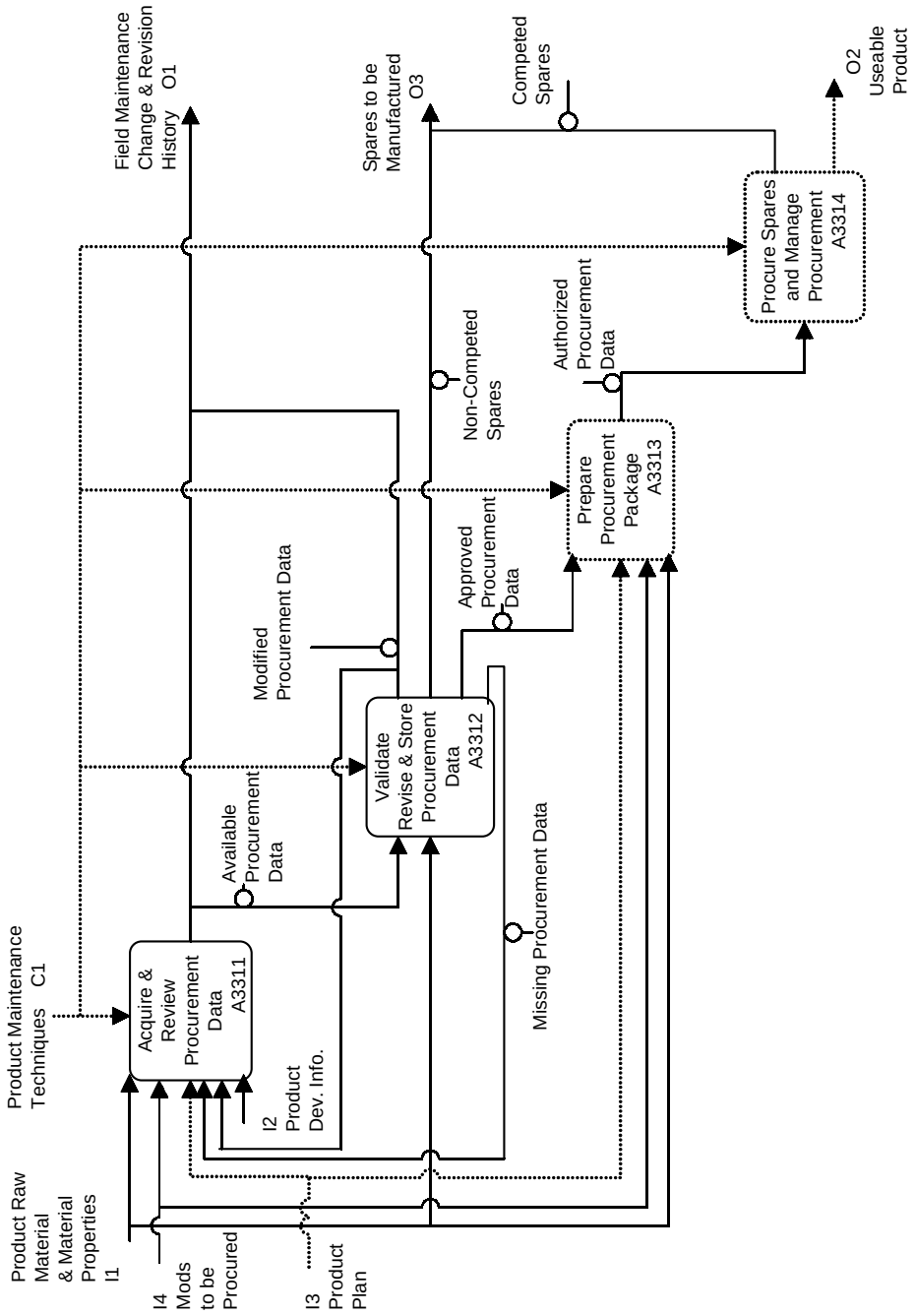

Figure F.15 - A331: spares procurement

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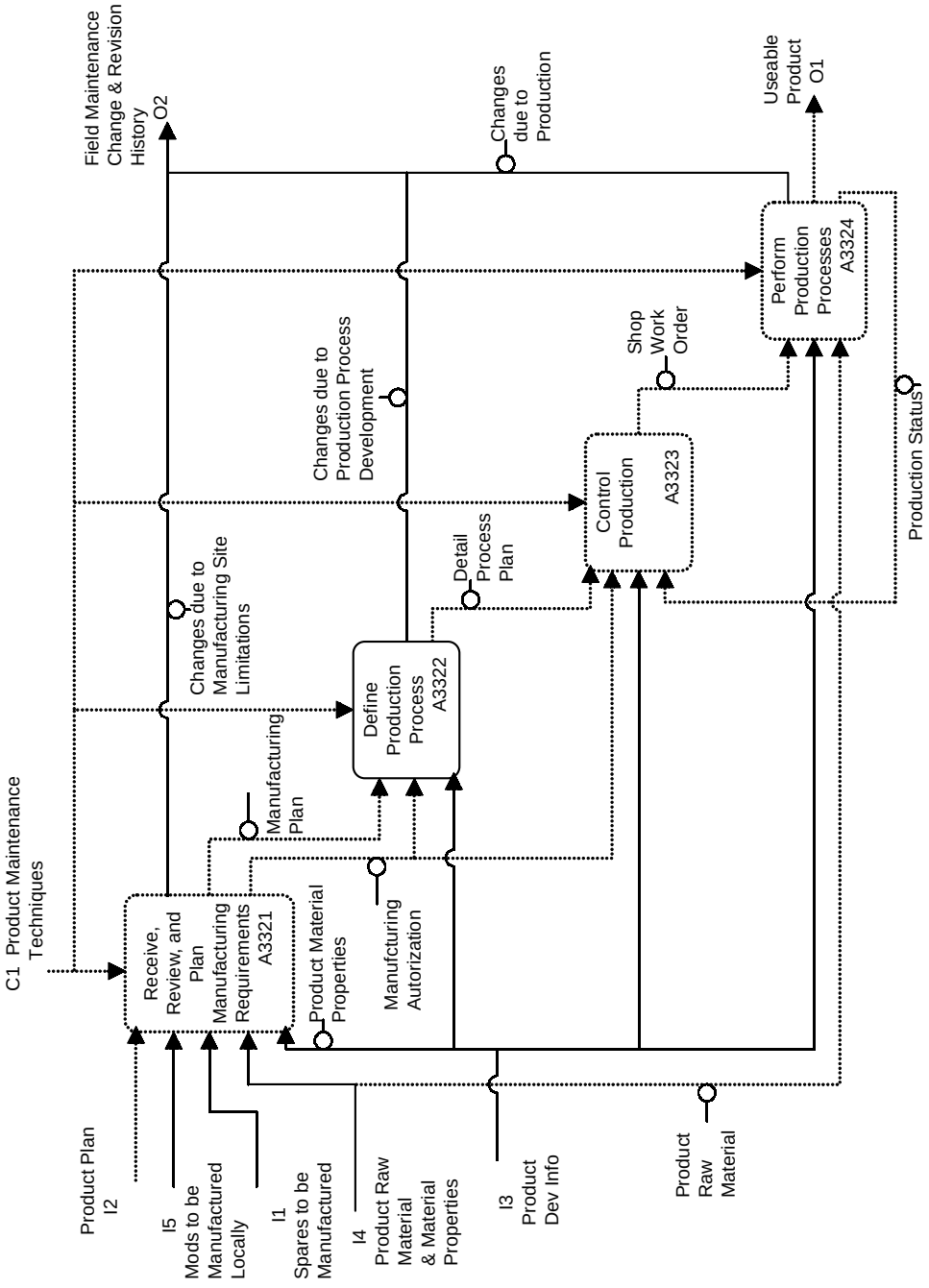

Figure F.16 - A223: local manufacture

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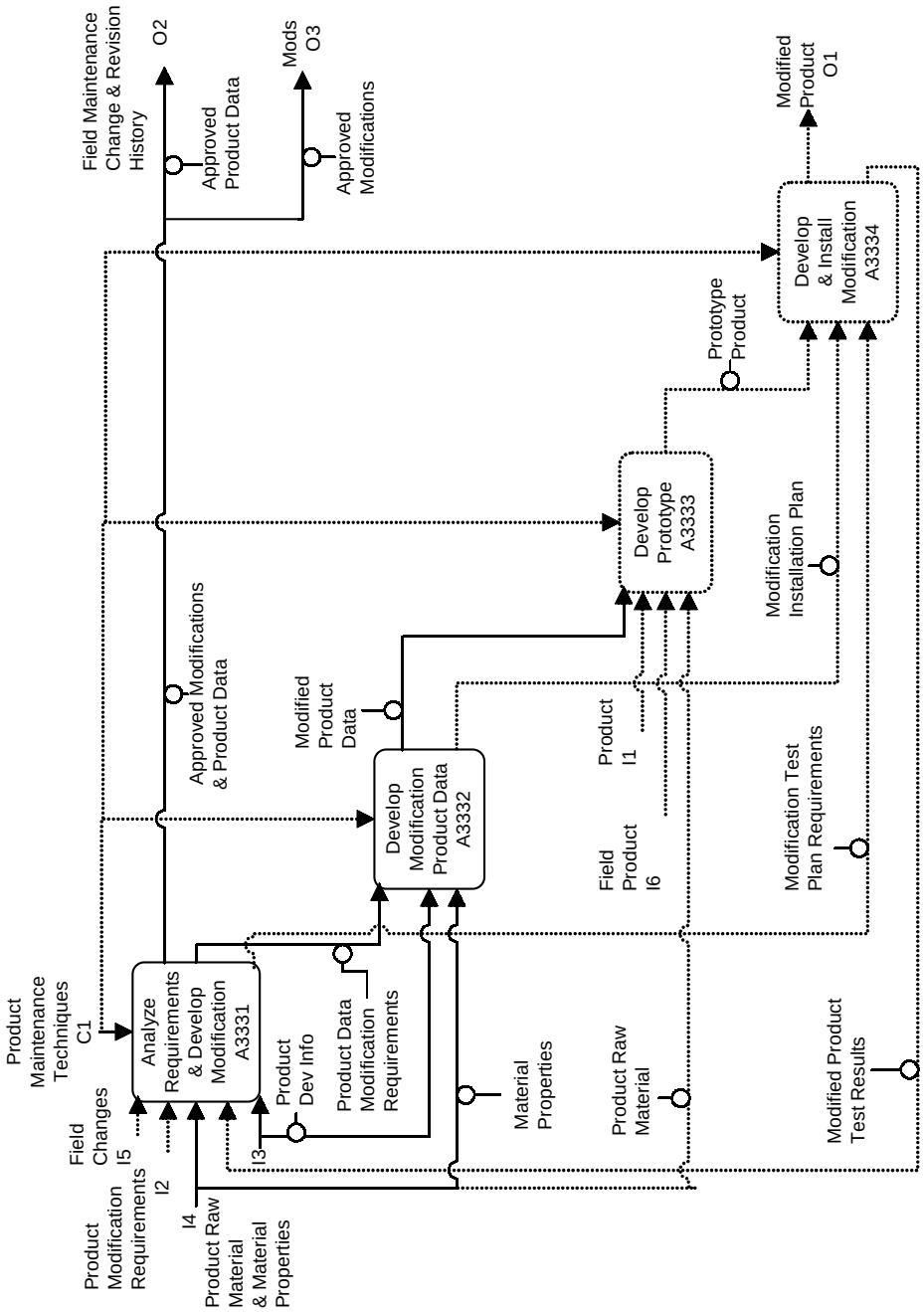

Figure F.17 - A333: develop modifications

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Annex G
(informative)

Application reference model

This annex provides the application reference model for this part of ISO 10303 and is given in Figures G.1 through G.29. The application reference model is a graphical representation of the structure and constraints of the application objects specified in clause 4. The graphical form of the application reference model is presented in EXPRESS-G. EXPRESS-G is defined in annex D of ISO 10303-11. The application reference model is independent from any implementation method.

NOTE The following EXPRESS-G diagram listing may be used as an aid for locating objects within the application reference model figures.

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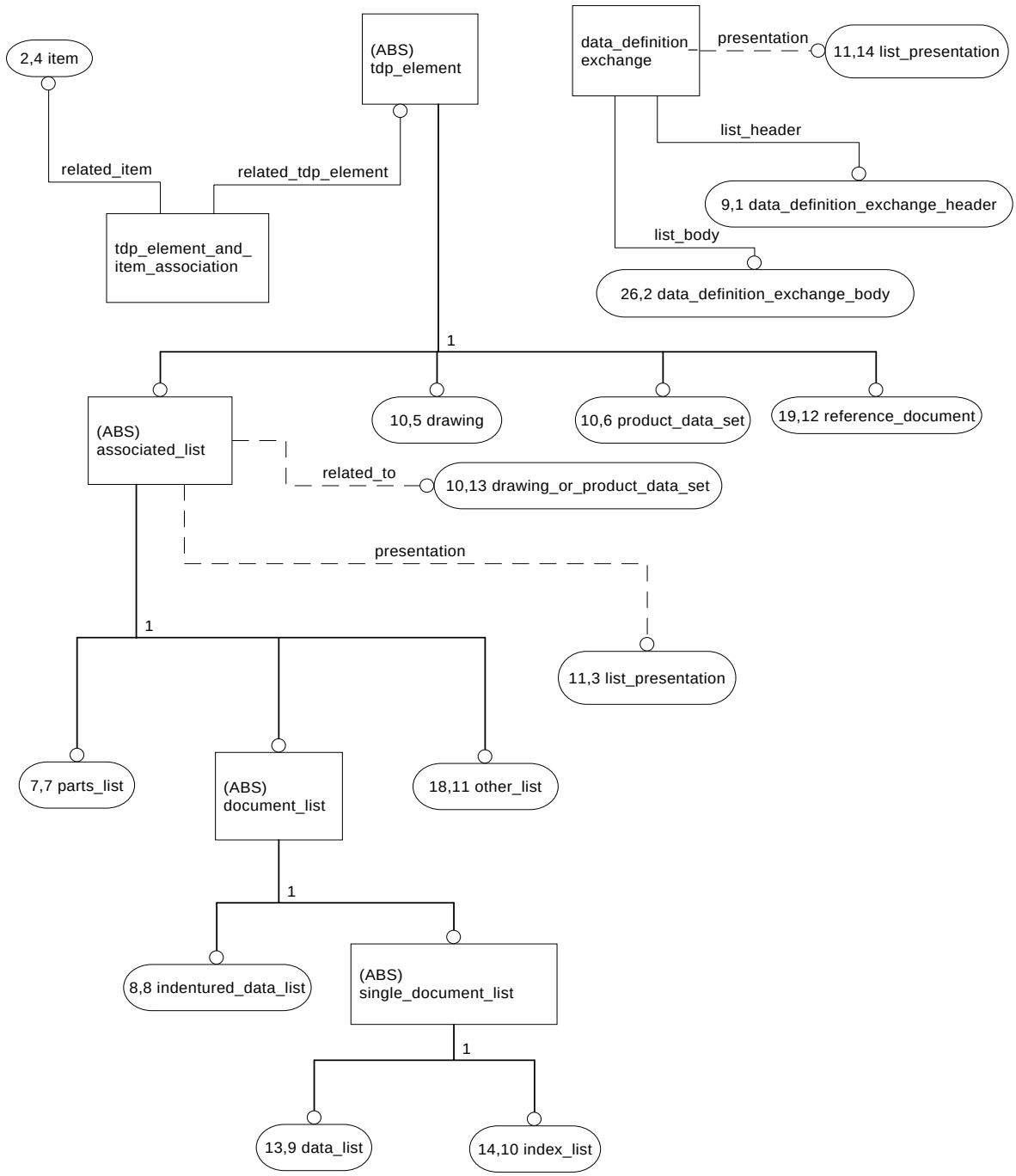

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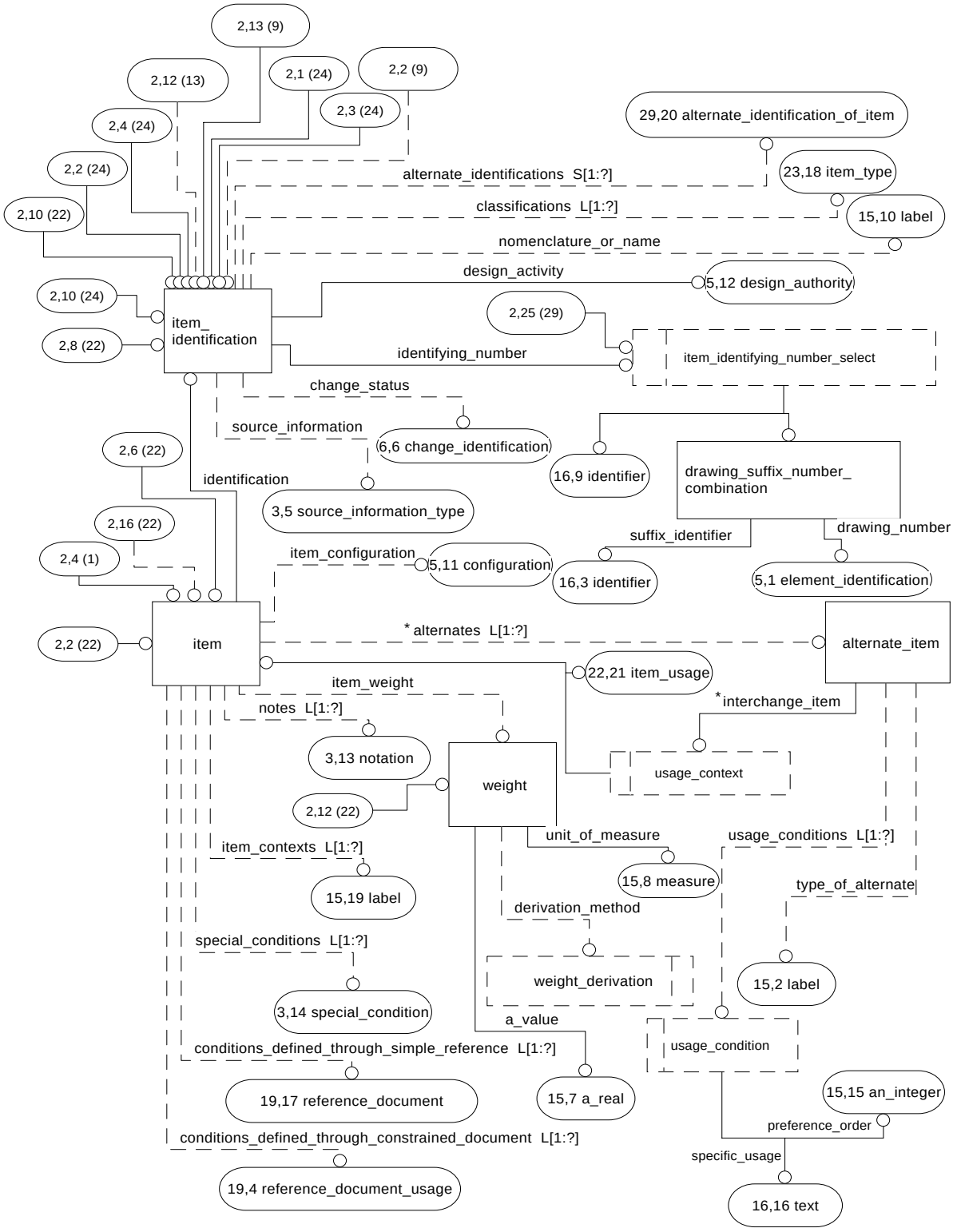

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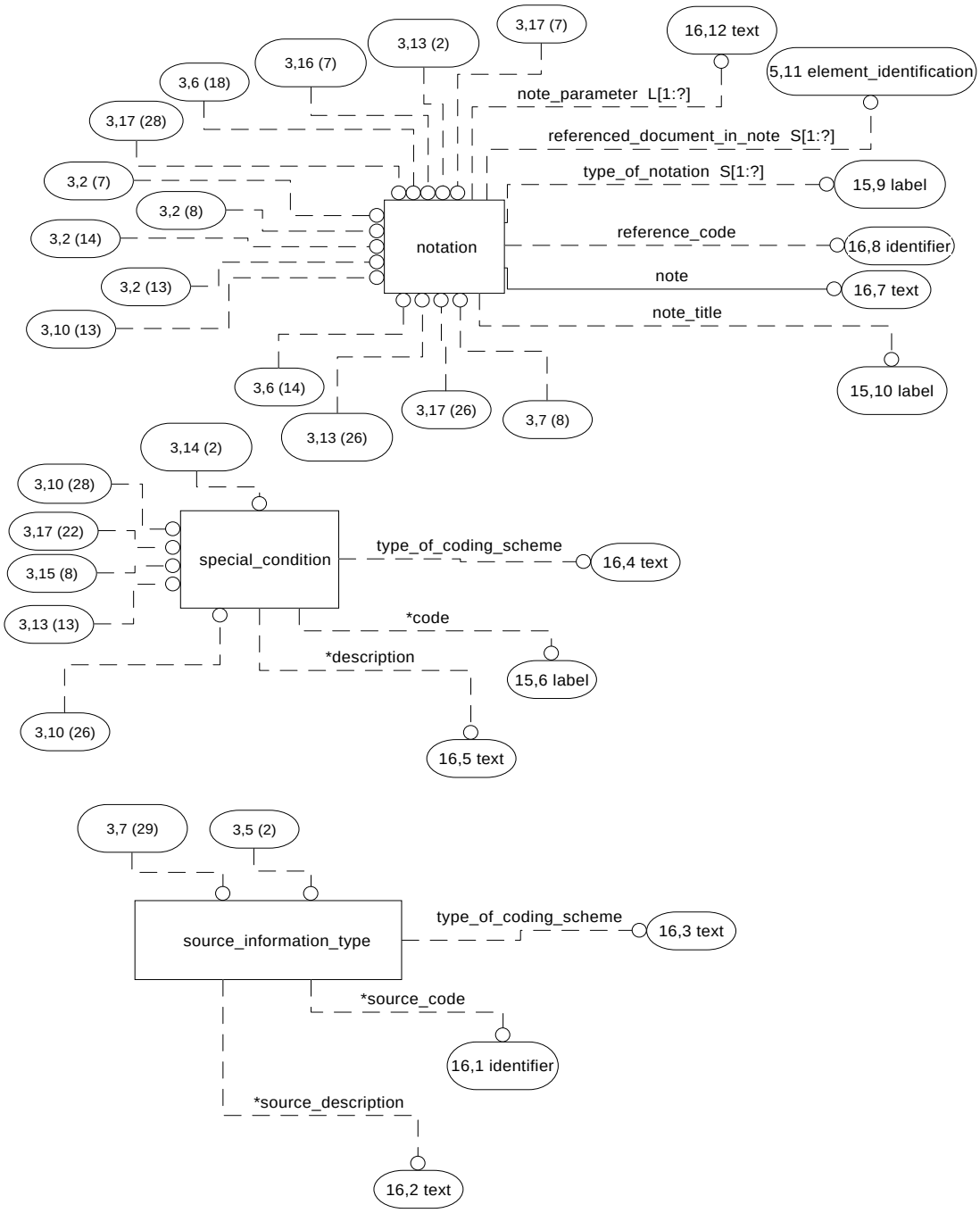

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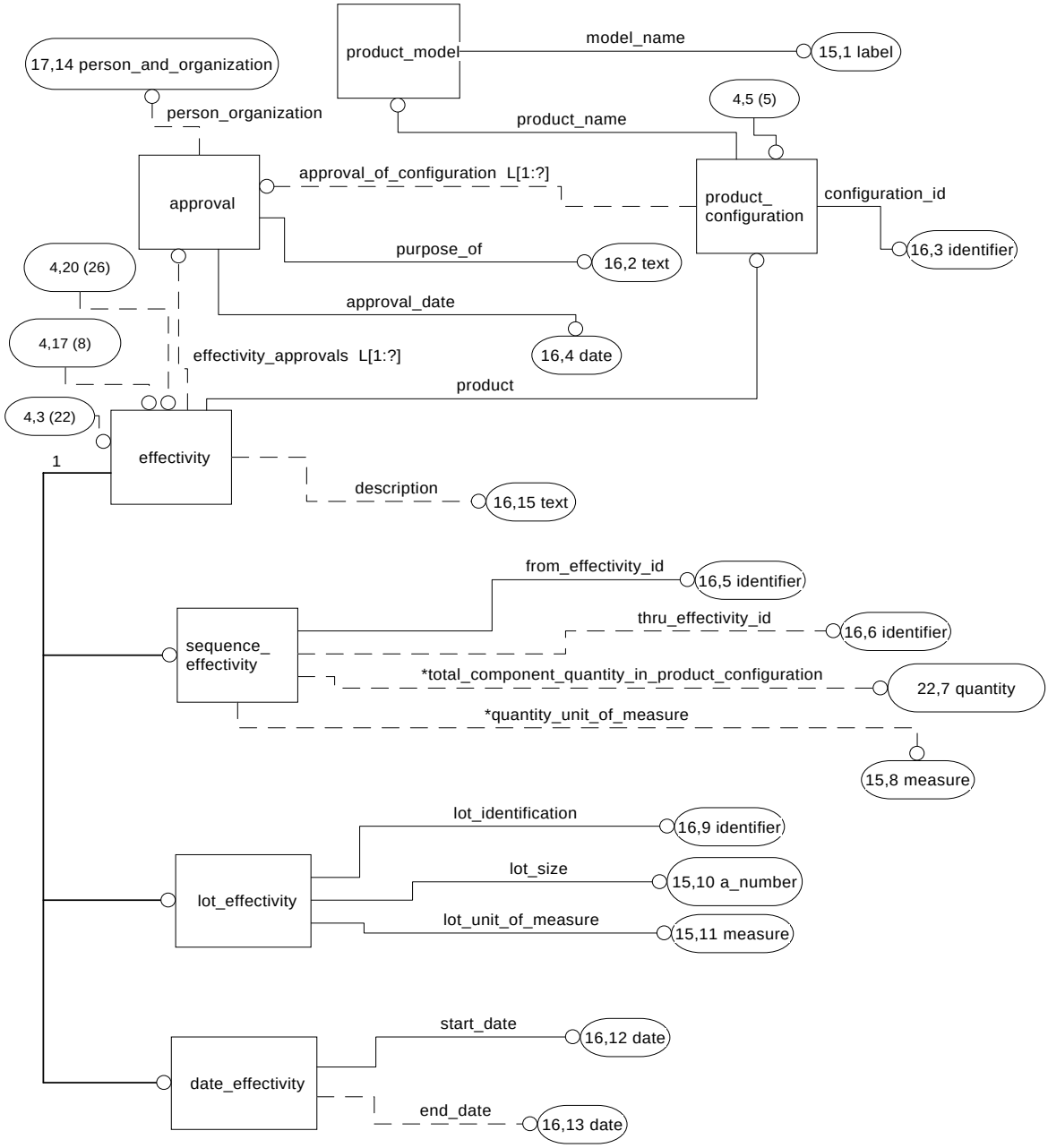

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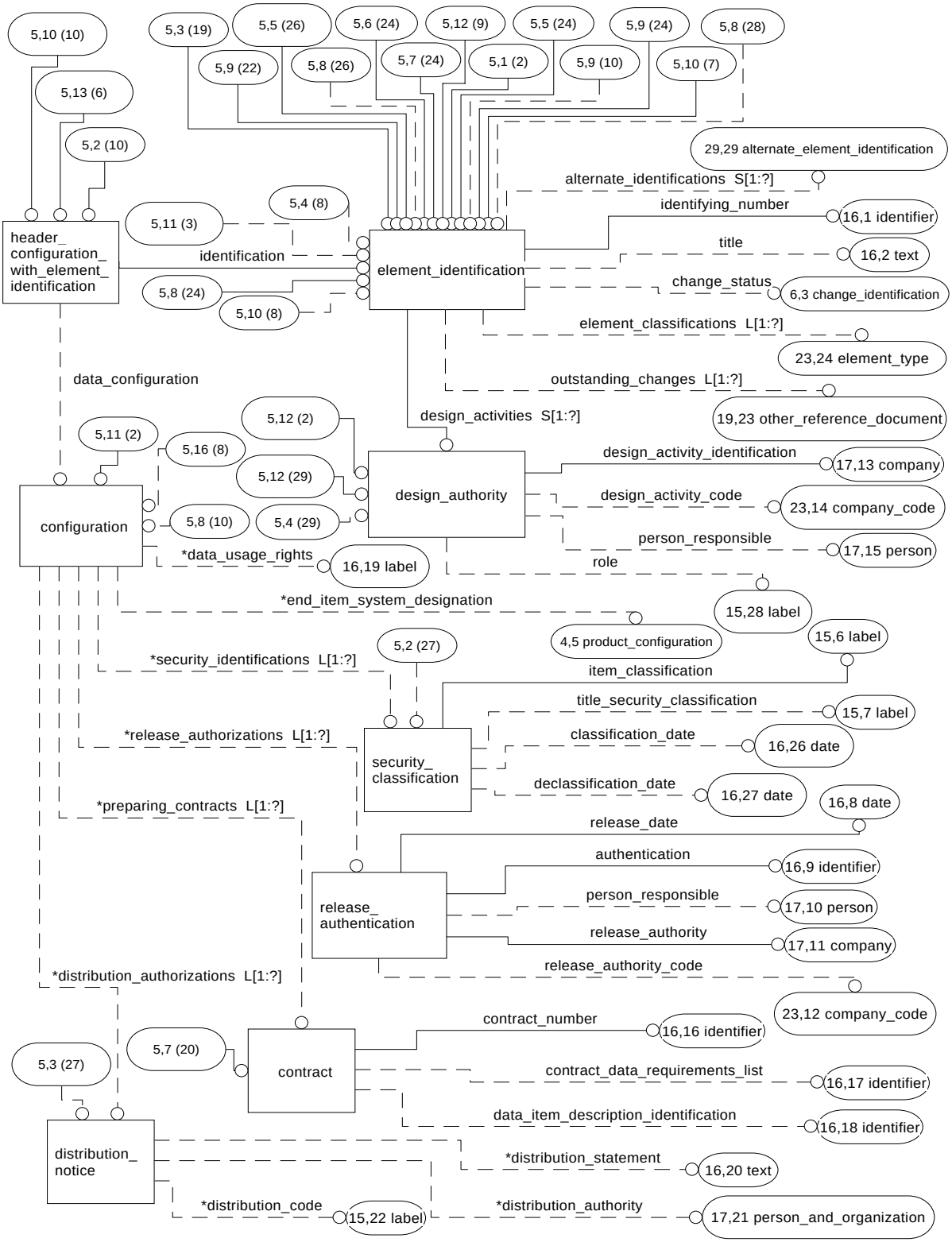

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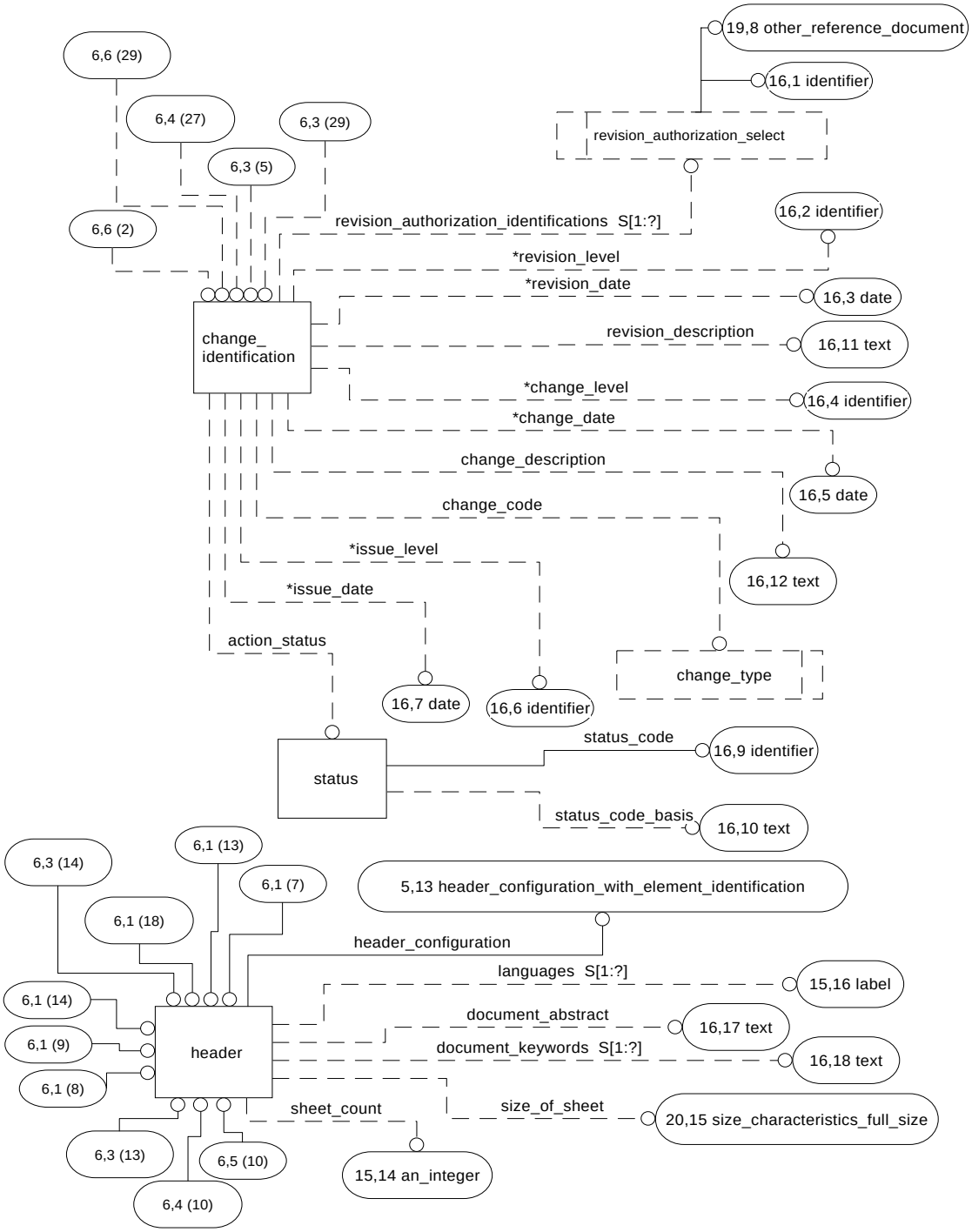

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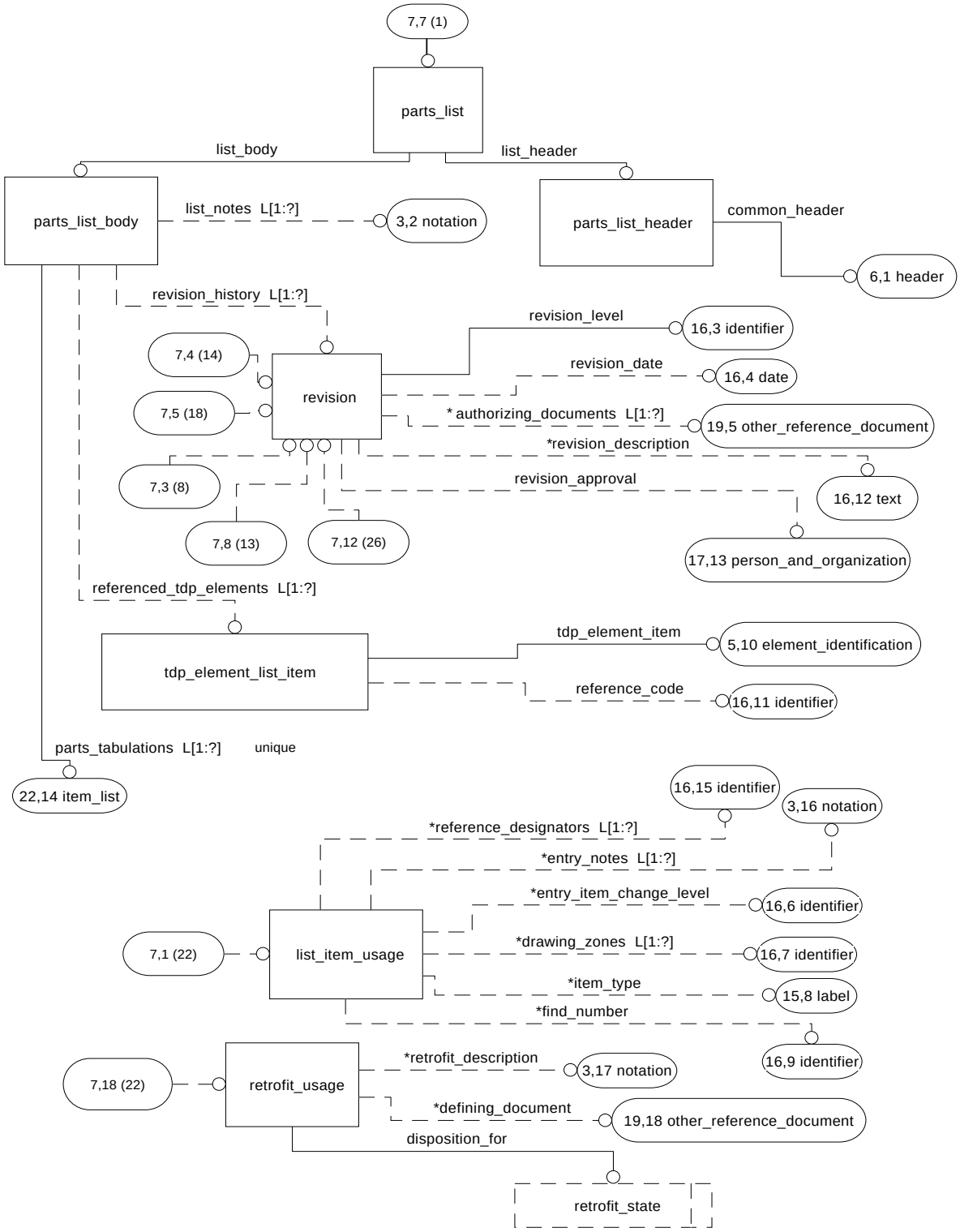

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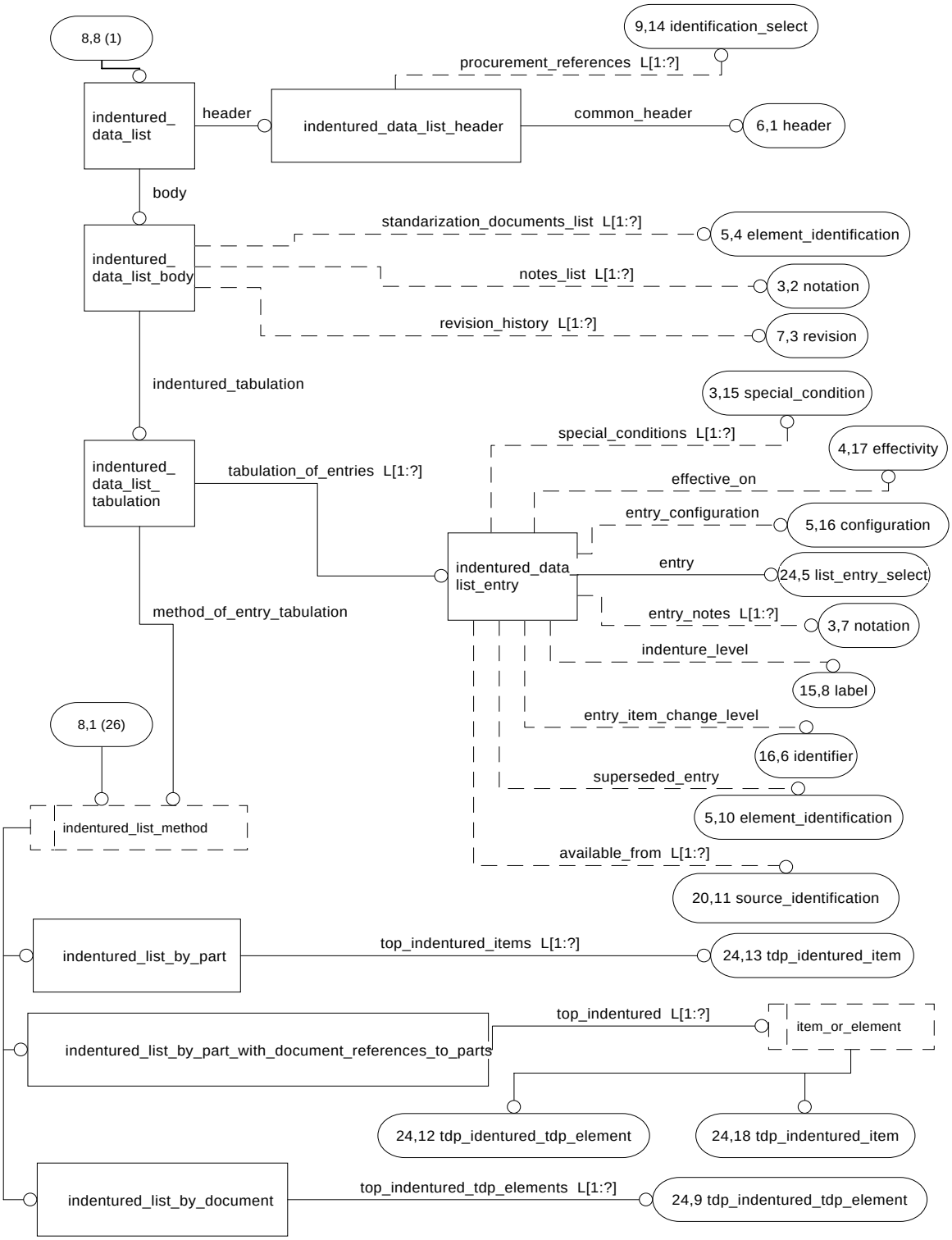

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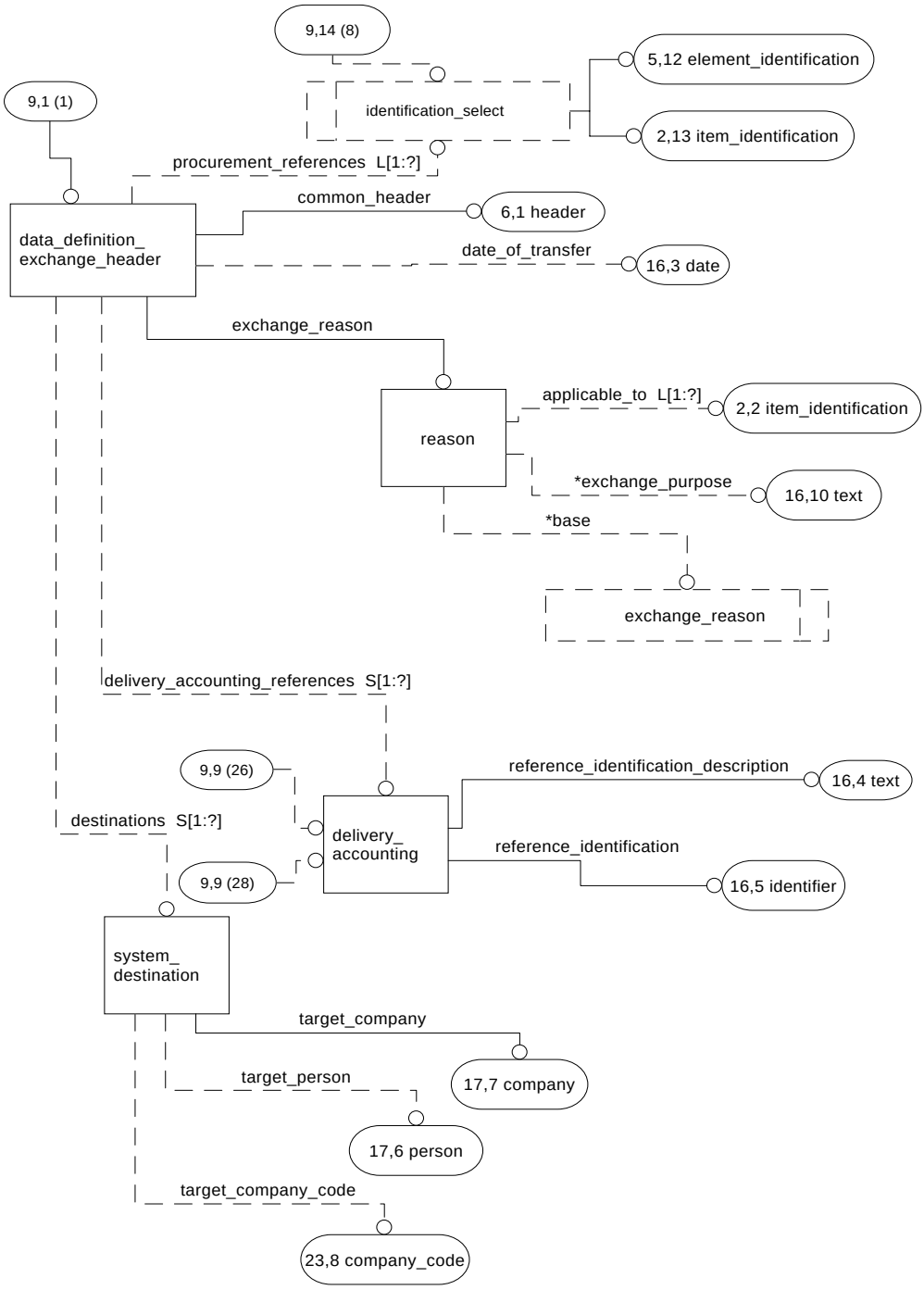

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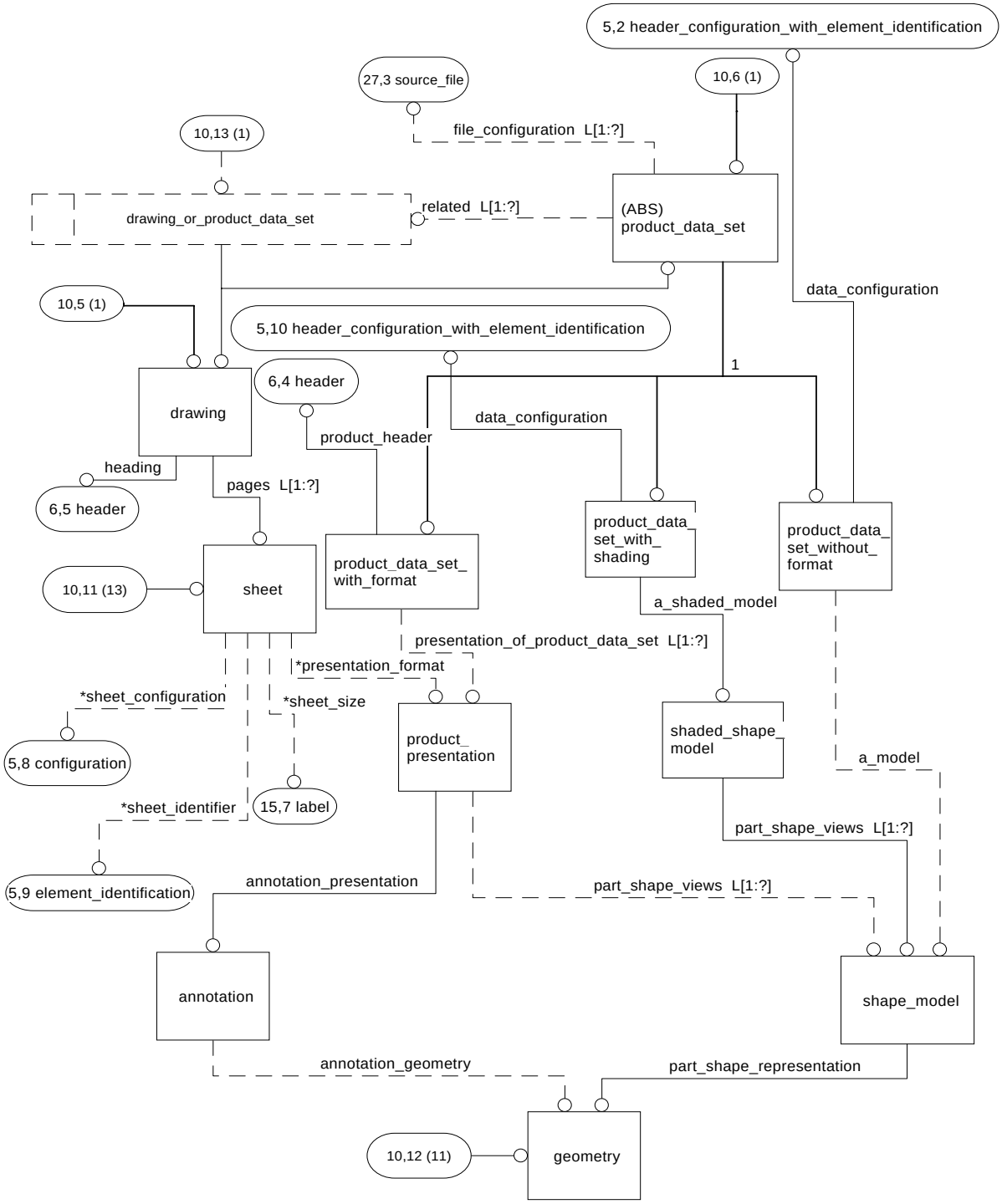

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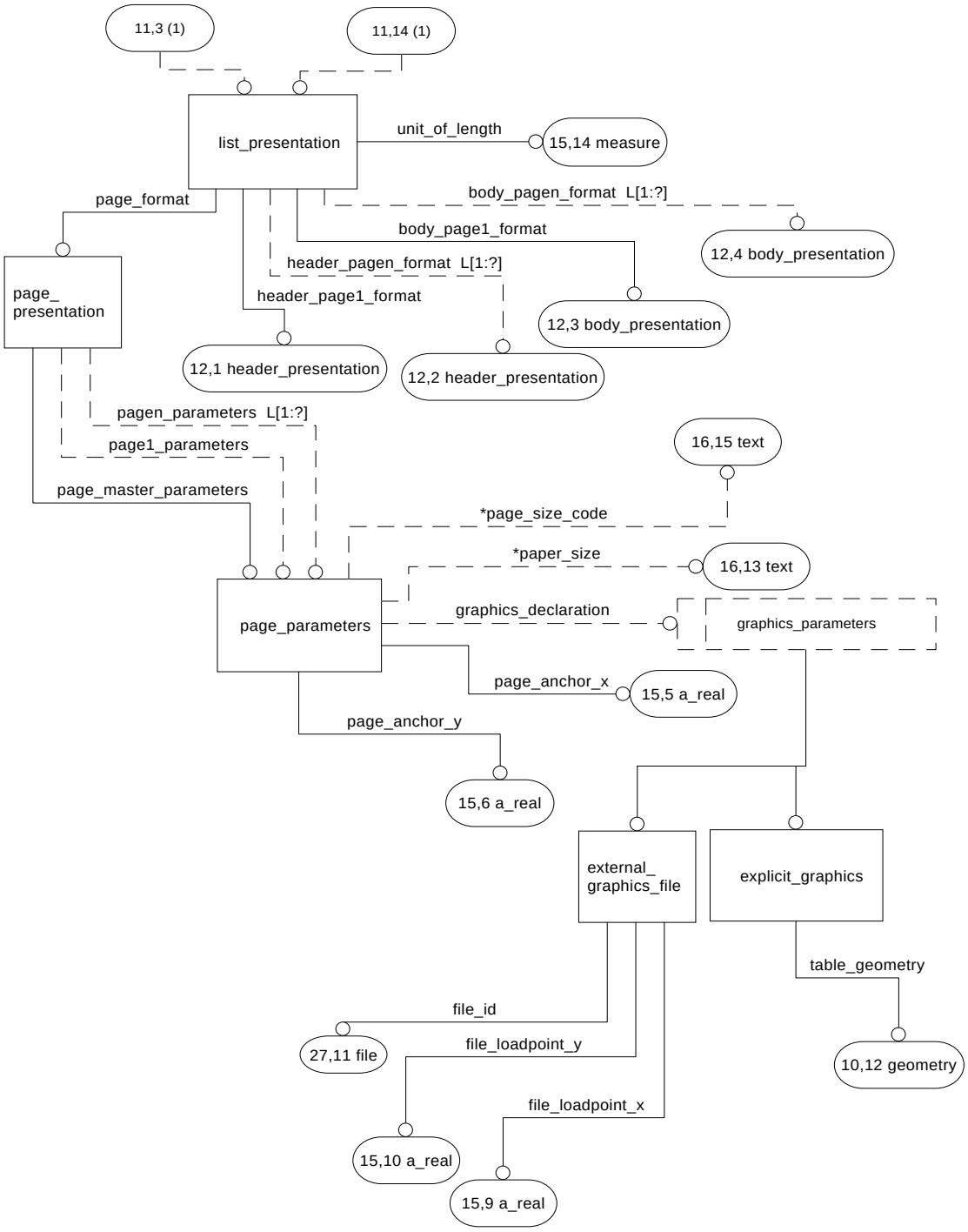

