# OSAC PROPOSED STANDARD 2024-S-0017
# Standard Guide for Forensic Physical Fit Examination of Documentary Evidence

Forensic Document Examination Subcommittee
Pattern/Impression Scientific Area Committee (SAC)
Organization of Scientific Area Committees (OSAC) for Forensic Science

## OSAC Proposed Standard

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# Standard Guide for Forensic Physical Fit Examination of Documentary Evidence

Prepared by
Forensic Document Examination Subcommittee
Version: 2.0
October 2025

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## Foreword

This guide covers the forensic physical fit examinations for the macroscopic and microscopic examinations of cut, torn, fractured, shredded, perforated paper or other document-related materials for the purpose of determining whether or not they were once joined together to form a single object. This guide is intended as an overview of the process for the physical fit examination of these document-related materials and to assist individuals in the evaluation and documentation of their physical comparisons. For other items not covered in this standard, such as glass, fabric, etc., consult the Standard Guide for Forensic Physical Fit Examination.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

**Keywords:** *physical fit, physical match, fracture match, fracture fit*

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**Standard Guide for Forensic Physical Fit Examination of Documentary Evidence**

## 1. Scope

**1.1** This guide covers the forensic physical fit examinations for the macroscopic and microscopic examinations of cut, torn, fractured, shredded, perforated paper or other document-related materials for the purpose of determining whether or not they were once joined together to form a single object. This guide is intended as an overview of the process for the physical fit examination of these document-related materials and to assist individuals in the evaluation and documentation of their physical comparisons. For other items not covered in this standard, such as glass, fabric, etc., consult the Standard Guide for Forensic Physical Fit Examination.

**1.2** This standard is intended for use by competent forensic document examiners (ASB 011) with the requisite formal education, discipline-specific training, and proficiency to perform forensic document examination casework.

**1.3** *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health and environmental practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

**2.1** Standards:

ASTM E1459, Guide for Physical Evidence Labeling and Related Documentation

ASTM E1492, Practice for Receiving, Documenting, Storing, and Retrieving Evidence in a Forensic Science Laboratory

ANSI/ASB Standard 011, Scope of Expertise in Forensic Document Examination

SWGDOC E11-13, SWGDOC Standard for Examination of Fracture Patterns and Paper Fiber Impressions on Single-Strike Film Ribbons and Typed Text

ANSI/ASTM E3392-24, Standard Guide for Forensic Physical Fit Examination

OSAC Draft Proposed Standard on Expression of Source Opinions in Forensic Document Examination

ANSI/ASB Technical Report 071, Forensic Document Examination Terms and Definitions (1st edition, 2024, draft)

## 3. Terminology

Terms and definitions for this standard shall be the same as the terms defined in ANSI/ASB Technical Report 071, Forensic Document Examination Terms and Definitions (1st edition, 2024, draft) unless otherwise defined here.

For purposes of this document, the following terms and definitions apply.

**3.1.1.**
**clones**
Each of the individual layers in a packet or stack specific to shredded documents (See 3.1.4).

**3.1.2.**
**delamination, n**
Feathering of paper edges caused by tearing.

**3.1.3.**
**lift-off correction tape, n**
The removal of a typed carbon-film ribbon character from the text by restriking with the same character while interposing an adhesive coated tape or sheet, thereby causing the imprinted character to adhere to the coating and be stripped from the substrate.

**3.1.4.**
**packet or stack, n**
Adhered layers of shred that may occur when multiple documents or folded document(s) are shredded in a shredder simultaneously.

**3.1.5.**
**paper, n**
Material manufactured typically from the pulp of wood or other fibrous substances, produced by mechanical or chemical processing and used for writing, drawing, or printing on, or wrapping material. May include cardboard or fiberboard.

**3.1.6.**
**physical fit, n**
An association based upon the realignment of two or more items that demonstrate they were once joined together to form a single object.

NOTE: The term match (e.g., physical match, fracture match) is not recommended to be used as it can be misleading to the layperson.

**3.1.7.**
**shred direction, n**
The direction in which a document(s) is shredded, which may be determined if a fragment is pointed, which occurs using certain types of shredders.

**3.1.8.**
**shred pattern, n**
The spatial arrangement of fragments in a shredded document, which can be estimated or determined by graphic means.
NOTE: Common shred patterns include strip-cut, cross-cut, and micro-cut.