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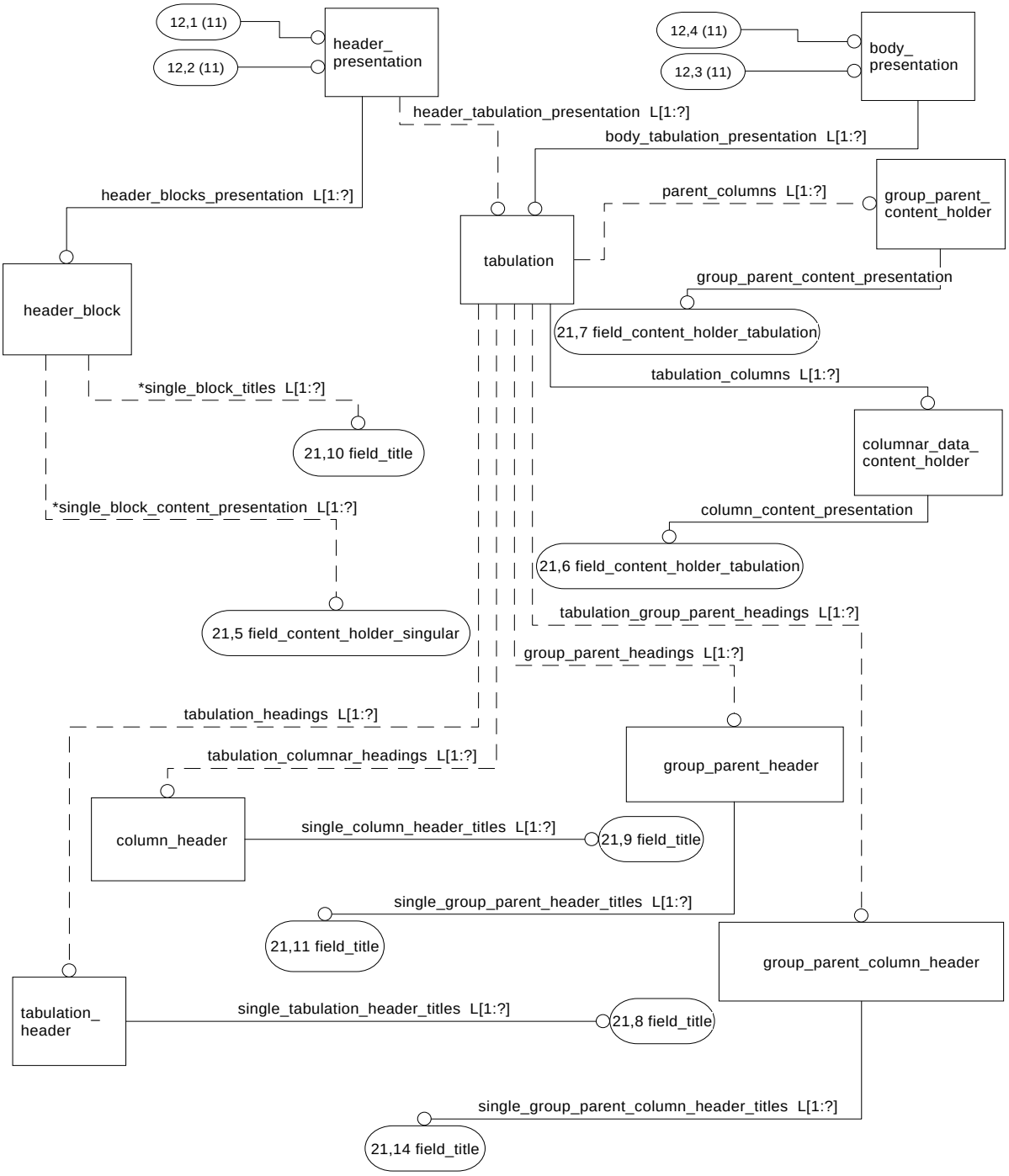

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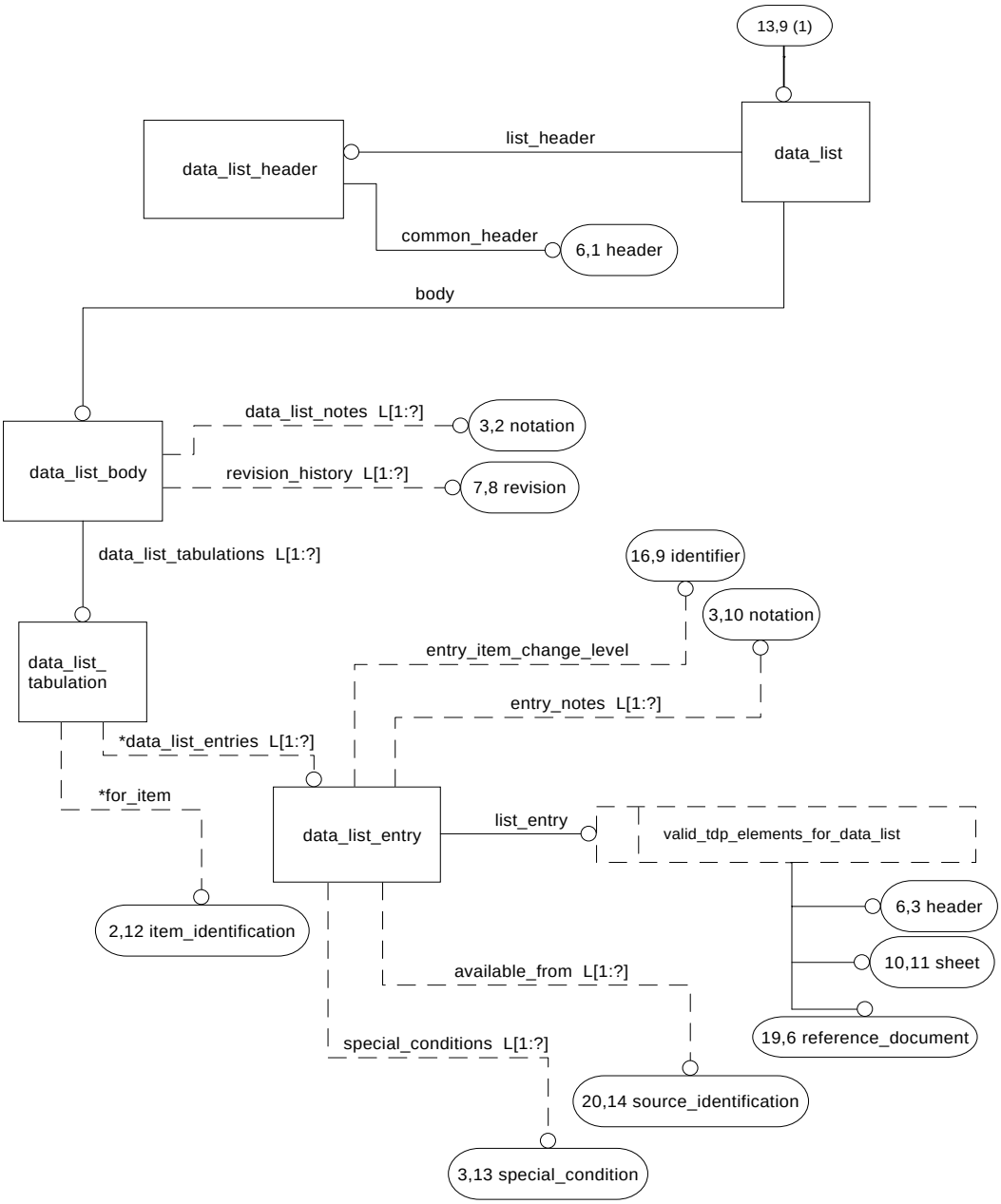

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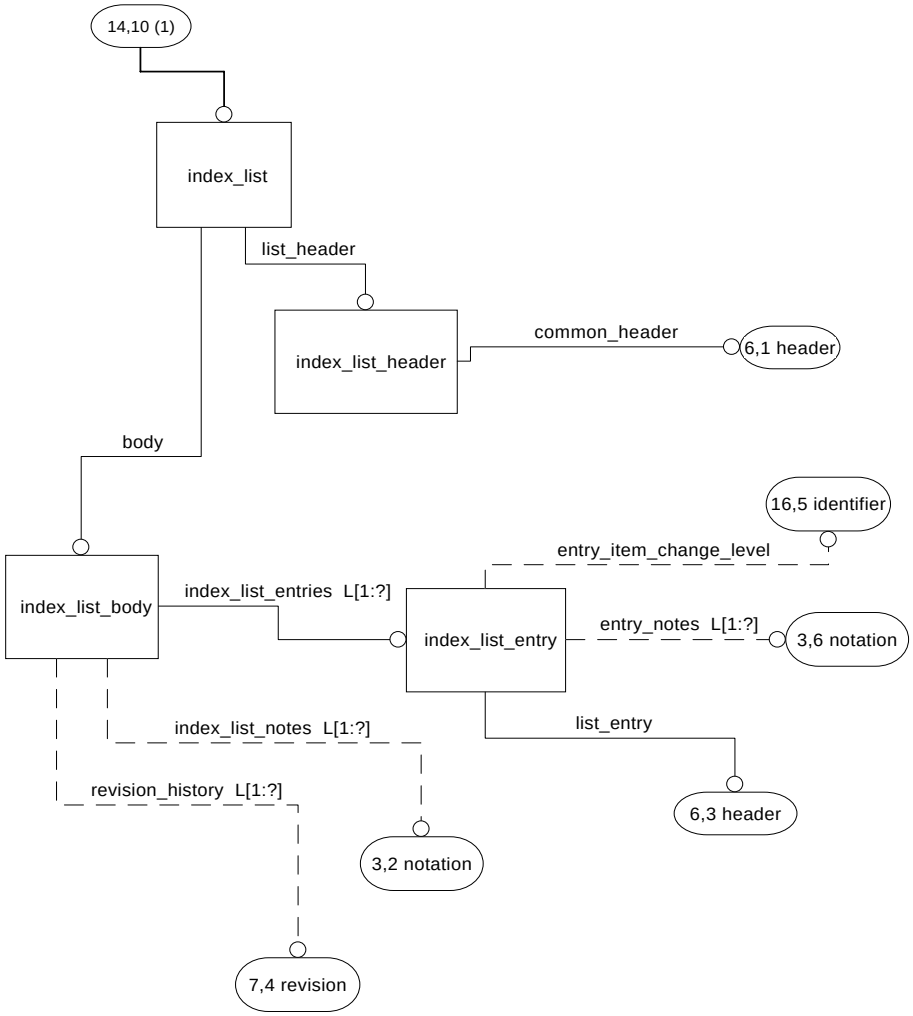

Figure G.14 - ARM EXPRESS-G diagram 14 of 29

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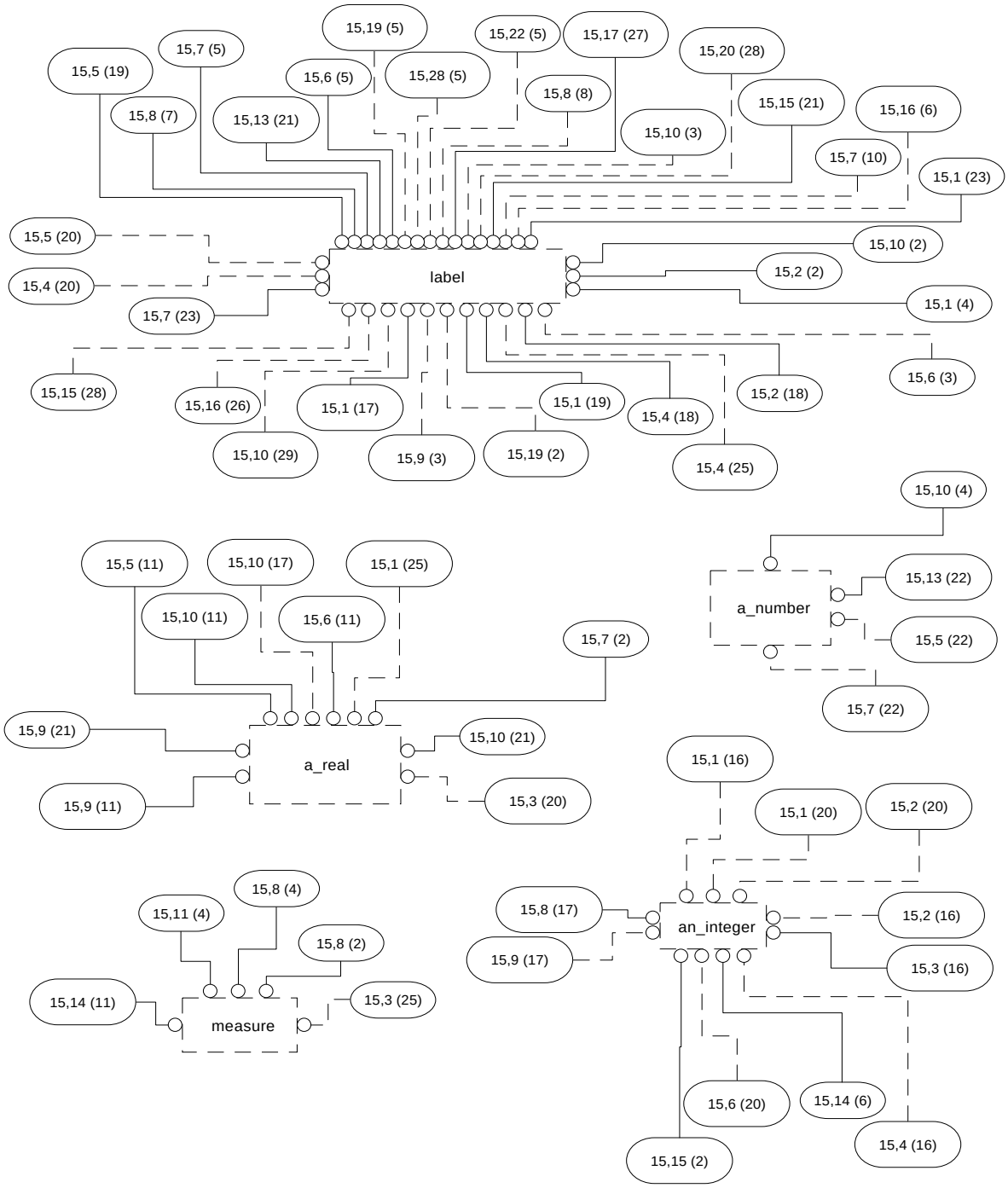

Figure G.15 - ARM EXPRESS-G diagram 15 of 29

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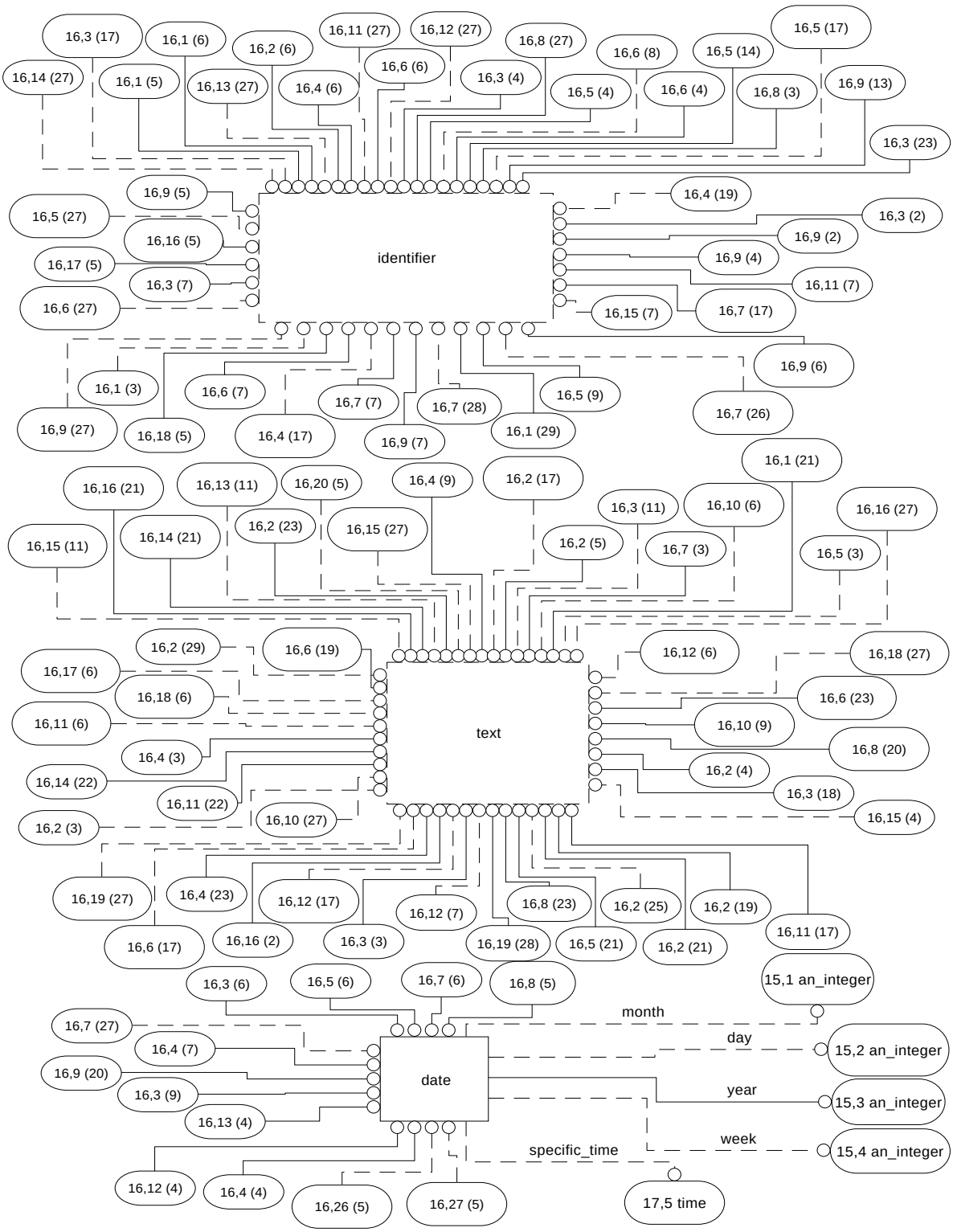

Figure G.16 - ARM EXPRESS-G diagram 16 of 29

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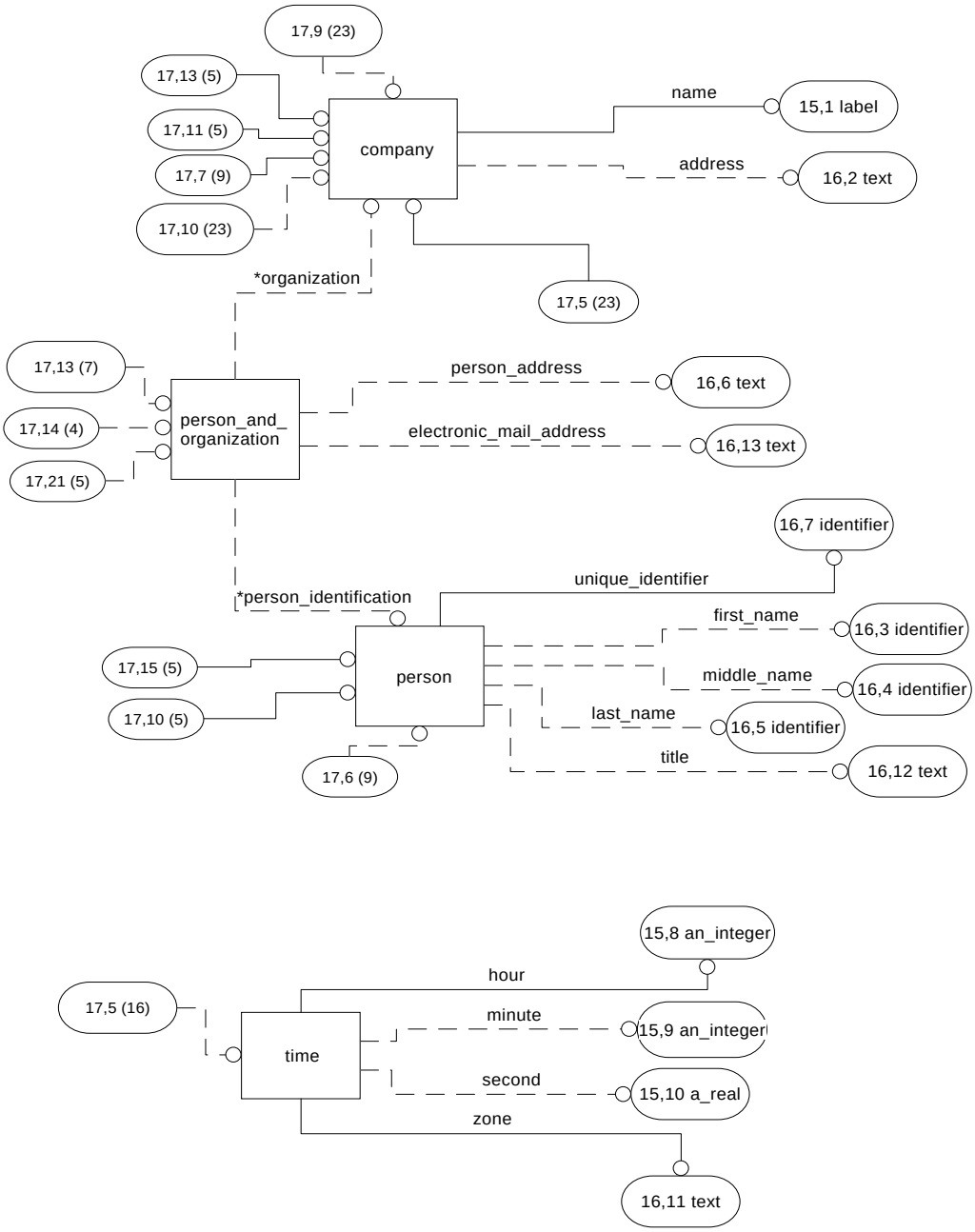

Figure G.17 - ARM EXPRESS-G diagram 17 of 29

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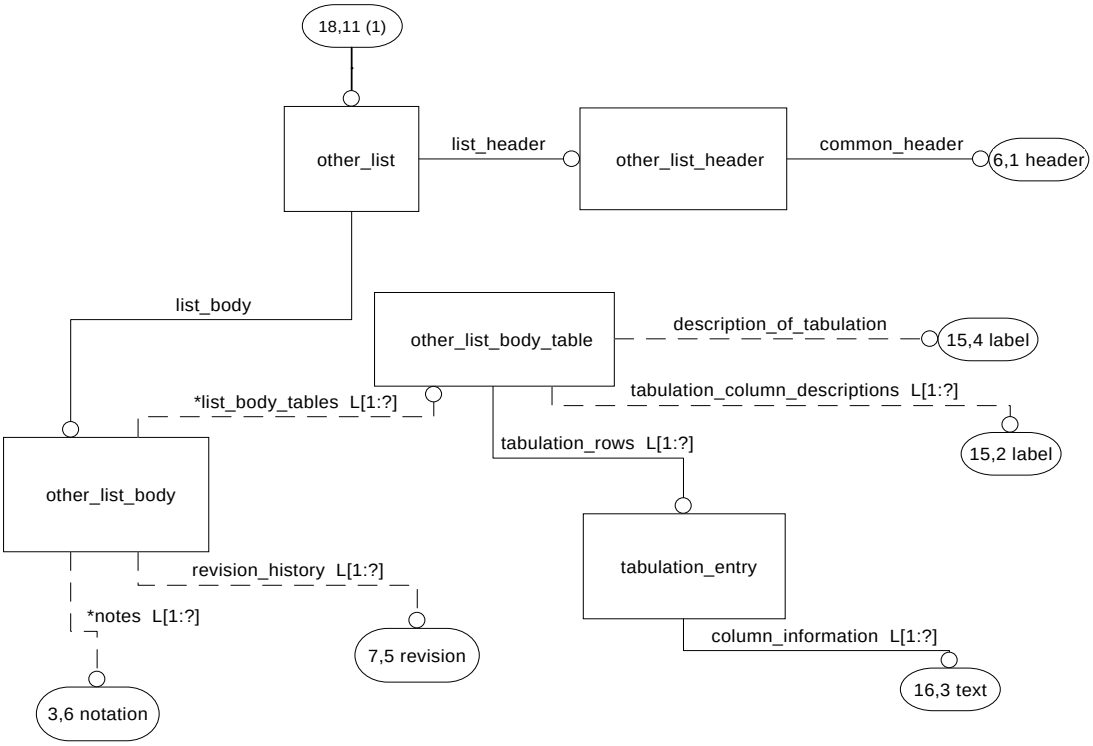

Figure G.18 - ARM EXPRESS-G diagram 18 of 29

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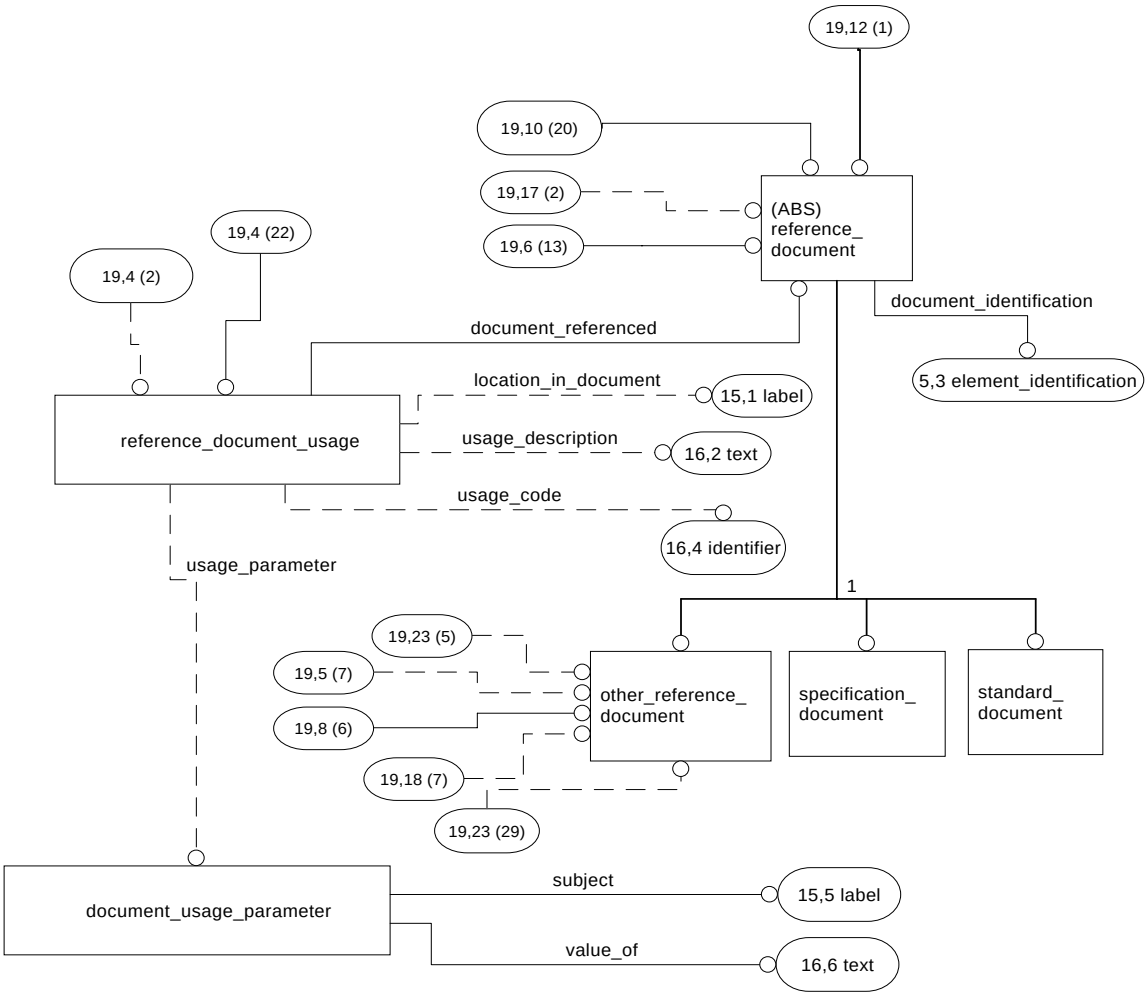

Figure G.19 - ARM EXPRESS-G diagram 19 of 29

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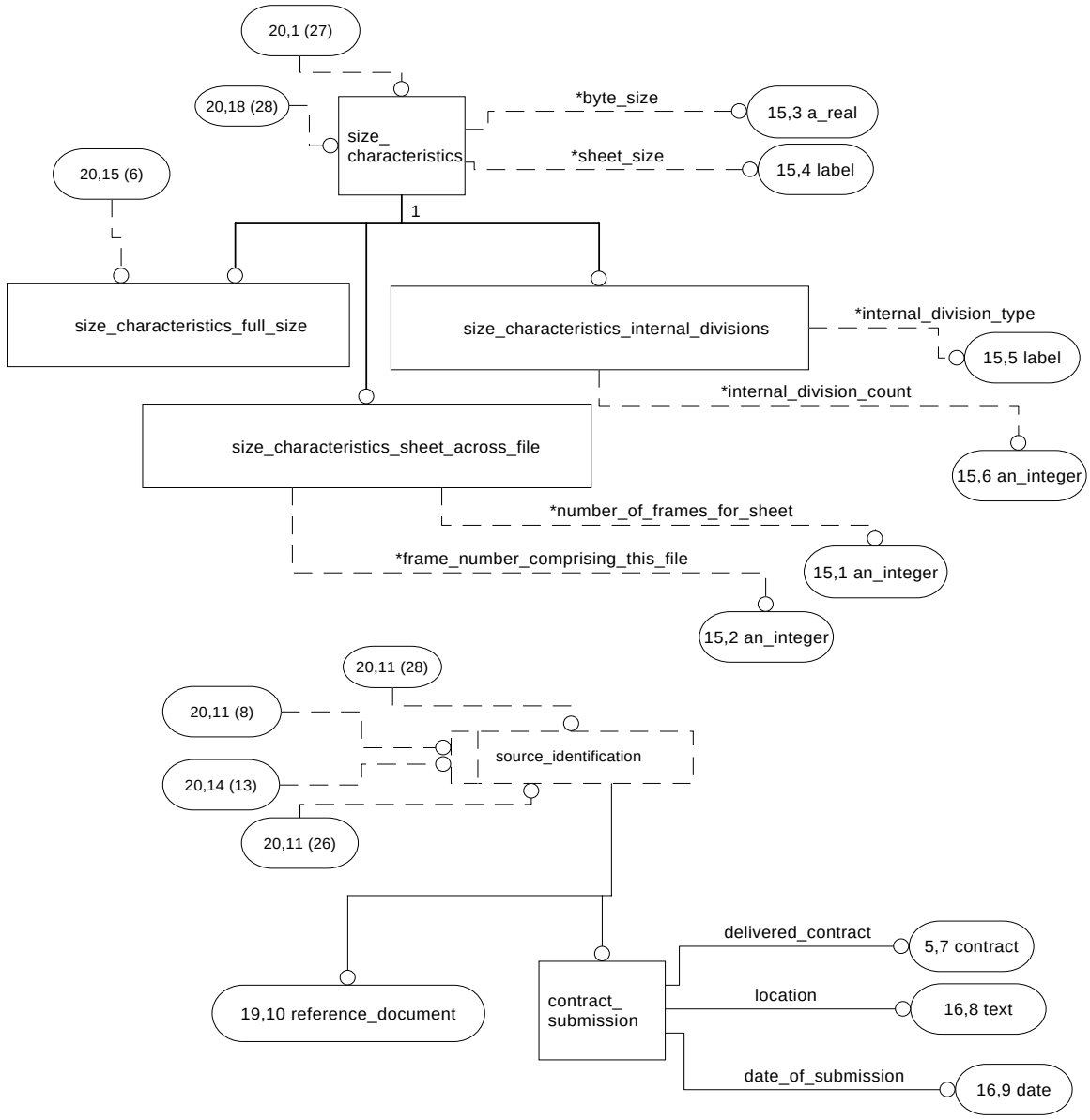

Figure G.20 - ARM EXPRESS-G diagram 20 of 29

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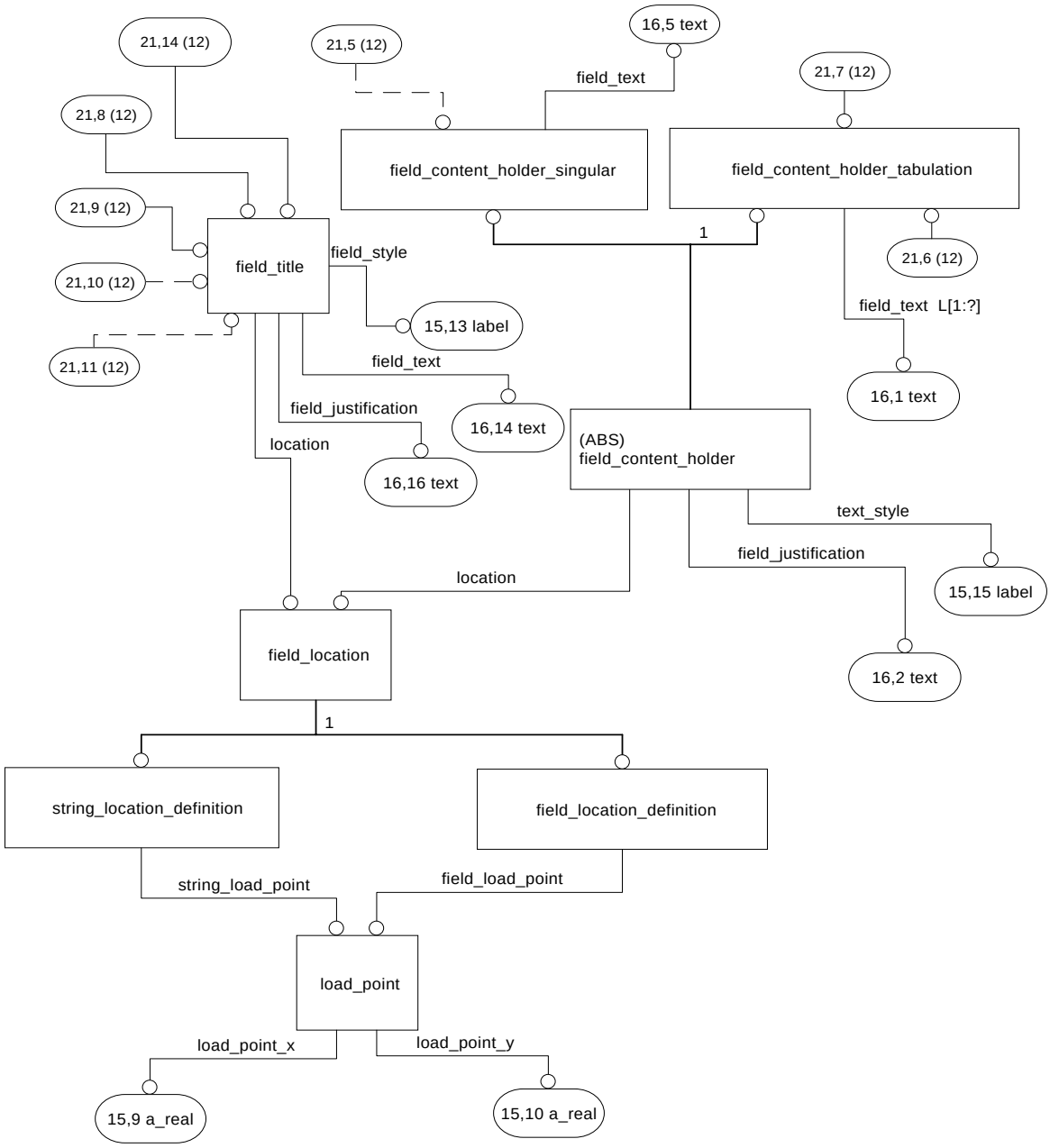

Figure G.21 - ARM EXPRESS-G diagram 21 of 29

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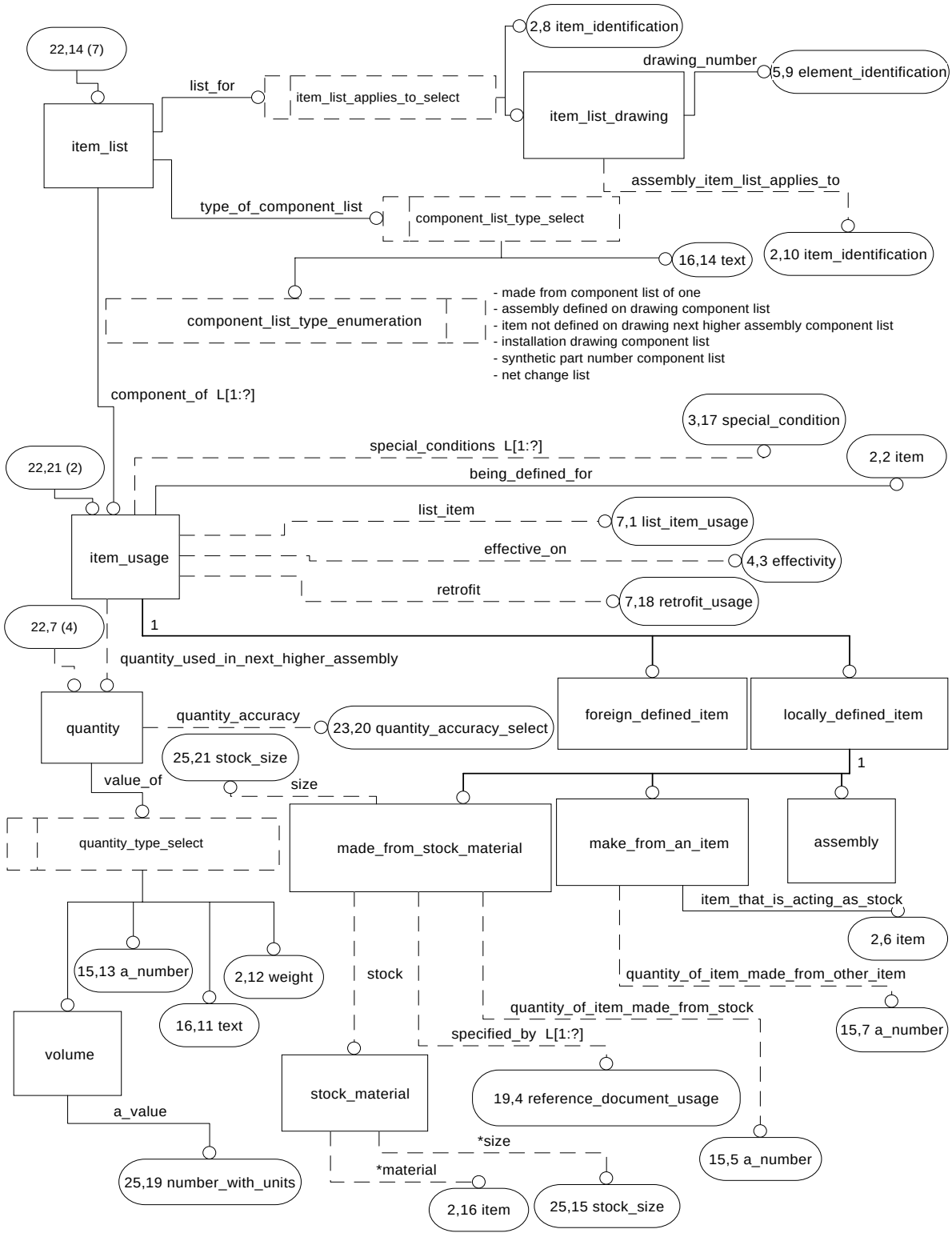

Figure G.22 - ARM EXPRESS-G diagram 22 of 29

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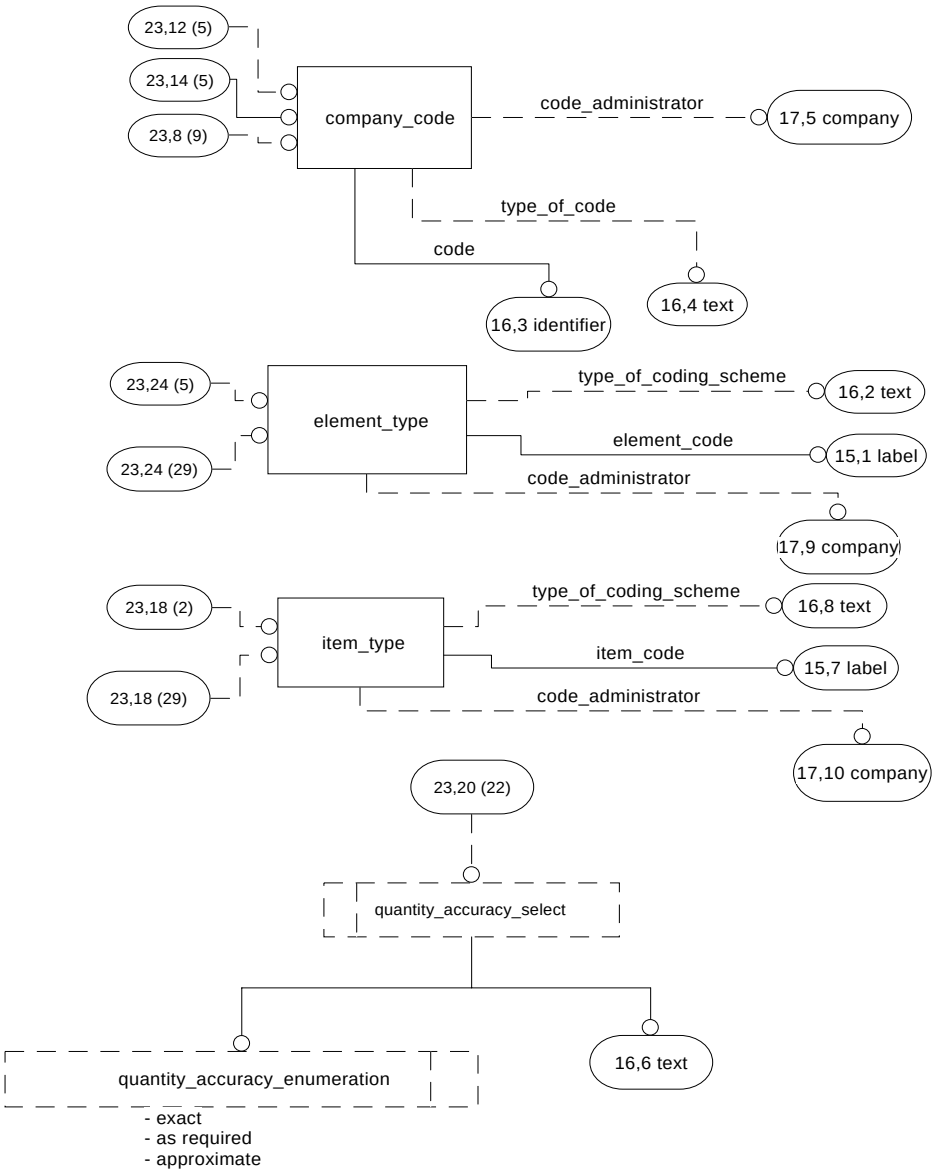

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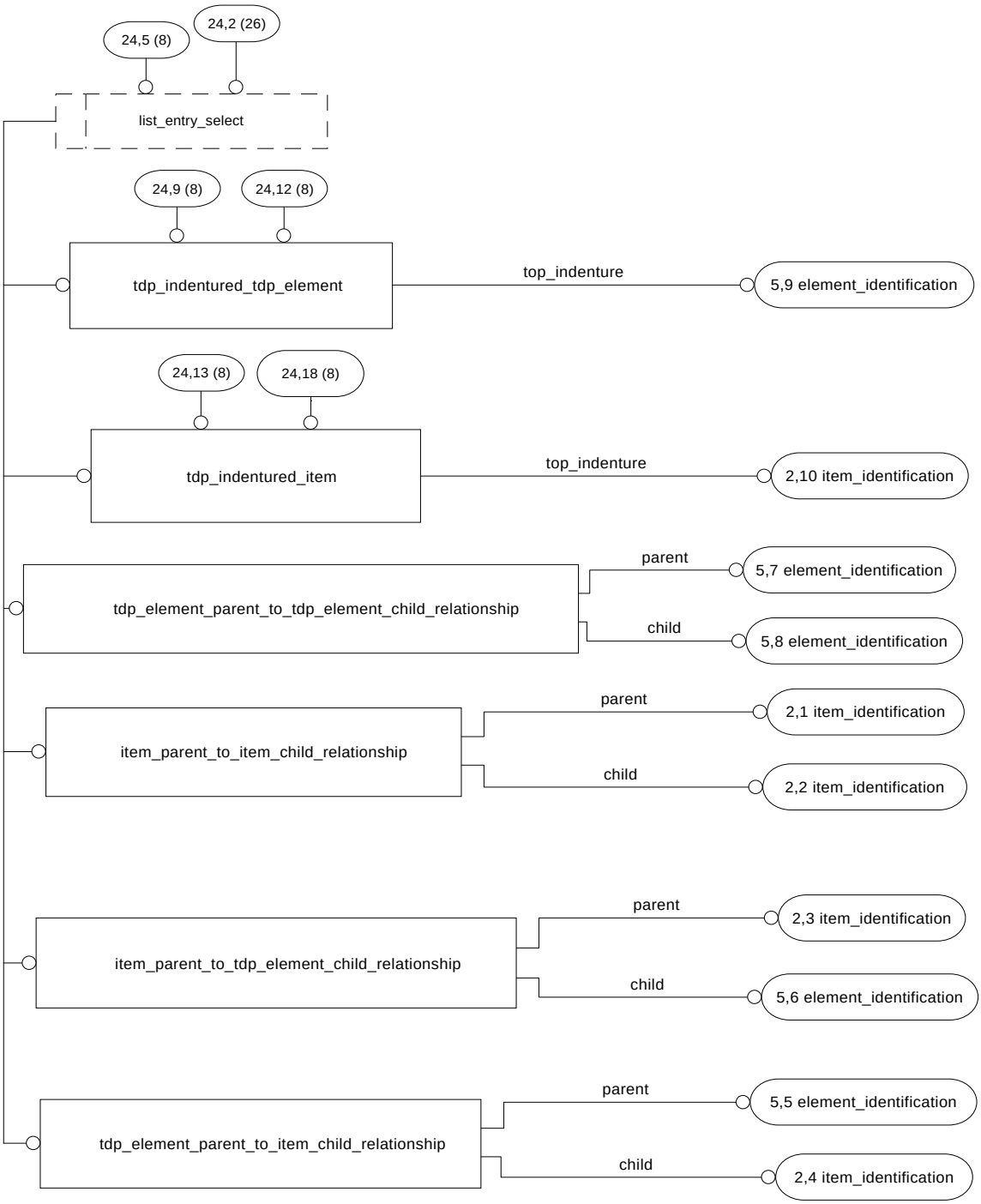

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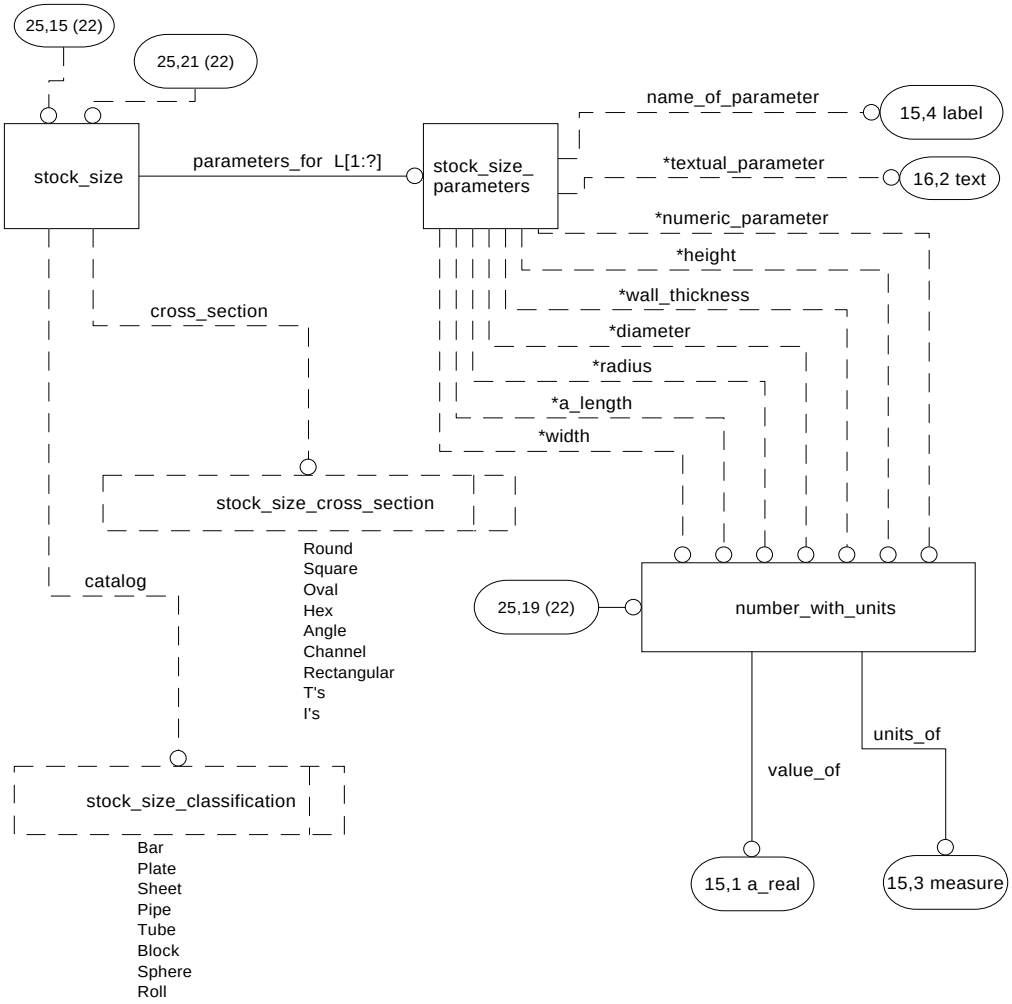

Figure G.25 - ARM EXPRESS-G diagram 25 of 29

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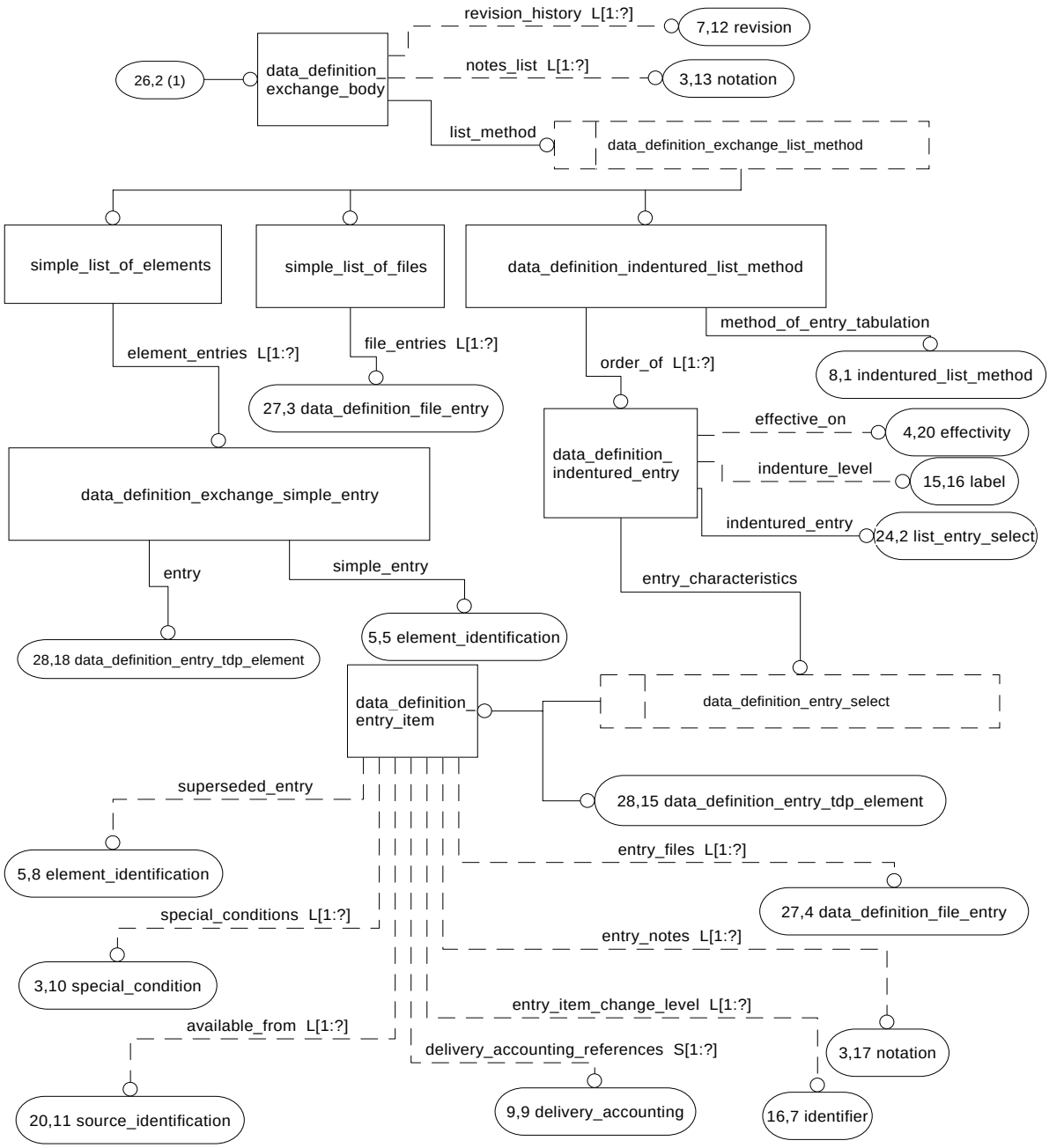

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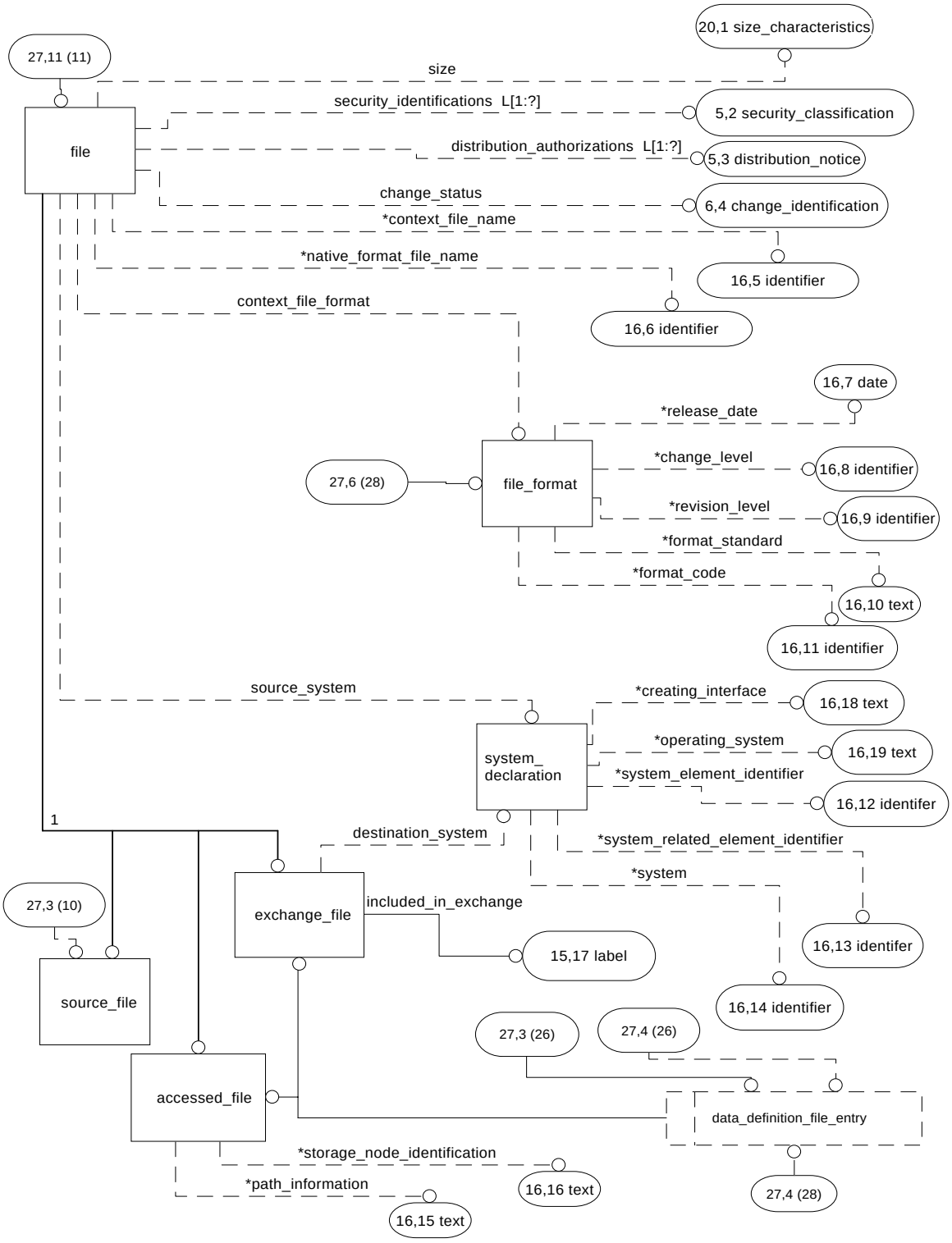

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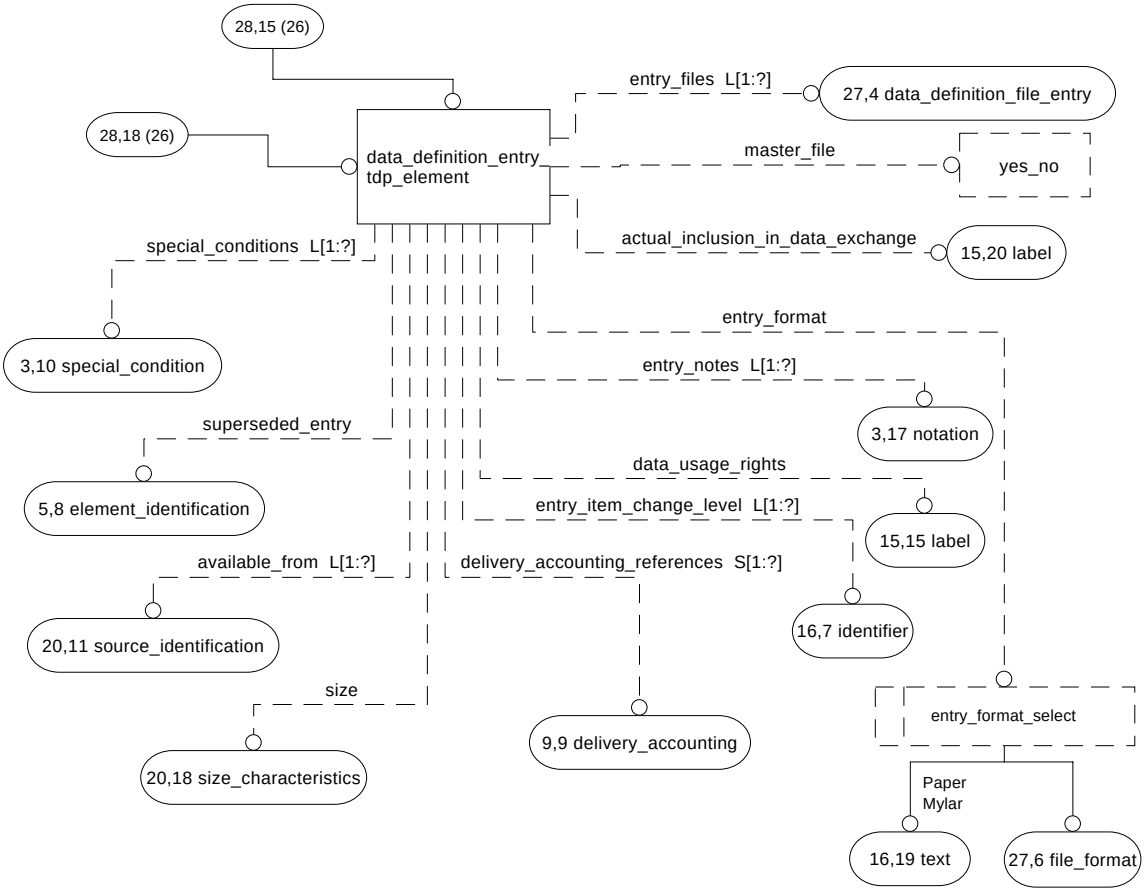

Figure G.28 - ARM EXPRESS - G diagram 28 of 29

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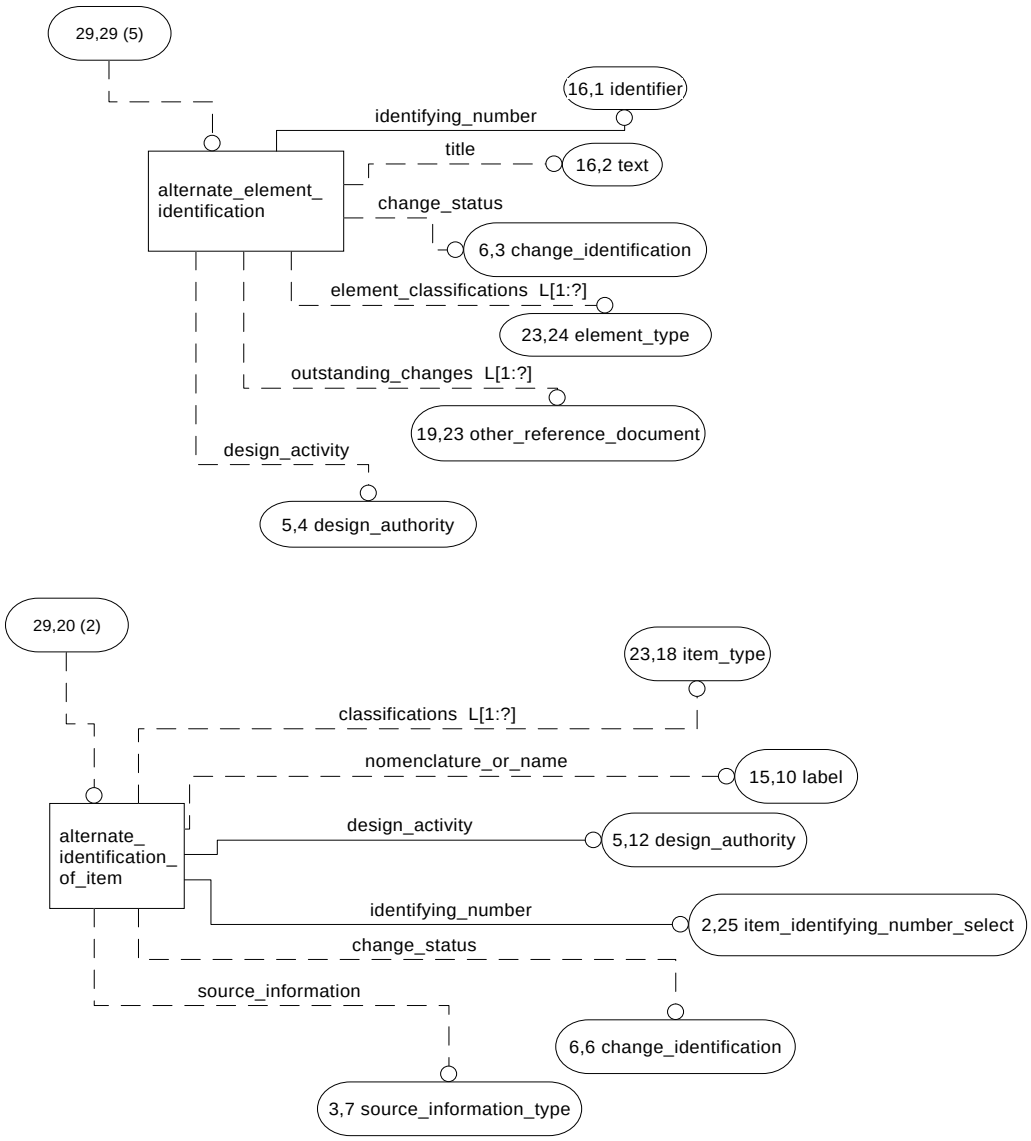

Figure G.29 - ARM EXPRESS-G Diagram 29 of 29

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Annex H
(informative)

AIM EXPRESS-G

Figures H.1 through H.56 correspond to the AIM EXPRESS expanded listing given in annex A. The diagrams use the EXPRESS-G graphical notation for the EXPRESS language. EXPRESS-G is defined in annex D of ISO 10303-11.

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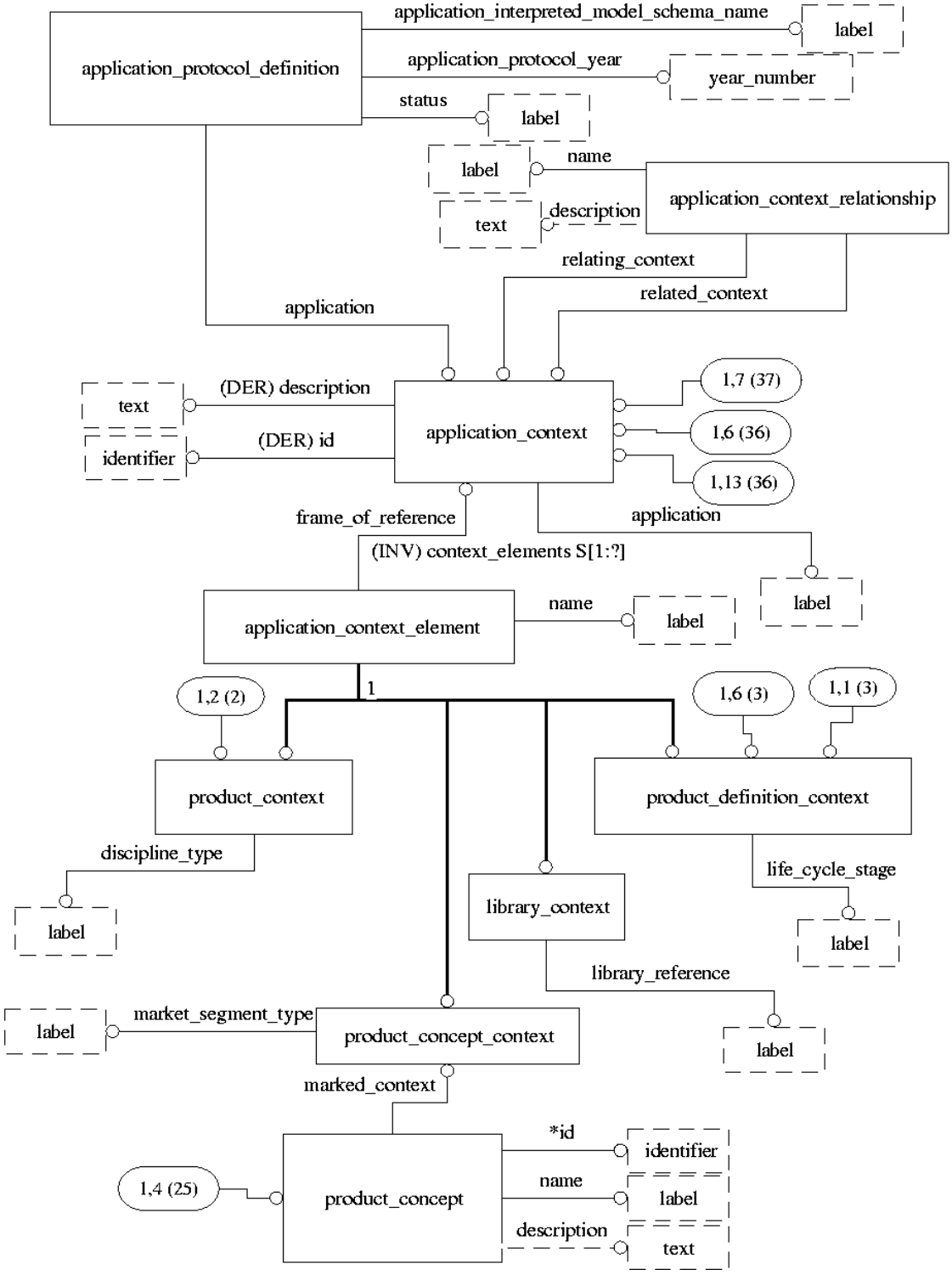

Figure H.1 - AIM EXPRESS-G diagram 1 of 56

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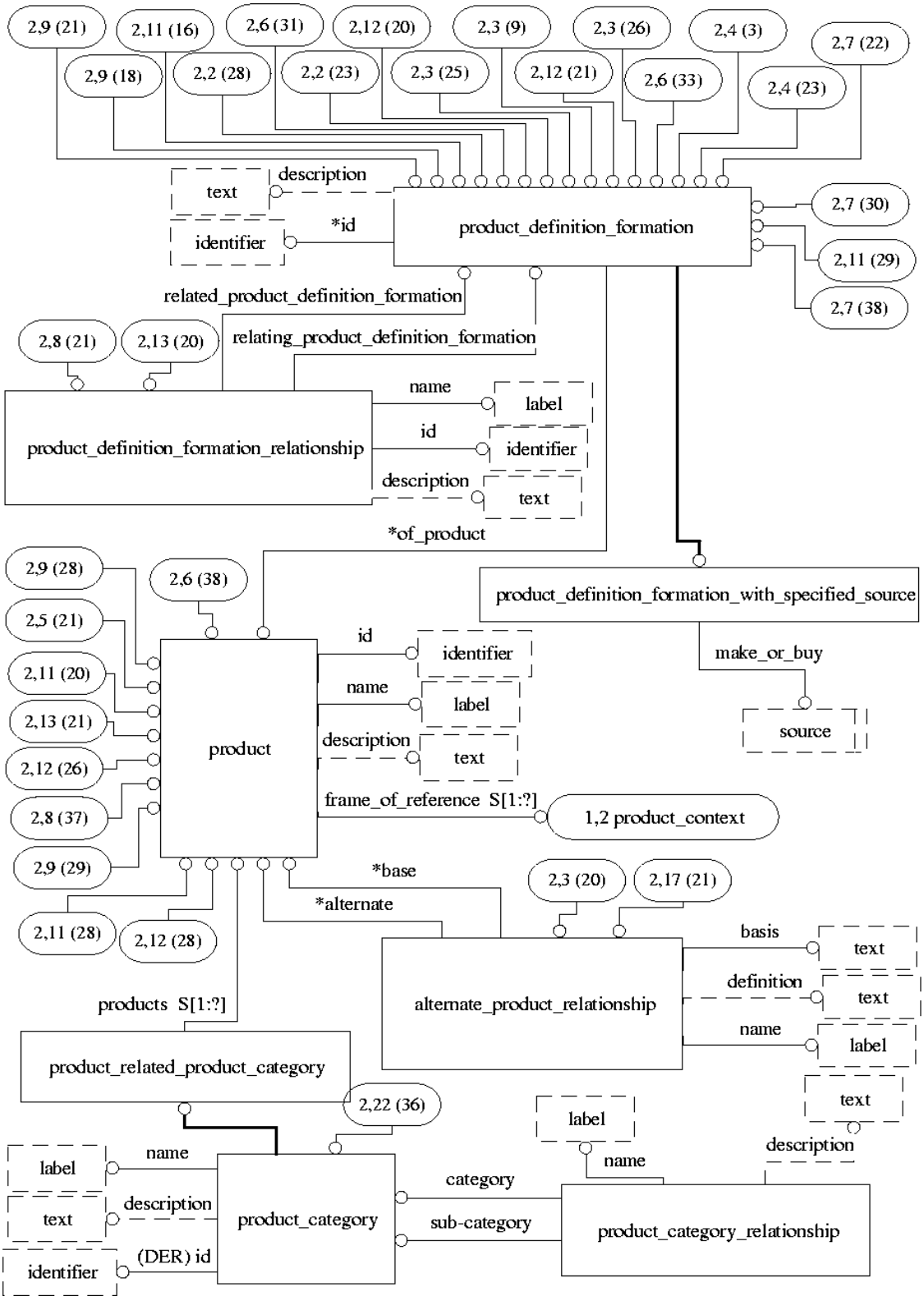

Figure H.2 - AIM EXPRESS-G diagram 2 of 56

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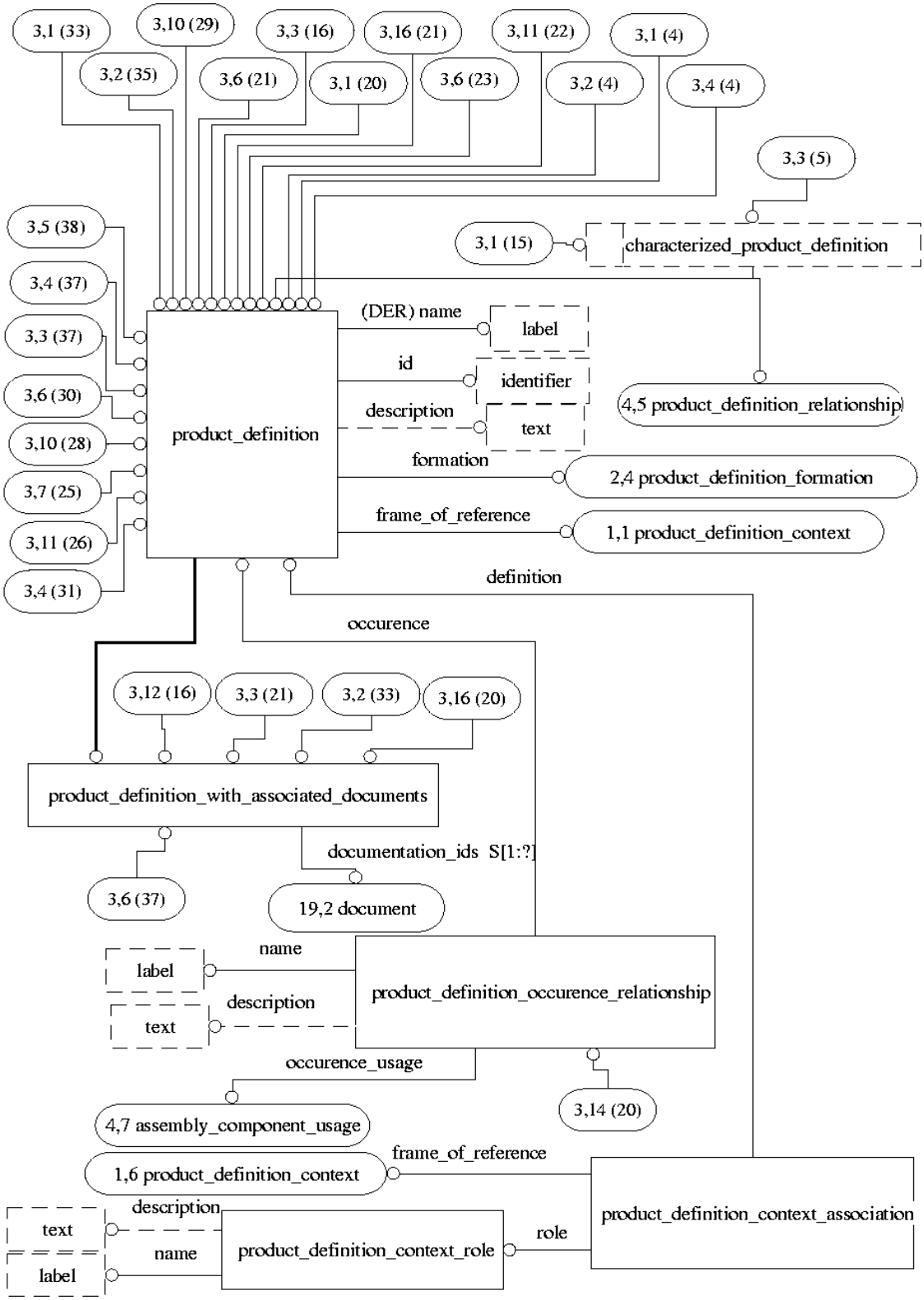

Figure H.3 - AIM EXPRESS-G diagram 3 of 56

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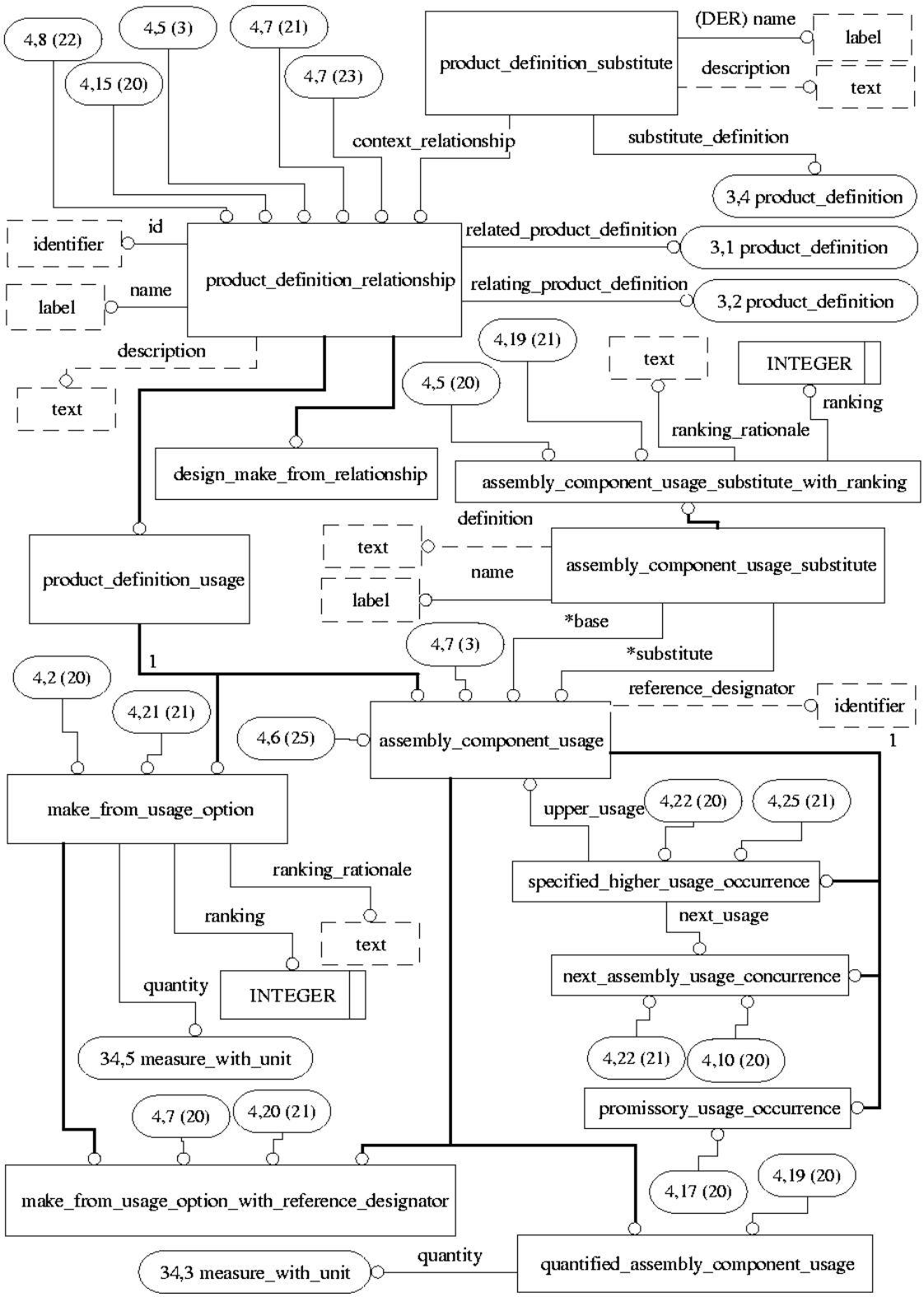

Figure H.4 - AIM EXPRESS-G diagram 4 of 55

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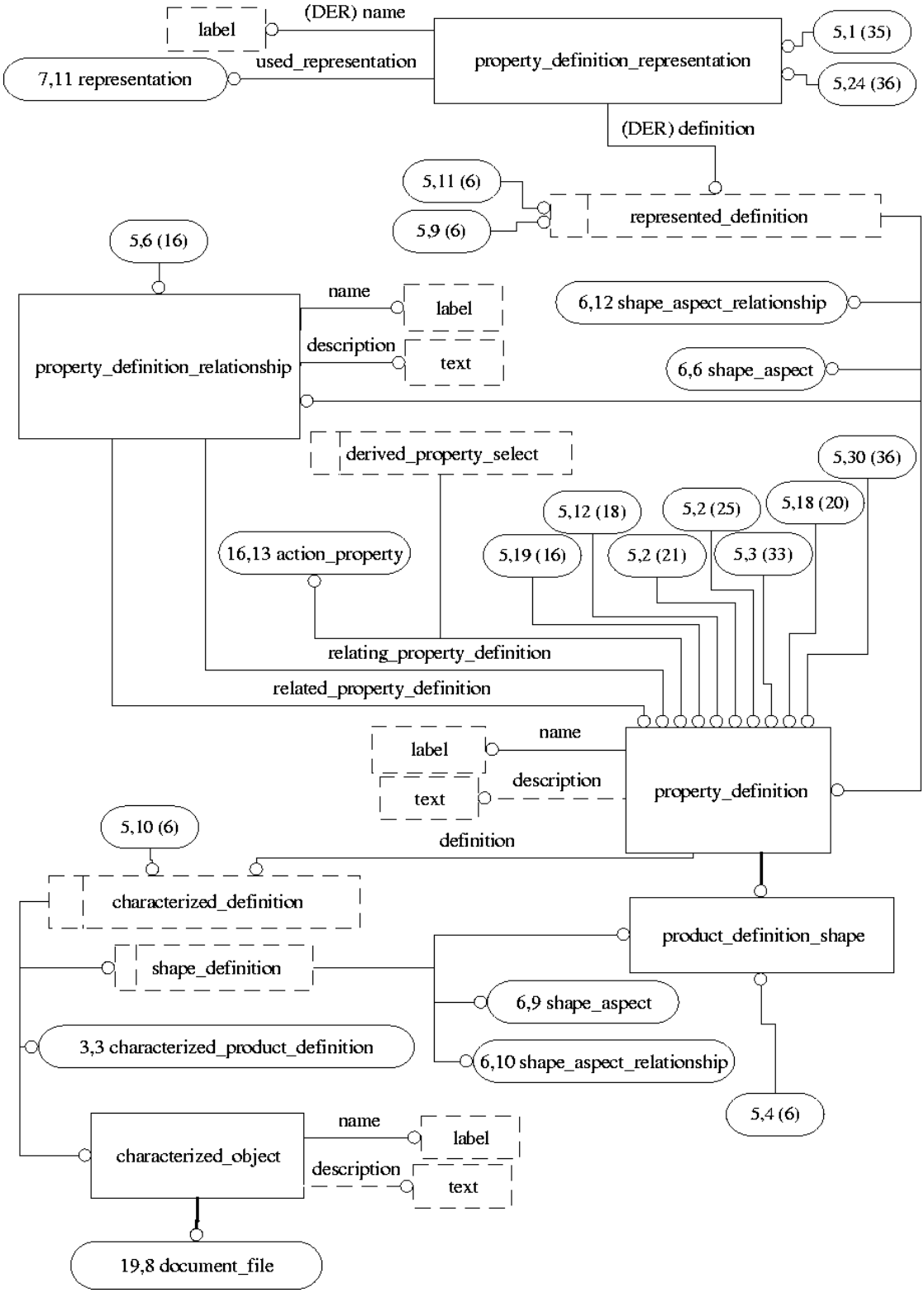

Figure H.5 - AIM EXPRESS-G diagram 5 of 56

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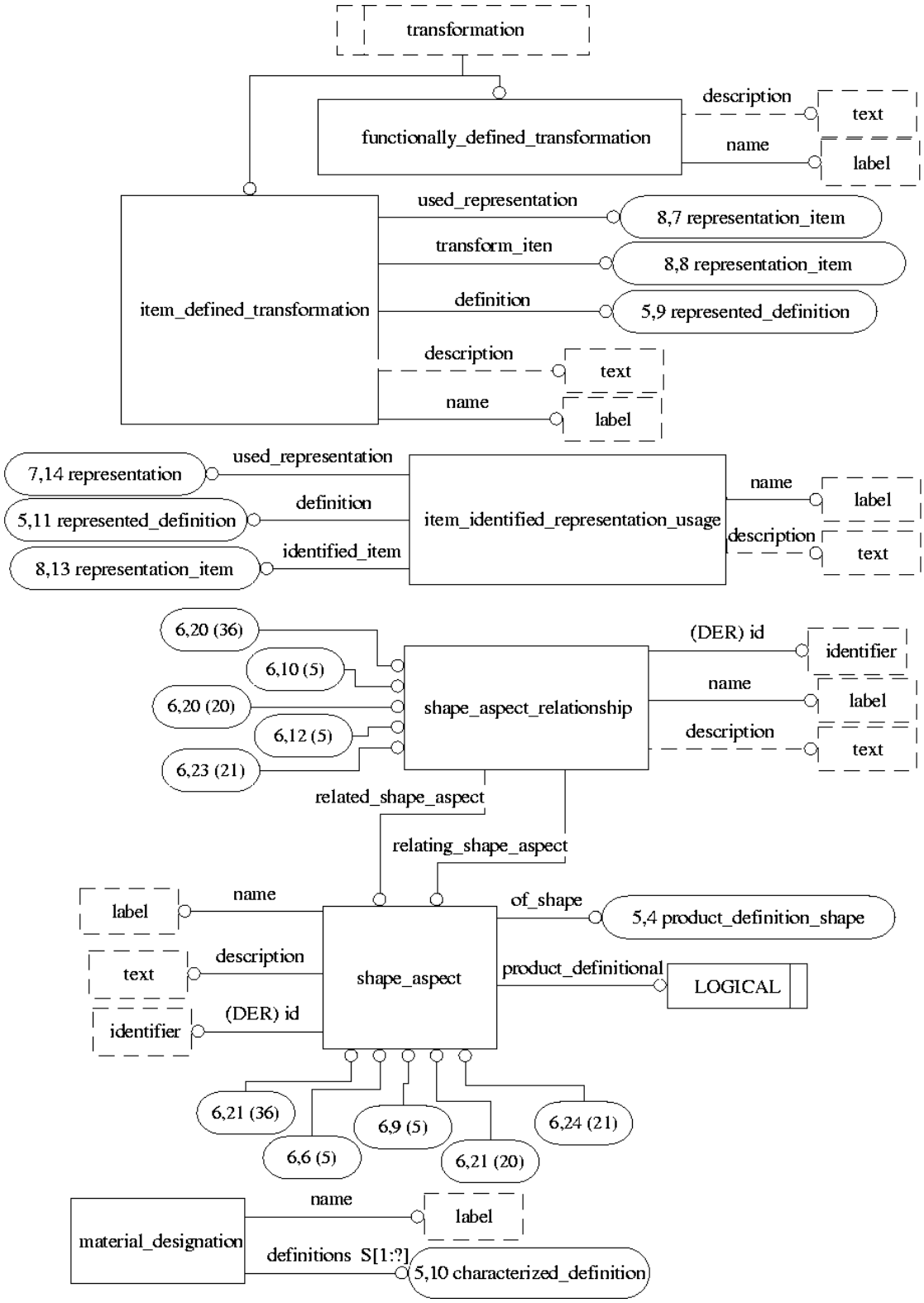

Figure H.6 - AIM EXPRESS-G diagram 6 of 55

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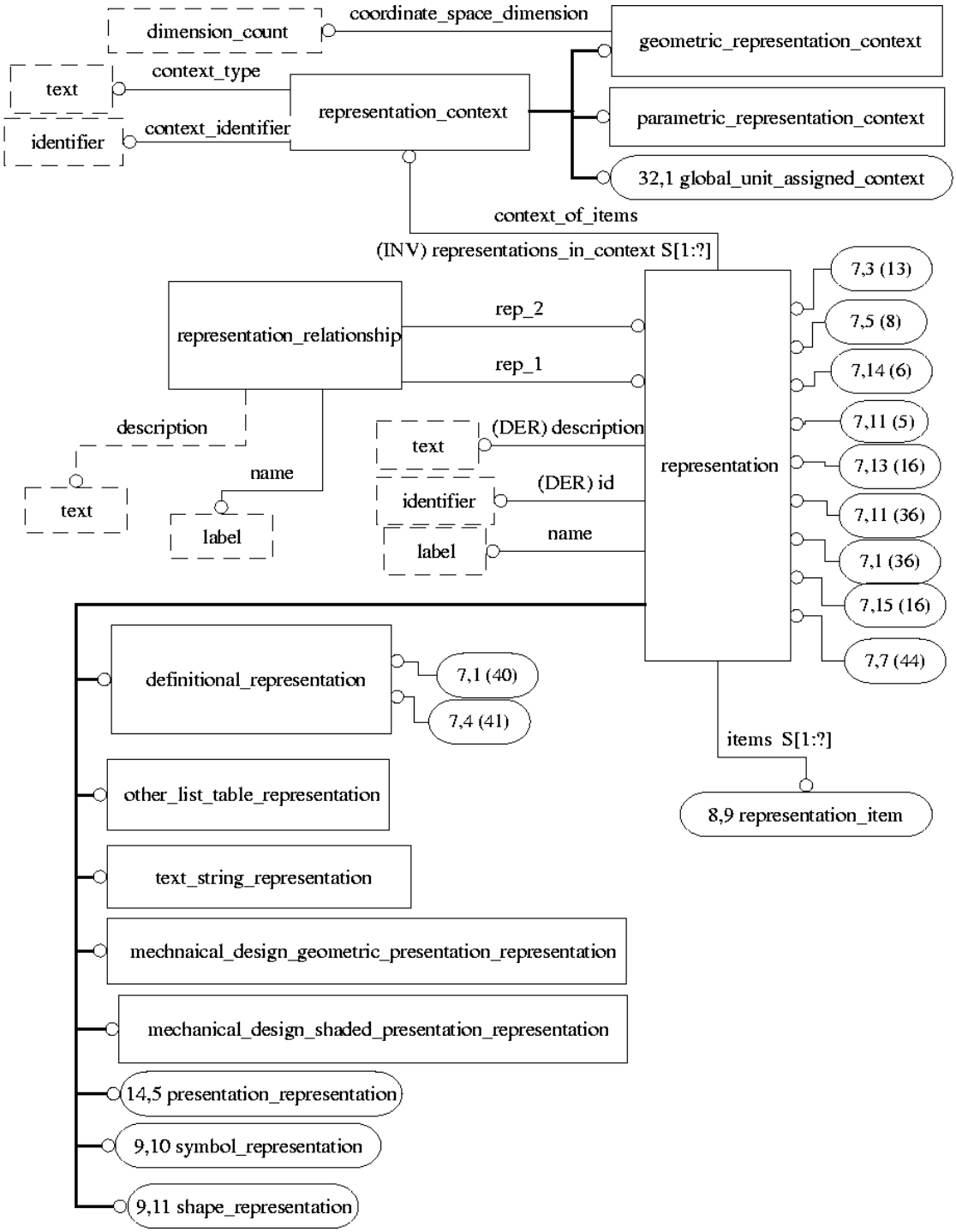

Figure H.7 - AIM EXPRESS-G diagram 7 of 56

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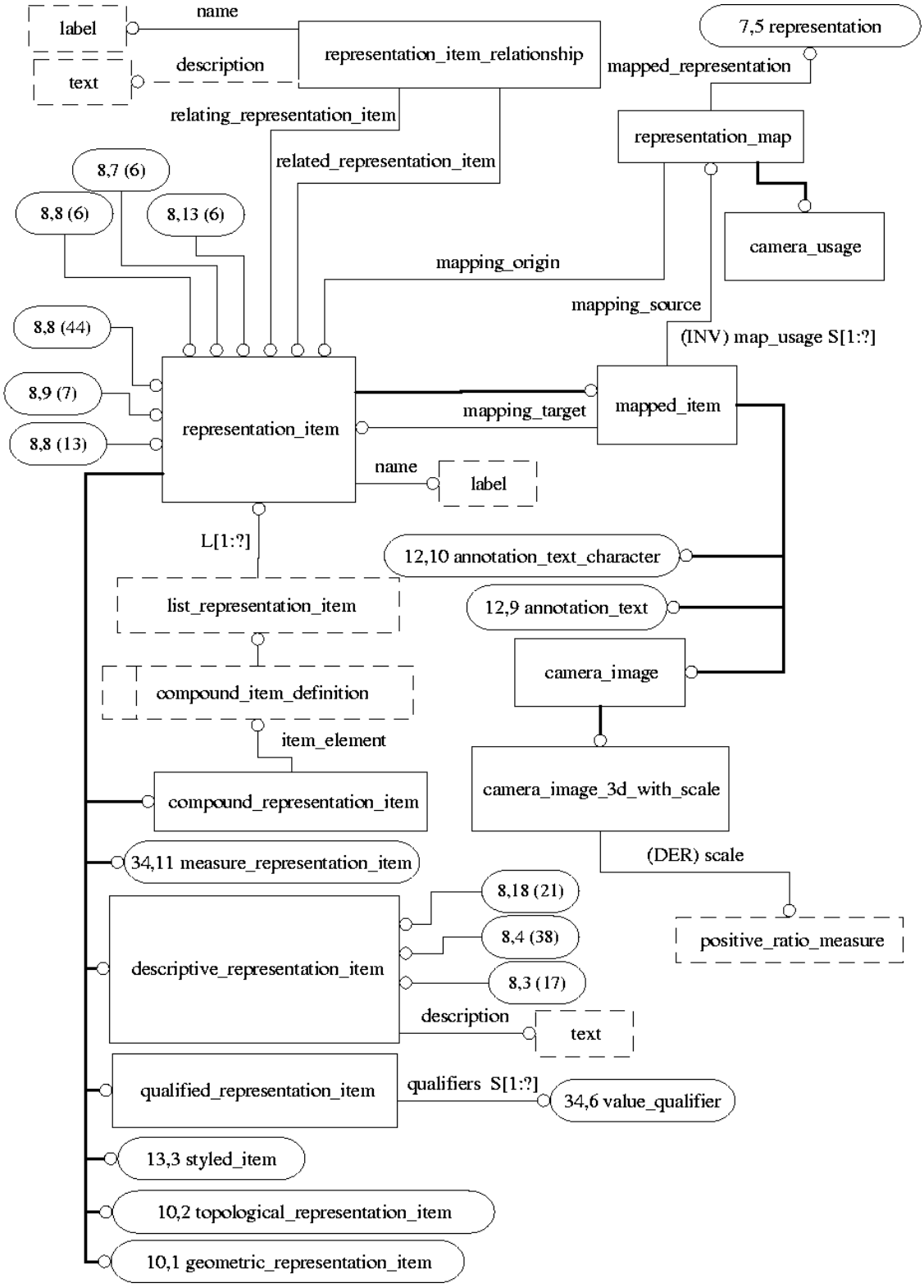

Figure H.8 - AIM EXPRESS-G diagram 8 of 56

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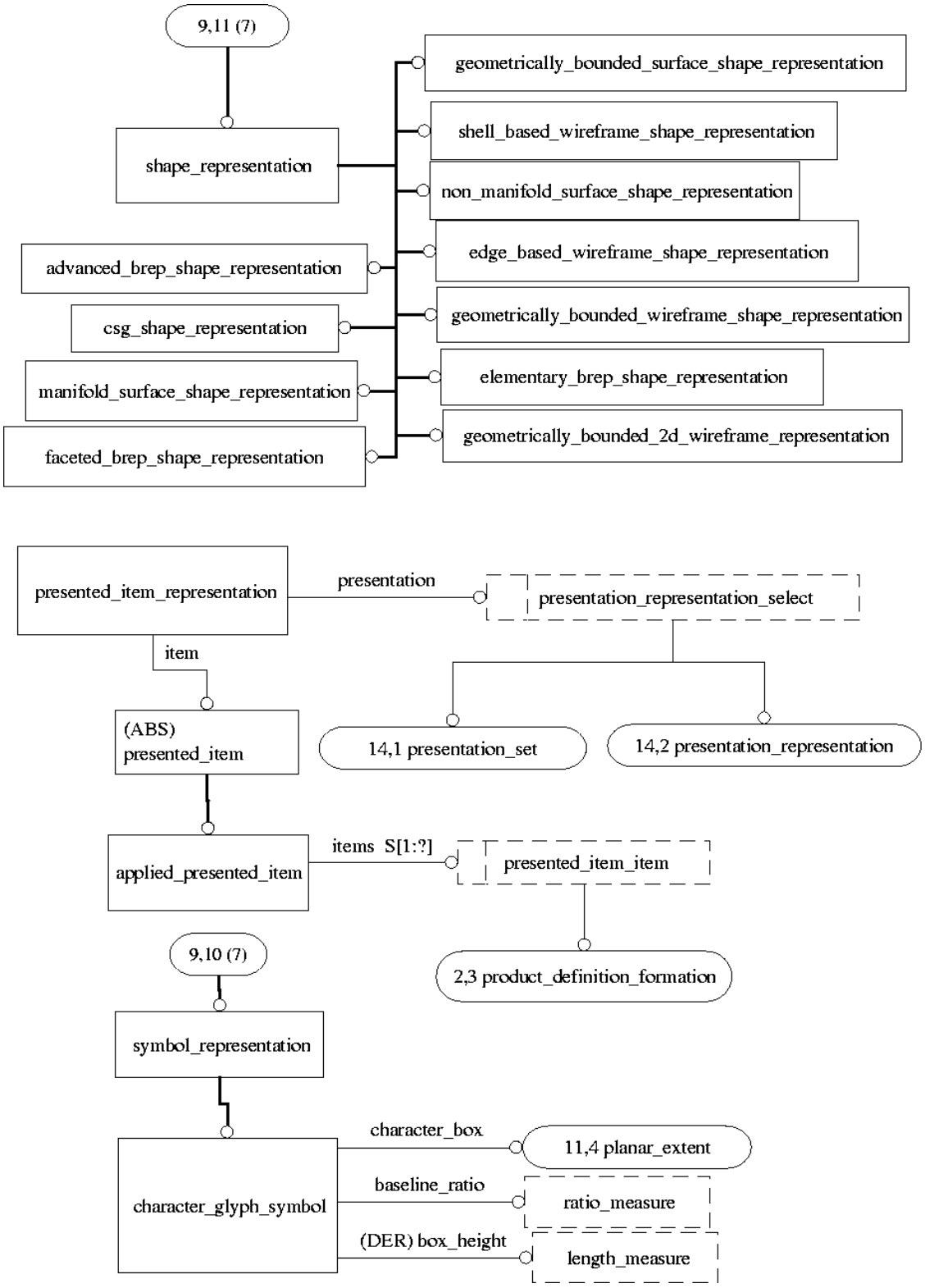

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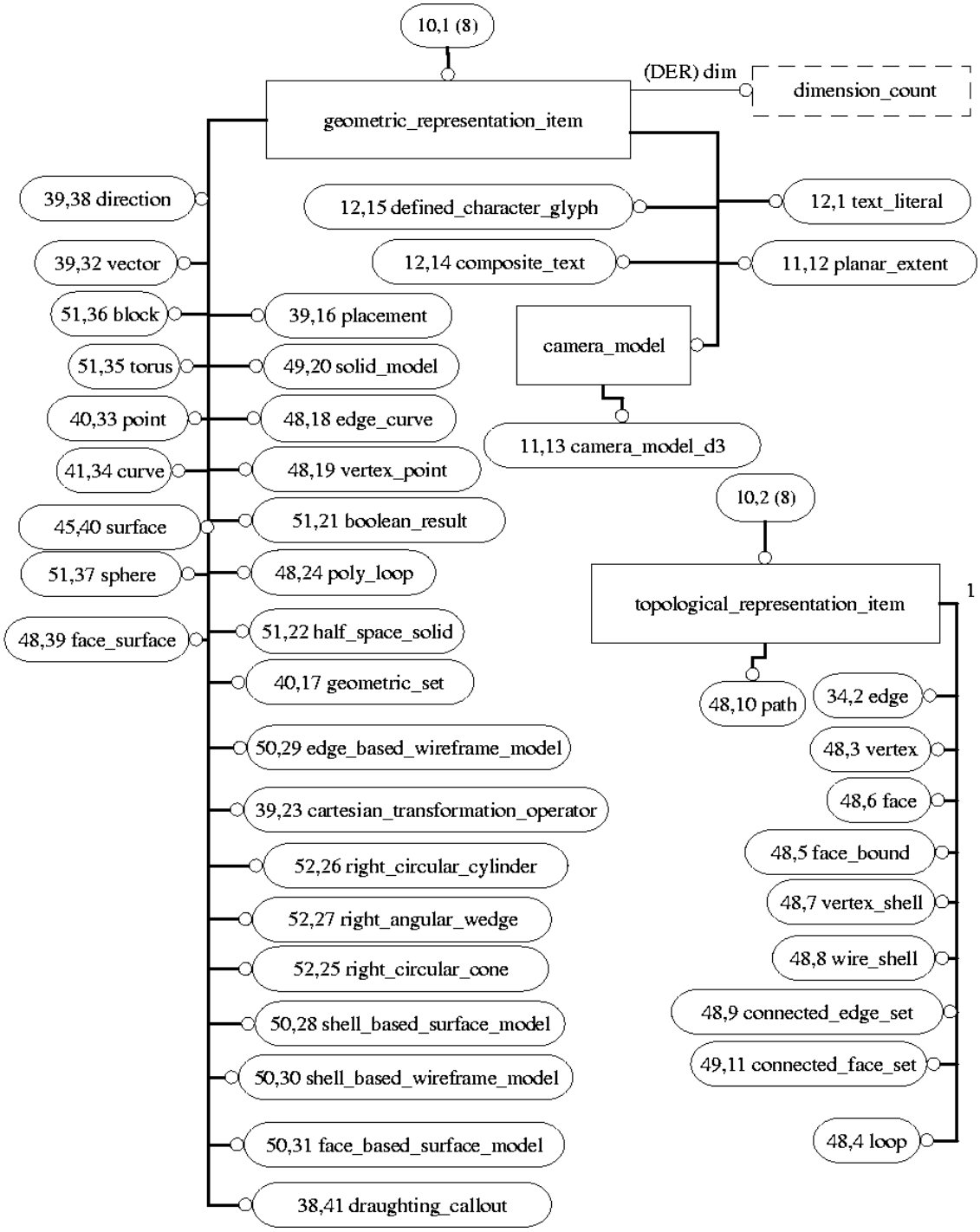