## 4. Summary of Guide

**4.1.** A physical fit examination is the process of evaluating two or more items to form an opinion about whether they were once joined together. It is based on the axiom that separation events (e.g., shreds, cuts, tears) are not reproducible, in whole or in part, because of the combination of applied forces, construction features, and material properties that can impart individualizing characteristics.

**4.2.** Separation occurs in a variety of ways (e.g., shredded, cut, torn). Separated materials that possess irregular edges and individualizing characteristics on their complementary surfaces can be realigned to demonstrate they were at one time a single object. The physical fit can be viewed in two or three dimensions.

**4.3.** Physical fit examinations can involve the assessment or reassembly of multiple questioned pieces. It may also involve the comparison of a questioned sample to a possible known source or to other questioned samples.

**4.4.** The absence of edge detail or material loss does not always rule out the possibility of a physical fit. A physical fit could result when physical features align across the compared edges (e.g., paper fibers, surface writing or printing, latent impressions, striations).

**4.5.** Different types of materials exhibit various types of individualizing characteristics based on their physical properties. The recognition and distinction between class and individualizing characteristics for different types of document-related materials allows the use of the same general procedures for the physical fit examinations of all document-related materials.

**4.6.** This guide contains a general procedure to perform physical fit examinations of document-related materials as well as a summary of considerations and limitations for an examiner to evaluate when conducting these examinations.

## 5. Significance and Use

**5.1.** This guide can assist the examiner in selecting and organizing a general analytical scheme for the evaluation and documentation of physical comparisons of document-related materials for a potential physical fit. The type and size of material influences the steps and equipment needed to assess the physical fit. Documentation, interpretation, and evaluation are all important parts of a physical fit examination.

**5.2.** Foundations of physical fit examinations in forensic science are described in the literature, including studies (see References, Section 19) on the use of physical fit examinations in forensic document examination casework.

**5.3.** It is not the intention of this guide to present comprehensive theories regarding the mechanism of fracturing, tearing, cutting, or other methods of separation.

**5.4.** Methods of comparison may include, but are not limited to, physical overlay, digital overlay, side-by-side comparison, etc. The operation of digital imaging software is outside the scope of this standard.

## 6. Quality Assurance Considerations

**6.1.** A quality assurance program is used to assess and verify that analytical testing procedures and reporting of results are monitored by means that include, but are not limited to, proficiency tests and technical audits. General quality assurance guidelines are available in ISO/IEC 17025.

## 7. Apparatus and Materials

**7.1.** Different equipment is used depending on the material being examined and the case specifics.

**7.2.** General list of common materials used can include but are not limited to:

**7.2.1.** Sampling handling tools (e.g., probe, forceps, bone folder, tweezers) to handle small pieces and bend folded pieces

**7.2.2.** Containers for sorted materials (e.g., trays, shallow bins/boxes)

**7.2.3.** Glass sheets to place pieces on/between

**7.2.4.** Transparent acetate or mylar sheets or sleeves/document protectors to place pieces on/between

**7.2.5.** Magnification devices (e.g., stereomicroscope, comparison microscopes, loupe, magnifier)

**7.2.6.** Ultraviolet illumination and other alternate light source(s) to detect differences in paper stock or observe fluorescent fibers

**7.2.7.** Measuring devices (e.g., ruler, micrometer) to measure fragment or perforation dimensions

**7.2.8.** Light box or transmitted light source to observe feathering/delamination

**7.2.9.** Self-adhesive sheets, lamination film for reassembly and/or preservation

**7.2.10.** Tape, glue sticks, and other adhesive applicators/materials

**7.2.11.** Electrostatic Detection Device (EDD) to enhance torn edges on fragments, or to develop indentations on the completed assembly

**7.2.12.** Polarizing filters for examining carbon film ribbons

**7.2.13.** Packaging and documentation materials (e.g., bags, labels, markers)

**7.2.14.** Image capturing device(s) (e.g., camera, scanner)

**7.2.15.** Oblique lighting

**7.2.16.** Digital reconstruction software

**7.2.17.** Digital raster-image editing software

## 8. Sample Handling

**8.1.** The general handling and tracking of samples should meet or exceed the requirements of ASTM Practice E1492 and ASTM Guide E1459.

**8.2.** The need for multiple types of examinations (e.g., trace, DNA, latent prints) is considered before initiating a physical fit examination. Communicate with examiners from other disciplines, as needed, to coordinate the order of examination or evidence preservation and recovery methods, and document the communication as appropriate. Examiners should consider how physical fit examinations may affect other desired examinations.

**8.3.** There should be very minimal handling of the evidence prior to submission and examination. The submitting individual should be cautioned to leave the evidence in the container and condition found, where feasible, and to not repackage the evidence.

**8.4.** The Forensic Document Examiner (FDE) shall document the type and physical condition of the evidence and/or the presence of other non-documentary evidence. Documentation includes images, sketches, marking/labeling of the individual samples, or other methods deemed appropriate for the evidence in question.

**8.5.** Physical fit examinations may require that samples from more than one item of evidence be examined together. Where feasible, evidence containers should be uniquely identified prior to analysis. The FDE shall document the tracking of samples taken from one or more evidence containers.

**8.6.** The FDE shall clean all tools used prior to contact with each item of evidence, when separation is required.

**8.7.** The FDE shall conduct a preliminary examination of each sample separately, prior to bringing them into contact with each other to prevent cross-contamination.

**8.8.** The FDE shall carefully handle evidence to protect it from damage, alteration, or cross-contamination.

**8.9.** The FDE shall preserve evidence in a manner to protect against damage or loss.

## 9. General Considerations and Limitations

**9.1.** General Considerations:

**9.1.1.** Examination notes should include an assessment of apparent missing material (e.g., separated into more than two pieces and one or more pieces appears to be missing) and deformation of material (e.g., twisting, tearing) that could impact results.

**9.1.2.** Features that span the edges being compared (e.g., printing, handwriting, ruling lines, images, paper inclusions, indentations/impressions, paper fibers, stains) are often used to support a physical fit. If imaging software is used for a virtual reconstruction, this is not a substitute for a physical fit examination.

**9.1.3.** The separation method (e.g., cut, torn, shredded) will influence the features of a physical fit examination.

**9.1.4.** Physical fit examination is a visual technique, and therefore, bias could occur. Precautions to minimize bias have been reported in the literature and can include:

**9.1.4.1.** Receiving adequate training on cognitive bias and methods that can mitigate or help avoid the effects of biasing information and procedures.

**9.1.4.2.** Avoiding task-irrelevant information (e.g., a suspect's confession or an investigator's opinion).

**9.1.4.3.** Assessing questioned samples prior to comparison to known samples, if submitted.

**9.1.4.4.** Conducting a technical review, verification, or both.

**9.1.5.** In the absence of a physical fit, a sample may not be able to be associated with an individual source; however, the possibility of a class association or exclusion could be determined with further examinations. When further examinations are conducted, refer to appropriate published standards (e.g., ASB 044 Standard for Examination of Documents for Indentations).

**9.1.6.** Communication with the responsible party may be useful to limit, expand, or modify the examination(s) as it progresses so that it results in the most effective use of resources. The providing of task-relevant information (i.e., the type of documents present; names, places, and/or numbers significant to the case) by the responsible party can be instrumental in facilitating document reassembly/reconstruction. This communication shall be documented.

**9.2.** Limitations

**9.2.1.** Sample composition or condition could limit a physical fit examination or strength of the opinion expressed. Examples include, but are not limited to:

**9.2.1.1.** Size of material to be examined (e.g., confetti-type shred).

**9.2.1.2.** Environmental effects (e.g., water-soaked, charred, exposure to UV).

**9.2.1.3.** Wear, damage, or deterioration.

**9.2.1.4.** Prior destructive forensic testing (e.g., chemical processing).

**9.2.1.5.** Lack of features to compare along the separated edge(s).

**9.2.1.6.** Improper collection, preservation, or handling.

**9.2.1.7.** Missing evidentiary documents/pieces of documents (i.e., an insufficient quantity of submitted material).

**9.2.1.8.** Class characteristics of shred fragments may be used to associate or disassociate to a particular class or model of shredder (e.g., size and shape of shredded material), but not to a specific shredder.

## 10. General Procedure

**10.1.** The FDE shall conduct an initial assessment of the document to determine the appropriate examinations, the sequence of examinations, and the potential limiting factors.