Figure H.10 - AIM EXPRESS-G diagram 10 of 56

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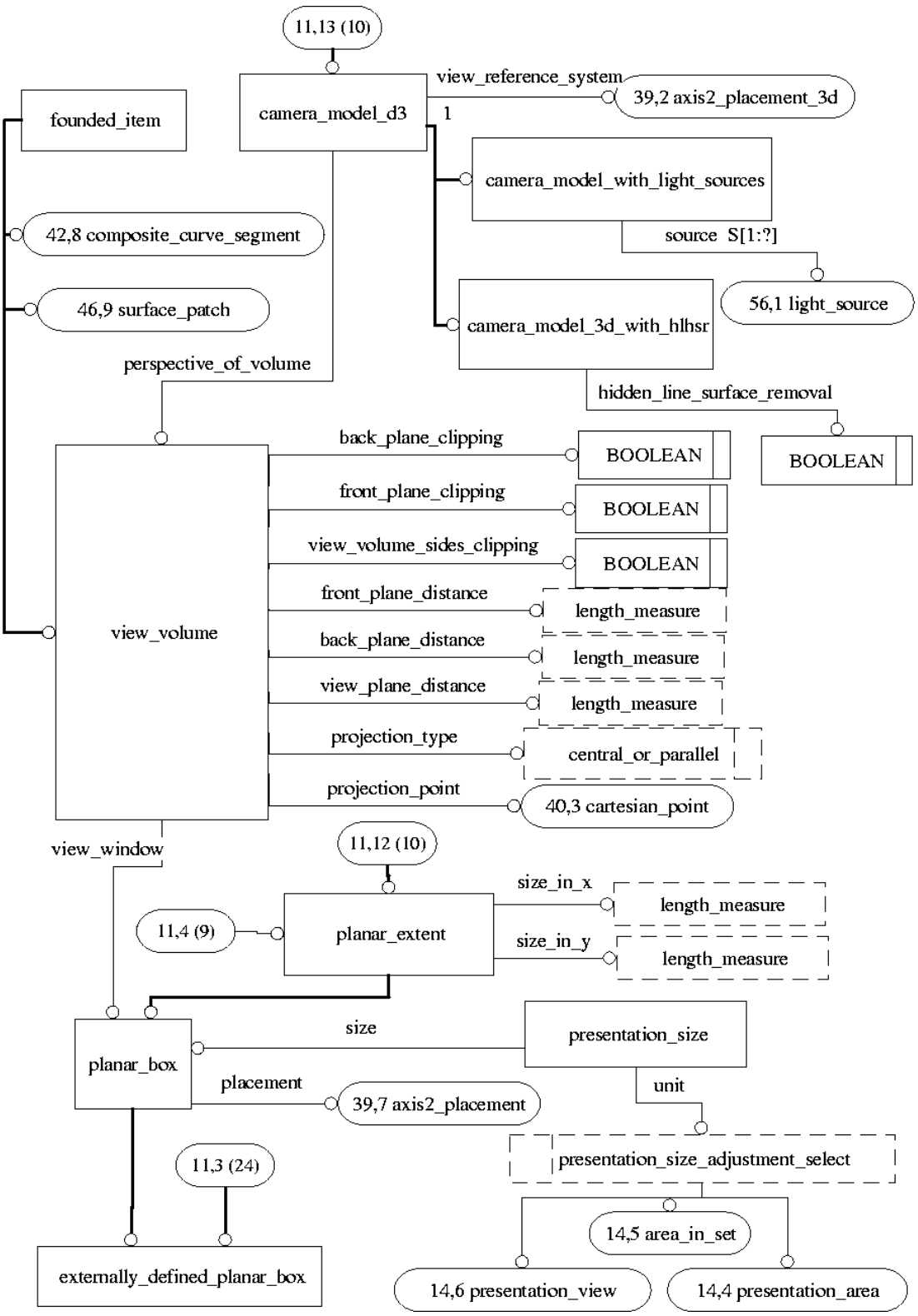

Figure H.11 - AIM EXPRESS-G diagram 11 of 56

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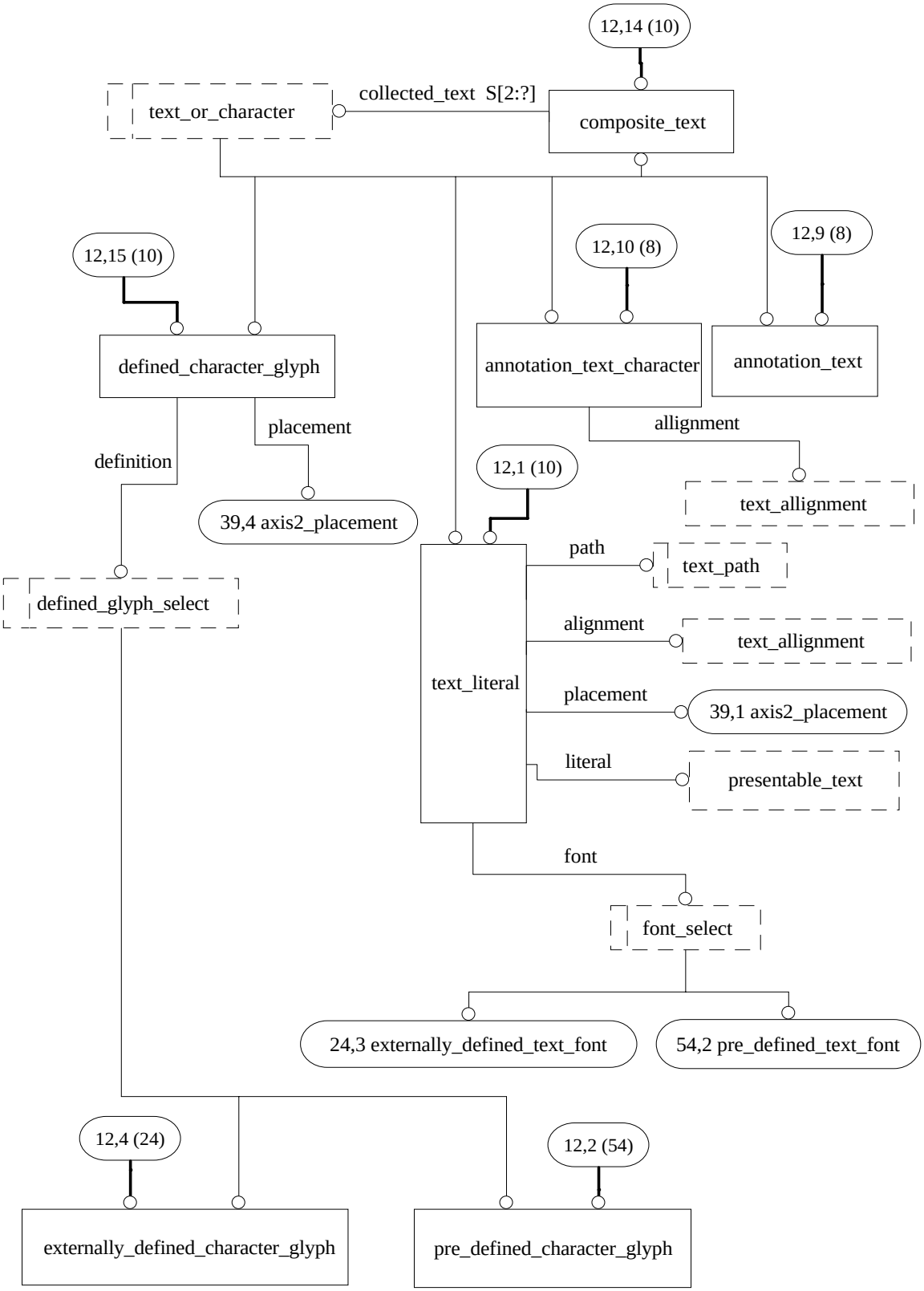

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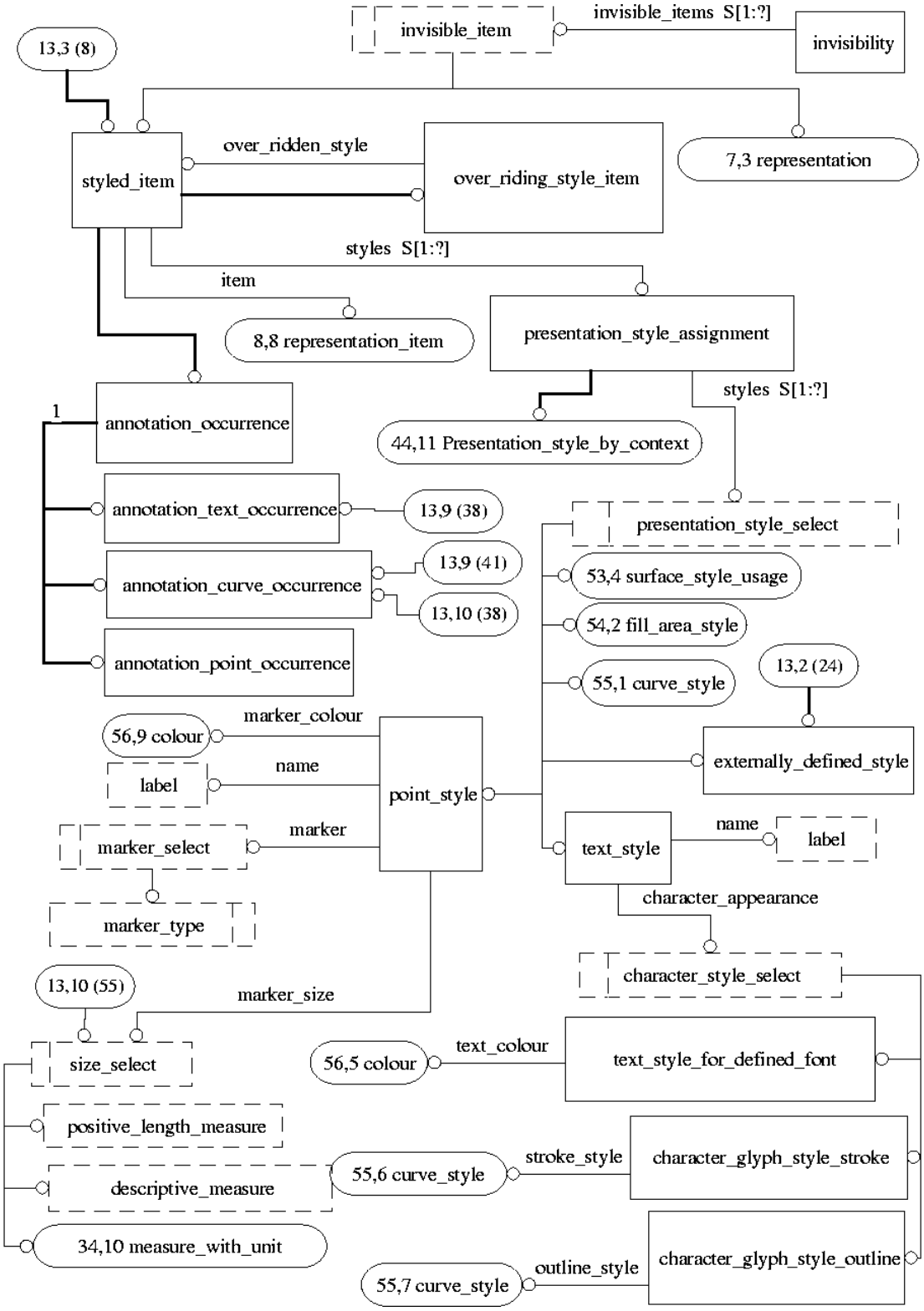

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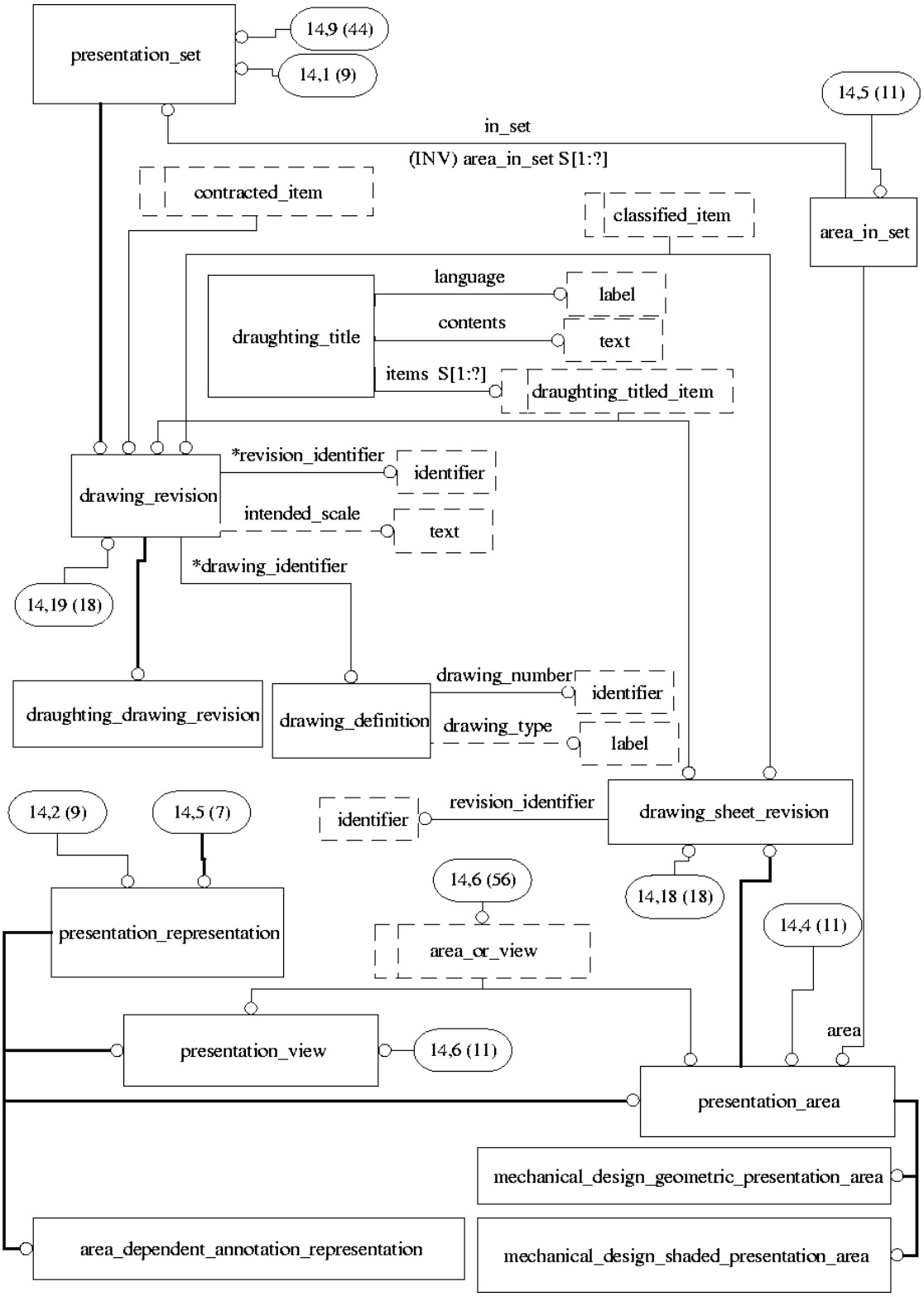

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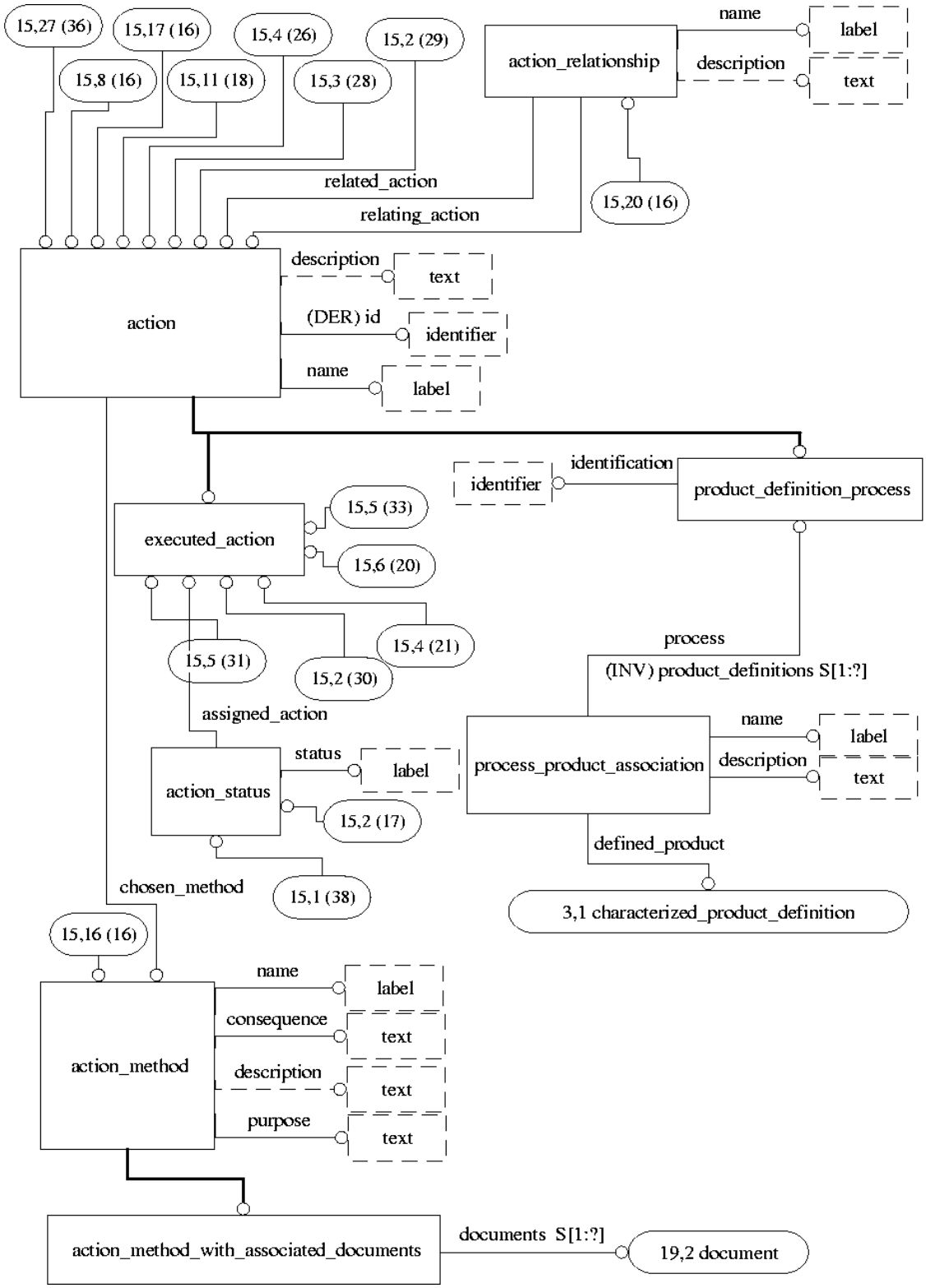

Figure H.15 - AIM EXPRESS-G diagram 15 of 56

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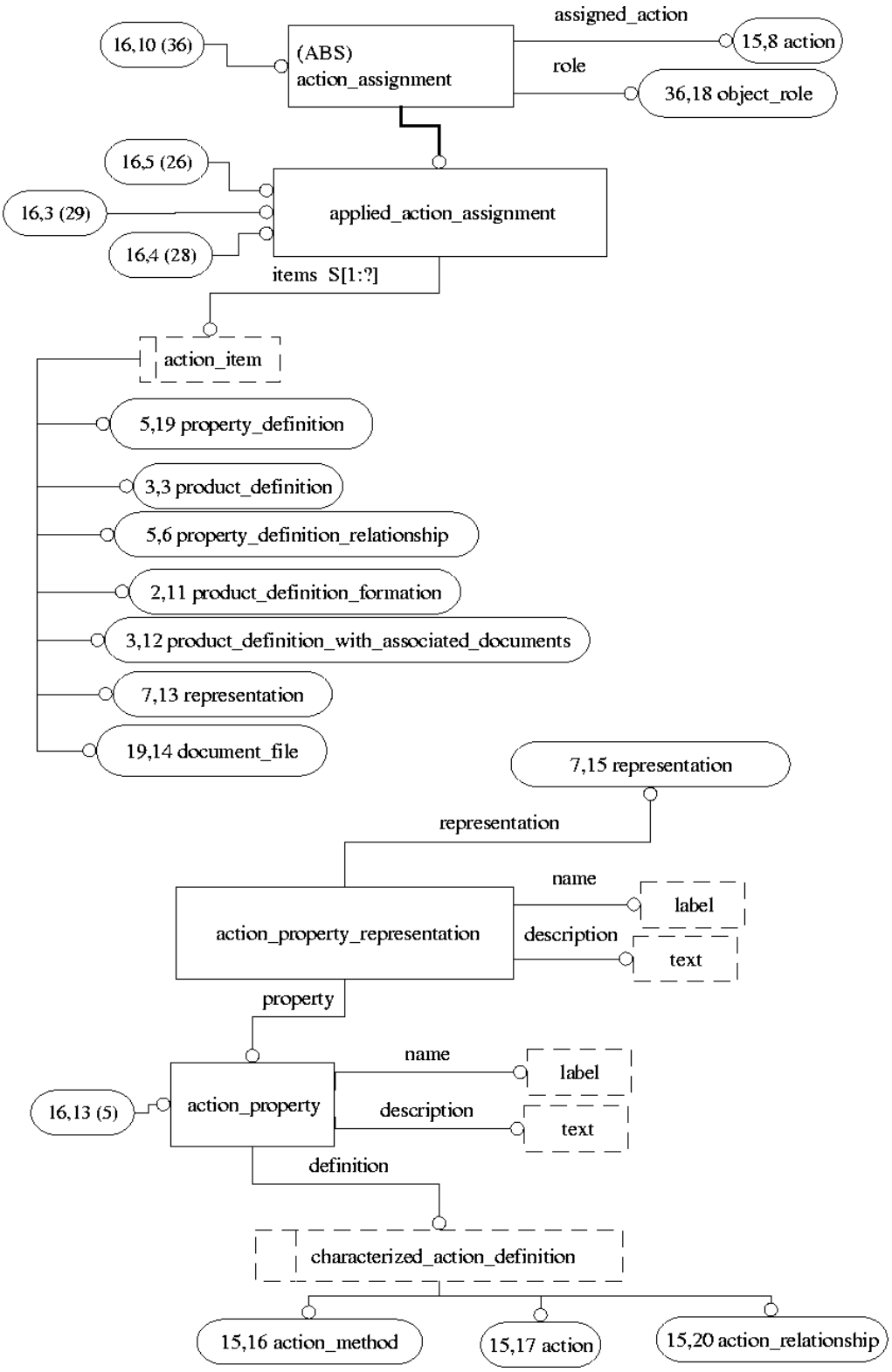

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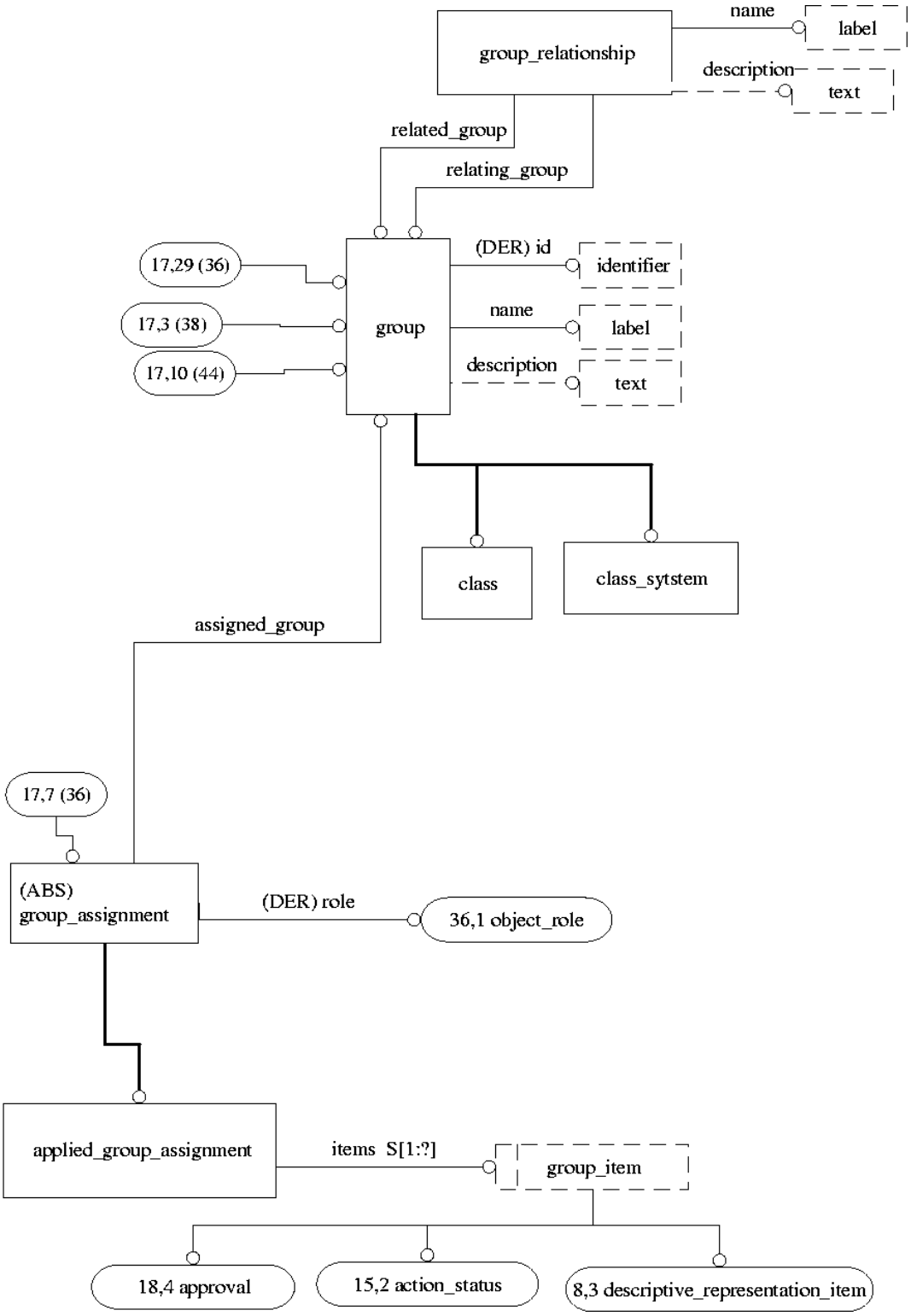

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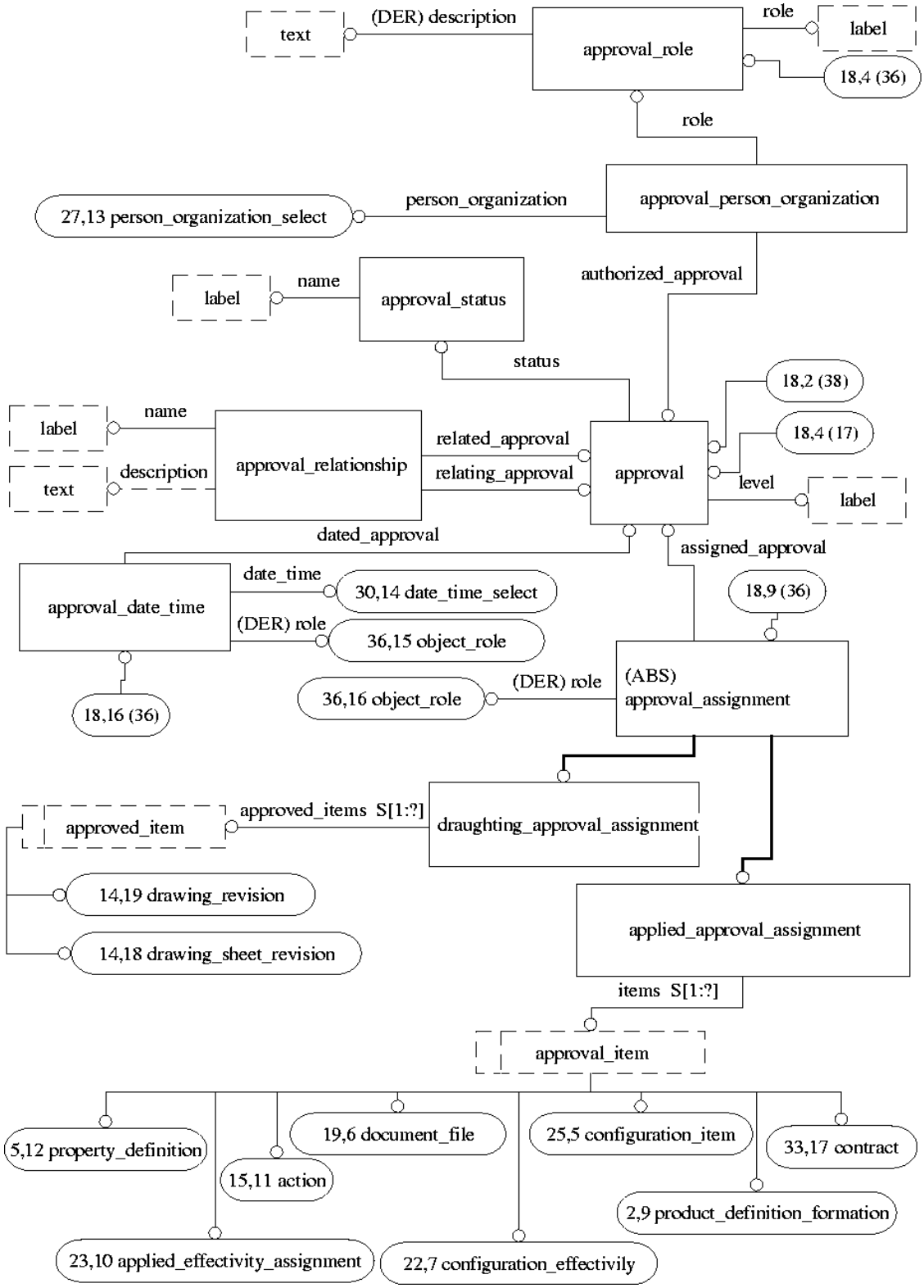

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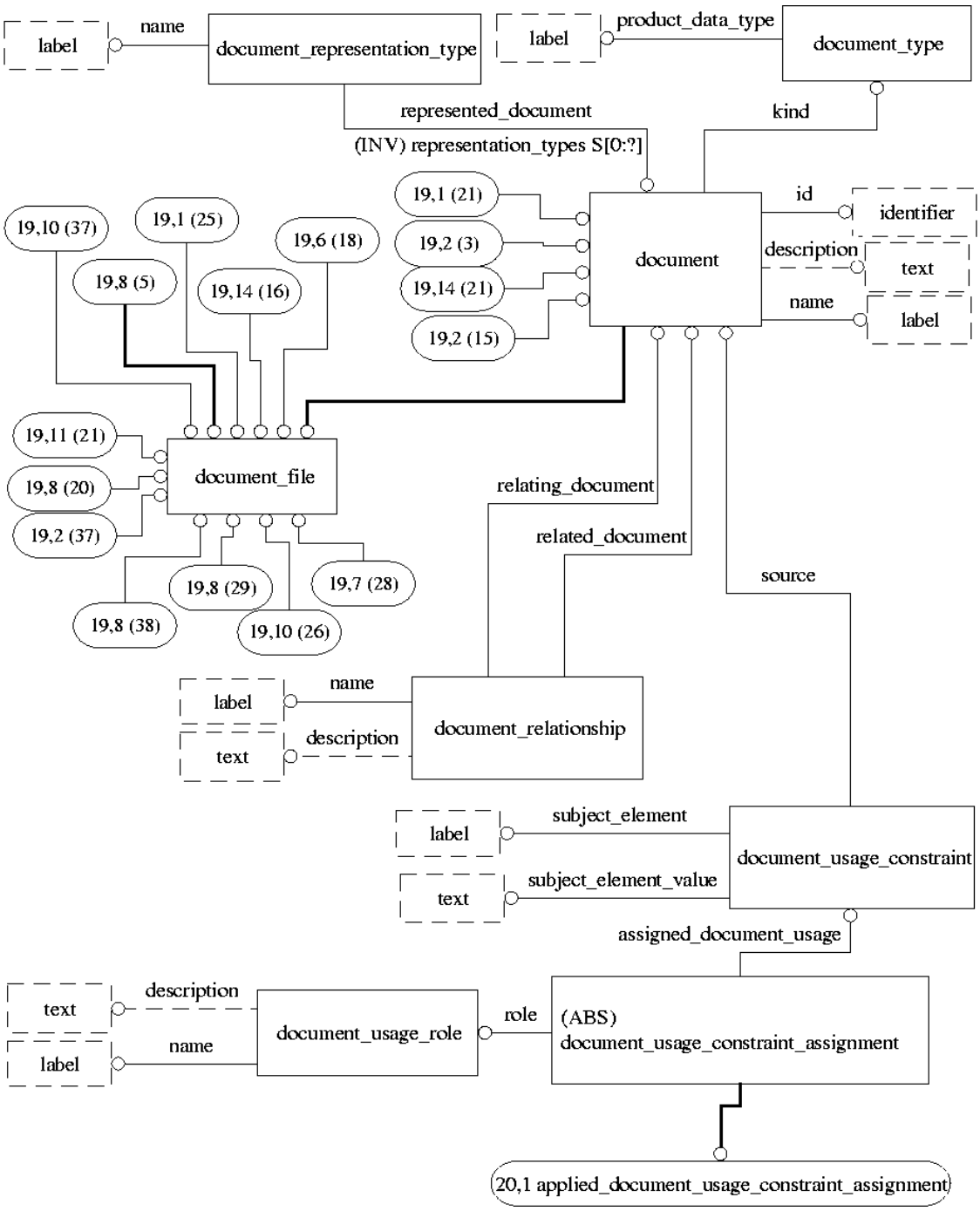

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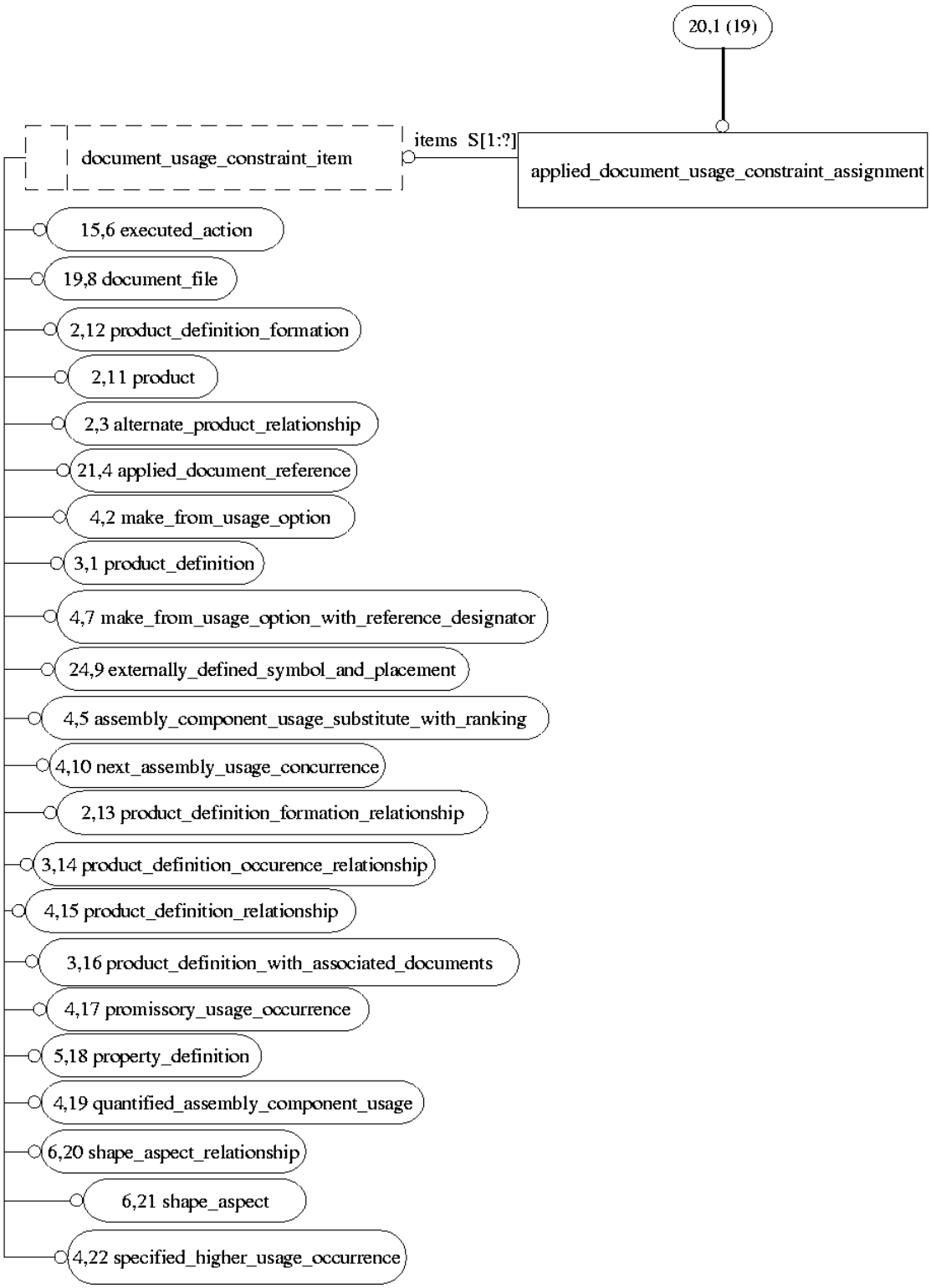

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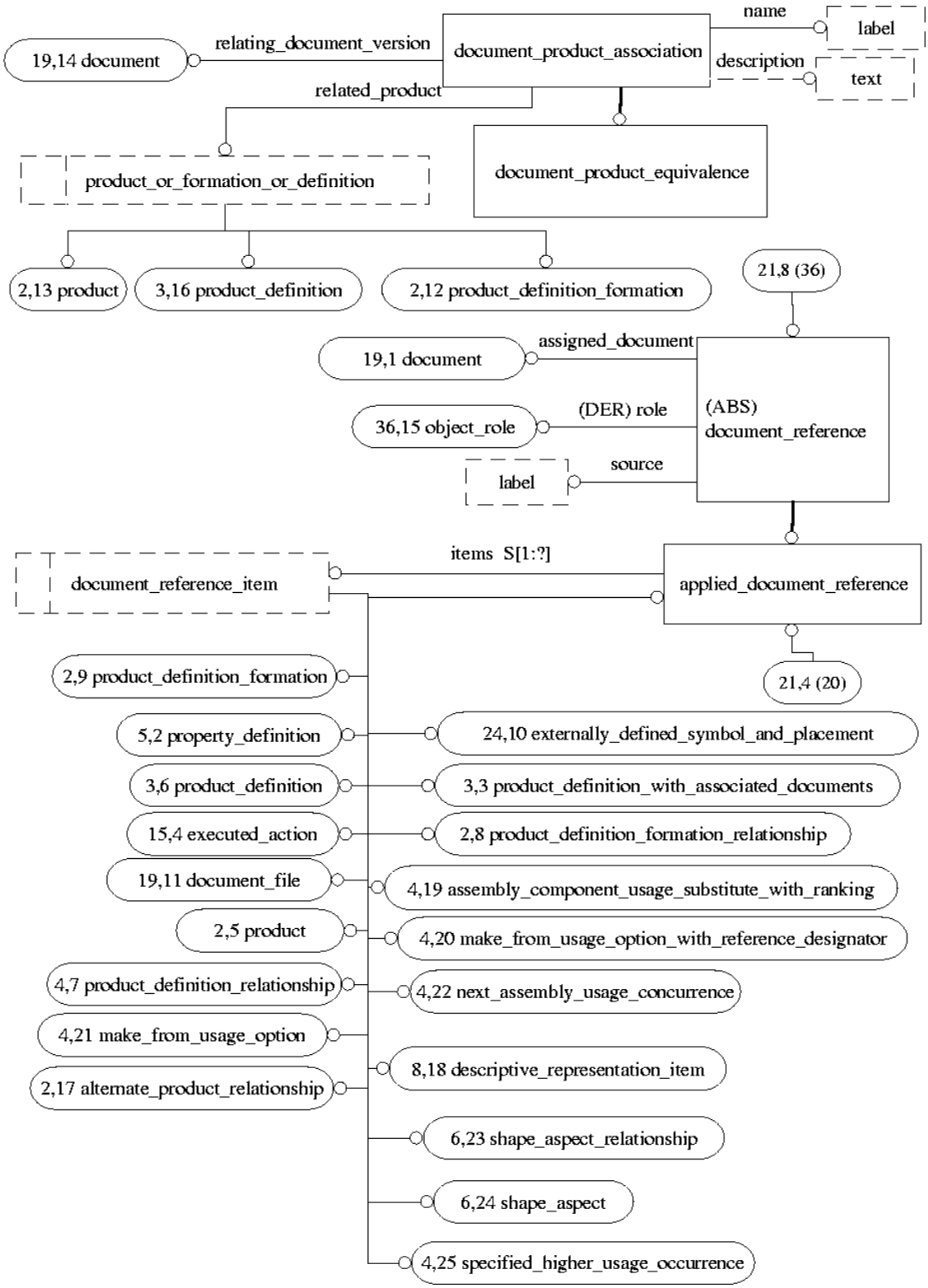

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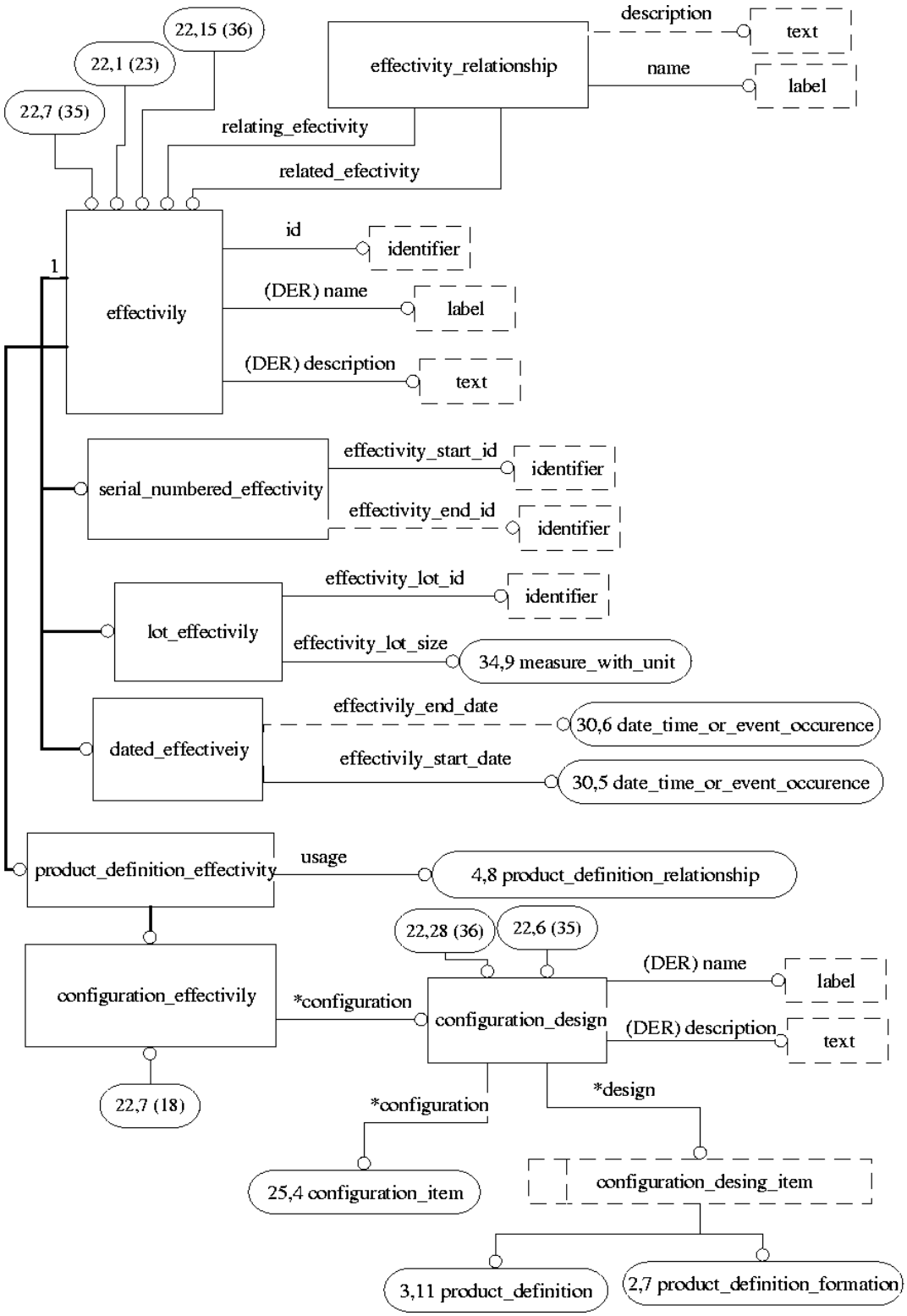

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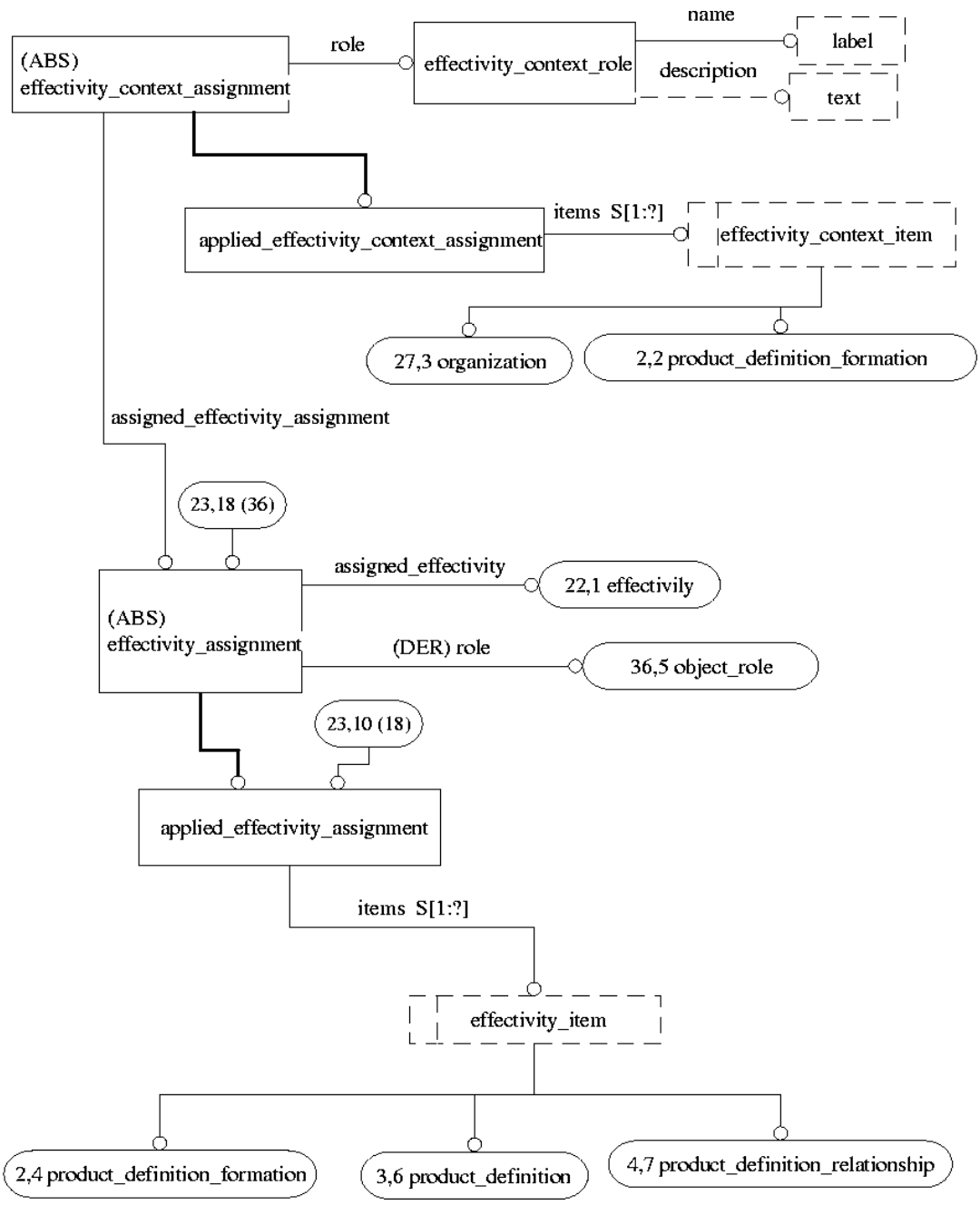

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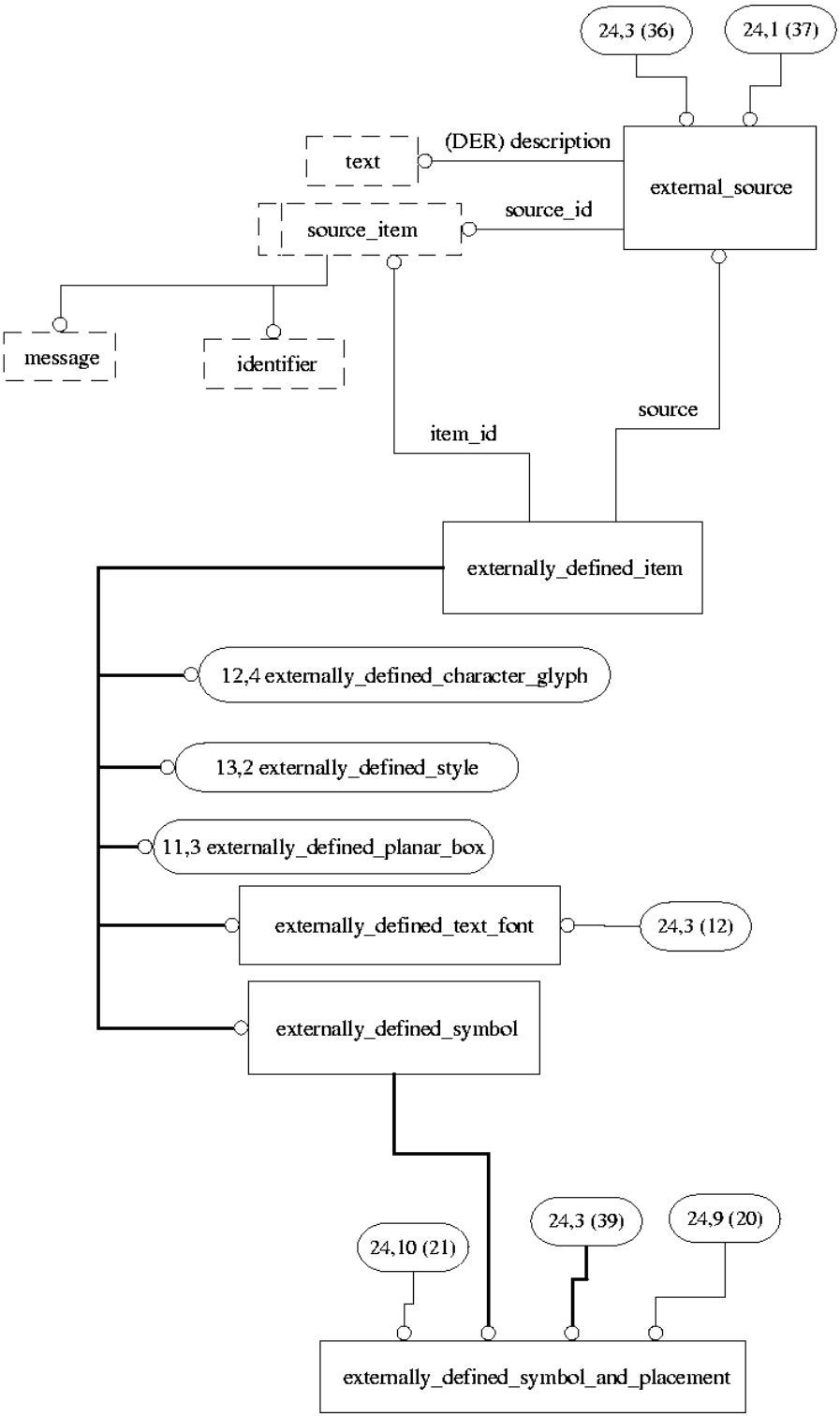