**10.2.** Subsequent to the completion of the initial assessment, the FDE shall proceed to the applicable examinations. The FDE may discontinue the procedure at any point during the examination. The FDE shall record the reason(s) for a discontinuation.

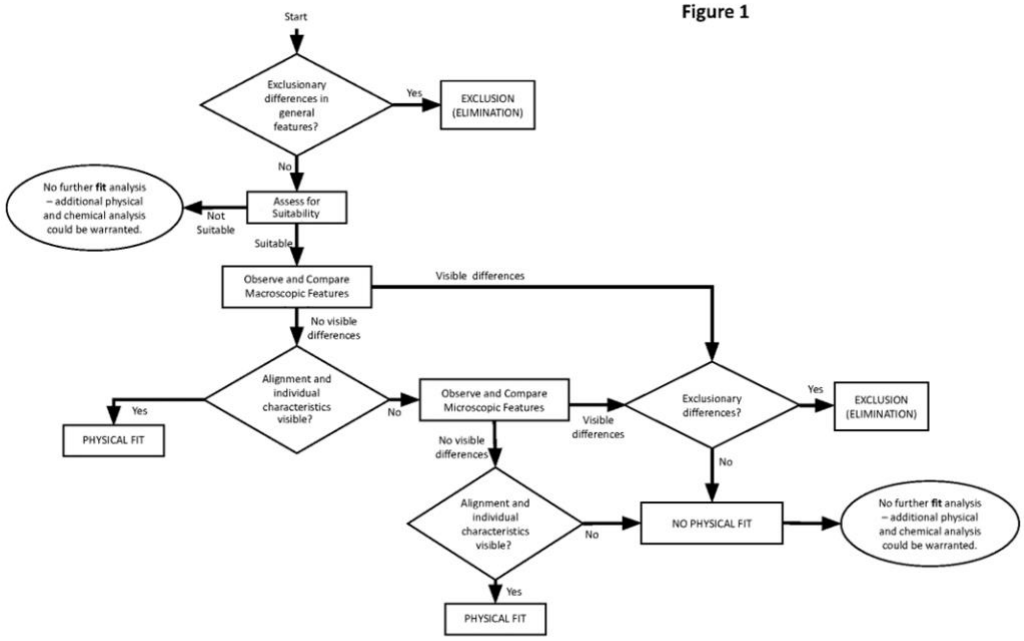
NOTE The remaining procedures in Section 10 need not be performed in the order listed. Not all procedures may be applicable to the item(s) being examined.

**10.3.** The FDE shall perform applicable procedures and contemporaneously record examinations performed and relevant observations in the notes. The results and accompanying notes should have sufficient detail to allow for an independent review and assessment of the conclusions by another FDE. The FDE shall include any relevant information, observations, equipment used, methods, evaluations, and conclusions, opinions, or interpretations.

**10.4.** Refer to Section 8 for sample handling considerations prior to and during physical fit examinations and Section 14 for results and interpretations.

**10.5.** A typical scheme for physical fit examinations is outlined in Figure 1.

**Figure 1**




**10.6.** During the examination, questioned samples shall be assessed prior to comparison to known samples, if known samples are submitted.

**10.7.** Written or typed descriptions, sketches, photographs, scans, or other images may be used to document each sample's features. See Section 12 for additional details on Examination Documentation.

**10.8.** The FDE shall conduct an assessment on the samples of interest and determine suitability for comparison.

NOTE: Consideration should be given to subsequent requested examinations by other forensic disciplines and the possibility of cross contamination. Refer to Sample Handling, paragraph 8.2.

**10.8.1.** The condition and general features of the samples shall be examined and documented. Observable features may include:

- material type
- method of separation
- color
- shape
- degree of gloss (i.e., matte vs. glossy)
- texture
- weave
- spectral characteristics
- surface marking(s) (e.g., printing, writing, erasures, etc.)
- manufacturing mark(s) (e.g., watermarks, wire marks, etc.)
- stains

- folds/indentations
- dimensions
- fracture or tear pattern(s)
- pattern continuation
- delamination
- presence of layers
- alignment of the fracture pattern(s)
- shred direction

NOTE: These features can be examined with various light sources and at varying angles of illumination. The material of interest dictates what properties are present and relevant during the physical assessment.