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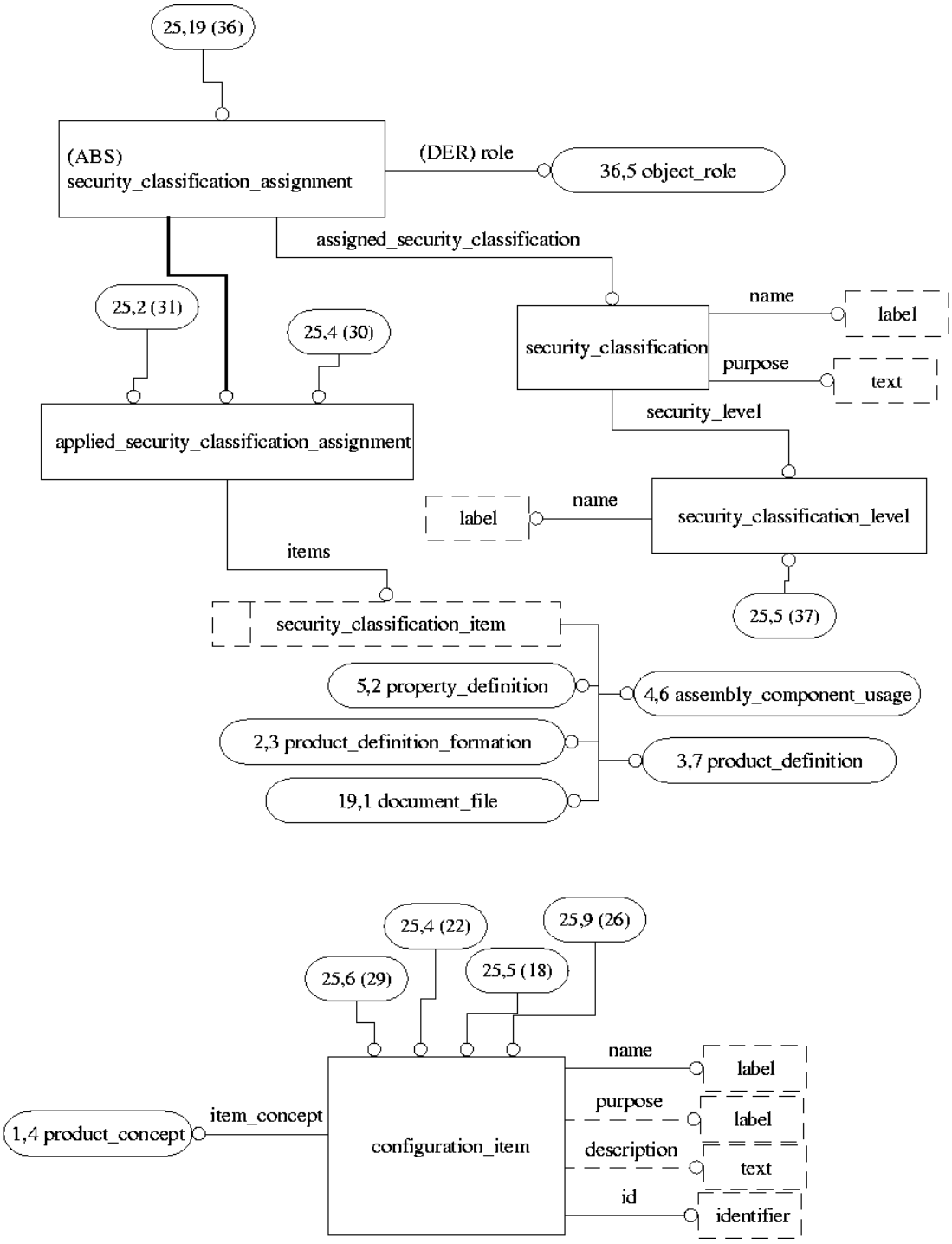

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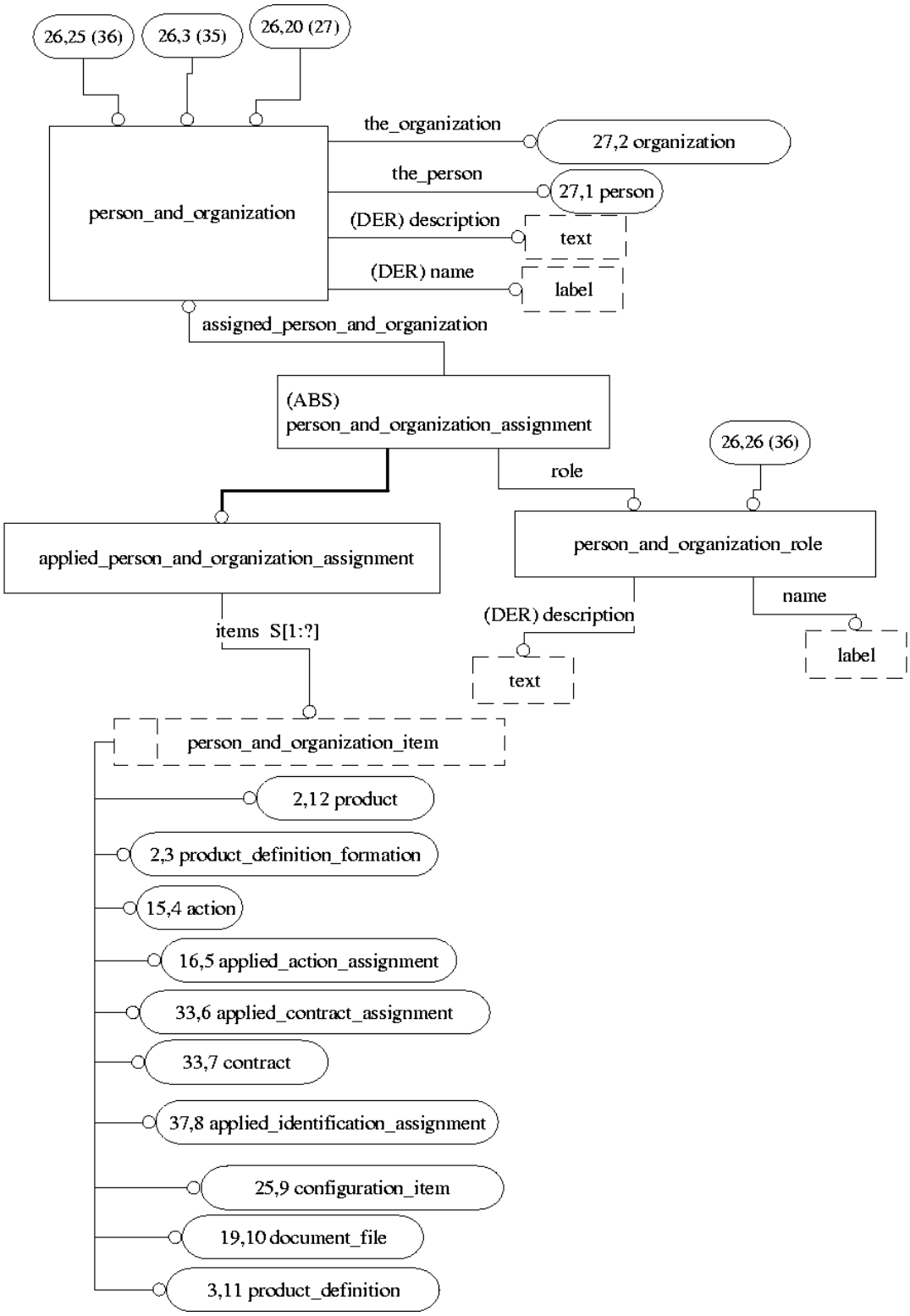

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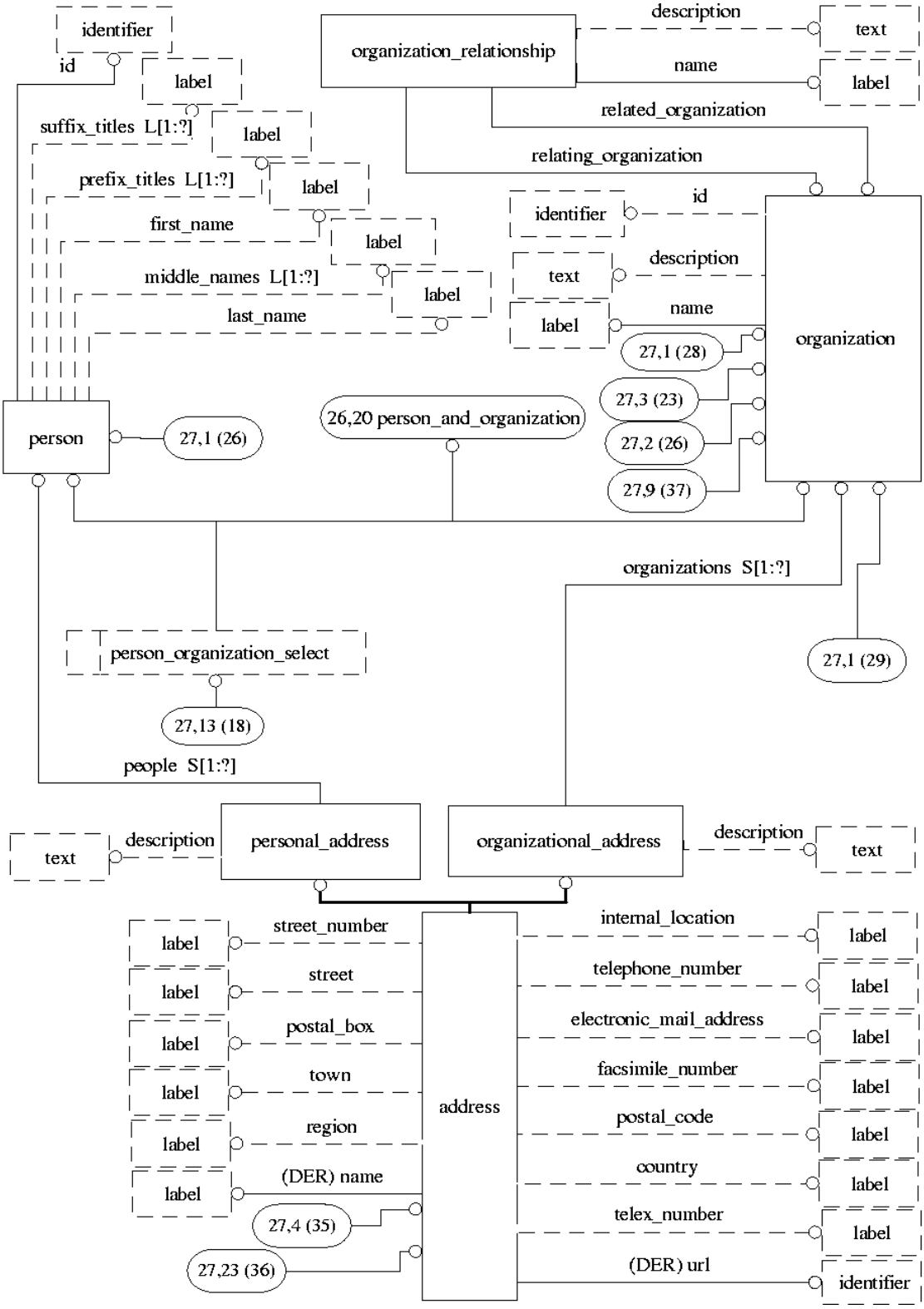

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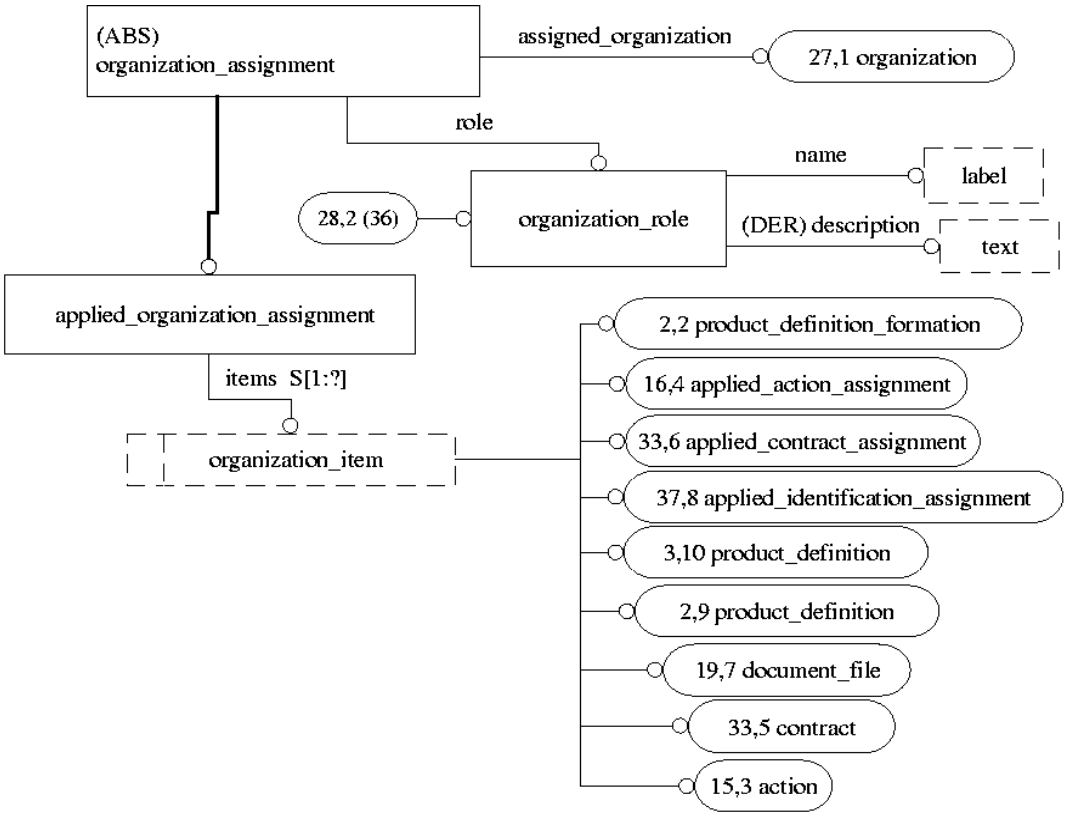

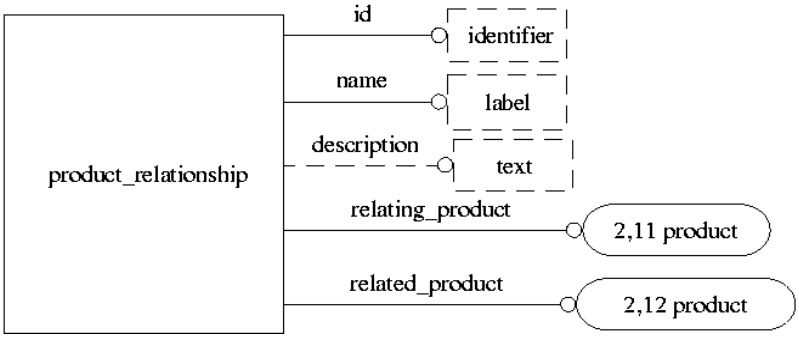

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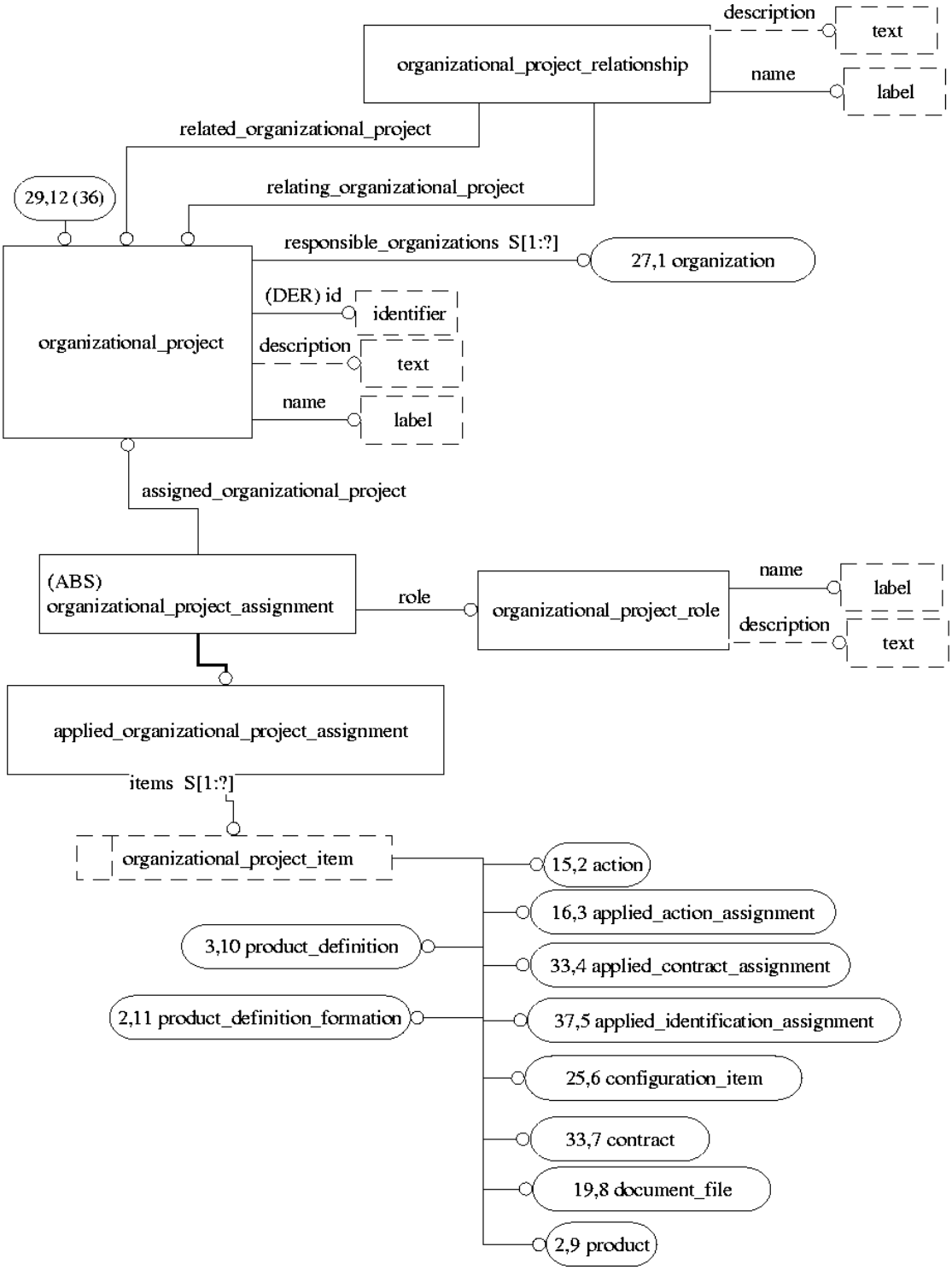

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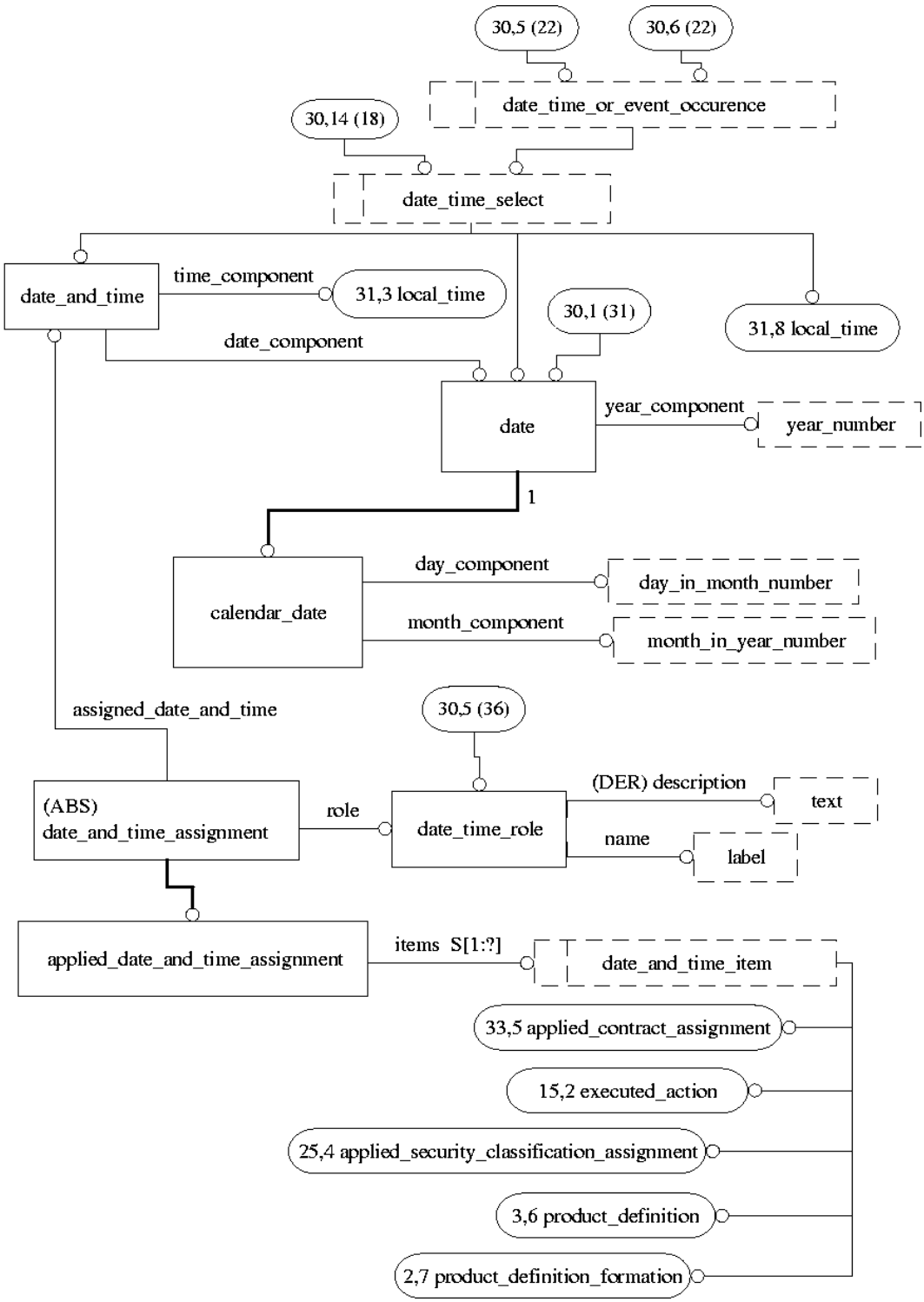

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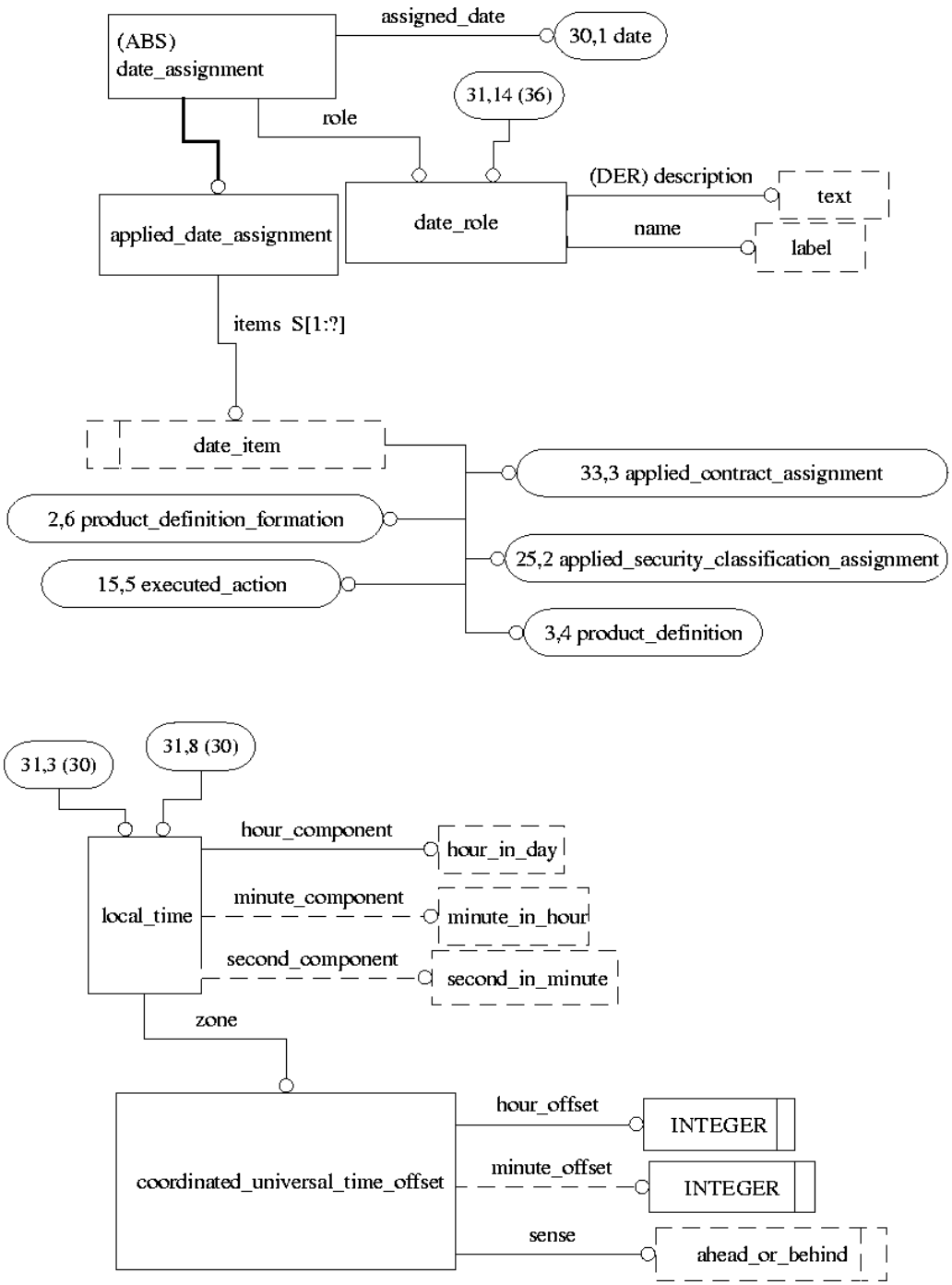

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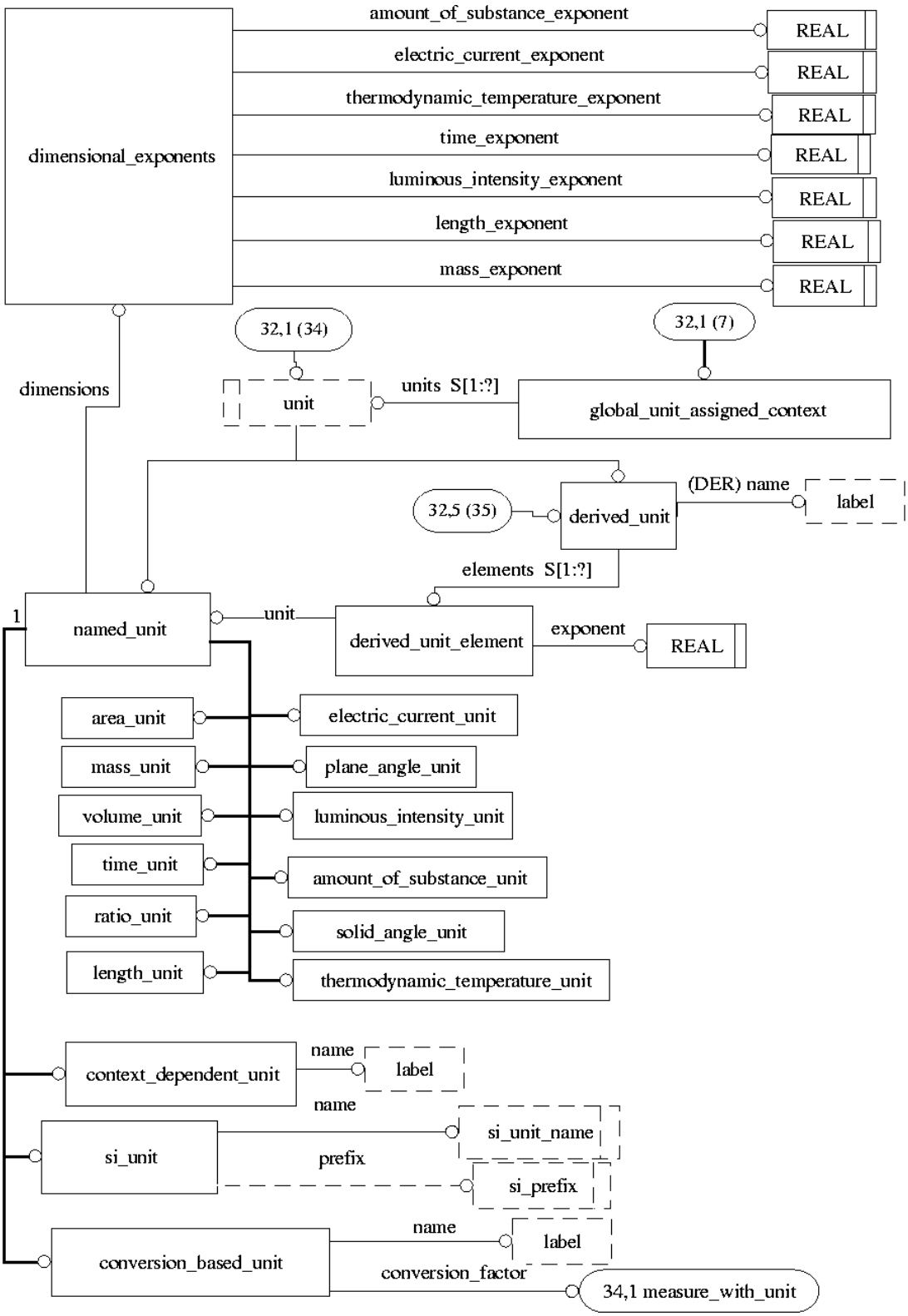

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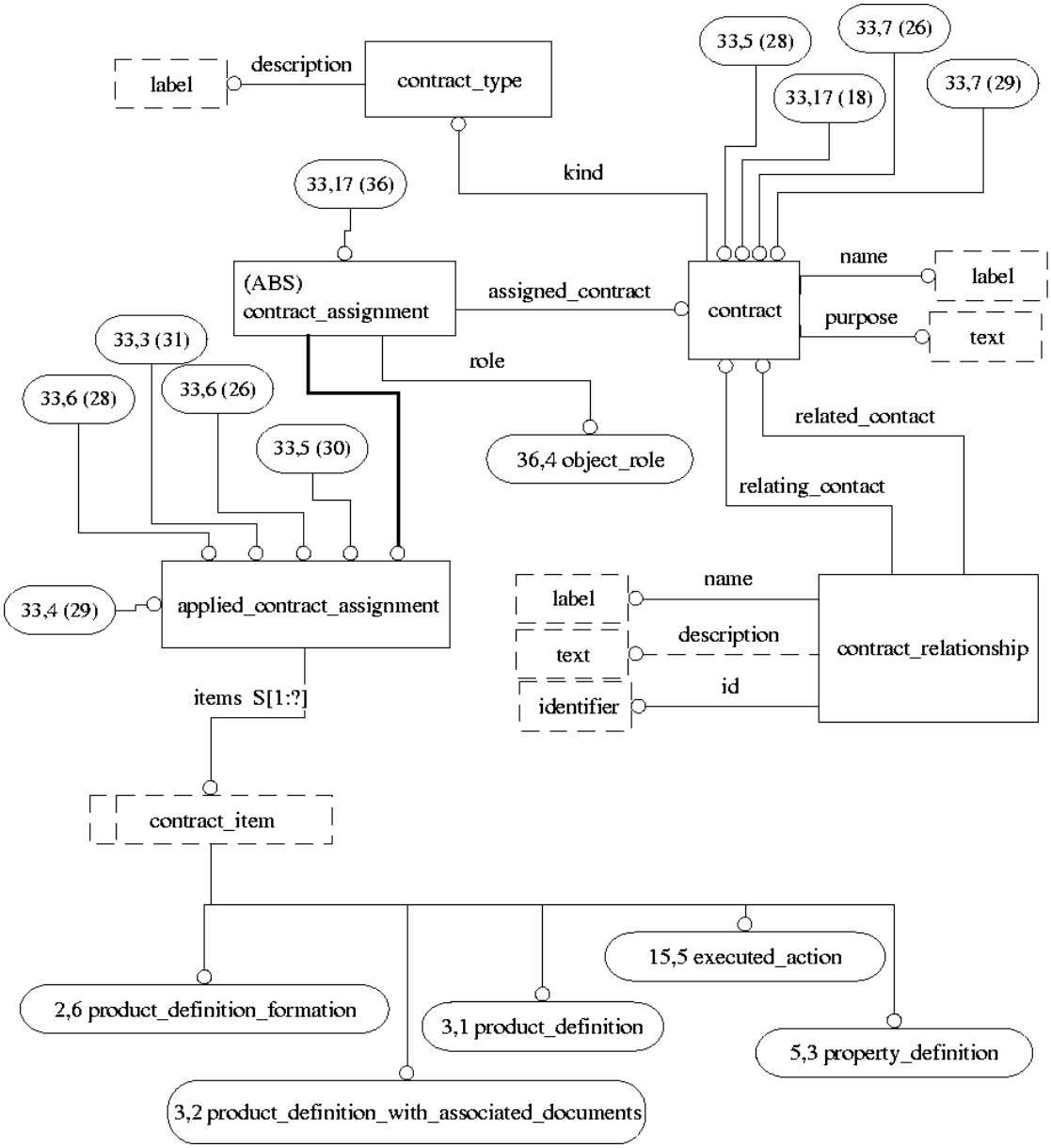

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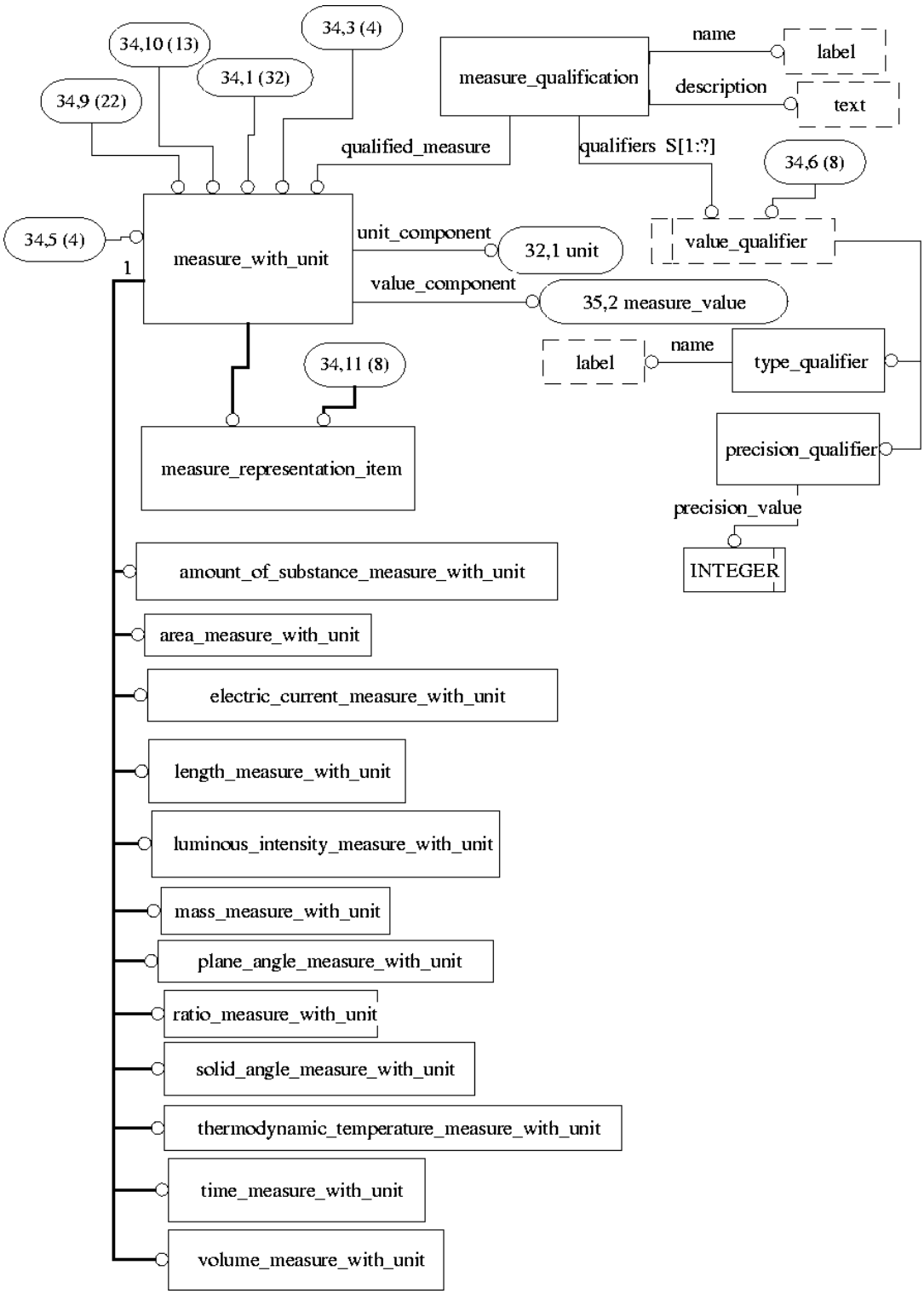

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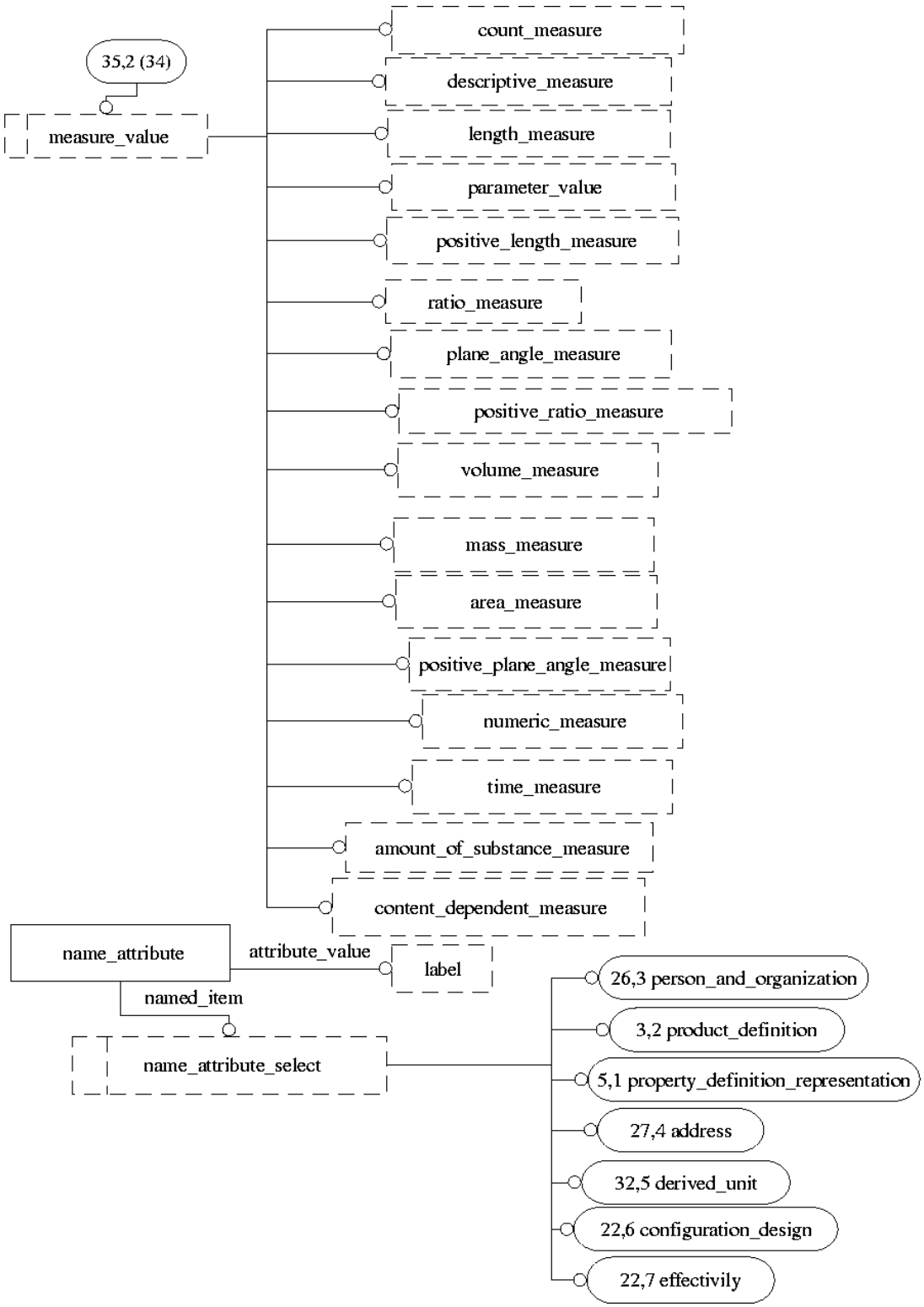

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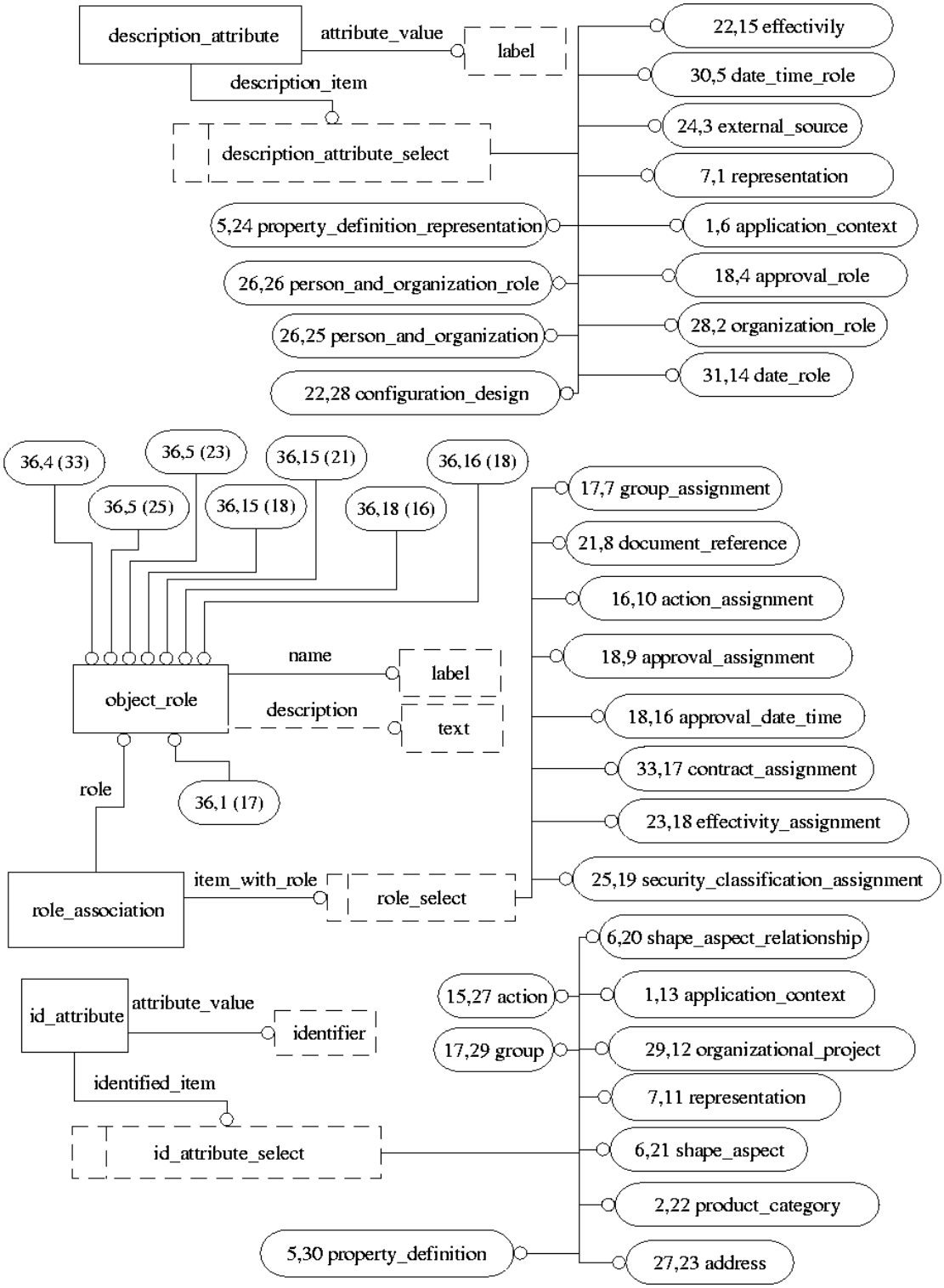

Figure H.36 - AIM EXPRESS-G diagram 36 of 56

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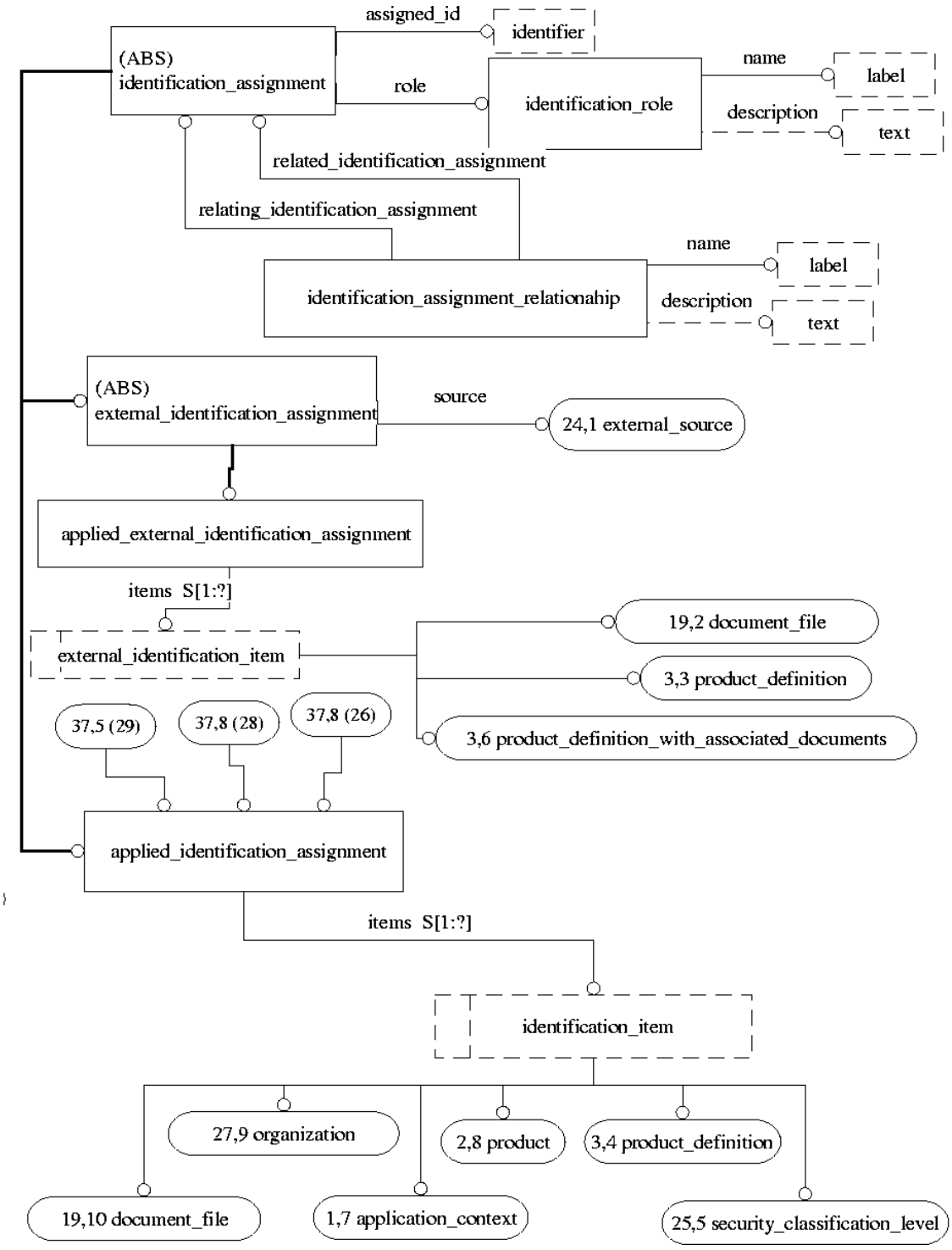

Figure H.37 - AIM EXPRESS-G diagram 37 of 56

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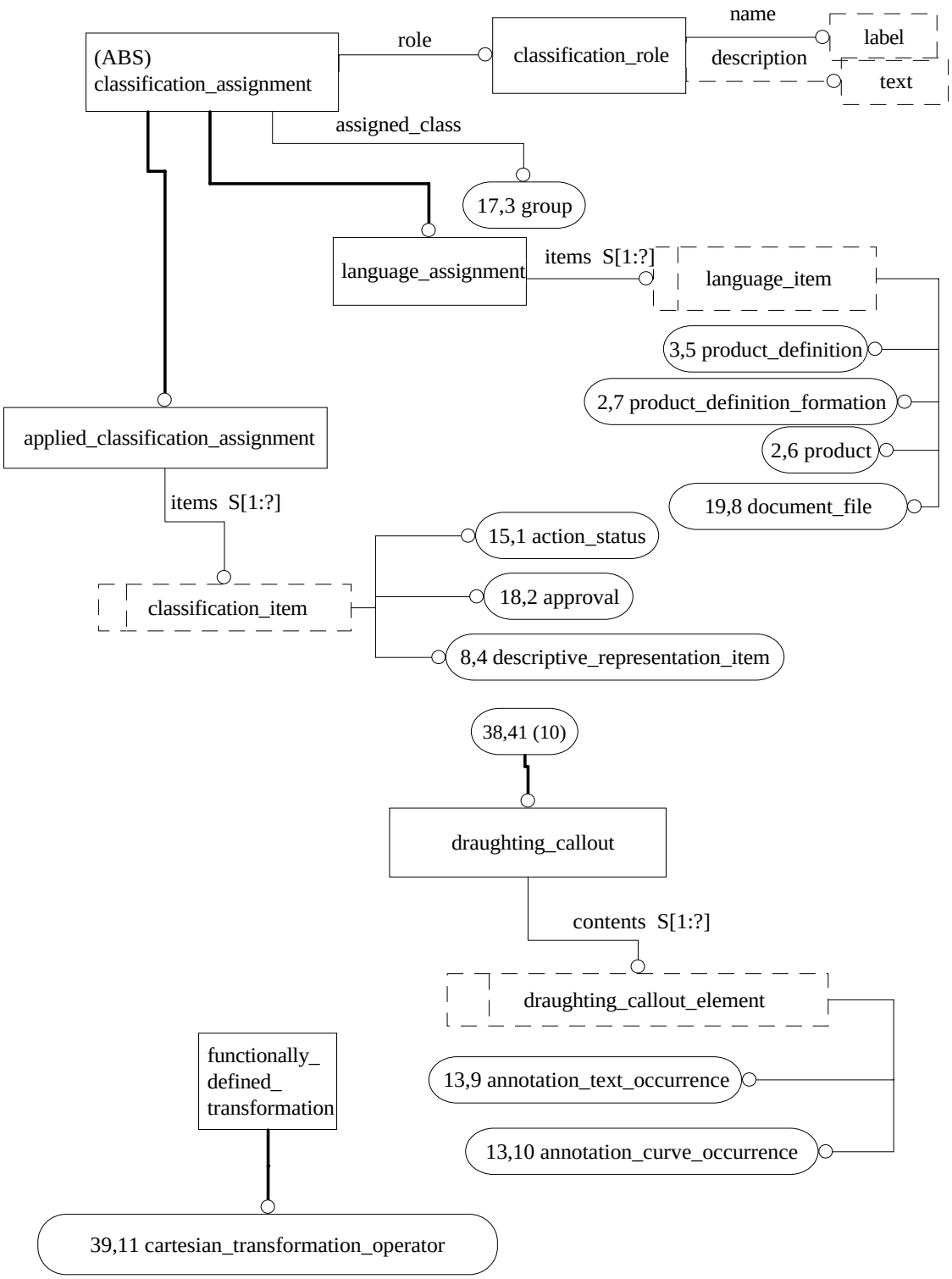

Figure H.38 - AIM EXPRESS-G diagram 38 of 56

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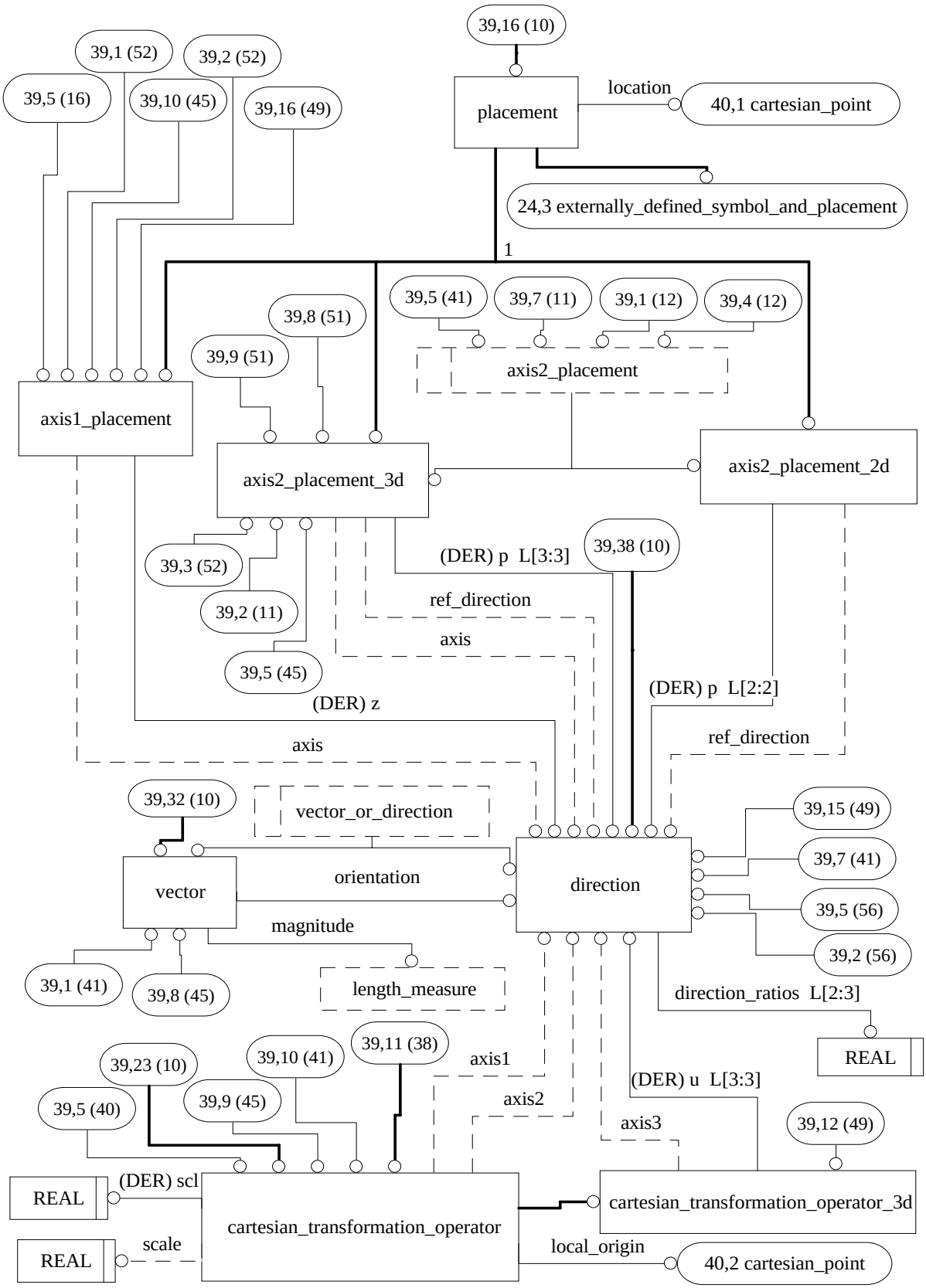

Figure H.39 - AIM EXPRESS-G diagram 39 of 56

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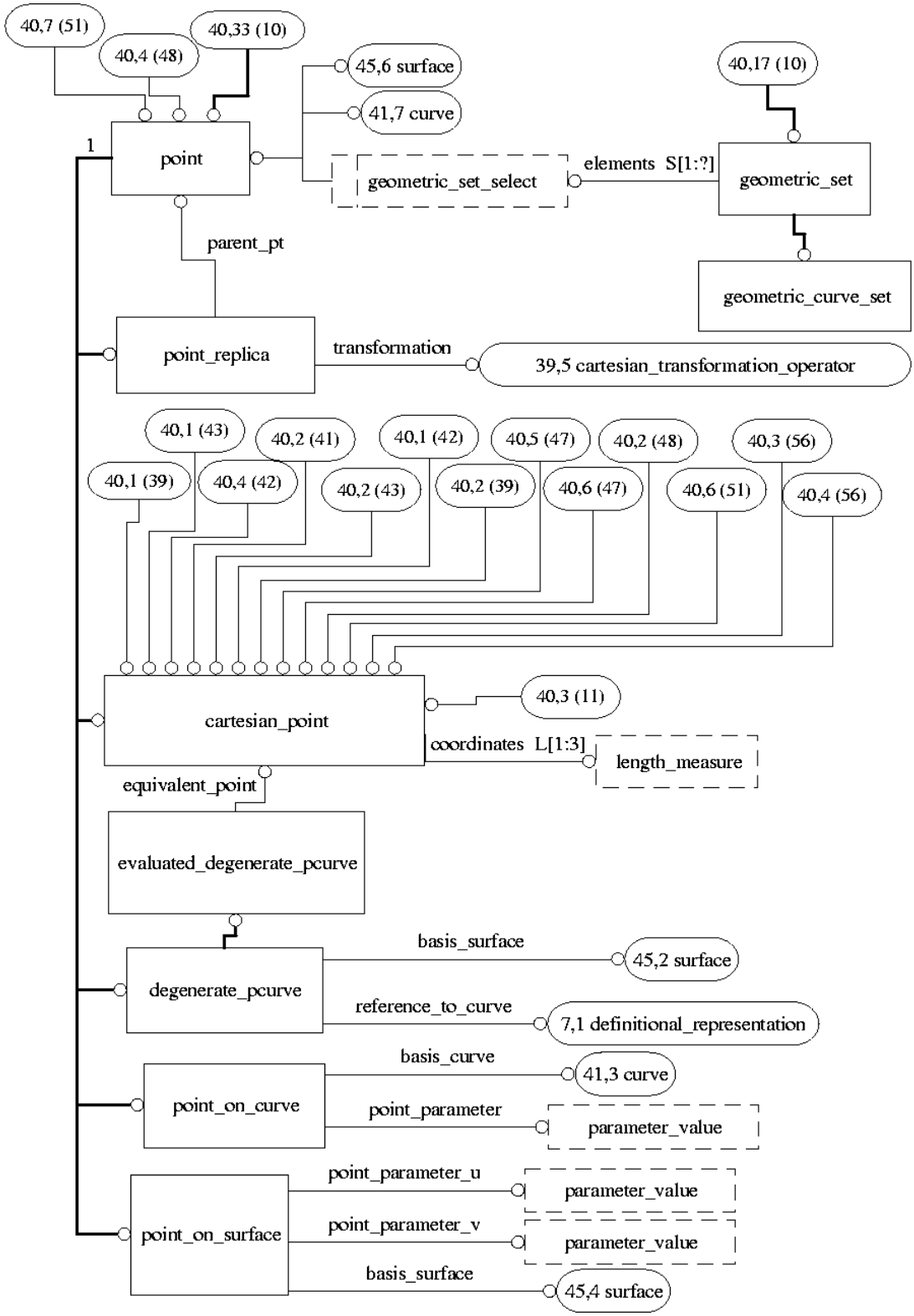

Figure H.40 - AIM EXPRESS-G diagram 40 of 56

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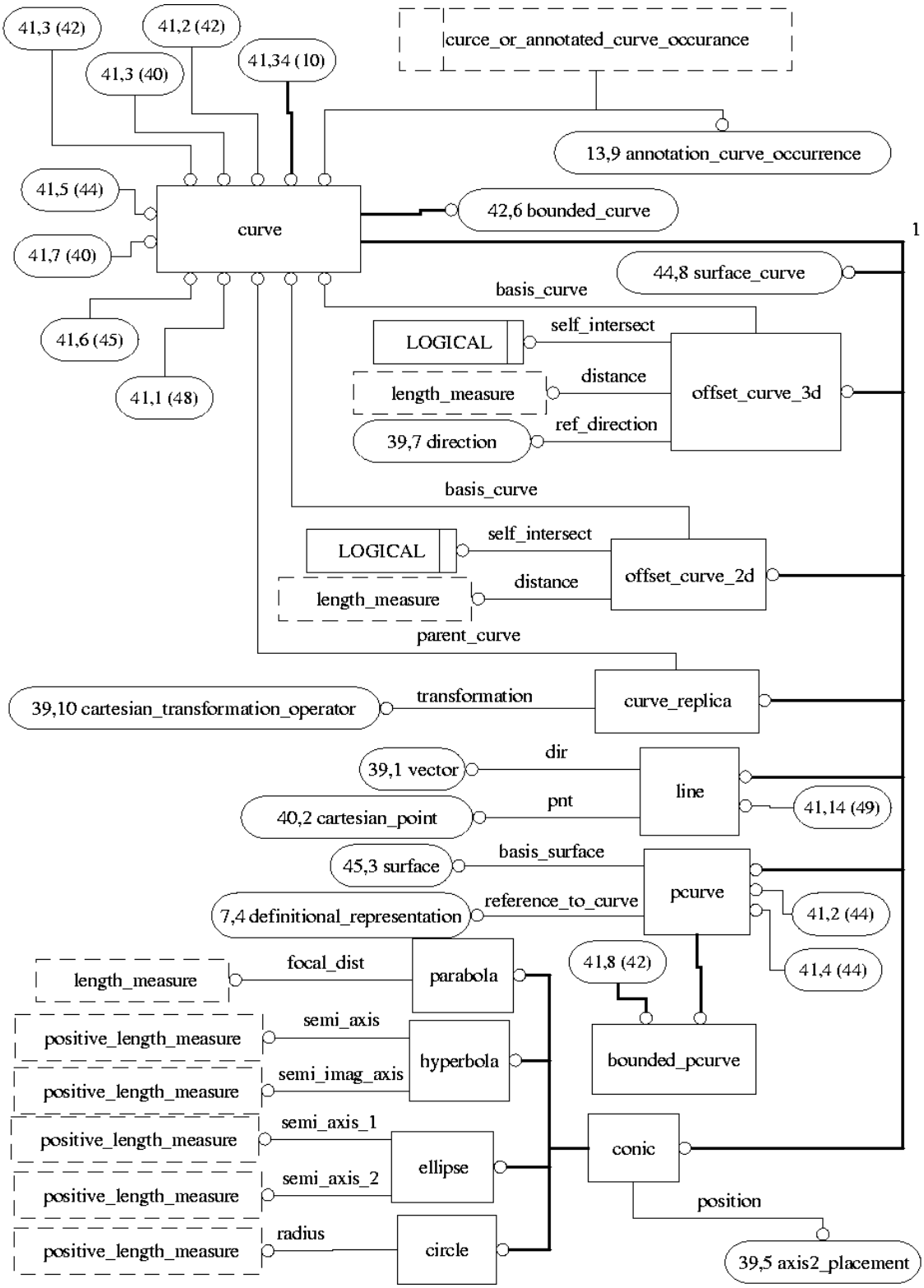

Figure H.41 - AIM EXPRESS-G diagram 41 of 56

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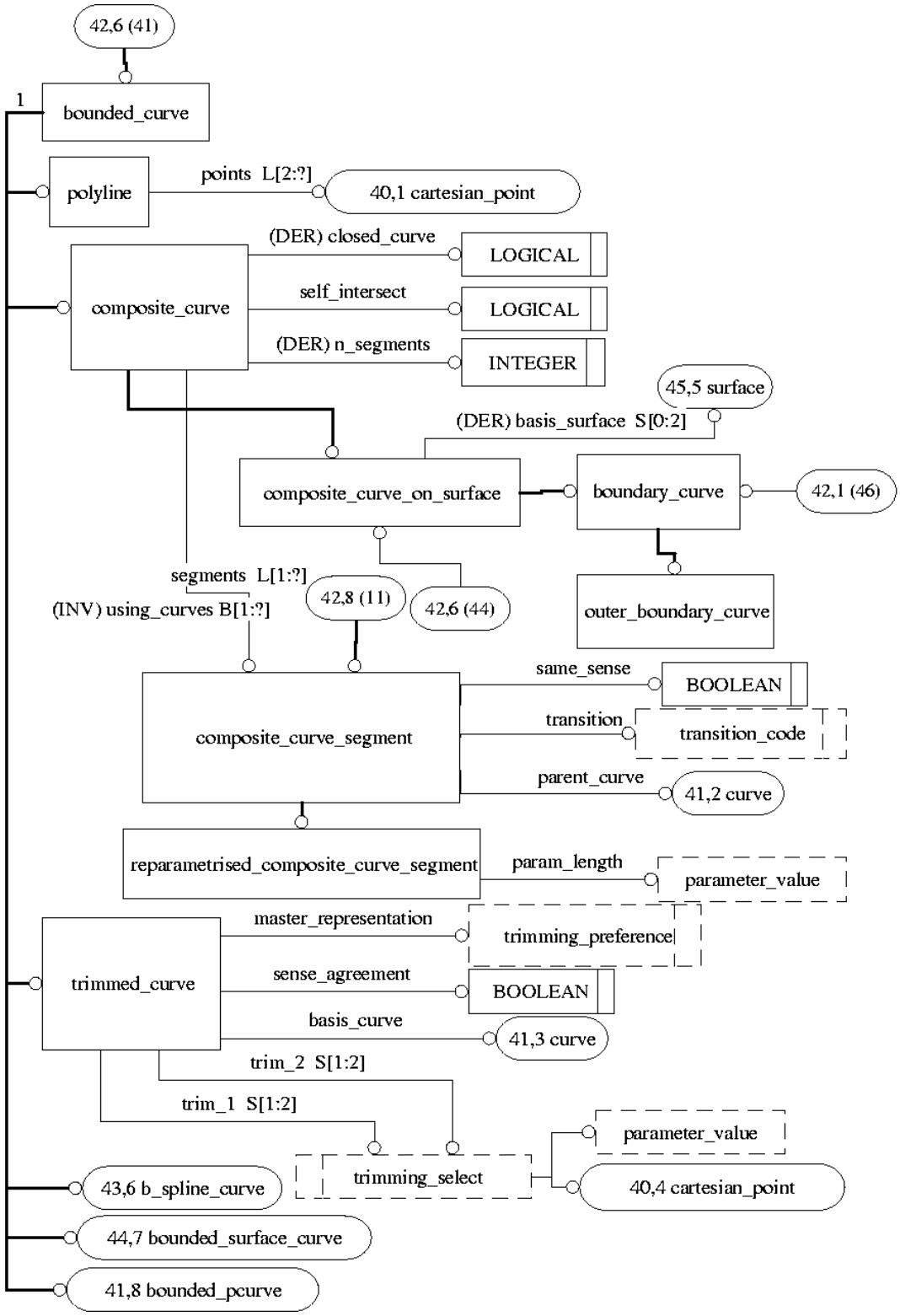

Figure H.42 - AIM EXPRESS-G diagram 42 of 56

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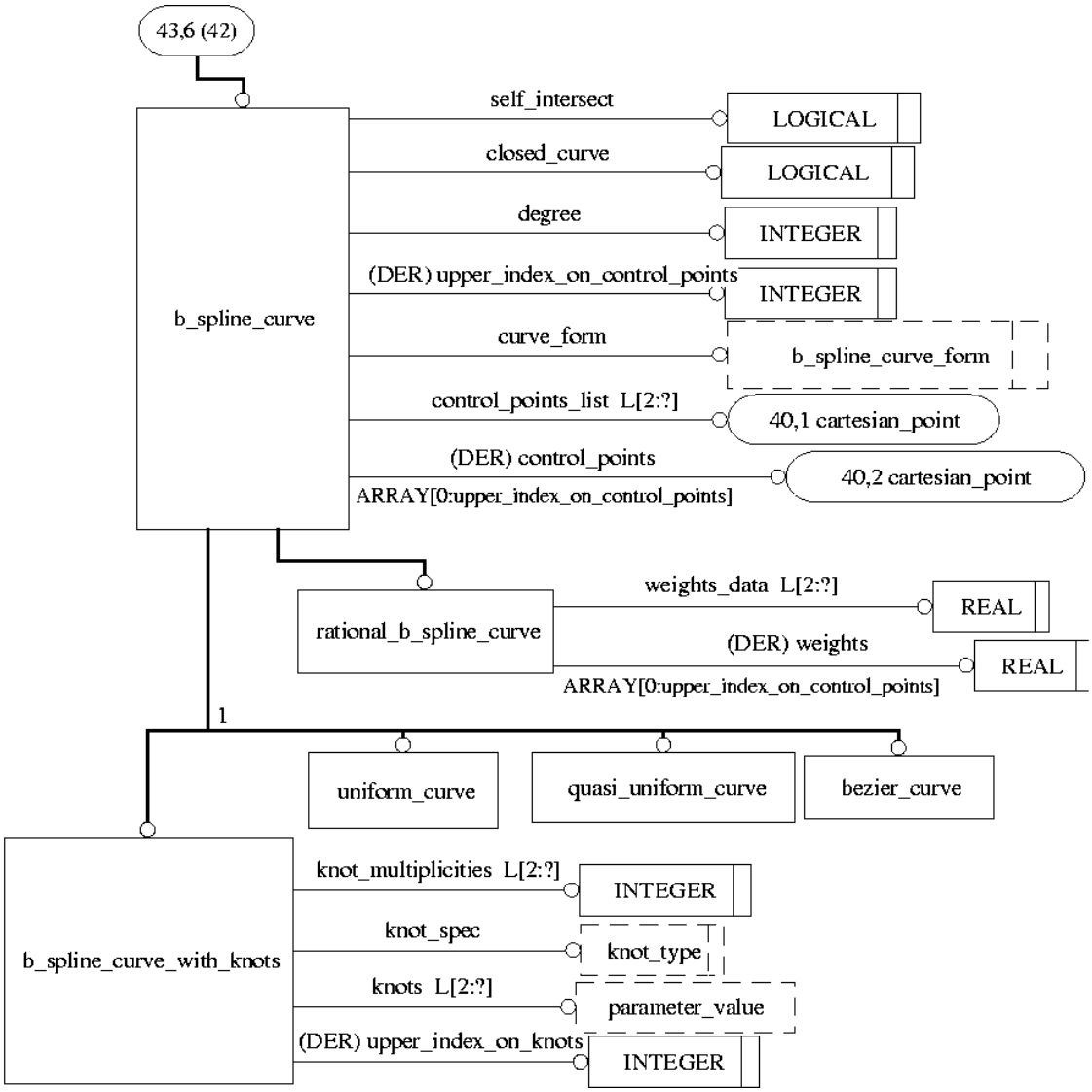

Figure H.43 - AIM EXPRESS-G diagram 43 of 56

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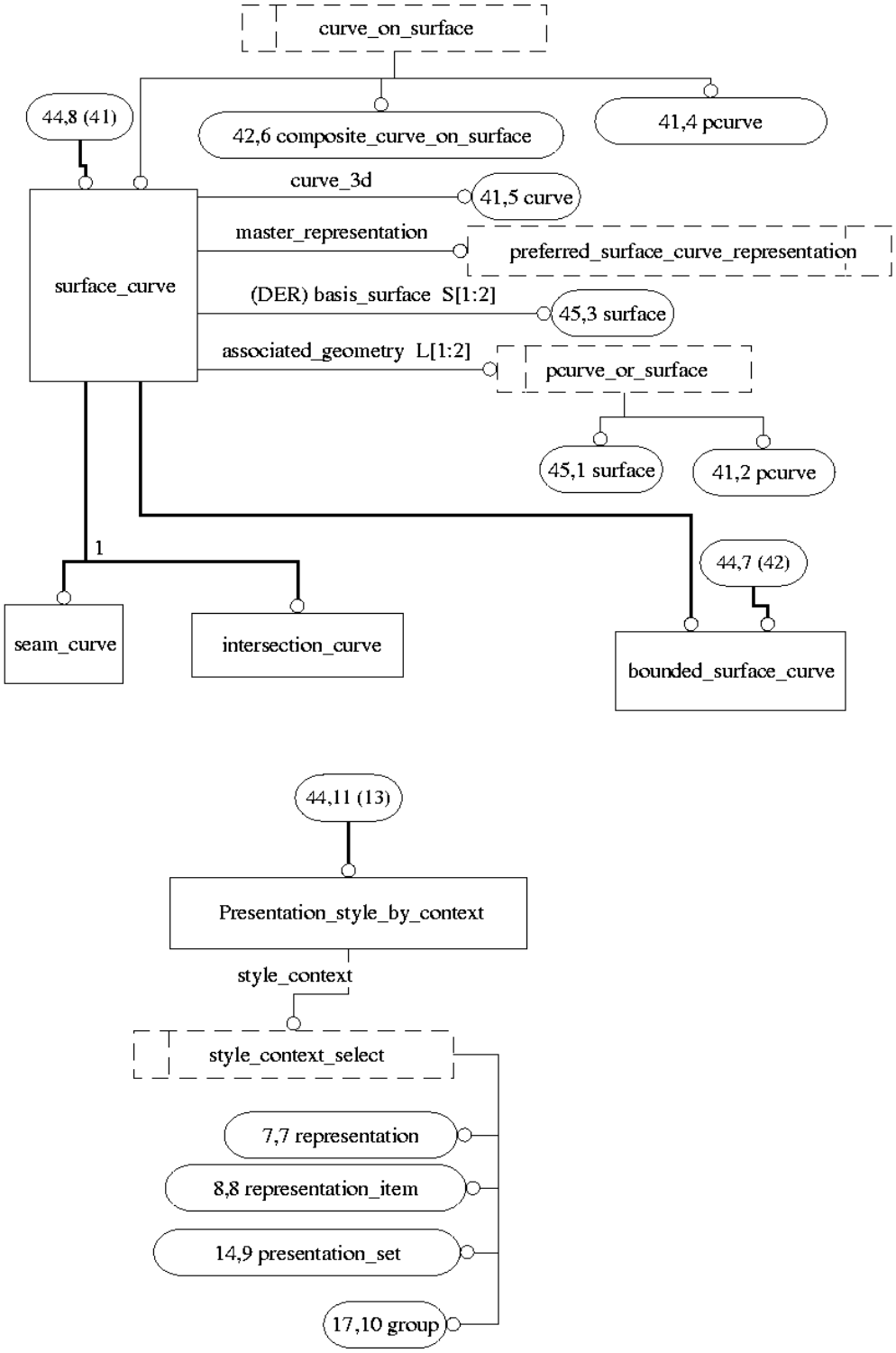

Figure H.44 - AIM EXPRESS-G diagram 44 of 56

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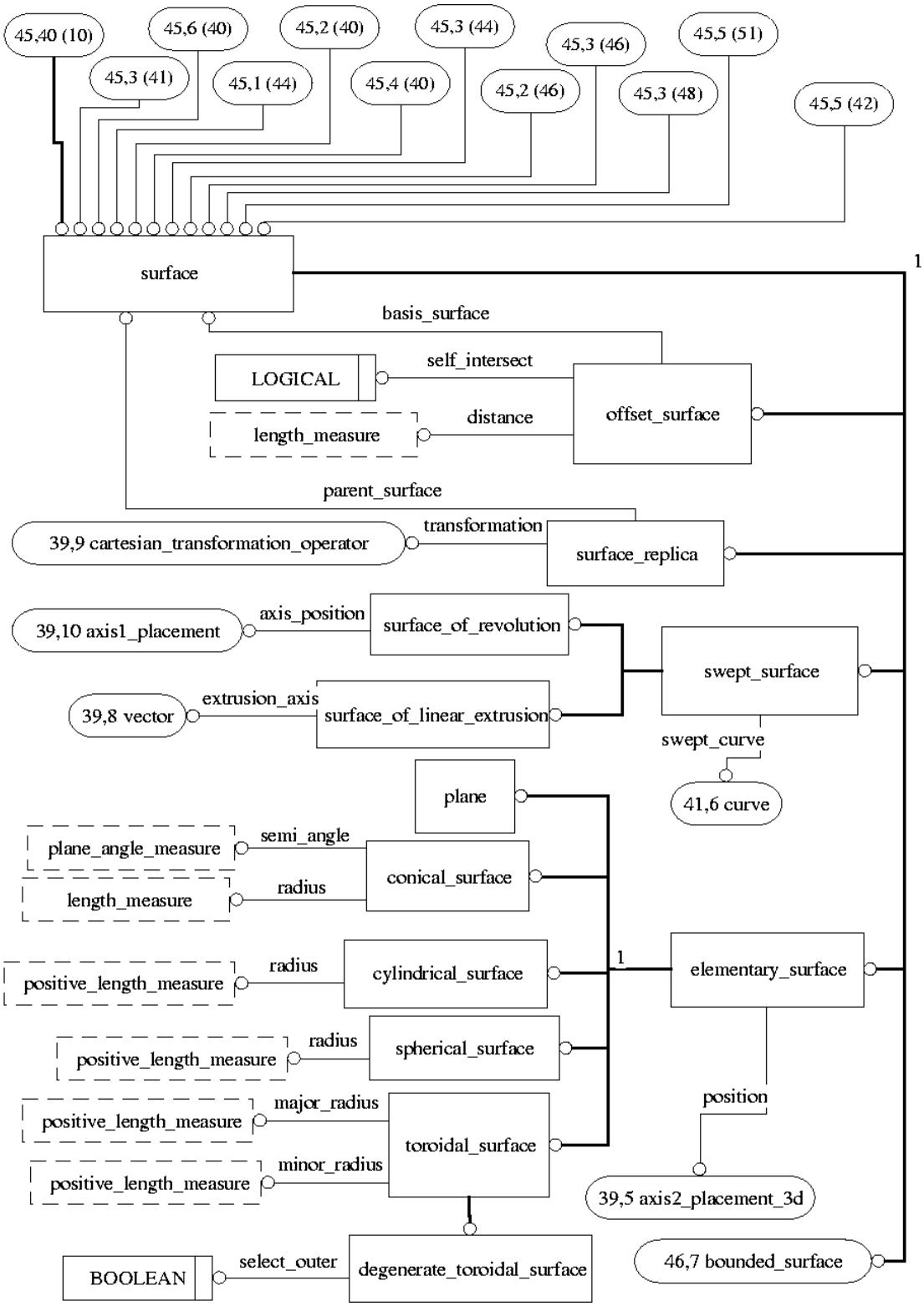

Figure H.45 - AIM EXPRESS-G diagram 45 of 56

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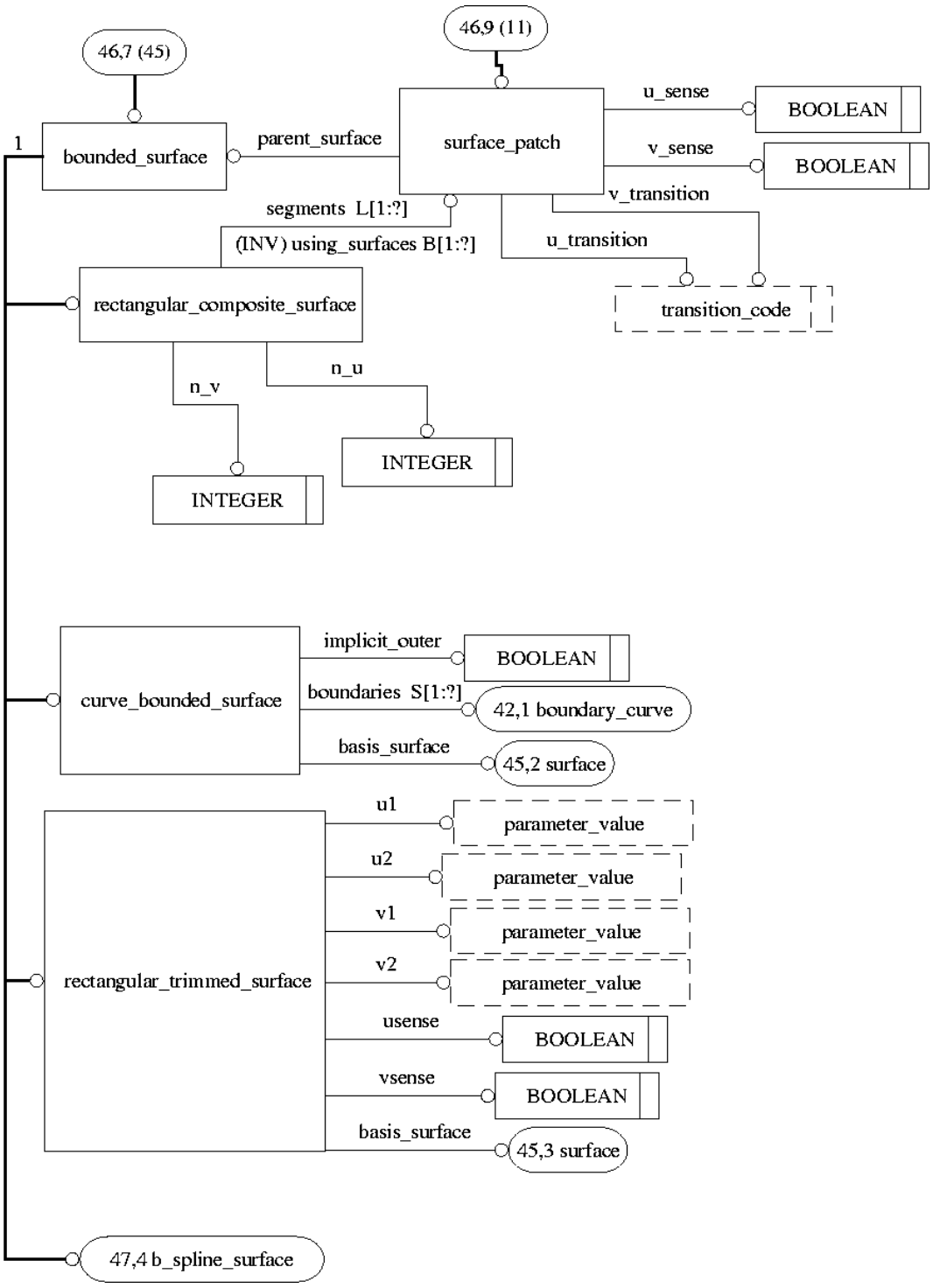

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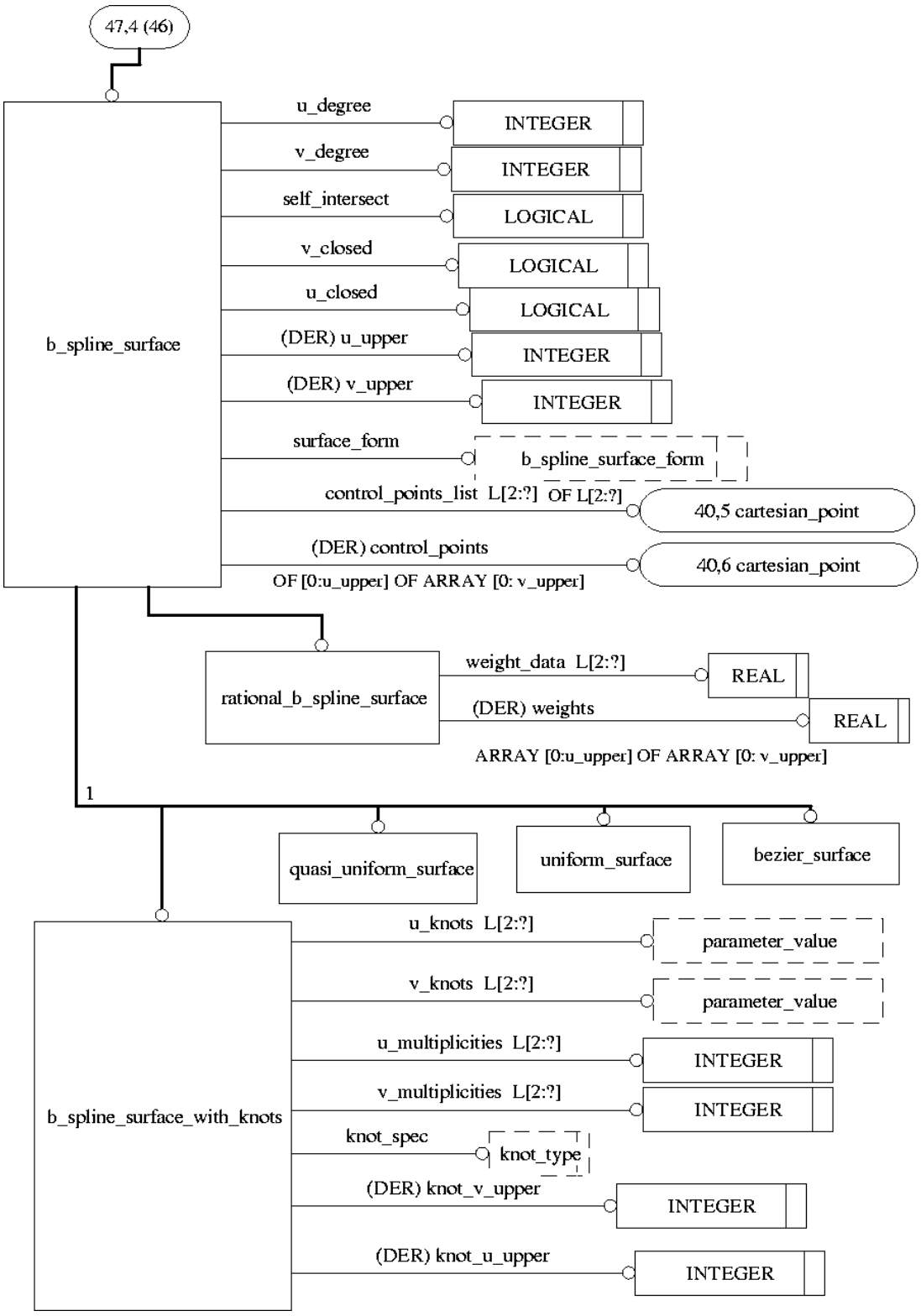

Figure H.47 - AIM EXPRESS-G diagram 47 of 56

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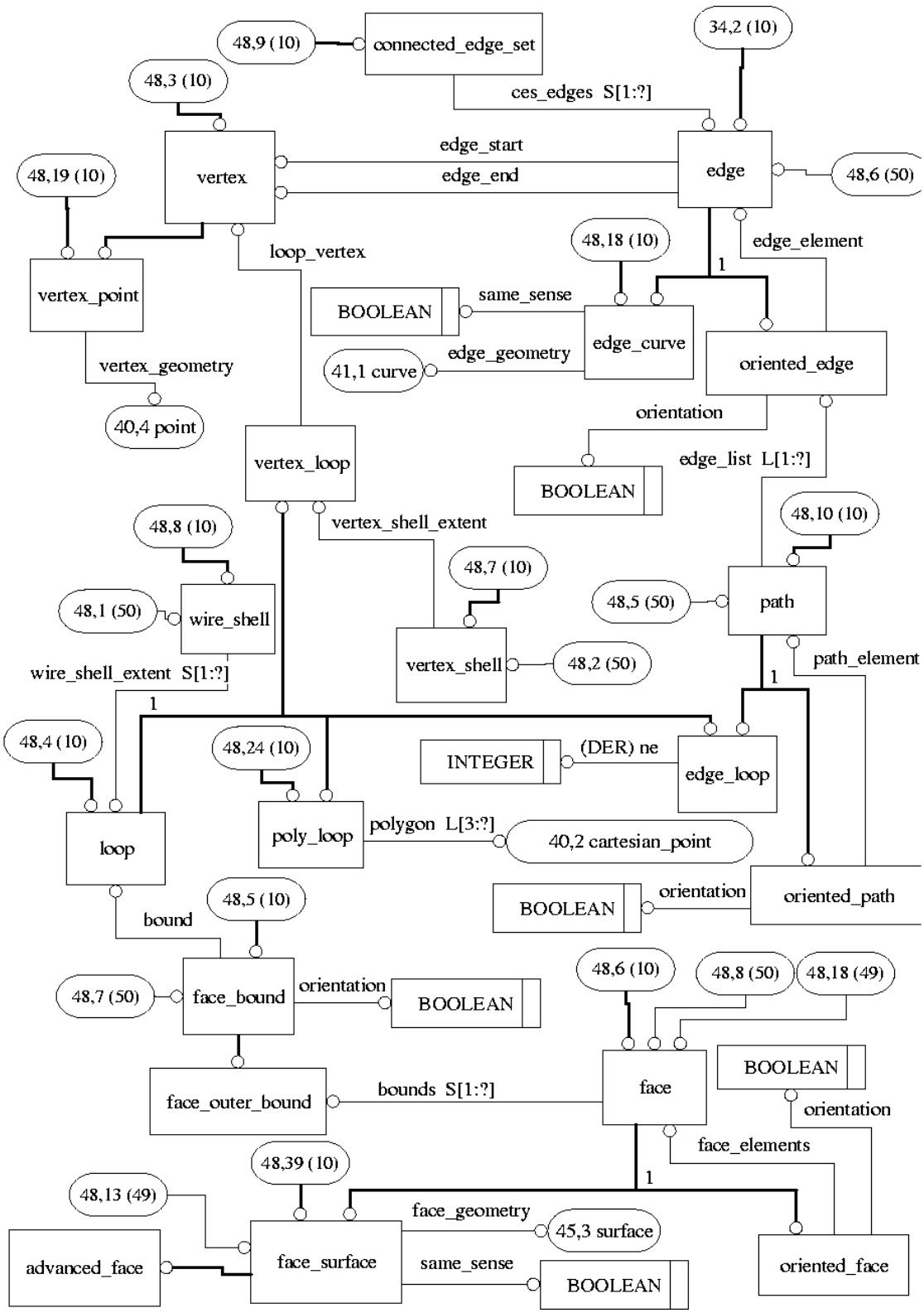

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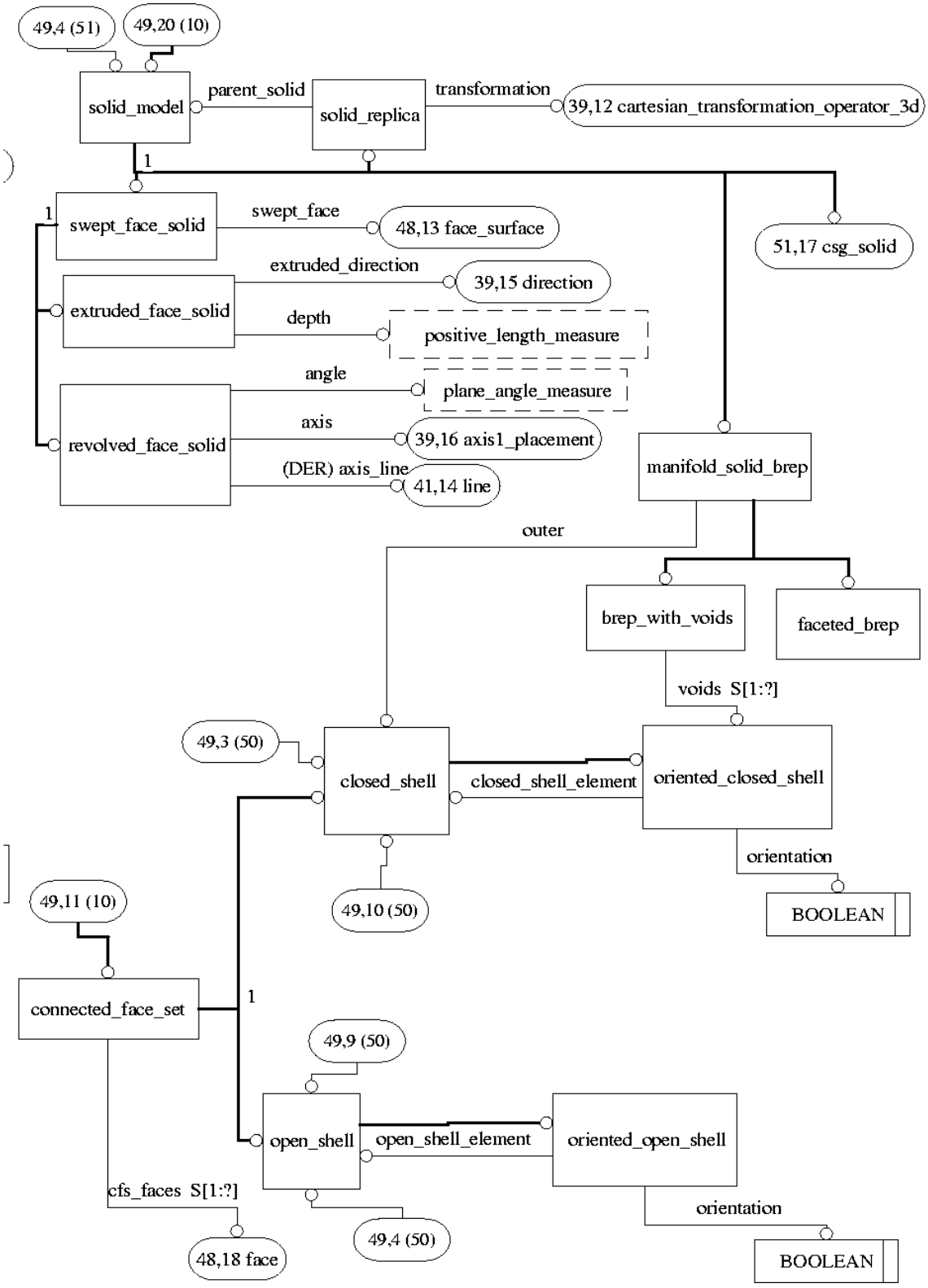

Figure H.49 - AIM EXPRESS-G diagram 49 of 55

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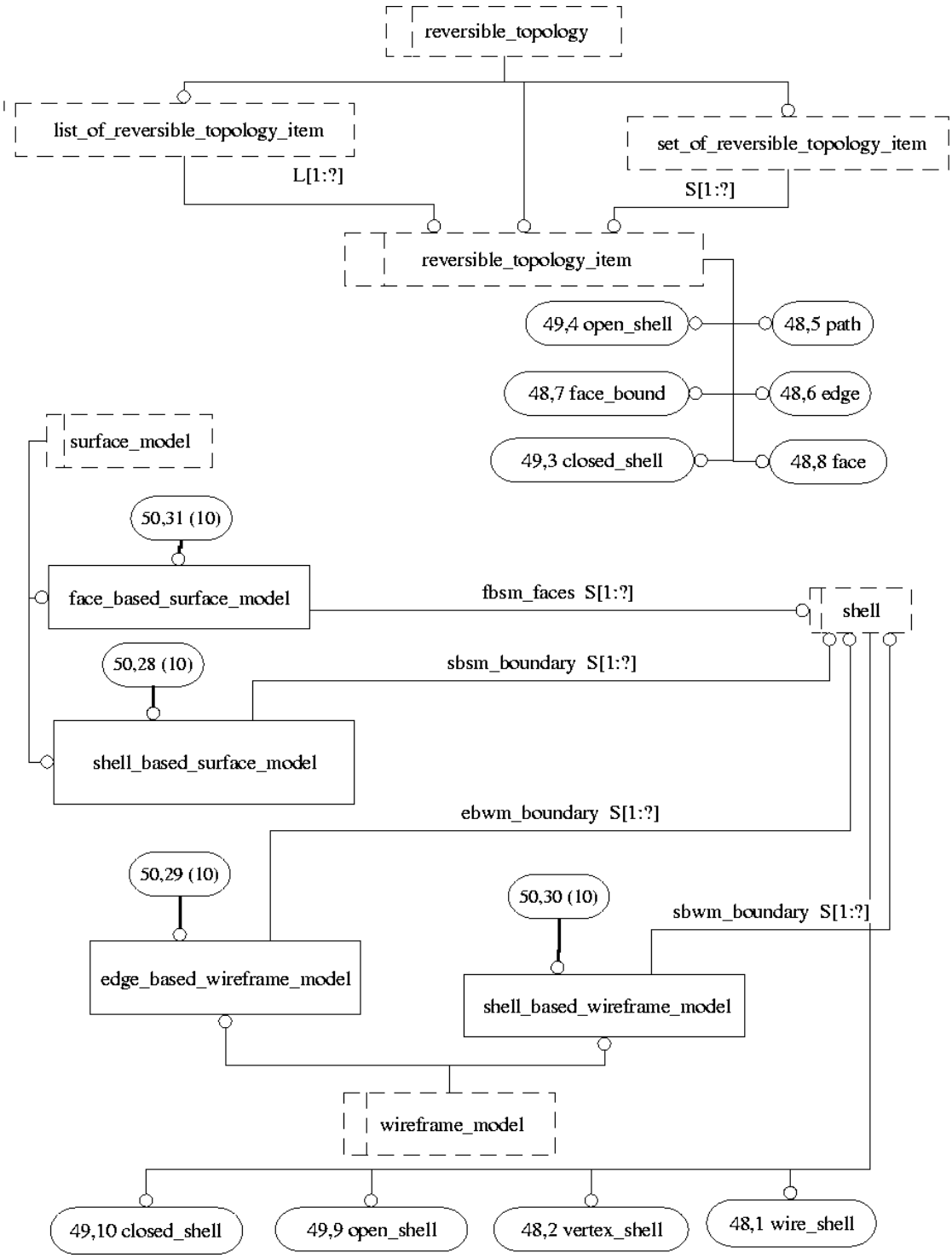

Figure H.50 - AIM EXPRESS-G diagram 50 of 56

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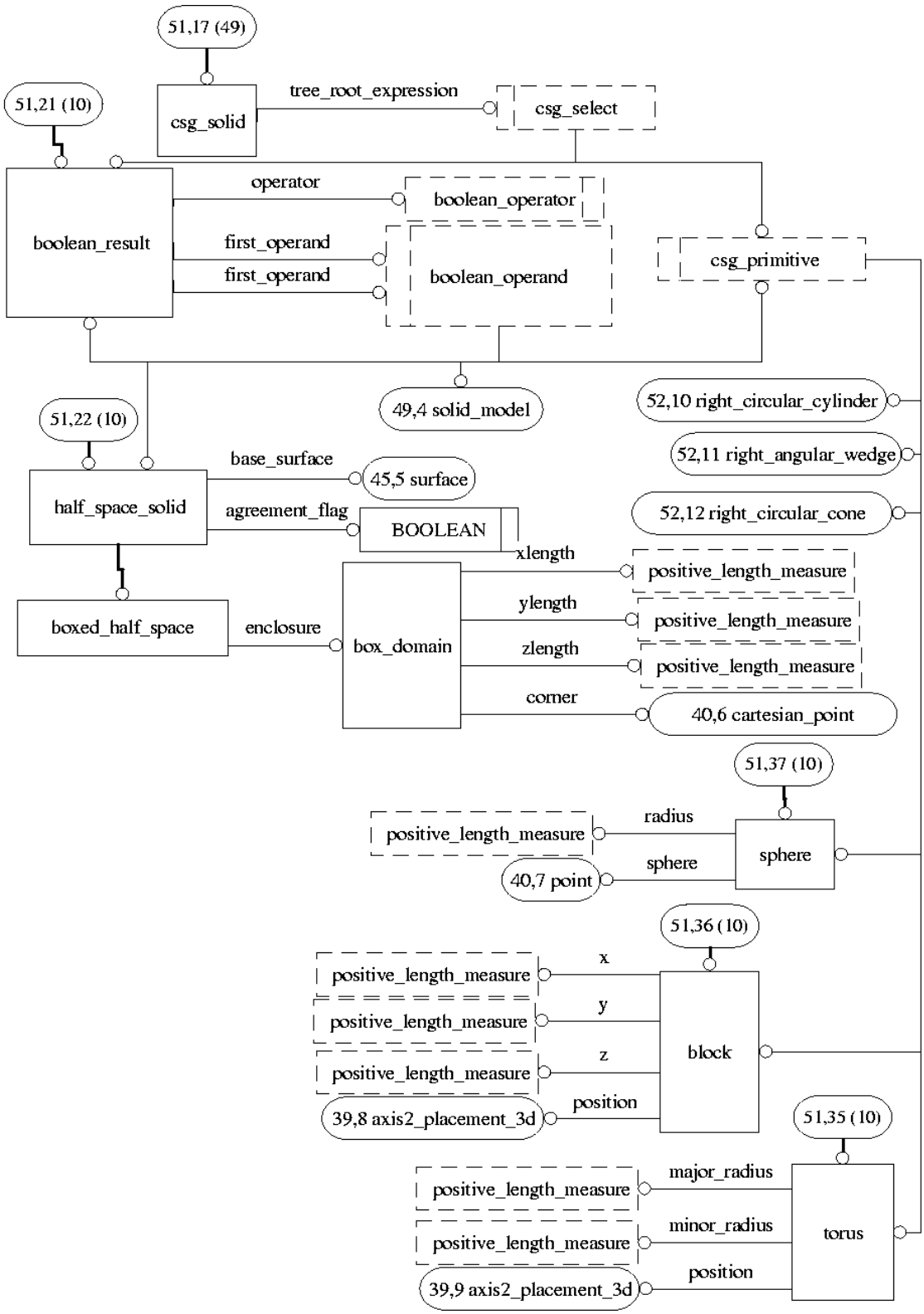