**10.8.2.** Samples that are suitable for physical fit examination are generally of good quality and have features that are not obscured by distortion, wear, weathering, prior handling, or loss of material.

**10.8.3.** Items containing multiple pieces shall be separated by condition and general features of the samples prior to determining their suitability for a physical fit comparison. The use of alternate light sources may be useful in separating pieces of similar color.

**10.9.** If the samples are deemed not suitable for physical fit comparison, no further physical fit analysis is required and the FDE shall document the limitations, discontinue the examination, and report accordingly. Additional physical and chemical analysis could be warranted but these are outside the scope of this standard.

**10.10.** If the samples are deemed suitable, the FDE shall conduct a physical fit examination.

**10.10.1.** When exclusionary differences are observed at any point during the examination, the FDE shall document the discrepancies, discontinue the examination as necessary, and report accordingly. Exclusionary differences can include differences in class characteristics (e.g., two documents with different paper stock).

**10.10.2.** When the macroscopic contours do not align and there are no corresponding features on the separated surfaces or no traversing surface features, no further physical fit examinations are required. The FDE shall document the discordance, discontinue these procedures, and report accordingly. Additional physical and chemical analyses could be conducted (e.g., destructive paper fiber analysis) but these are outside the scope of this standard.

**10.10.3.** Individual samples may be sorted using the features listed in paragraph 10.5.1.

- The dimensions of the individual samples, in addition to the area of the alignment, can be measured (e.g., using a ruler, caliper, micrometer) and documented, as needed.
- During the sorting process, if packets of clones are observed, the relative position of each layer should be noted.

NOTE: If the sorting process allows for the sorting of layers in a clone packet based on macroscopic surface features, this step may not be necessary.

**10.11.** When individualizing characteristics are not visible at the macroscopic level to support a physical fit, a microscopic examination may follow.

**10.11.1.** The microscopic edge features are observable using a simple magnifier, stereomicroscope, comparison microscope, or a combination thereof. Different lighting (e.g., ring light, fiber optic light, transmitted light, reflected light) can be used depending on the type of material being examined. The size and physical properties of the samples determine which observation techniques should be used.

**10.11.2.** The individual samples may be compared microscopically for the observation and documentation of similarities and differences in features such as:

- alignment
- color
- delamination
- distortion
- fluorescence and/or luminescence
- fracture marks
- fracture pattern features
- missing material
- stretching
- texture
- traversing surface features (e.g., stains, printing, writing)

**10.8.2.1** Minimize contact between the sample edges to prevent damage and/or contamination during alignment.

**10.11.3.** Individual paper fibers may be observed traversing the cut or torn edge. These paper fibers may be visible in white light, transmitted light, and with alternate light sources.

**10.11.4.** The FDE shall observe and document multiple paper fibers traversing a cut or torn edge in corresponding locations in order to associate cut/torn documents at the microscopic level.

**10.11.5.** A physical fit determination occurs when the samples share class and individualizing macroscopic and microscopic features across the aligned edges and surfaces, including the cross section.

**10.12.** When practicable, physical fit associations should be preserved through encapsulation, imaging, or both, and retained.

NOTE: This facilitates technical review or verification. Care should be taken in the selection of the preservation method to allow for other forensic testing.

**10.13.** The findings of the examinations shall be submitted for technical review, and may be submitted for verification, in accordance with the laboratory/practitioner's quality assurance procedures.

**10.14.** The correspondence of observed class characteristics between the compared items during a physical fit examination could warrant additional testing to evaluate the possibility of an association or non-association, but these are outside the scope of this standard.

## 11. Special Considerations

**11.1.** The types of materials listed below are commonly encountered during paper physical fit examinations, however, this does not preclude other materials from being examined and compared for physical fit. For each material, class characteristics including composition or construction, the manner of separation, relevant features, and limitations inherent to that material are considered. Note that examples of characteristics and features are listed in each section but are not meant to be exhaustive. Different materials will exhibit varied individualizing characteristics based on their construction or other properties (such as layered materials). The recognition and distinction between class and individualizing characteristics for different document-related materials allows the use of the same general procedures for the physical fit examinations of all document-related materials. At various points in these procedures, based on the evaluation of the evidence, the FDE may decide to discontinue or limit the procedure(s) and report accordingly.