Figure H.51 - AIM EXPRESS-G diagram 51 of 56

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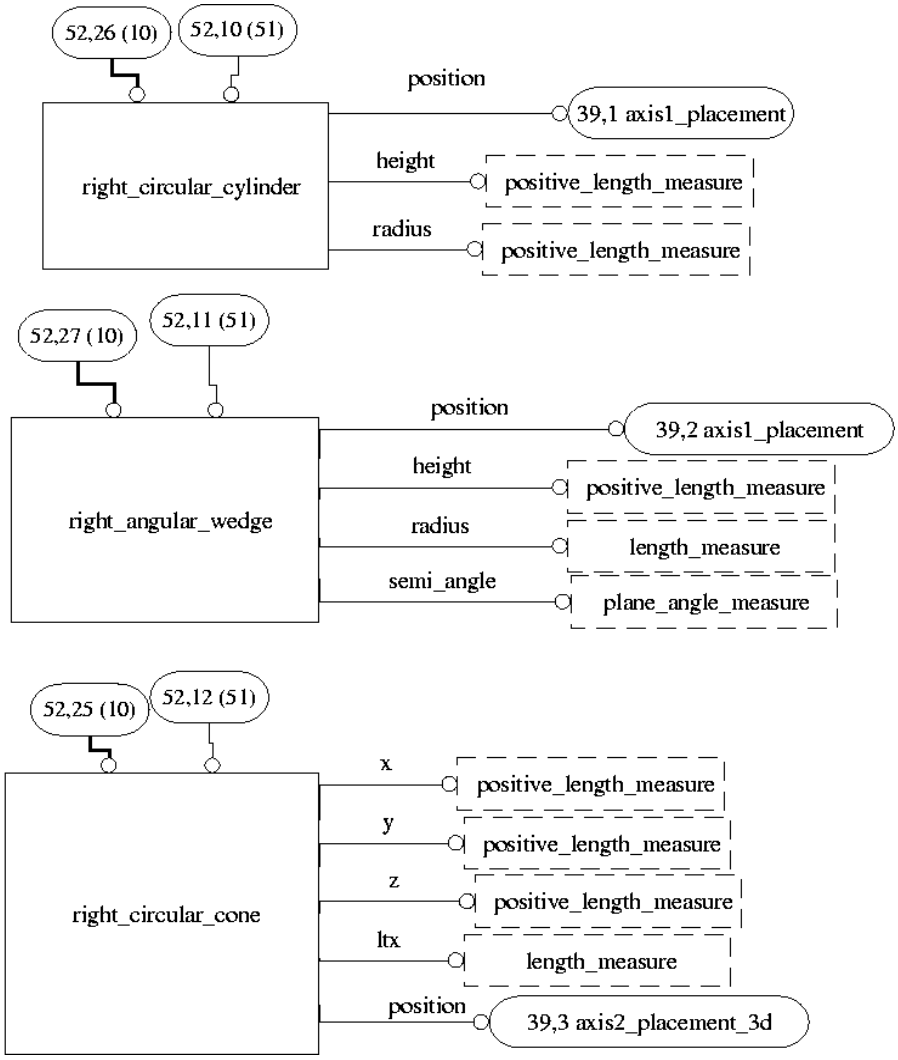

Figure H.52 - AIM EXPRESS-G diagram 52 of 55

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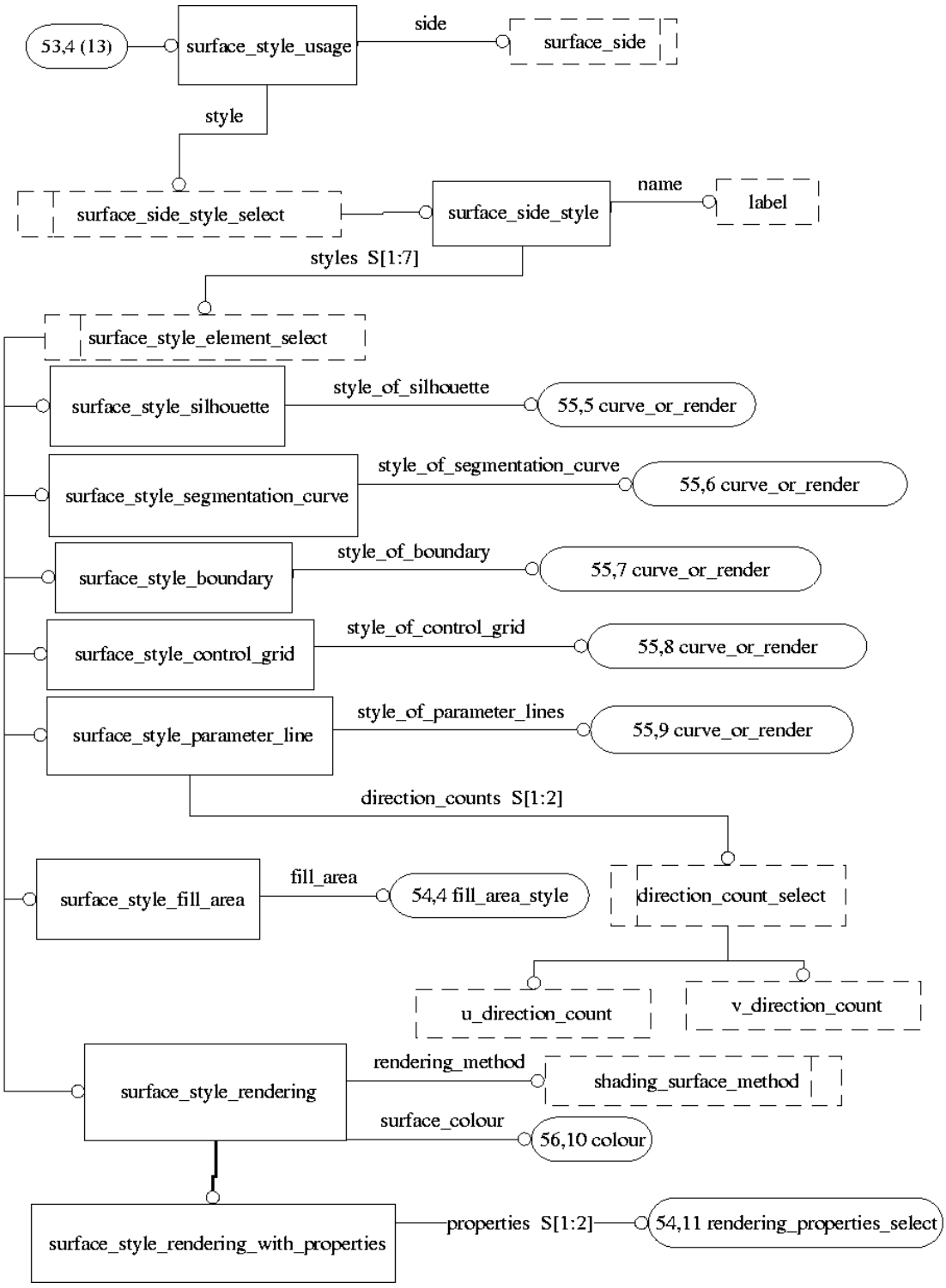

Figure H.53 - AIM EXPRESS-G diagram 53 of 56

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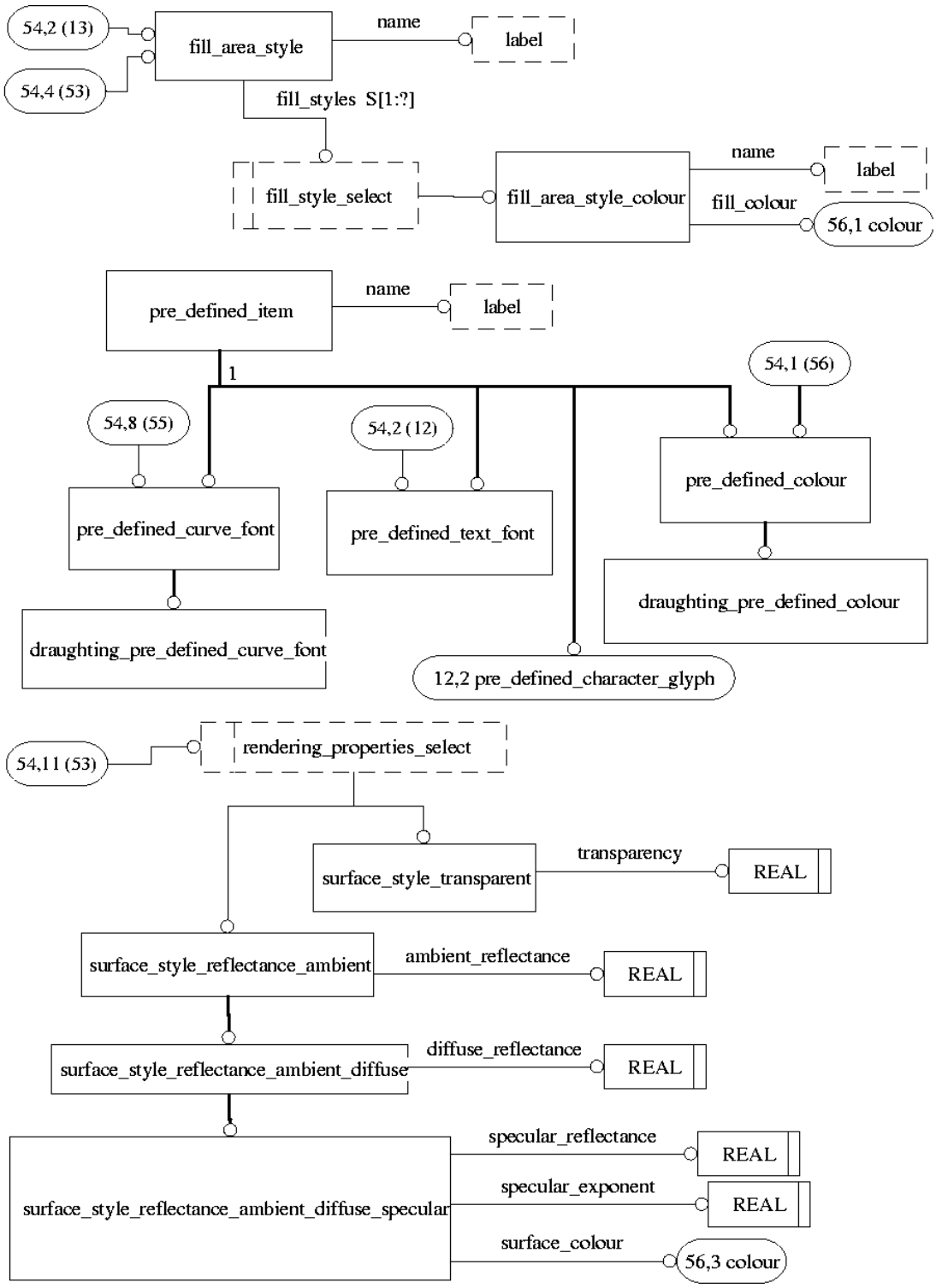

Figure H.54 - AIM EXPRESS-G diagram 54 of 56

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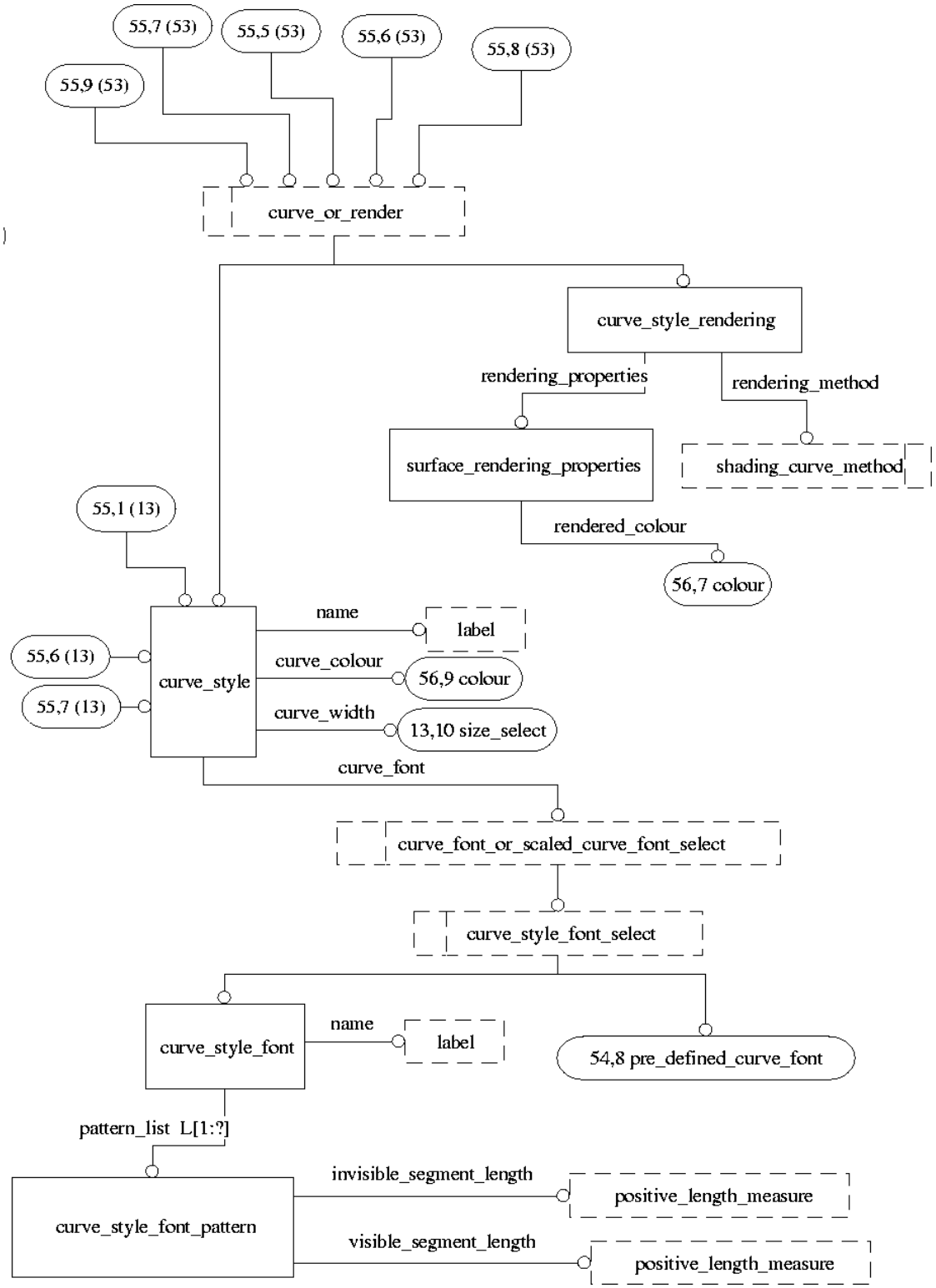

Figure H.55 - AIM EXPRESS-G diagram 55 of 56

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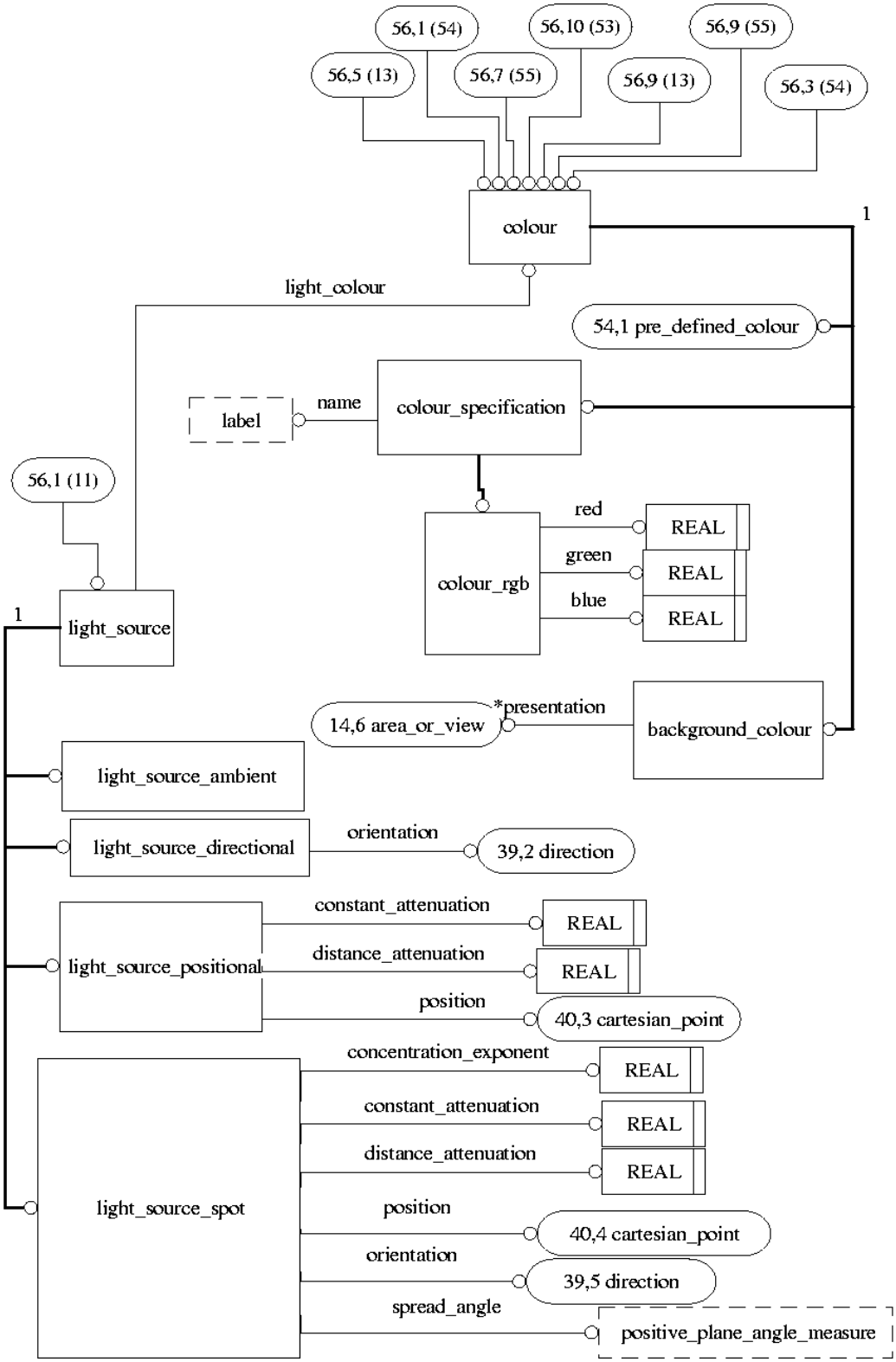

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Annex J
(informative)

Computer-interpretable listings

This annex provides a listing of the EXPRESS entity names and corresponding short names as specified in this part of ISO 10303. It also provides a listing of the complete EXPRESS schema specified in this part of ISO 10303 without comments or other explanatory text. This annex is available in computer-interpretable form and can be found at the following URLs:

Short names: http://www.mel.nist.gov/div826/subject/apde/snr/
EXPRESS: http://www.mel.nist.gov/step/parts/part232/dis/

If there is difficulty accessing these sites contact ISO Central Secretariat or contact the ISO TC 184/SC4 Secretariat directly at: sc4sec@cme.nist.gov.

NOTE The information provided in computer-interpretable form at the above URLs is informative. The information that is contained in the body of this part of ISO 10303 is normative.

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Annex K
(informative)

Usage Scenarios

This annex has two major topics. The first topic, K.1, deals with describing information exchange scenarios. The second topic, K.2 through K.6 describes the different levels of capabilities that can be utilized within a unit of functionality. The units of functionality in this annex that have these levels of capabilities described for them are:

— data definition exchange;

— data list;

— index list;

— indentured data list;

— parts list.

K.1 Information exchange scenarios

Two information exchange scenarios have been created to highlight different aspects of how this part of ISO 10301 may be used. Product data exchange among PDM systems in different enterprises and the creation stage of the information that goes into formulating a Technical Data Package are the aspects of the following two scenarios, respectively. These two scenarios will show possible usages or business practices. Annex K defines capability levels of this part of ISO 10303 that can be applied to the following scenarios or any other scenario.

K.1.1 Design data information exchange scenario

An information exchange scenario was created for this part of ISO 10303 to highlight the exchange aspects among PDM systems. This scenario will show the functionality and the interoperability of this part of 10303 and other ISO 10303 Application Protocol parts, such as ISO 10303-209, in a real world scenario. This scenario will simulate the business process of exchanging technical information among a prime contractor, design/analysis team, and end customer, as shown in Figure KF.1. The scenario can be viewed as six stages. The stages are as follows:

— ‘Prime Contractor’ putting technical data package of requirements together and sending the package to ‘Design/Analysis Team’;

— ‘Design Analysis Team’ perform ‘Preliminary sizing and design’;

— ‘Design Analysis Team’ perform finite element analysis of design;

— ‘Design Analysis Team’ create ‘Technical data package of sub-assembly’ and ship to ‘Prime Contractor’;

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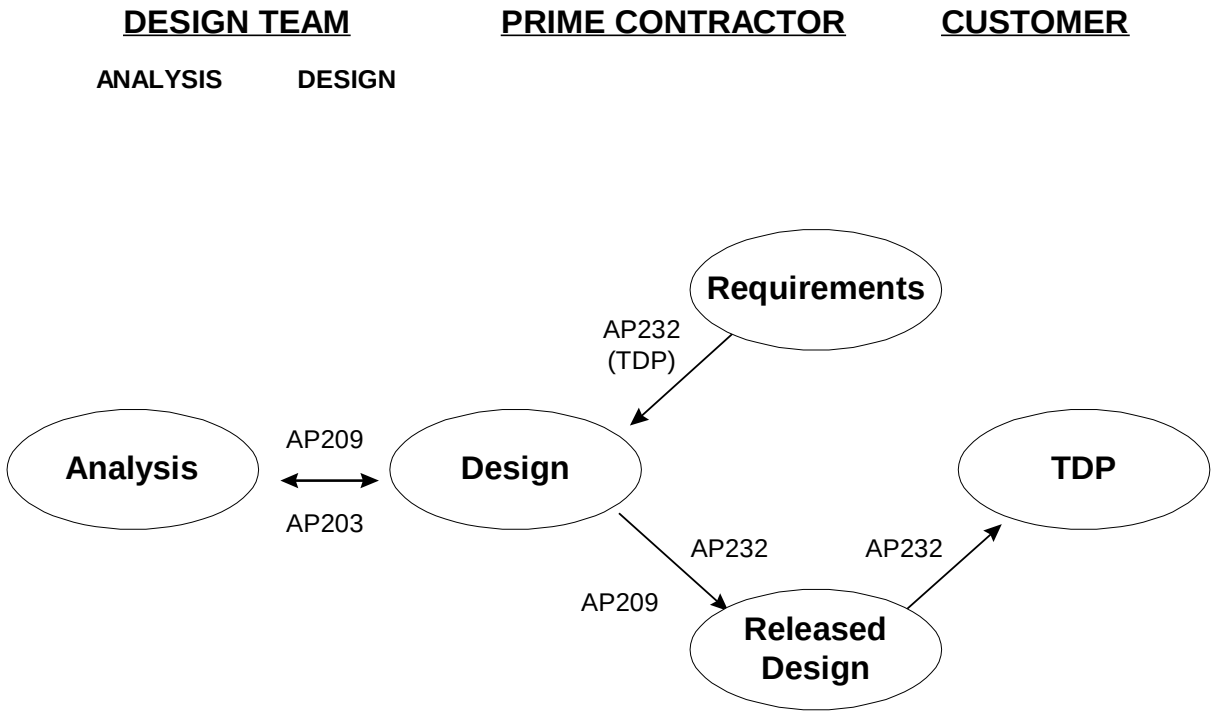

Figure K.1 - TDP information exchange activity

— 'Prime Contractor' incorporate technical data into overall technical data package and deliver to end customer;

— 'End Customer' incorporate technical data package into their data management system.

K.1.1.1 Prime Contractor - Packaging of technical requirements

The first business process stage deals with a 'Prime Contractor' packaging technical requirements for a sub-assembly and sending these requirements to a 'Design/Analysis Team'.

The 'Prime Contractor' will utilize the PDM's product and document structure to identify the out-sourced sub-assembly. Requirement data sets for sub-assembly are then identified and prepared for shipment to 'Design/Analysis Team'. Requirement data sets may include a procurement control drawing, sub-assembly shape envelope, additional technical requirements, and meta data that packages and relates these requirement data sets together. This meta data may be captured within this part of ISO 10303.

K.1.1.2 Design/Analysis Team - Preliminary sizing and design

The second business process stage deals with a subcontractor or teaming partner receiving the requirement data sets from the 'Prime Contractor', and performing preliminary sizing and design on the components of the sub-assembly. The subcontractor ot teaming partner is the 'Design/Analysis Team'.

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The subcontractor would take the received data files and use the exchange meta data with the TDP to properly place them under configuration control. A product and document structure just for the sub-assembly would be created to reflect proposed product structure and data to be generated in the design/analysis process. This sub-assembly structure should identify the high level data that will be delivered to the Prime contractor. The sub-assembly shape envelope file, that is in an ISO 10303-21 file format utilizing ISO 10303-203, ISO 10303-209, or this part of ISO 10303 format, will be translated to the Design/Analysis Team's native CAD System.

The sub-assembly shape envelope is then utilized to prepare shape parameter packets for individual sub-assembly components. The result of this activity provides shape information used as input to preliminary design activities such as initial structural sizing. Utilizing ISO 10303-209, one or more of the resulting shape parameter packets for structural sizing will be sent to automated design tools. In these design tools, detail shapes and parameters of the component design will be formulated (e.g., shape features, constituent ply shapes, and ply tables). This initial component design is then converted back into an ISO 10303-21 file for ISO 10303-209 information.

K.1.1.3 Design/Analysis Team - Finite element analysis of design

The third business process stage deals with performing analytical structural validation of the component. A populated ISO 10303-209 file will be utilized as a common storage location which facilities sharing and relating component data along different steps of the finite element analysis process.

Part shape via ISO 10303-209 will be translated into a FEA pre-processor. A FEA model will be generated on the FEA pre-processor. This FEA will be translated and merged into the existing ISO 10303-209 file. Material properties for each finite element will be generated utilizing the ISO 10303-209 file as input. The material properties will be inserted into the FEA pre-processor and control information for the FEA model generated. The FEA controls are then translated and merged into the existing ISO 10303-209 file. A FEA solver will be run against the FEA model in the FEA pre-processor. The results of the FEA solver will then be both translated and merged into the existing ISO 10303-209 file and viewed by a FEA post processor.

At this point, an iteration on the design could occur if the FEA result warranted it.

K.1.1.4 Design/Analysis Team - Technical data package of sub-assembly

The fourth business process stage deals with performing formal documentation of the sub-assembly component and related the component's data within the sub-assembly's IDL and shipping list to Prime Contractor.

This consists of creating the parts list, data list, indentured data list, applications list, product data sets (containing product 3D shape information) and shipping list utilizing this part of ISO 10303. The drawing will be captured in this part of ISO 10303 or ISO 10303-202. In this scenario, any component and/or sub-assembly technical information may be created or captured in other file formats and incorporated into the technical data package for the sub-assembly delivery to the Prime Contractor.

A more in-depth look into the actual creation and formatting of the information in a released engineering technical data package is presented in subclause K.1.2, Application activity model information creation scenario.

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K.1.1.5 Prime Contractor - Technical data package of end-item

The fifth business process stage deals with creating/updating the technical data package for the end-item that will be shipped to the ‘End-Customer’.

The ‘Prime Contractor’ takes the technical data package from the ‘Design/Analysis Team’ and either updates the ‘End-Item’ product and document structure or maintains a separate sub-assembly product and document structure while placing the technical data in the appropriate places based on the ‘Prime Contractor's’ enterprise data configuration control system.

The ‘Prime Contractor’ then creates the packaging information needed to ship the updated ‘End-Item’ data to the ‘Customer’. At this point, the ‘Prime Contractor’ could send a complete sub-assembly TDP, a partial TDP (reflecting just changes), or just the TDP meta data (describing what data is available for the sub-assembly). For this scenario, select a partial TDP consisting of information related to one component in the sub-assembly. Other sub-assemblies and components which make up the End-Item will be identified only with their product data being noted as "to be delivered at a later time". The creation of the shipping list data file, captured in the this part of ISO 10303, could be done through a Product Data Management (PDM) system or something equivalent.

K.1.1.6 End Customer - Storage and usage of technical data package

The fifth business process stage deals with the ‘End Customer’ receiving the technical data package from the ‘Prime Contractor’ and placing the received information in it's proper location in their system. Potentially a bid package could be constructed, utilizing this part of ISO 10303, that would identify and related the required technical data needed to reprocure a product.

K.1.2 TDP creation information exchange scenario

An information exchange scenario was created for this part of ISO 10303 to condense the TDP creation portion of the AAM activity model in this annex down to a single figure from the view point of the engineer that developed the TDP. This was accomplished so that this portion of the AAM could be explained without the level of detail that is required for the complete AAM. Node A2, Manage, Design, Build and Support a Product, is the portion of the AAM this scenario reflects. Figure K.2 delineates this single figure to present this portion of the abbreviated AAM.

Typical TDP documentation starts with the development of the design in whatever form/format is required. This is classically a two-dimensional geometric format, but is more frequently being developed in a three-dimensional geometric environment. The TDP documentation process follows with determining the drawing requirements for the respective customer and translating that into the required drawing border, format, symbology, terminology, etc. of the customer (and/or seeking a deviation from the respective customer requirements) for drawing based TDP practices. The TDP documentation process for product data sets define product data set presentation and format requirements for the respective customer and determining the ability to satisfy these requirements with current data exchange standards and specifications.

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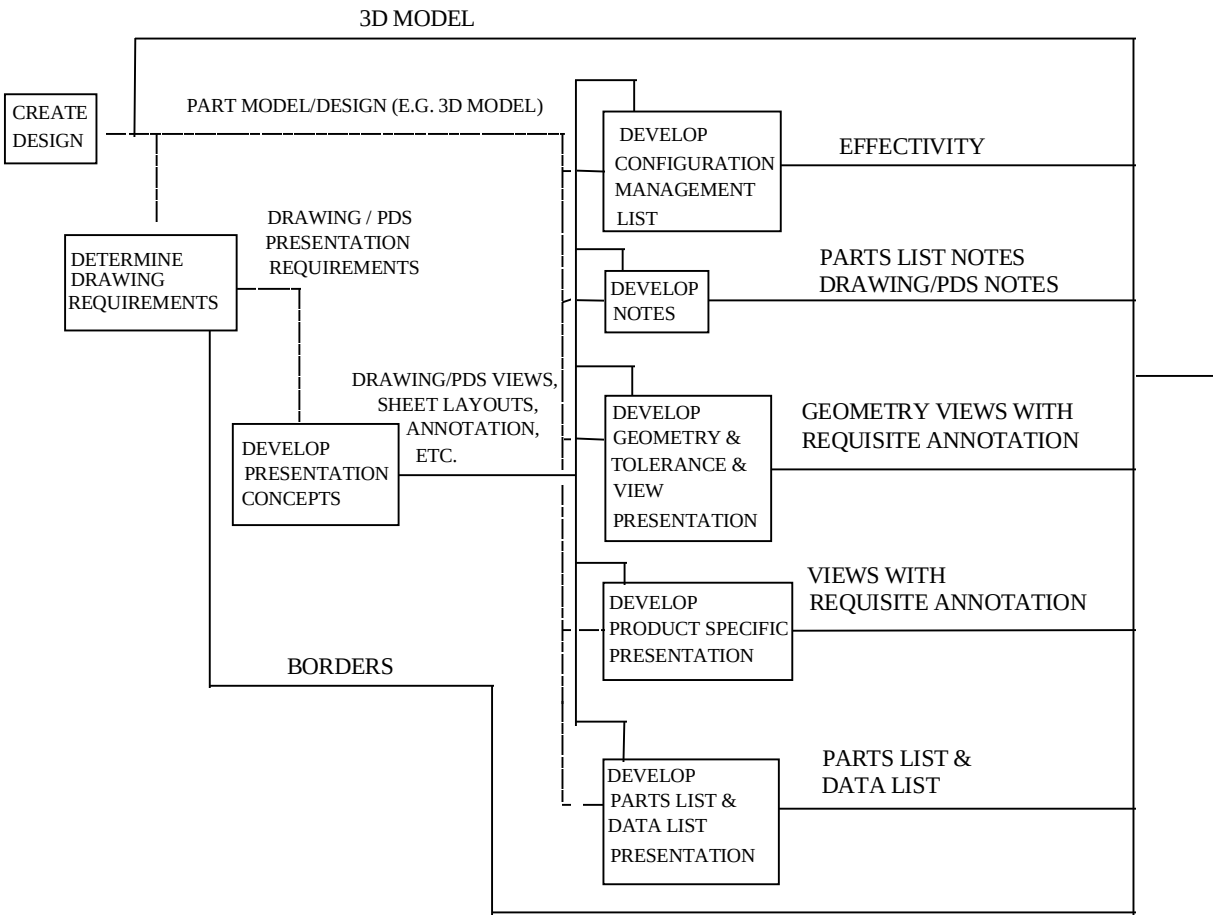

Figure K.2 - Information creation scenario for TDP development

The customer requirements will dictate what the presentation concepts are for the geometric and textual information. The geometric information that was utilized in the creation of the design is then converted to the appropriate form/format that is required to appropriately document the design. This is done in several stages that are delineated in the five boxes on the right hand side of Figure K.2. These activities would be done manually within a computer-aided design application and the output would be translated into the appropriate design format for exchange to the downstream applications.

Information that would not be captured in this scenario is a direct relationship between a piece of geometric information and the annotation (including dimensions and tolerances) required to document the geometric information. A relationship is established between the views of the geometric information, but these views would not have the geometry in the view related to one another. The view data is directly related to the three-dimensional model, but this is not on a geometric element level. The relationship is at a higher level than the geometric element level. The three-dimensional data is not required, but is preferred. The master geometric representation is the two-dimensional view of the data with the three-dimensional data as reference material for the application.

Associated List information (e.g., Parts List, Data Lists) is maintained at a level of capability so that an automated application could process the information in multiple ways. These associated lists would be maintained as separate documents.

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All this product data is then associated together utilizing some form of Product Data Management (PDM) system.

The following terms are used in the TDP creation information exchange scenario in Figure K.2.

The definitions given in this annex do not supersede the definitions given in the main body of the text.

K.1.2.1
Create Design
Develop design concepts of shapes, fits, and interrelationships to other parts and structural requirements. This includes possible variant design, special design applications, and investigation of downstream component requirements.

K.1.2.2
Determine Drawing Requirements
Determine the appropriate drawing documentation requirements or Product Data Set preparation requirements for the component. This includes review of company and customer drawing /PDS reference manuals and standards.

K.1.2.3
Develop Configuration Management List
Verify the configuration of the component under design and document appropriate effectivity of the component. This would include update of the configuration information for a modification of the component.

K.1.2.4
Develop Geometry & Tolerance & View Presentation
Document the shape of the component in a manner whereby a competent manufacturer could produce the component from the design documentation. This includes manufacturing tolerances.

K.1.2.5
Develop Notes
Document the required textual information. This would include process, drawing/PDS interpretation, finish, material and other requirements.

K.1.2.6
Develop Part List & Data List Presentation
Document the required list information in the appropriate formats that comply with company/customer standards for presenting face of the drawing data. This includes the reference between the shape information and the parts list and/or data list. This reference is not explicitly represented in a digital manner.

K.1.2.7
Develop Presentation Concept
Develop the appropriate presentation concepts for the component to adequately represent the design on the drawing/PDS. This includes the view of the component on the drawing/PDS including cross-sectional views, as well as required textual information for notes, part lists, etc.

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K.1.2.8
Develop Product Specific Presentation
Document the appropriate shape information and requisite annotation so that downstream applications can utilize the shape information without recourse to the original design activity.

The following give the definitions of the data that is flowing through the activities.

K.1.2.9
3-D Model
This is the three-dimensional geometric representation of the component.

K.1.2.10
Borders:
This is the standard drawing border that is selected to contain the design documentation.

K.1.2.11
Drawing/PDS Presentation Requirements:
These are the presentation requirements for the part model /design in the drawing/PDS.

K.1.2.12
Effectivity
This is the properly documented effectivity of the component on a drawing/PDS and within the appropriate list.

K.1.2.13
Geometry Views with Requisite Annotation
These are the view plane representations of the geometry and the annotation required to delineate the design requirements and allowances for downstream applications (i.e., tolerances, view dependent information, etc.).

K.1.2.14
Part Model/Design
This is the shape representation and associated textual information of the component in whatever form is appropriate to utilize in documenting the design in a drawing/PDS.

K.1.2.15
Parts List & Data List
These are the lists that are required for the design documentation. These lists delineate the appropriate documentation for the component so that downstream applications can build the component.

K.1.2.16
Parts List Notes, Drawing/PDS Notes
These are any required notes on the Parts List (e.g., finish, heat treat, etc.) or Drawing /PDS (i.e., interpretation standards, revision, etc.) that are required for downstream applications to build and/or support the component.

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K.1.2.17
Product Specific Views with Requisite Annotation
These are views of the geometric representation and the requisite annotation which document specific product characteristics (e.g., cross sectional views, schematics, composite ply layups, etc.).

K.1.2.18
Views, Sheet Layouts, Annotation
Views are the selected shape views of the component that will be documented in a drawing/PDS. Sheet Layouts are the sheet size and sheet constraints that are applied to document the design with the given drawing requirements. Annotation is the drawing/PDS requirement for presenting the annotation in the design documentation.

K.2 Definitions and levels of capability for the parts list

This appendix section defines the Parts List (PL) and its associated information. The levels of capability for the PL focus on the ability to capture part or item information including configuration and accountability information for the purposes of exchanging the PL information between two enterprises or between two systems. These levels of capability do not address graphical presentation of the Parts List.

K.2.1 Parts list definition

The Parts List is a tabulation of parts and bulk materials (except those materials that support a process) when used in the item. Reference documents may also be tabulated on parts lists. Items listed on subordinate assembly parts lists or specified in a referenced document are not repeated in the using assembly parts list unless it is necessary to limit options permitted by the subordinate document. In-house documents, for in-house usage only may be referenced parenthetically.

K.2.2 Parts list levels of capability

The functional utility of the PL is dependent on the amount of TDP element information recorded. The following levels of capability define an increasing level of utility attributed to the number of application objects used to comprise it.

K.2.2.1 Minimal level

This level provides a minimum level of item or part identification capability for commercial exchanges. The PL constructs identified allow for simple item relationships and characteristics to be exchanged. Only mandatory application objects are identified. All other application objects in the following levels of capability are considered optional in a commercial exchange. This level of capability allows for the capture and exchange of the following information:

— identifies the PL document number and version;

— identifies the PL version and number of sheets;

— identifies the find number of a part on the drawing (when applicable);

— identifies notes or remarks pertinent to the item or part in the PL tabulations;

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— identifies parts (or identifying numbers) by number, nomenclature (i.e., name), and quantity required for the item, i.e., assembly.

K.2.2.2 Controlled level

This level provides a higher level than the minimum level of part or item identification capability.

Government requirements are usually more stringent than the commercial requirements in the definition of the developing design authority information and in configuration procedures for the PL.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities identified in minimum level above;

— identifies the contract number under which the PL was prepared;

— identifies the title of the PL;

— identifies the preparing activity of the PL and the preparing activity of the tabulated entries in the PL;

— identifies the weight of the item or part;

— identifies the release authentication (when required).

K.2.2.3 Limited history and material identification level

This level of capability contains two different aspects. The first aspect is the capability to identify a particular configuration of a part that is applicable to a specific effectivity of a product (i.e., limited history). The other capability is to identify material information and material stock characteristics for a part or item. This level of capability allows for the capture and exchange of the following information:

— all of the capabilities in the controlled level of capability;

— additional information for material identification that includes stock material, stock size, and document identifying material characteristics;

— limited history for identification of the part or item into the end item configuration. This includes quantity of the part or item in the end item.

K.2.2.4 Supplemental identification level

The supplemental identification level of capability provides capabilities to those previously cited in identifying and defining parts or items, limited history, and material. This level of capability also provides for:

— all of the capabilities in the limited history and material identification level;

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— additional information for material identification that includes stock material, stock size, and document identifying material characteristics;

— limited history for identification of the part or item into the end item configuration. This includes quantity of the part or item in the end item;

— notation for each item or part, including special conditions identified for the item or part;

— security, distribution, and data rights information on a per item or part basis.

K.2.3 Parts list requirements traceability

Table K.2.1 and table K.2.2 identify the application objects for the Parts List (PL) and to which level of capability they apply. The columns in the matrix are correlated to the levels of capability as follows:

— Column 1 is the application object, enumeration, or select;

— Column 2 = Level 1 = Minimum level (commercial);

— Column 3 = Level 2 = Controlled level (government);

— Column 4 = Level 3 = Limited history and material identification level;

— Column 5 = Level 4 = Supplemental identification level;

— Column 6 is notes of interest to the other columns.

Table K.2.1 defines the levels of capability for PL EXPRESS constructs for selects and enumerations. Table K.2.2 defines the levels of capability for PL applications objects.

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Table K.2.1 - Levels of capability for PL selects and enumerations

Parts list Selects and enumerations	Levels of capability				Notes
	1	2	3	4	
Enumerations					
change_type				X	
component_list_type_enumeration				X	
retrofit_state				X	
quantity_accuracy_enumeration	X	X	X	X	
stock_size_classification			X	X	For material level
stock_size_cross_section			X	X	For material level
weight_derivation				X	
Selects					
component_list_type_select	X	X	X	X	
drawing_or_product_data_set				X	
item_identifying_number_select	X	X	X	X	
item_list_applies_to_select	X	X	X	X	
quantity_accuracy_select	X	X	X	X	
quantity_type_select	X	X	X	X	
revision_authorization_select	X	X	X	X	
usage_condition				X	

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Table K.2.2 - Levels of capability for PL application objects and attributes

Parts list objects	Levels of capability				Notes
	1	2	3	4	
a_number	X	X	X	X	
a_real	X	X	X	X	
alternate_element_identification	X	X	X	X	
change_status			X	X	
design_activity	X	X	X	X	
element_classifications		X	X	X	
identifying_number	X	X	X	X	
outstanding_changes			X	X	
title	X	X	X	X	
alternate_identification_of_item	X	X	X	X	
change_status			X	X	
classifications			X	X	
design_activity	X	X	X	X	
identifying_number	X	X	X	X	
nomenclaature_or_name	X	X	X	X	
source_information				X	
alternate_item				X	
interchange_item				X	
type_of_alternate				X	
usage_conditions				X	
an_integer	X	X	X	X	
approval			X	X	For limited history
date			X	X	For limited history
person_organization			X	X	For limited history

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
data_usage_rights				X	
distribution_authorizations				X	
end_item_system_designation			X	X	Level 3 for limited history
preparing_contracts		X	X	X	
release_authorizations	X	X	X	X	
security_identificatoins				X	
contract		X	X	X	
contract_data_requirements_ list_number				X	
contract_number		X	X	X	
commercial_item_description_or_- data_item_description_number				X	
contract_submission				X	
date	X	X	X	X	
day	X	X	X	X	
month	X	X	X	X	
specific_time	X	X	X	X	
week	X	X	X	X	
year	X	X	X	X	
date_effectivity			X	X	For limited history
end_date			X	X	For limited history
start_date			X	X	For limited history
design_authority	X	X	X	X	
design_activity_code				X	

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
title		X	X	X	
element_type		X	X	X	
element_code		X	X	X	
type_of_coding_scheme		X	X	X	
foreign_defined_item			X	X	For material capability
header	X	X	X	X	
header_configuration	X	X	X	X	
sheet_count	X	X	X	X	
header_configuration_with_element_-identification	X	X	X	X	
data_configuration	X	X	X	X	
identification	X	X	X	X	
identifier	X	X	X	X	
item	X	X	X	X	
alternatives				X	
conditions_defined_through_-constrained_document			X	X	For material capability
conditions_defined_through_simple_-reference			X	X	For material capability
identification	X	X	X	X	
item_configuration				X	
item_contexts	X	X	X	X	
item_weight	X	X	X	X	
notes				X	
special_conditions				X	

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
item_identification	X	X	X	X	
alternate_identifications	X	X	X	X	
change_status	X	X	X	X	
classifications	X	X	X	X	
design_activity	X	X	X	X	
identifying_number	X	X	X	X	
nomenclature_or_name	X	X	X	X	
source_information					Not used
item_list	X	X	X	X	
component_of	X	X	X	X	
list_for	X	X	X	X	
type_of_component_list	X	X	X	X	
item_list_drawing	X	X	X	X	
assembly_item_list_applies_to	X	X	X	X	
drawing_number	X	X	X	X	
item_type	X	X	X	X	
code_administrator				X	
item_code	X	X	X	X	
type_of_coding_scheme				X	
item_usage	X	X	X	X	
being_defined_for	X	X	X	X	
effective_on			X	X	For limited history capa-bility
list_item	X	X	X	X	

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
quantity_used_in_next_higher_ assembly	X	X	X	X	
retofit				X	
special_conditions		X	X	X	
label	X	X	X	X	
list_item_usage	X	X	X	X	
drawing_zones				X	
entry_item_change_level	X	X	X	X	
entry_notes			X	X	
find_number				X	
item_type				X	
reference_designators				X	
locally_defined_item		X	X	X	For drawing and material capability
lot_effectivity			X	X	For limited history capa-bility
lot_identification			X	X	For limited history capa-bility
lot_size			X	X	For limited history capa-bility
lot_unit_of_measure			X	X	For limited history capa-bility
made_from_stock_material		X	X	X	For drawing and material capability
quantity_of_item_made_from _stock			X	X	For material capability
specified_by		X	X	X	For drawing and material capability

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
stock			X	X	For material capability
make_from_an_item			X	X	For material capability
quantity_of_item_made_from_other_-item			X	X	For material capability
item_that_is_acting_as_stock			X	X	For material capability
measure	X	X	X	X	
notation	X	X	X	X	
note	X	X	X	X	
note_title	X	X	X	X	
reference_code	X	X	X	X	
referenced_document_in_note	X	X	X	X	
type_of_notation	X	X	X	X	
number_with_units	X	X	X	X	
units_of	X	X	X	X	
value_of	X	X	X	X	
other_reference_document	X	X	X	X	
parts_list	X	X	X	X	
list_body	X	X	X	X	
list_header	X	X	X	X	
parts_list_body	X	X	X	X	
parts_tabulations	X	X	X	X	
referenced_tdp_elements		X	X	X	For drawing
revision_history	X	X	X	X	
parts_list_header	X	X	X	X	

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
person_responsible				X	
release_authority				X	
release_authority_code				X	
release_date	X	X	X	X	
retrofit_usage				X	
desposition_for				X	
defining_document				X	
retrofit_description				X	
revision	X	X	X	X	
authorizing_documents	X	X	X	X	
revision_approval_and_organization				X	
revision_date	X	X	X	X	
revision_description	X	X	X	X	
revision_level	X	X	X	X	
security_classification				X	
item_classification				X	
title_security_classification				X	
sequence_effectivity			X	X	For limited history
component_quantity			X	X	For limited history
from_effectivity_id			X	X	For limited history
quantity_unit_of_measure			X	X	For limited history
thru_effectivity_id			X	X	For limited history
sheet				X	

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Table K2.2 - Levels of capability for PL application objects and attributes (continued)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
size_characteristics				X	
size_characteristics_full_size				X	
special_condition		X	X	X	
code		X	X	X	
description				X	
type_of_coding_scheme		X	X	X	
specification_document			X	X	For material capability
standard_document			X	X	For material capability
status			X	X	
stock_material			X	X	For material capability
material			X	X	For material capability
size			X	X	For material capability
stock_size			X	X	For material capability
catalog			X	X	For material capability
cross_section			X	X	For material capability
parameters_for			X	X	For material capability
stock_size_parameters			X	X	For material capability
diameter			X	X	For material capability
height			X	X	For material capability
length			X	X	For material capability
radius			X	X	For material capability
textual_parameters			X	X	For material capability
wall_thickness			X	X	For material capability

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Table K.2.2 - Levels of capability for PL application objects and attributes (concluded)

Parts list objects	Levels of capability				Notes
	1	2	3	4	
width			X	X	For material capability
tdp_element	X	X	X	X	
tdp_element_and_item_association	X	X	X	X	
tdp_element_list_item		X	X	X	For drawing
reference_code		X	X	X	For drawing
tdp_element_item		X	X	X	For drawing
text	X	X	X	X	
time	X	X	X	X	
hour	X	X	X	X	
minute	X	X	X	X	
second	X	X	X	X	
zone	X	X	X	X	
volume	X	X	X	X	
value	X	X	X	X	
weight	X	X	X	X	
derivation_method				X	
unit_of_measure	X	X	X	X	

K.3 Definitions and levels of capability for the data list

This appendix section defines the Data List (DL) and its associated information. The levels of capability for the DL focus on the ability to capture document management and accountability information for the purposes of exchanging the DL information between two enterprises or between two systems. These levels of capability do not address graphical presentation of the Data List.

K.3.1 Data list definition

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The Data List is a tabulation of all engineering drawings, product data sets, associated lists, specifications, standards, and subordinate data lists pertaining to the item to which the data list applies and essential in-house documents necessary to meet the technical design disclosure requirements, except for those in-house documents referenced parenthetically.

Data captured on the Data List is comprised primarily of summary information about TDP elements or documents that include element identification (e.g., document number, title), security, distribution controls, and other pertinent information required to support the management of the TDP element. The Data List tabulation identifies those TDP elements that are called out for the item to which the data list applies and does not give a top-down break-down listing of all TDP elements below the level of the item.

K.3.2 Data list levels of capability

The functional utility of the DL is dependent on the amount of TDP element information recorded. The following levels of capability define an increasing level of utility attributed to the number of application objects used to comprise it.

K.3.2.1 Minimal level

This level provides a minimum level of document management and document accounting capability for commercial exchanges. The DL constructs identified allow for simple TDP element relationships and characteristics to be exchanged. Only mandatory application objects are identified, all other application objects in the following levels of capability are considered optional in a commercial exchange.

— This level of capability allows for the capture and exchange of the following information:

— identifies the DL document number and version;

— identifies the DL version and number of sheets;

— identifies tabulated documents and TDP elements by number, version, and nomenclature (i.e., name);

— identifies for each tabulated document the drawing size (when applicable) and the number of sheets (for a drawing).

K.3.2.2 Controlled level

This level provides a higher level than the minimum level of document management and document accounting capability. Government requirements are usually more stringent than the commercial requirements in the definition of the developing design authority information and in configuration procedures for the DL.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities identified in minimum level above;

— identifies the contract number under which the DL was prepared;

— identifies the title of the DL;

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— identifies the preparing activity of the DL and the preparing activity of the tabulated entries in the DL;

— identifies the release authentication (when required).

K.3.2.3 Supplemental identification level

The supplemental identification level of capability provides capabilities to those previously cited of identifying and managing TDP element using information which specifically characterizes the TDP element for data management and accountability functions.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities in the controlled level of capability;

— notation for each TDP elements, including special conditions identified for the TDP element;

— end item identification usage of the item that the DL was prepared for;

— security, distribution, and data rights information for the DL of interest and the tabulations on the DL.

K.3.3 Data list requirements traceability

Table K.3.1 and Table K.3.2 identify the application objects for the Data List (DL) and to which level of capability they apply. The columns in the matrix are correlated to the levels of capability as follows:

— Column 1 is the application object, enumeration, or select;

— Column 2 = Level 1 capability = Minimum level (commercial);

— Column 3 = Level 2 capability = Controlled level (government);

— Column 4 = Level 3 capability = Supplemental identification level;

— Column 5 contains notes of interest to the other columns.

Table K.3.1 defines the levels of capability for DL EXPRESS constructs for selects and enumerations. Table K.3.2 defines the levels of capability for DL applications objects.