**11.2.** Machine-shredded documents/material

**11.2.1.** Background: Machine-shredded documents may be reassembled to their original configuration due to their uniformity of separation, the similarities exhibited in size and shape, the presence of surface characteristics such as surface markings (e.g., printing, handwriting), shred direction, and composition such as color, thickness, UV-reflectance, and tactility.

**11.2.2.** The FDE shall examine the shredded material using the following procedures:

**11.2.2.1.** Sort the shredded material into subgroups using the features listed in paragraph 10.5.1, if present.

**11.2.2.2.** Subdivide above subgroups according to the features listed in paragraph 10.8.2, if present.

**11.2.2.3.** Arrange the shreds by:

- Flattening fragments and clone packets, as necessary.
- Placing the fragments so the distinctive surface characteristics are visible (i.e., same side up).
- Orienting the fragments by surface markings (i.e., print direction/orientation), if present.
- Orienting the fragments by shred direction.

NOTE: Pointed end may indicate direction of the shred, however, shredded material from the edge of a document may display a flat edge on the lead or trail end.

NOTE: The arrangement of shreds may be completed in whatever order the FDE determines.

**11.2.2.4.** Process clones by separating the stacks and preserving the layer order.

**11.2.2.5.** Associate and assemble the fragments using the features listed in paragraphs 10.5.1 and/or 10.8.2.

NOTE: It may be helpful to create an assembly grid based on the measurements of the shreds.

**11.2.2.6.** Preserve the paper shred assemblies through encapsulation, imaging, or both.

**11.2.2.7.** The findings of the examinations shall be submitted for technical review, and may be submitted for verification, in accordance with the laboratory/practitioner's quality assurance procedures.

**11.3.** Examination of shredders

**11.3.1.** Background: Shredder(s) are machines used to shred documents and due to their construction, may have mechanical parts that produce characteristics such as shreds of different size(s), shape(s), and/or shred pattern(s) (e.g., cross-cut, strip-cut).

**11.3.2.** The FDE shall examine the questioned shredded material in accordance with Section 11.2.2.

**11.3.3.** The FDE shall examine the shredder and collection bin for residual shredded material including the machine blades and collect if located.

**11.4.** Comparison of shredded documents and shredders

**11.4.1.** Background: Machine-shredded documents/materials may be compared to a shredder(s) due to the reproducibility of shred patterns. Shred patterns may exhibit similarities in size, shape, and edge morphology generated by the cutting blades of shredders. FDEs may be able to compare shred fragments to shredder(s) using these characteristics.

NOTE: Shredders are typically manufactured with one of two different types of cutting mechanisms: engraved cutting blades or blades attached to an axle. Shred fragments exhibit class characteristics (e.g., shred direction, width of shred) that can be associated or not with a particular class or model of shredder, but may not be able to be associated with a specific shredder.

**11.4.2.** If a comparison between shredded material to exemplar shred and/or exemplar shredder is requested, the FDE shall examine the shredded material(s) and shredder(s) in accordance with Sections 11.2 and 11.3, respectively, and follow the procedures below.

**11.4.3.** The FDE shall ensure that all residual shred material has been removed from the shredder, including from the blades, prior to producing exemplar shred.

**11.4.3.1.** If residual shred fragments are located in the shredder, the FDE shall examine the residual shred in accordance with Section 11.2.2.

**11.4.4.** The FDE shall prepare a quantity of exemplar shred.

NOTE: Using similar substrate (e.g., similar size and thickness) to that of the questioned shredded material and paper with surface marking/printing may be the most beneficial to use in the preparation of known shred material to aid in the reconstruction of the exemplar shred.

**11.4.5.** The FDE shall examine the exemplar shred in accordance with Section 11.2.2.

**11.4.6.** The FDE shall compare exemplar shred with residual shred located in collection bin/machine blades, if any, for consistency of size, shape, and shred pattern.

**11.4.7.** If exemplar shred and shred located in collection bin/machine blades are consistent, the FDE shall compare these shreds to the questioned shred material in accordance with Section 11.2.2.

**11.4.8.** If exemplar shred and shred from the collection bin/machine blades are not consistent, the FDE shall compare each subgroup to the questioned shred material in accordance with Section 11.2.2.

**11.4.9.** The FDE shall examine the exemplar shred for observable shred defects. If observed, inspect the machine blades for potential defects and record observations in the case record.

**11.4.10.** The FDE shall document the association or non-association of questioned and known paper shreds/shredder in the case record.

**11.4.11.** The findings of the examinations shall be submitted for technical review, and may be submitted for verification, in accordance with the laboratory/practitioner's quality assurance procedures.

**11.5.** Single-strike film typewriter ribbon and/or lift-off and cover-up correction tape

**11.5.1.** Background: Single-strike film ribbons are used in typewriters to prepare documents. When a character is typed, the typeface strikes the ribbon against the substrate, resulting in the separation of carbon film from the carrier ribbon and the transfer of the carbon to the substrate in the shape of the typed character. This process may leave a negative impression (i.e., voided area) of the typed character on the ribbon. The fracture pattern along the edges of the typed character may be associated with the fracture pattern along the edges of the voided area, for the same character, on the carbon film ribbon. Additionally, paper fiber impressions may be located on the single-strike ribbon caused by the act of typing.

NOTE: These procedures are also applicable to related examinations, such as: lift-off-and cover-up correction tapes and sheets; carbon paper and carbon copies; documents produced with certain non-impact printing devices (e.g., printing devices using a thermal imaging transfer ribbon).

**11.5.2.** The FDE shall examine the document for the characteristics of original typed text. At various points in these procedures, if a determination that a particular feature is not present or that an item is lacking in comparability, the FDE shall discontinue or limit the procedure(s) and report accordingly.

**11.5.3.** If original typed text is present, the FDE shall examine it for characteristics associated with a single-strike ribbon, e.g., typed text sits on the surface of the substrate and exhibits a flaky appearance and may display jagged edges.

**11.5.4.** If a non-original document depicts typed text (i.e., machine-printed or digital image) and fracture patterns are observed, a limited fracture pattern comparison of gross features may be possible.

**11.5.5.** The FDE shall examine the ribbon for characteristics associated with a single-strike carbon film.

**11.5.6.** The FDE shall compare the ribbon and the original typed text for consistency in typestyle.

NOTE A typewriter ribbon can contain more than one style of type.

**11.5.7.** The FDE shall compare the ribbon and the original typed text for consistency in content, including errors and corrections.

NOTE: This comparison may be accomplished by visual inspection (e.g., microscopically) or by the use of a ribbon reading device, which is a device that permits the transcription of carbon film ribbons through the use of a light source and possibly a digital recorder.

**11.5.8.** The FDE shall examine and compare the fracture pattern of the characters on the ribbon to the fracture pattern of the corresponding characters on the document, subject to guidance in paragraph 11.5.10 below.

**11.5.9.** The FDE shall examine the ribbon for paper fiber impressions within the void area of a character. These paper fiber impressions can be compared with the paper fibers within the inked area of the corresponding character on the document, subject to guidance in paragraph 11.5.10 below.

NOTE: Viewing the ribbon between polarizing filters can help in the visualization of paper fiber impressions in the substrate film.

**11.5.10.** When examining the typed text, the FDE shall ensure the examination applies to the entirety of the questioned text.

**11.5.11.** The FDE shall note the physical fit and paper fiber associations and/or discrepancies, and any limitations. The FDE shall document any interpretations of these associations and/or discrepancies and report accordingly.

**11.5.12.** The findings of the examinations shall be submitted for technical review, and may be submitted for verification in accordance, with the laboratory/practitioner's quality assurance procedures.

## 12. Examination Documentation

**12.1.** Documentation includes handwritten or typed descriptions, photographs, scans, or other images, sketches, marking or labeling of the individual items, or other methods deemed appropriate for the evidence.

**12.2.** Documentation should include observations of physical damage and the presence of other evidence.

**12.3.** The FDE shall record handwritten or typed descriptions, sketches, photographs, scans, or other images that are used to document features of individual items and close-up images or photomicrographs used to document microscopic features.

**12.4.** The FDE shall record the substantial apparatus and materials used in the physical fit examination.

**12.5.** The FDE shall record any observations that support physical fit. Physical fit of evidentiary value requires documentation sufficient for technical review, verification, court presentations, or other visual demonstrations. This includes images of pertinent edges and observed features as well as the correspondence between the edges of the pieces showing the physical fit.