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Table K.3.1 - Levels of capability for DL selects and enumerations

Data list Selects and enumerations	Levels of capability			Notes
	1	2	3	
Enumerations				
change_type			X	
Selects				
drawing_or_product_data_set			X	
item_identifying_number_select			X	
revision_authorization_select	X	X	X	
source_identification			X	
valid_tdp_elements_for_data_list	X	X	X	

Table K.3.2 - Levels of capability for DL application objects and attributes

Data list objects	Levels of capability			Notes
	1	2	3	
a_number	X	X	X	
a_real	X	X	X	
alternate_element_identification			X	
change_status			X	
design_activity			X	
element_classifications			X	
identifying_number			X	
outstanding_changes			X	
title			X	
alternate_identification_of_item			X	
change_status			X	

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
classifications			X	
design_activity			X	
identifying_number			X	
nomenclaature_or_name			X	
source_information			X	
an_integer	X	X	X	
approval				
date				
person_organization				
purpose_of				
associated_list	X	X	X	
presentation				This is for presentation of the information only.
related_to			X	
change_identification	X	X	X	
change_code			X	
change_date			X	
change_description			X	
change_level			X	
issue_date			X	
issue_level			X	
revision_authorization_identifications	X	X	X	
revision_date	X	X	X	
revision_description	X	X	X	

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
revision_level	X	X	X	
status			X	
company	X	X	X	
company_code		X	X	
code		X	X	
type_of_code		X	X	
configuration	X	X	X	
data_usage_rights			X	
distribution_authorization			X	
end_item_system_designation			X	
preparing_contracts		X	X	
release_authorizations	X	X	X	
security_identifications			X	
contract		X	X	
commercial_item_description_or_data_item_description_number			X	
contract_data_requirements_list_number			X	
contract_number		X	X	
contract_submission			X	
data_submission			X	
delivered_contract			X	
location			X	
data_list	X	X	X	
body	X	X	X	

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
list_header	X	X	X	
data_list_body	X	X	X	
data_list_notes			X	
data_list_tabulations	X	X	X	
revision_history	X	X	X	
data_list_entry	X	X	X	
available_from			X	
entry_item_change_level			X	
entry_notes			X	
list_entry	X	X	X	
special_conditions			X	
data_list_header	X	X	X	
common_header	X	X	X	
data_list_tabulation	X	X	X	
data_list_entries	X	X	X	
for_item			X	
date	X	X	X	
day	X	X	X	
month	X	X	X	
speicfic_time	X	X	X	
week	X	X	X	
year	X	X	X	
design_authority	X	X	X	

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
design_activity_code		X	X	
design_activity_identification	X	X	X	
person_responsible			X	
distribution_notice			X	
distribution_authority			X	
distribution_code			X	
distribution_statement			X	
document_list	X	X	X	
drawing	X	X	X	For DL Tabulations
heading	X	X	X	For DL Tabulations
pages	X	X	X	For DL Tabulations
drawing_suffix_number_combination	X	X	X	
drawing_number	X	X	X	
suffix_identifier	X	X	X	if required
effectivity			X	
element_identification	X	X	X	
alternate_identifications	X	X	X	
change_status	X	X	X	if applicable
design_activity	X	X	X	
element_classifications		X	X	
identifying_number	X	X	X	
title		X	X	
element_type		X	X	

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
element_code		X	X	
type_of_coding_scheme		X	X	
header	X	X	X	
header_configuration	X	X	X	
sheet_count	X	X	X	
header_configuration_with_element_-identification	X	X	X	
data_configuration	X	X	X	
identification	X	X	X	
identifier	X	X	X	
item			X	
alternates (N/A)				
item_weight (N/A)				
final_conditions (N/A)				
finish_conditions (N/A)				
item_configuration			X	
identification			X	
notes			X	
special_conditions			X	
item_identification			X	
alternate_identifications			X	
change_status			X	
classifications			X	
design_activity			X	

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
identifying_number			X	
nomenclature_or_name			X	
source_information			X	
item_type			X	
code_administrator			X	
item_code			X	
type_of_coding_scheme			X	
label	X	X	X	
lot_effectivity			X	
notation			X	
note			X	
note_title			X	
reference_code			X	
referenced_document_in_note			X	
type_of_notation			X	
other_list	X	X	X	For DL Tabulations
list_body				This is not to be used
list_header	X	X	X	For DL Tabulations
other_list_header	X	X	X	For DL Tabulations
common_header	X	X	X	For DL Tabulations
other_reference_document	X	X	X	
parts_list	X	X	X	For DL Tabulations
list_body				This is not to be used

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
list_header	X	X	X	For DL Tabulations
parts_list_header	X	X	X	For DL Tabulations
common_header	X	X	X	For DL Tabulations
person			X	
person_and_organization			X	
organization			X	
person_address			X	
person_identification			X	
product_configuration			X	
configuration_id			X	
product_name			X	
product_data_set	X	X	X	For DL Tabulations
file_configuration				This is not to be used
product_data_set_with_format	X	X	X	For DL Tabulations
presentation_of_product_data_set				This is not to be used
product_header	X	X	X	For DL Tabulations
product_data_set_with_shading	X	X	X	
a_shaded_model				This is not used
data_configuration	X	X	X	For DL Tabulations
product_data_set_without_format	X	X	X	For DL Tabulations
data_configuration	X	X	X	For DL Tabulations
model				This is not to be used
product_model			X	

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Table K.3.2 - Levels of capability for DL application objects and attributes (continued)

Data list objects	Levels of capability			Notes
	1	2	3	
model_name			X	
reference_document	X	X	X	
document_identification	X	X	X	
release_authentication	X	X	X	
authentication	X	X	X	
person_responsible			X	
release_authority			X	
release_authority_code			X	
release_date	X	X	X	
revision	X	X	X	
authorizing_documents	X	X	X	
revision_approval_and_organization			X	
revision_date	X	X	X	
revision_description	X	X	X	
revision_level	X	X	X	
security_classification			X	
item_classification			X	
title_security_classification			X	
sequence_effectivity			X	
sheet	X	X	X	For DL Tabulations
presentation_format				Not to be used
sheet_configuration	X	X	X	For DL Tabulations
sheet_identifier	X	X	X	For DL Tabulations

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Table K.3.2 - Levels of capability for DL application objects and attributes (concluded)

Data list objects	Levels of capability			Notes
	1	2	3	
sheet_size	X	X	X	For DL Tabulations
single_document_list	X	X	X	
size_characteristics			X	
size_characteristics_fule_size			X	
special_condition			X	
code			X	
description			X	
type_of_coding_scheme			X	
specification_document	X	X	X	For DL Tabulations
standard_docmunent	X	X	X	For DL Tabulations
status			X	
tdp_element	X	X	X	
tdp_element_and_item_association	X	X	X	
text	X	X	X	
time	X	X	X	
hour	X	X	X	
minute	X	X	X	
second	X	X	X	
zone	X	X	X	

K.4 Definitions and levels of capability for the index list

This appendix section defines the Index List (IL) and its associated information. The levels of capability for the IL focus on the ability to capture document management and accountability information for the purposes of exchanging the IL information between two enterprises or between two systems. These levels of capability do not address graphical presentation of the Index List.

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K.4.1 Index list definition

The Index List is a tabulation of data lists and subordinate index lists pertaining to the item to which the index list applies.

Data captured on the Index List is comprised primarily of summary information about TDP elements or documents for purposes of collecting the TDP.

K.4.2 Index list levels of capability

The functional utility of the IL is dependent on the amount of TDP element information recorded. The following levels of capability define an increasing level of utility attributed to the number of application objects used to comprise it.

K.4.2.1 Minimal level

This level provides a minimum level of document management and document accounting capability for commercial exchanges. The IL constructs identified allow for simple TDP element relationships and characteristics to be exchanged. Only mandatory application objects are identified, all other application objects in the following levels of capability are considered optional in a commercial exchange.

This level of capability allows for the capture and exchange of the following information:

— identifies the IL document number and version;

— identifies the IL version and number of sheets;

— identifies tabulated TDP elements by number, version, and nomenclature (i.e., name).

K.4.2.2 Controlled level

This level provides a higher level than the minimum level of document management and document accounting capability. Government requirements are more stringent than the commercial requirements in the definition of the developing design authority information and in configuration procedures for the IL.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities identified in minimum level above;

— identifies the contract number under which the IL was prepared;

— identifies the title of the IL;

— identifies the preparing activity of the IL and the preparing activity of the tabulated entries in the IL;

— identifies the release authentication (when required).

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K.4.3 Supplemental identification level

The supplemental identification level of capability provides capabilities to those previously cited of identifying and managing TDP element using information which specifically characterizes the TDP element for data management and accountability functions.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities in the controlled level of capability;

— notation for each TDP elements, including special conditions identified for the TDP element;

— end item identification usage of the item that the IL was prepared for;

— security, distribution, and data rights information for the IL of interest and the tabulations on the IL.

K.4.4 Index list requirements traceability

Table K.4.1 and table K.4.2 identify the application objects for the Index List (IL) and to which level of capability they apply. The columns in the matrix are correlated to the levels of capability as follows:

— Column 1 - Column 1 is the application object, enumeration, or select;

— Column 2 = Level 1 = Minimum level (commercial);

— Column 3 = Level 2 = Controlled level (government);

— Column 3 = Level 3 = Supplemental identification level;

— Column 4 contains the notes of interest to the other columns.

Table K.4.1 defines the levels of capability for IL EXPRESS constructs for selects and enumerations. Table K.4.2 defines the levels of capability for IL applications objects.

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Table K.4.1 - Levels of capability for IL selects and enumerations

Index list Selects and enumerations	Levels of capability			Notes
	1	2	3	
Enumerations				
change_type			X	
Selects				
drawing_or_product_data_set			X	
revision_authorization_select	X	X	X	
valid_tdp_elements_for_index_list	X	X	X	

Table K.4.2 - Levels of capability for IL application objects and attributes

Index list objects	Levels of capability			Notes
	1	2	3	
a_number	X	X	X	
a_real	X	X	X	
alternate_element_identification			X	
change_status			X	
design_activity			X	
element_classifications			X	
identifying_number			X	
outstanding_changes			X	
title			X	
an_integer	X	X	X	
approval			X	
associated_list	X	X	X	
presentation				This is for presentation of the information only.

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Table K.4.2 - Levels of capability for IL application objects and attributes (continued)

Index list objects	Levels of capability			Notes
	1	2	3	
related_to			X	
change_identification	X	X	X	
action_status			X	
change_code			X	
change_date			X	
change_description			X	
change_level			X	
issue_date			X	
issue_level			X	
revision_authorization_identifications	X	X	X	
revision_date	X	X	X	
revision_description	X	X	X	
revision_level	X	X	X	
company	X	X	X	
company_code		X	X	
code		X	X	
type_of_code		X	X	
configuration	X	X	X	
data_usage_rights			X	
distribution_authorizations			X	
end_item_system_designation			X	
preparing_contracts		X	X	
release_authorizations	X	X	X	

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Table K.4.2 - Levels of capability for IL application objects and attributes (continued)

Index list objects	Levels of capability			Notes
	1	2	3	
security_identifications			X	
contract		X	X	
contract_data_requirments_list_number			X	
contract_number		X	X	
commercial_item_description_or_data_-item_description_number			X	
data_list	X	X	X	For IL Tabulations
body				Not to be used
list_header	X	X	X	For IL Tabulations
data_list_header	X	X	X	For IL Tabulations
common_header	X	X	X	For IL Tabulations
date	X	X	X	
day	X	X	X	
month	X	X	X	
specific_time	X	X	X	
week	X	X	X	
year	X	X	X	
date_effectivity			X	
design_authority	X	X	X	
design_activity_code			X	
design_activity_identification	X	X	X	
person_responsible			X	
distribution_notice			X	
distribution_authority			X	

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Table K.4.2 - Levels of capability for IL application objects and attributes (continued)

Index list objects	Levels of capability			Notes
	1	2	3	
distribution_code			X	
distribution_statement			X	
document_list	X	X	X	
drawing			X	
heading			X	
pages			X	
effectivity			X	
element_identification	X	X	X	
alternate_identifications	X	X	X	
change_status	X	X	X	if applicable
design_activity	X	X	X	
element_classifications		X	X	
identifying_number	X	X	X	
title		X	X	
element_type		X	X	
element_code		X	X	
type_of_coding_scheme		X	X	
header	X	X	X	
header_configuration	X	X	X	
sheet_count	X	X	X	
header_configuration_with_element_-identification	X	X	X	
data_configuration	X	X	X	
identification	X	X	X	

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Table K.4.2 - Levels of capability for IL application objects and attributes (continued)

Index list objects	Levels of capability			Notes
	1	2	3	
identifier	X	X	X	
indentured_data_list	X	X	X	For IL tabulations
body				Not to be used
header	X	X	X	For IL tabulations
indentured_data_list_header	X	X	X	For IL tabulations
common_header	X	X	X	For IL tabulations
index_list	X	X	X	
body	X	X	X	
list_header	X	X	X	
index_list_body	X	X	X	
index_list_entries	X	X	X	
index_list_notes			X	
revision_history	X	X	X	
index_list_entry	X	X	X	
entry_notes			X	
entry_item_change_level			X	
list_entry	X	X	X	
index_list_header	X	X	X	
common_header	X	X	X	
item			X	
alternates (N/A)				
item_weight (N/A)				
final_conditions (N/A)				
finish_conditions (N/A)				

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Table K.4.2 - Levels of capability for IL application objects and attributes (continued)

Index list objects	Levels of capability			Notes
	1	2	3	
item_configuration			X	
identification			X	
notes			X	
special_conditions			X	
item_identification			X	
alternate_identifications			X	
change_status			X	
classifications			X	
design_activity			X	
identifying_number			X	
nomenclature_or_name			X	
source_information			X	
label	X	X	X	
lot_effectivity			X	
notation			X	
note			X	
note_title			X	
reference_code			X	
referenced_document_in_note			X	
type_of_notation			X	
other_reference_document	X	X	X	
person			X	
person_and_organization			X	
organization			X	

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Table K.4.2 - Levels of capability for IL application objects and attributes (continued)

Index list objects	Levels of capability			Notes
	1	2	3	
person_identification			X	
person_address			X	
product_configuration			X	
configuration_id			X	
product_name			X	
product_model			X	
model_name			X	
reference_document	X	X	X	
document_identification	X	X	X	
release_authentication	X	X	X	
authentication	X	X	X	
person_responsible authentication			X	
release_authority			X	
release_authority_code			X	
release_date	X	X	X	
revision	X	X	X	
authorizing_documents	X	X	X	
revision_approval_and_organization			X	
revision_date	X	X	X	
revision_description	X	X	X	
revision_level	X	X	X	
security_classification			X	
item_classification			X	

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Table K.4.2 - Levels of capability for IL application objects and attributes (concluded)

Index list objects	Levels of capability			Notes
	1	2	3	
title_security_classification			X	
sequence_effectivity			X	
sheet			X	
single_document_list	X	X	X	
size_characteristics			X	
size_characteristics_full_size			X	
status			X	
tdp_element	X	X	X	
tdp_element_and_item_association			X	
text	X	X	X	
time	X	X	X	
hour	X	X	X	
minute	X	X	X	
second	X	X	X	
zone	X	X	X	

K.5 Definitions and levels of capability for the Data Definition Exchange (DDE)

K.5.1 Data definition exchange

This appendix section defines the Data Definition Exchange and its associated information. The levels of capability for the DDE focus on the ability to capture the packaging/shipping information required to identify and relate among one another the product data exchanged, in whole or in part, between two enterprises or between two systems. Within the DDE focus, the ability to capture product and document management and accountability information is also included.

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K.5.1.1 Definition

The Data Definition Exchange (DDE) is an intelligent list identifying Technical Data Package (TDP) Elements that potentially are exchanged, such as engineering drawings, associated lists, referenced documents, or any other data sets or documents related to product items. The DDE may be use to identify and record the total number of TDP Elements required to support the given product item. In addition, TDP Elements for one or more products, assemblies, or details can be identified together within a DDE. The DDE content can be as basic as a simple shipping list or as complex as a full inventory of design disclosure defining which TDP Elements are actually being exchanged. A full inventory of design disclosure provides such things as TDP element to TDP element relationships, TDP element to data file relationships, file format data, and delivery accounting information. The DDE may use an indentured hierarchical structure which identifies how elements are related. The DDE may also be exchanged without accompanying TDP elements.

K.5.1.2 Functional capture of data relationships

The utilization of data relationships within the DDE is one of the primary aspects for distinguishing the level of capabilities that are supported by the DDE. First, utilizing a simple list of TDP Elements being exchanged provides support for a minimum set of exchange application capabilities. Next, providing an indentured list relationship of TDP Elements supports a more rich set of application capabilities.

The basis of indenture for a DDE may be of three types. The first is a TDP Element to TDP Element (or document to document) relationship. For example, a drawing and all of its referenced documents are identified starting with the end item or assembly drawing and identifying all referenced drawings, associated lists, product data sets and other referenced documents. The second is a part number to part number hierarchical indenture list with intermingled subordinate indentures of part to TDP element relationships and TDP element to TDP element relationships. This provides the ability to specifically identify all TDP elements required to define each part or assembly. The third is similar to the second in that a part to part relationship is derivable, however, the indenture is structured to first define a document/drawing, then its disclosed or referenced parts, then for each part the subassembly documents/drawings disclosing the subassembly parts, and then finally for each subassembly document/drawing the subassembly component parts are defined. Thus the third indenture method provides a part based indenture method while capturing the subordinate indenture relationships of a TDP element to a part.

K.5.1.3 Functional capture of required data

Data captured in the DDE is comprised primarily of description information about the TDP elements including element identification (document number, title, etc.), security and distribution controls, file formats, delivery accounting, exchange existence knowledge and other pertinent information required to support the exchange of TDP elements.

K.5.1.4 Levels of capability

The functional utility of the DDE is dependent on the amount of TDP element information recorded. The following levels of capability define an increasing level of utility attributed to the quantity of information construct types valid for a particular level.

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K.5.1.4.1 Shipping list - Provides a minimum level of exchange information for a set of TDP elements. The exchange information at a minimum can only consist of a simple list of TDP elements (documents) or a simple list of files being exchanged. This level of capability does NOT provide for relationship information between two or more TDP elements to be captured. This shipping list capability could be utilized for any collection of files, even related technical data files that are not typically included as design discloser information, that needed to be exchanged as part of a package within or among business enterprises.

This level of capability allows for the capture and exchange of the following information:

— identifies DDE and related product item(s);

— defines DDE version data including original/revision data;

— date that the DDE is created;

— simple list of TDP elements or data files that comprise TDP elements;

— allows for identification of TDP elements by number and version.

K.5.1.4.2 General packaging - Provides a basic level of exchange information for a set of TDP elements. In addition to the requirements for a shipping list being covered, this general packaging capability provides: TDP element to their corresponding data file relationships, data file digital format identification, and general TDP element description data such as security, source, and destination information. Also the capability is supported where two or more formats (digital or non-digital) are required for a single TDP element, thus enabling the receiving enterprise/system to identify, manage, and account for all distinct TDP element forms necessary to support the product item, assembly, or detail. An example would be a parts list TDP element with a computer processable form contained in a STEP format and a presentation form in a raster format.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities identified in Shipping List capability;

— identifies the different forms available for each TDP element (e.g., raster, STEP, SGML, paper, etc.);

— provides TDP element to data file relationships;

— provides digital format of the data files;

— identifies total count of internal TDP element divisions and their division types such as the sheet count or pages;

— identifies document usage controls (unlimited or limited rights) for the DDE and TDP elements;

— provides system origination with release authorization and target system destination;

— identifies security level of document or title;

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— date of transfer of the DDE;

— allows for the identification of TDP elements by document type and preparing design activity.

K.5.1.4.3 Indenture list - Provide relationships among TDP elements, among Product Items, and among TDP elements and Product Items. These relationships establish the capability to tie/merge product data management structure to document based management structures. There are three types of indenture for a DDE. Each indenture type is described in the following three subsections: K.5.1.4.3.1, K.5.1.4.3.2, K.5.1.4.3.3. The capability each indenture list type provides is not additive to each other but is applied independently to the other DDE capability levels. There are four types of parent child relationship that are utilized to formulate the three types of indenture lists. Table K.5.1 shows which parent child relationships are used in the three types of indenture lists.

Table K.5.1 - Parent child relationships used in indenture list types

INDENTURE LIST TYPE	PARENT/ CHILD			
	PART/ PART	PART/ TDP Element	TDP Element/ PART	TDP Element/ TDP Element
Indenture by TDP Element				Yes *
Indenture by Part	Yes *	Yes		Yes
Indenture by Part (with Document References to Parts)	Yes *	Yes *	Yes *	Yes *

Notes: * - Top Indenture

K.5.1.4.3.1 Indenture by TDP element - Provides the ability to capture the relationships of TDP elements within the exchange. A hierarchical indenture list that provides a parent child relationship between the TDP elements is supported. Applications can query this list to identify what documents are referenced from any other. For example, the relationship between an assembly drawing and its subordinate documents (detail drawings, material specification, etc.) may be captured.

This level of capability allows for the capture and exchange of the following information:

— identifies parent child relationships between TDP elements;

— allows for a hierarchical order of indenture to be captured among TDP elements.

K.5.1.4.3.2 Indenture by part - Provides the ability to capture the relationships of parts within the exchange. A hierarchical indentured list that provides a parent child relationship between parts and assemblies, parts and their TDP elements, and TDP elements and their subordinate TDP elements is supported. Applications may query this list to identify what documents are available about a part, what

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parts go into which assembly, and what documents are referenced from other documents. For example, utilizing the Indenture by Part capability level, the drawing a part is defined in and the assembly that a part is a portion of could be determined by just knowing the identification of a part.

This level of capability allows for the capture and exchange of the following information:

— identifies parent child relationships between parts;

— identifies parent child relationships between a part (parent) and a TDP Element (child);

— identifies parent child relationships between TDP elements;

— allows for a hierarchical order of indenture to be captured among parts and TDP elements with the part always playing the higher indenture role when associated directly with a TDP Element;

— identifies that a part always occupies the first indenture level.

K.5.1.4.3.3 Indenture by part (with document references to parts) - Provides the ability to capture the relationships of parts and/or TDP Elements within the exchange. A hierarchical indentured list that provides a parent child relationship between parts and assemblies, parts and their TDP elements, TDP elements and their parts, and TDP elements and their subordinate TDP elements is supported. Applications may query this list to identify what documents are available about a part, what parts go into which assembly, what parts are defined in a drawing, and what documents are referenced from other documents. For example, utilizing the Indenture by Part (with Document References to Parts) capability level, the parts defined on an assembly drawing could be identified by just knowing the identification of the assembly drawing.

This level of capability allows for the capture and exchange of the following information:

— identifies an implied parent child relationships between parts;

— identifies parent child relationships between a part (parent) and a TDP Element (child);

— identifies parent child relationships between a TDP Element (parent) and a part (child);

— identifies parent child relationships between TDP elements;

— allows for a hierarchical order of indenture to be captured among parts and TDP elements with either the part or the TDP Element playing the higher indenture role;

— allows that just the TDP_element occupy the first indenture level.

K.5.1.4.4 Delivery accounting - Provides the ability to capture tracking parameters so that traceability of shipments may be performed. Identification of formal shipping documents/forms such as Letter of Transmittals or U.S.A. government form DD250 may be captured to provide a relationship with legacy delivery accounting systems. Delivery Accounting information may be captured not only for the specific information that makes up the DDE itself but also for any TDP Element entry with in the DDE.

This level of capability allows for the capture and exchange of the following information:

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— allows for the identification of Shipping List identification;

— allows for the identification of Purchase Orders;

— provides for the identification of associated Letters of Transmittals;

— provides for the identification of related Material Receiving Inspection Forms;

— reason for the exchange may be captured;

— identifies the procurement control drawing(s) (PCD) or specification control drawing (SCD) for which the DDE is developed;

— identifies the contract under which the TDP element was developed if not developed specifically for the contract authorizing the DDE.

K.5.1.4.4.1 Supplemental identification parameters - Provides additional capabilities to those previously cited of identifying and managing TDP elements using information which specifically characterizes the TDP elements for data management and accountability functions. This type of information includes data access knowledge, size characteristics, electronic signatures, plus some general entry note and change information.

This level of capability allows for the capture and exchange of the following information:

— identification of size_characteristic such as byte size for files and sheet size for layout or physical presentation;

— defines data access knowledge for remote or direct access to TDP data files such as path information or storage node identification;

— allows for the identification status of the life cycle and the DDE and TDP element entry are in during the exchange;

— allows for the identification of note and change information of each tdp element entry;

— identifies the serialization (effectivity) of the listed part;

— identifies electronic signature information. [Not in model, but evaluating inclusion].

K.5.1.5 Relation to other techncial data elements

The concept of the DDE is similar to a shipping list which is used to identify the documents or product data being exchanged. However, the DDE also represents all of the same information available in the IDL. The two dominant characteristics differentiating the two concepts (i.e., the DDE, and IDL) is that the DDE is not intended to take on the form of a physical document, and the IDL does constitute a design disclosure element for which it is its primary purpose.

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The DDE can be used in conjunction with the IDL. The DDE constitutes a single source of document exchange metadata as an alternative or complementary to other digital exchange technologies (e.g., EDIFACT, ANSI X.12/EDI, United States MIL-STD-1840, or FTP).

K.5.2 Levels of capability resource matrix

The following matrix defines Data Definition Exchange (DDE) objects and to which level of capability they apply. The columns in the matrix are correlated to the levels of capability as follows:

Column 2 = Level 1 = Shipping list;
Column 3 = Level 2 = General packaging;
Column 4 = Level 3 = Indentured list;
Column 5 = Level 4 = Delivery accounting;
Column 6 = Level 5 = Supplemental Identification Parameters;

The listing of DDE objects and their assigned levels of capability are defined in two tables. Table K.5.2 defines the levels of capability for DDE base types, selects, and enumeration objects. Table K.5.3 defines the levels of capability for DDE entities and their associated attributes.

Each column in Table K.5.2 and Table K.5.3 reflecting a capability level only shows additive capability that would be combined with the other capability levels.

Table K.5.2 - Levels of capability for DDE, selects, and enumerations

Data definition exchange SELECTS AND ENUMERATIONS	Levels of capability				
	1	2	3	4	5
ENUMERATIONS					
change_type	X				
change		X			
original	X				
original_with_change		X			
other		X			
revision	X				
revision_with_change		X			
exchange_reason		X			
quantity_accuracy_enumeration					X
approximate					X
as required					X

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Table K.5.2 - Levels of capability for DDE, selects, and enumerations (continued)

Data definition exchange SELECTS AND ENUMERATIONS	Levels of capability				
	1	2	3	4	5
exact					X
SELECTS					
data_definition_entry_select			X		
data_definition_exchange_list_method	X				
data_definition_indentured_list_method		X			
simple_list_of_elements	X				
simple_list_of_files	X				
data_definition_file_entry		X			
accessed_file					X
exchange_file		X			
entry_format_select		X			
file_format		X			
text		X			
identification_select		X			
element_identification		X			
item_identification			X		
indentured_list_method			X		
indentured_list_by_document			X		
indentured_list_by_part				X	
indentured_list_by_part_with_document_-references_to_parts			X		
item_identifying_number_select			X		
drawing_suffix_number_combination			X		
identifier			X		
item_or_element			X		

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Table K.5.2 - Levels of capability for DDE, selects, and enumerations (concluded)

Data definition exchange SELECTS AND ENUMERATIONS	Levels of capability				
	1	2	3	4	5
tdp_indentured_item			X		
tdp_indentured_tdp_element			X		
list_entry_select			X		
item_parent_to_item_child_relationship			X		
item_parent_to_tdp_element_child_-relationship			X		
tdp_element_parent_to_tdp_element_child_-relationship			X		
tdp_element_parent_to_item_child_-relationship			X		
tdp_indentured_item			X		
tdp_indentured_tdp_element			X		
quantity_accuracy_select					X
quantity_accuracy_enumeration					X
text					X
quantity_type_select					X
a_number					X
text					X
volume					X
weight					X
revision_authroization_select	X				
identifier	X				
other_reference_document	X				
source_identification					X
contract_submission					X
reference_document					X

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Table K.5.3 - Levels of capability for DDE application objects and attributes

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
a_number	X				
a_real	X				
accessed_file					X
file					X
path_information					X
storage_node_identification					X
alternate_element_identification					X
change_status					X
design_activity					X
element_classifications					X
identifying_number					X
outstanding_changes					X
title					X
alternate_identification_of_item					X
change_status					X
classifications					X
design_activity					X
identifying_number					X
nomenclature_or_name					X
source_information					X
alternate_item					X
interchange_item					X
type_of_alternate					X
usage_conditions					X

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
an_integer	X				
approval					X
date					X
person_organization					X
purpose_of					X
change_identification	X				
action_status		X			
change_code		X			
change_date		X			
change_description		X			
change_level		X			
issue_date		X			
issue_level		X			
revision_authorization_identifications	X				
revision_date	X				
revision_description	X				
revision_level	X				
company	X				
company_code	X				
code	X				
code_administrator	X				
type_of_code	X				
configuration	X				
data_usage_rights		X			

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
distribution_authorizations		X			
end_item_system_designation		X			
preparing_contracts					X
release_authorization	X				
security_identifications		X			
contract	X				
commerical_item_description_ or_data_item_-description_number					X
contract_data_requirements_list_number					X
contract_number	X				
contract_submission					X
date_of_submission					X
delivered_contract					X
location					X
data_definition_entry_item					
available_from					X
delivery_accounting_references				X	
entry_files	X				
entry_item_change_level					X
entry_notes	X				
special_conditions					X
superceded_entry					X
data_definition_entry_tdp_element	X				
actual_inclusion_in_data_exchange				X	
available_from					X

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
data_usage_rights		X			
delivery_accounting_references				X	
entry_files	X				
entry_format		X			
entry_item_change_level					X
entry_notes	X				
master_file					X
size					X
special_conditions					X
supercede_entry					X
data_definition_exchange	X				
list_body	X				
list_header	X				
presentation	X				
data_definition_exchange_body	X				
list_method	X				
notes_list					X
revision_history					X
data_definition_exchange_header	X				
common_header	X				
date_of_transfer		X			
delivery_accounting_references				X	
destinations		X			
exchange_reason				X	
procurement_references					X

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
data_definition_exchange_simple_entry	X				
entry	X				
simple_entry	X				
data_definition_indentured_entry			X		
effective_on			X		
entry_characteristics			X		
indenture_level			X		
indentured_entry			X		
data_definition_indentured_list_method			X		
method_of_entry_tabulation			X		
order_of			X		
date	X				
day	X				
month	X				
specific_time	X				
week	X				
year	X				
date_effectivity					X
end_date					X
start_date					X
delivery_accounting				X	
reference_identification				X	
reference_identification_description				X	
design_authority		X			
design_activity_code		X			

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
design_activity_identification		X			
person_responsible					X
distribution_notice		X			
distribution_code		X			
distribution_authority		X			
distribution_statement		X			
document_usage_parameter					X
subject					X
value_of					X
drawing_suffix_number_combination			X		
drawing_number			X		
suffix_identifier			X		
effectivity					X
description					X
effectivity_approvals					X
product					X
element_identification	X				
alternate_identifications	X				
change_status	X				
design_activity	X				
element_classifications					X
identifying_number	X				
outstanding_changes					X
title					X
element_type					X

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
code_administrator					X
element_code					X
type_of_coding_scheme					X
exchange_file		X			
destination_system		X			
included_in_exchange					X
file		X			
change_status					X
context_file_format		X			
context_file_name		X			
distribution_authorization		X			
native_format_file_name					X
security_identification		X			
size					X
source_system		X			
file_format		X			
change_level		X			
format_code		X			
format_standard		X			
release_date		X			
revision_level		X			
header	X				
document_abstract	X				
document_keywords	X				
header_configuration	X				

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
language	X				
sheet_count	X				
size_of_sheet	X				
header_configuration_with_element_identification	X				
data_configuration	X				
identification	X				
identifier	X				
indentured_list_by_document			X		
top_indentured_tdp_elements			X		
indentured_list_by_part			X		
top_indentured_items			X		
indentured_list_by_part_with_document_-references_to_parts			X		
top_indentured			X		
item			X		
alternates					X
item_weight (N/A)					
final_conditions (N/A)					
finish_conditions (N/A)					
item_configuration					X
identification			X		
notes					X
special_conditions					X
item_identification			X		
alternate_identifications			X		

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
change_status			X		
classifications			X		
desgin_activity			X		
identifying_number			X		
nomenclature_or_name					X
source_information					X
item_parent_to_item_child_relationship			X		
child			X		
parent			X		
item_parent_to_tdp_element_child_relationship			X		
child			X		
parent			X		
item_type					X
code_administrator					X
item_code					X
type_of_coding_scheme					X
label	X				
lot_effectivity					X
lot_identification					X
lot_size					X
lot_unit_of_measure					X
measure					X
notation	X				
note	X				
note_title	X				

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
reference_code	X				
referenced_document_in_note					X
type_of_notation	X				
number_with_units					X
units_of					X
value_of					X
other_reference_document					X
document_identification					X
person	X				
person_and_organization	X				
electronic_mail_address	X				
organization	X				
person_address	X				
person_identification	X				
product_configuration		X			
approval_of_configuration		X			
configuration_id		X			
product_name		X			
product_model		X			
model_name		X			
quantity					X
quantity_accuracy					X
value_of					X
reason				X	
applicable_to				X	

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
exchange_purpose				X	
base				X	
reference_document					X
release_authentication	X				
authentication	X				
person_responsible	X				
release_authority	X				
release_authority_code	X				
release_date	X				
revision	X				
authorizing_documents	X				
revision_approval					X
revision_date	X				
revision_description					X
revision_level	X				
security_classification		X			
item_classification		X			
title_security_classification		X			
sequence_effectivity					X
from_effectivity_id					X
quantity_unit_of_measure					X
thru_effectivity_id					X
total_component_quantity_in_product_-configuration					X
sheet		X			

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
presentation_format (N/A)					
sheet_configuration					X
sheet_identifier		X			
sheet_size		X			
simple_list_of_elements	X				
element_entries	X				
simple_list_of_files	X				
size_characteristics		X			
byte_size					X
sheet_size		X			
size_characteristics_full_size		X			
size_characteristics		X			
size_characteristics_internal_divisions		X			
internal_division_count		X			
internal_division_type		X			
size_characteristics		X			
size_characteristics_sheet_across_file		X			
frame_number_comprising_this_file		X			
number_of_frames_for_sheet		X			
size_characteristics		X			
source_information_type					X
source_code					X
source_description					X
type_of_coding_scheme					X
special_condition					X

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Table K.5.3 - Levels of capability for DDE, application objects and attributes (continued)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
code					X
description					X
type_of_coding_schema					X
specification_document	X				
standard_document	X				
status					X
status_code					X
status_code_basis					X
system_declaration		X			
creating_system		X			
operating_system		X			
system		X			
system_element_identifier		X			
system_related_element_identifier		X			
system_destination		X			
target_person		X			
target_company		X			
target_company_code_code		X			
tdp_element	X				
tdp_element_and_item_association	X				
tdp_element_parent_to_item_child_relationship			X		
child			X		
parent			X		
tdp_element_parent_to_tdp_element_child_-relationship			X		

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Table K.5.3 - Levels of capability for DDE application objects and attributes (concluded)

Data definition exchange OBJECTS	Levels of capability				
	1	2	3	4	5
child			X		
parent			X		
tdp_indentured_item			X		
top_indenture			X		
tdp_indentured_tdp_element			X		
top_indenture			X		
text	X				
time	X				
hour	X				
minute	X				
second	X				
zone	X				
volume					X
weight					X
yes_no				X	

K.6 Definitions and levels of capability for the indentured data list

K.6.1 Indentured data list

This appendix section defines the Indentured Data List (IDL) and its associated information. The levels of capability for the IDL focus on the ability to capture document management and accountability information for the purposes of exchanging this IDL information (and thus capability) between two enterprises or between two systems.

K.6.1.1 Definition

The Indentured Data List (IDL) is a design document disclosing a master list of Technical Data Package elements (TDP elements) such as engineering drawings, associated lists, referenced documents, or other

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design disclosure data which together provide product design data for a given product, assembly, or detail. The IDL defines the listing of TDP element by using an indentured hierarchical structure which identifies how elements are related. The IDL is used to identify and record the total number of TDP elements required to support the given product item.

K.6.1.2 Functional capture of data relationships

The basis of indenture for an IDL may be of three types. The first is a TDP element to TDP element (or document to document) relationship. For example, a drawing and all of its referenced documents are identified starting with the end item or assembly drawing and identifying all referenced drawings, associated lists, product data sets and other referenced documents. The second is a part number to part number hierarchical indenture list with intermingled subordinate indentures of part to TDP element relationships and TDP element to TDP element relationships. This provides the ability to specifically identify all TDP elements required to define each part or assembly. The third is similar to the second in that a part to part relationship is derivable, however, the indenture is structured to first define a document/drawing, then its disclosed or referenced parts, then for each part the subassembly documents/drawings disclosing the subassembly parts, and then finally for each subassembly document/drawing the subassembly component parts are defined. Thus the third indenture method provides a part based indenture method while capturing the subordinate indenture relationships of a TDP element to a part.

K.6.1.3 Functional capture of required data

Data captured on the IDL is comprised primarily of summary information about the TDP elements including related elements (parent or children), element identification (document number, title, etc.), security and distribution controls, and other pertinent information required to support the management of the element.

K.6.1.4 Levels of capability

The functional utility of the IDL is dependent on the amount of TDP element information recorded. The following levels of capability define an increasing level of utility attributed to the number of application objects used to comprise it. All levels of capability defined in the following sections utilized one of the three indentured methods described in section K.5.1.4.3.

K.6.1.4.1 Minimum level - Provides a minimum level of document management and document accounting capability for commercial exchanges. The IDL constructs identified allow for simple TDP element relationships and characteristics to be exchanged. Both mandatory and optional data are identified.

This level of capability allows for the capture and exchange of the following information:

— identifies the IDL document number and version;

— allows for identification of documents/TDP element by number and version;

— allows for identification of outstanding changes to document;

— defines element relationships by using a document indenture basis;

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— defines the revision authorization document number;

— identifies general identification information (sheet count).

K.6.1.4.2 Controlled level - Provides a controlled level of document management and document accounting capability for government exchanges (i.e., government or military contracts involving procurement, reprocurement, repair, maintenance, analysis, etc.)

The constructs identified encompass that capability captured by the commercial IDL plus additional mandatory information identifying contract, design activity, and other critical factors.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities identified in the minimum level (Commercial);

— identifies the design activity responsible for the end item/IDL by identifying number and name;

— identifies the contract number under which the IDL was prepared;

— defines the title of the IDL;

— defines the end item or system designator for which the IDL was prepared;

— release_authentication;

— allows for identification of documents/TDP element by document type and preparing design activity;

— identifies document usage controls (unlimited or limited rights);

— identifies general application data (source/usage identification and special conditions).

K.6.1.4.3 Part number indenture basis - Provides a capability of managing and accounting for documents based on a designed component basis. A basic indenture method is a document-based indenture method. For a part indenture basis, a listing of part numbers to engineering document number (TDP element number) relationships and detail/subassembly to next higher assembly/end item TDP element relationships are captured for cross-reference use. The part number indenture basis may be captured in either of two ways. The first is part to part indenture relationship. The second is a document/drawing to part indentured relationship. The part indenture methods defined in this level of capability are described in the following two sections. The capability each indenture list type provides is not additive to each other but is applied independently to the other IDL capability levels.

Together, these three indenture methods (the original document-based indenture method, and the two part-based indenture methods defined for this level of capability) provide four types of parent-child relationships among TDP elements and Product Items. Table K.6.1 shows which parent child relationships are used in the three types of indenture lists.

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Table K.6.1 - Parent child relationships used in indenture list types

INDENTURE LIST TYPE	PARENT/ CHILD			
	PART/ PART	PART/ TDP Element	TDP Element/ PART	TDP Element/ TDP Element
Indenture by TDP Element				Yes *
Indenture by Part	Yes *	Yes		Yes
Indenture by Part (with Document References to Parts)	Yes *	Yes *	Yes *	Yes *

NOTE * - Top Indenture

K.6.1.4.3.1 Indenture by part - Provides the ability to capture the relationships of parts within the exchange. A hierarchical indentured list that provides a parent child relationship between parts and assemblies, parts and their TDP elements, and TDP elements and their subordinate TDP elements is supported. Applications may query this list to identify what documents are available about a part, what parts go into which assembly, and what documents are referenced from other documents. For example, utilizing the Indenture by Part capability level, the drawing a part is defined in and the assembly that a part is a portion of could be determined by just knowing the identification of a part.

— This level of capability allows for the capture and exchange of the following information:

— identifies parent child relationships between parts;

— identifies parent child relationships between a part (parent) and a TDP Element (child);

— identifies parent child relationships between TDP elements;

— allows for a hierarchical order of indenture to be captured among parts and TDP elements with the part always playing the higher indenture role when associated directly with a TDP Element.;

— identifies that a part always occupies the first indenture level.

K.6.1.4.3.2 Indenture by part (with document references to parts) - Provides the ability to capture the relationships of parts and/or TDP Elements within the exchange. A hierarchical indentured list that provides a parent child relationship between, parts and assemblies, parts and their TDP elements, TDP elements and their parts, and TDP elements and their subordinate TDP elements is supported. Applications may query this list to identify what documents are available about a part, what parts go into which assembly, what parts are defined on a drawing, and what documents are referenced from other documents. For example, utilizing the Indenture by Part (with Document References to Parts) capability level, the

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parts defined on an assembly drawing could be identified by just knowing the identification of the assembly drawing.

This level of capability allows for the capture and exchange of the following information:

— identifies an implied parent child relationships between parts;

— identifies parent child relationships between a part (parent) and a TDP Element (child);

— identifies parent child relationships between a TDP Element (parent) and a part (child);

— identifies parent child relationships between TDP elements;

— allows for a hierarchical order of indenture to be captured among parts and TDP elements with

— either the part or the TDP Element playing the higher indenture role;

— allows that just the TDP_element occupy the first indenture level.

K.6.1.4.4 Supplemental identification parameters - Provides additional capabilities to those previously cited of identifying and managing TDP element using information which specifically characterizes the TDP element for data management and accountability functions. This type of information includes national security classification, related IDL relationship data, related procurement or authorizing requirement information (e.g., for tracing contractor to subcontractor IDL development), etc.

This level of capability allows for the capture and exchange of the following information:

— all of the capabilities in any of the above capability levels;

— defines the security classification of the TDP element or the title of the TDP element;

— identifies the procurement control drawing(s) (PCD) or specification control drawing (SCD) for which the IDL is developed;

— identifies related IDL documents;

— defines the contract under which the TDP element was developed if not developed specifically for the contract authorizing the IDL;

— identifies the TDP element document as generally available through some identified service library or register (e.g., the U.S. Department of Defense Index of Specifications and Standards).

K.6.1.5 Relation to other technical data elements

The concept of the IDL is a recent development founded from another technical data element called a Master Engineering Document List (MEDL). The IDL may be substituted for the MEDL when the part number indenture basis is used. The IDL is currently recognized as a design disclosure document.

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The IDL is also functionally related to Data Lists and Index Lists and may be used to replace all data lists and an index list of all data lists for a given product item. In addition, the IDL may be used to identify a cross-reference for part numbers and their associated drawings and therefore maintains some Parts List functionality.

The IDL is also closely related to Data Definition Exchange (DDE) technical data element under the TDP AP development. The capability to identify all elements comprising full design disclosure for a given level of product, assembly, or detail, using an indentured structure is a common characteristic between these two elements. The primary differences are that 1) the DDE handles simple list of files or TDP_elements, and 2) the DDE is used primarily for facilitating exchanges.

The IDL could be used in conjunction with the DDE.

K.6.2 Requirements traceability

The following matrix defines Indentured Data List (IDL) objects and to which level of capability they apply. The columns in the matrix are correlated to the levels of capability as follows:

Column 2 = Level 1 = Minimum Level;
Column 3 = Level 2 = Controlled Level;
Column 4 = Level 3 = Part Number Indenture Basis;
Column 5 = Level 4 = Supplemental Identification Parameters;

The listing of IDL objects and their assigned levels of capability are defined in two tables. Table K.6.2 defines the levels of capability for IDL base types, selects, and enumeration objects. Table K.6.3 defines the levels of capability for IDL entities and their associated attributes.

Each column in Table K.6.2 and K.6.3 reflecting a capability level only shows additive capability that would
be combined with the other capability levels.

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Table K.6.2 - Levels of capability for IDL selects, and enumerations

Indentured data list SELECTS AND ENUMERATIONS	Levels of capability			
	1	2	3	5
ENUMERATIONS				
change_type	X			
original_with_change				X
revision	X			
revision_with_change				X
change				X
other				X
original	X			
quantity_accuracy_enumeration				X
approximate				X
as required				X
exact				X
SELECTS				
drawing_or_product_data_set				X
identification_select	X			
item_identification			X	
element_identification	X			
indentured_list_method	X			
indentured_list_by_part			X	
indentured_list_by_document	X			
indentured_list_by_part_with_document_-references_to_parts			X	
item_identifying_number_select			X	
identifier			X	
drawing_suffix_number_combination			X	
item_or_element	X			

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Table K.6.2 - Levels of capability for IDL selects and enumerations (concluded)

Indentured data list SELECTS AND ENUMERATIONS	Levels of capability			
	1	2	3	5
tdp_indentured_tdp_element	X			
tdp_indentured_item	X			
list_entry_select	X			
item_parent_to_item_child_relationship			X	
tdp_element_parent_to_item_child_relationship			X	
tdp_element_parent_to_tdp_element_child_ relationship	X			
item_parent_to_tdp_element_child_relationship			X	
tdp_indentured_tdp_element	X			
tdp_indentured_item			X	
quantity_accuracy_select				X
quantity_accuracy_enumeration				X
text				X
quantity_type_select				X
a_number				X
text				X
volume				X
weight				X
revision_authorization_select	X			
other_reference_document	X			
identifier	X			
source_identification				X
contract_submission				X
reference_document				X

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Table K.6.3 - Levels of capability for IDL application objects and attributes

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
a_number	X			
a_real	X			
alternate_element_identification				X
change_status				X
design_activity				X
element_classification				X
identifying_number				X
outstanding_changes				X
title				X
alternate_identification_of_item				X
change_status				X
classifications				X
design_activity				X
identifying_number				X
nomenclature_or_name				X
source_information				X
alternate_item				X
interchange_item				X
type_of_alternate				X
usage_conditions				X
an_integer	X			
approval				X
purpose_of				X
date				X
person_organization				X

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
associated_list	X			
change_identification	X			
action_status				X
change_code				X
change_date				X
change_description				X
change_level				X
issue_date				X
issue_level				X
revision_authorization_identifications	X			
revision_date	X			
revision_description	X			
revision_level	X			
company	X			
company_code	X			
code	X			
code_administrator	X			
type_of_code	X			
configuration	X			
data_usage_rights		X		
distribution_authorizations				X
end_item_system_designation	X			
preparing_contracts				X
release_authorizations	X			
distribution_authorizations				X

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
contract		X		
commerical_item_description_or_data_ item_description_number				X
contract_data_requirements_list_number				X
contract_number		X		
contract_submission				X
date_of_submission				X
delivered_contract				X
location				X
date	X			
day	X			
month	X			
specific_time	X			
week	X			
year	X			
date_effectivity				X
end_date				X
start_date				X
design_authority		X		
design_activity_code		X		
design_activity_identification		X		
person_responsible				X
distribution_notice				X
distribution_authority				X
distribution_code				X

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
distribution_statement				X
document_list	X			
document_usage_parameter				X
subject				X
value_of				X
drawing				X
drawing_suffix_number_combination	X			
drawing_number	X			
suffix_identifier			X	
effectivity				X
description				X
effectivity_approvals				X
product				X
element_identification	X			
alternate_identifications	X			
change_status	X			
design_activity	X			
element_classifications		X		
identifying_number	X			
outstanding_changes	X			
title		X		
element_type		X		
code_administrator		X		
element_code		X		
type_of_coding_scheme		X		

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
header	X			
document_abstract	X			
document_keywords	X			
header_configuration	X			
language	X			
sheet_count	X			
size_of_sheet	X			
header_configuration_with_element_-identification	X			
data_configuration	X			
identification	X			
identifier	X			
indentured_data_list	X			
header	X			
body	X			
indentured_data_list_body	X			
indentured_tabulation	X			
standarization_documents_list	X			
notes_list				X
revision_history				X
indentured_data_list_entry	X			
available_from				X
effectivity_on				X
entry	X			
entry_configuration				X

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
entry_item_change_level				X
entry_notes				X
indenture_level	X			
special_conditions			X	
superceded_entry				X
indentured_data_list_header	X			
common_header	X			
procurement_references				X
indentured_data_list_tabulation	X			
method_of_entry_tabulation	X			
tabulation_of_entries	X			
indentured_list_by_document	X			
top_indentured_tdp_elements	X			
indentured_list_by_part			X	
top_indentured_items			X	
indentured_list_by_part_with_document_-references_to_parts			X	
top_indentured			X	
item			X	
alternates				X
item_weight (N/A)				
final_conditions (N/A)				
finish_conditions (N/A)				
item_configuration			X	
identification			X	

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
notes			X	
special_conditions			X	
item_identification			X	
alternate_identifications			X	
change_status			X	
classifications			X	
design_activity			X	
identifying_number			X	
nomenclature_or_name				X
source_information			X	
item_parent_to_item_child_relationship			X	
child			X	
parent			X	
item_parent_to_tdp_element_child_-relationship			X	
child			X	
parent			X	
item_type				X
code_administrator				X
item_code				X
type_of_coding_scheme				X
label	X			
lot_effectivity				X
lot_identification				X
lot_size				X

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
lot_unit_of_measure				X
measure				X
notation	X			
note	X			
note_title	X			
reference_code	X			
referenced_document_in_note				X
type_of_notation	X			
number_of_units				X
units_of				X
value_of				X
other_reference_document				X
document_identification				X
person				X
person_and_organization	X			
electronic_mail_address				X
organization	X			
person_address				X
person_identification				X
product_configuration		X		
approval_of_configuration		X		
configuration_id		X		
product_name		X		
product_data_set				X
file_configuration				X

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
product_data_set_with_format				X
presentation_of_product_data_set				X
product_header				X
product_data_set_with_shading				X
a_shaded_model				X
data_configuration				X
product_data_set_without_format				X
data_configuration				X
model				X
product_model		X		
model_name		X		
quantity				X
quantity_accuracy				X
value_of				X
reference_document	X			
release_authentication	X	X		X
authentication		X		
person_responsible				X
release_authority				X
release_authority_code				X
release_date	X			
revision	X			
revision_level	X			
revision_date	X			

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
authorizing_documents	X			
revision_description				X
revision_approval				X
security_classification				X
item_classification				X
title_security_classification				X
sequence_effectivity				X
from_effectivity_id				X
quantity_unit_of_measure				X
thru_effectivity_id				X
total_component_quantity_in_product_configuration				X
sheet	X			
sheet_configuration	X			
sheet_size	X			
sheet_identifier	X			
presentation_format (N/A)	X			
size_characteristics		X		
byte_size		X		
sheet_size		X		
size_characteristics_full_size		X		
size_characteristics		X		
source_information_type		X		
source_code		X		
source_description		X		

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Table K.6.3 - Levels of capability for IDL application objects and attributes (continued)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
type_of_coding_scheme		X		
special_condition		X		
code		X		
description		X		
type_of_coding_scheme		X		
specification_document				X
standard_document				X
tdp_element	X			
tdp_element_and_item_association	X			
tdp_element_parent_to_item_child_-relationship			X	
child			X	
parent			X	
tdp_element_parent_to_tdp_element_child_-relationship	X			
child	X			
parent	X			
tdp_indentured_item			X	
top_indenture			X	
tdp_indentured_tdp_element	X			
top_indenture	X			
text	X			
time	X			
second	X			
minute	X			
hour	X			

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Table K.6.3 - Levels of capability for IDL application objects and attributes (concluded)

Indentured data list OBJECTS	Levels of capability			
	1	2	3	4
zone	X			
volume				**X**
weight				**X**

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