**12.6.** The FDE shall record any observations that support the absence of a physical fit.

**12.7.** The FDE shall record examination documentation contemporaneously.

**12.8.** Image documentation should include a scale, an overall image with a scale for reference, or annotation of the magnification used.

**12.9.** The examination notes shall include sufficient detail to support the interpretations and opinions such that another qualified practitioner could fully evaluate the specifics of the examination and consideration of limitations, and thus be able to evaluate the correctness of the interpretation and opinion based on those notes or documentation.

**12.10.** Verifications shall be in accordance with the laboratory/practitioner's quality assurance procedures and documented in the case record. The verification documentation shall include the verifier's identity, date of verification, exhibits examined, and the result(s).

## 13. Additional Considerations

**13.1.** During a physical fit examination, items could be encountered with features that correspond in a manner that can be replicated.

**13.1.1.** An example of this type of evidence includes shredded paper shredded by two machines of a similar manufacturer or design.

## 14. Results and Interpretations

For results and interpretations that may be reached in physical fit examinations, refer to ANSI/ASTM E3392-24, *Standard Guide for Forensic Physical Fit Examination*.

## 15. Report Wording Examples

**15.1** The following are only examples and not intended to be exhaustive. Additional examples of report wording can also be found in the OSAC Draft Proposed Standard on Expression of Source Opinions in Forensic Document Examination.

**15.1.1** The Item 1 piece of paper and Item 2 piece of paper physically correspond with distinctive features of the torn edges. This serves as the basis for the opinion that Item 1 and Item 2 were once part of a single object.

**15.1.2** Based on similarities in class characteristics and distinctive features of the edge of Item 1 and the edge of Item 2, Item 1 was observed to physically correspond with the edge of Item 2. These findings provide more support that Item 1 piece of paper originated and was at one time part of the Item 2 piece of paper, as opposed to originating from and being a part of another piece of paper.

**15.1.3** The Item 1 shred pieces were examined and compared to the Item 2 shred pieces. Item 1 and Item 2 were similar in class characteristics (e.g., size and/or shape); however, the items did not physically fit back together.

**15.1.4** The Item 1 original typed text was compared to Item 2 single strike typewriter ribbon. Item 1 exhibited distinctive features which physically fit with Item 2, which means the typewriter impressions on Item 1 originated from Item 2.

**15.1.5** The Item 1, a torn lined sheet of notebook paper, and Item 2, a partial page in a notebook, do not realign to form one larger piece.

**15.1.6** The Item 1 shred pattern was different than the shred pattern produced by the Item 2 known shredder. Therefore, Item 1 did not originate from the known shredder, Item 2.

**15.1.7** The torn paper in Item 1 is a different color than the torn paper in Item 2. Therefore, the torn paper in Item 1 did not originate from Item 2.

**15.1.8** The Item 1 quantity of shred was examined and compared to the Item 2 shredder and Item 3 shredder to determine whether or not Items 2 or 3 produced Item 1. Based on the examinations conducted, the items are able to be compared; however, there are no individualizing characteristics present. Therefore, Item 1 could have originated from Item 2 shredder or Item 3 shredder or another shredder of similar manufacturer or design.

**15.1.9** The quantity of questioned shred was processed with imaging software and reconstructed virtually. This is not a physical comparison and may not be reflective of the physical document.

## 16. Additional Reporting Language

**16.1** The examined items may share sufficient characteristics to warrant additional comparison examinations to evaluate the possibility of an association of evidence with class characteristics or an exclusion. The results of those examinations, if conducted, will be reported separately.

**16.2** The absence of a physical fit does not imply that the compared items did not originate from the same source.

**16.3** When the physical fit examination is the final forensic document examination step, a statement explaining the reasons for not completing further examinations shall be included by the FDE.

## 17. Technical Review/Verification

**17.1** Physical fit examinations shall be subject to technical review and may be verified by another qualified examiner.

**17.2** Verification can be in the form of review and examination of the actual evidentiary material or by reviewing the documentation (e.g., images) which clearly and objectively demonstrates the physical fit.

NOTE: Verifications can be open or blind. Blind verifications are more robust than open verifications, however, it may not be practical to conduct verifications following a physical fit analysis.

**17.3** Verification can be completed during the technical review process.

**Annex A**

(informative)

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