Standardized Technical Specification

PRIIA 305 Next-Generation Equipment Committee
Single-Level Passenger Rail Cars

Chapter 1

Specification Summary

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1.0 Specification Summary

1.1 Overview

The purpose of this specification is to define the performance and technical requirements for a fleet of new single-level passenger rail cars for use in medium- to long-distance intercity corridor service in North America. All technical characteristics and performance parameters for these cars are contained herein, as well as the design review, inspection, testing and documentation requirements for producing and supporting these rail cars.

This specification has been developed by the Next Generation Corridor Equipment Pool Committee created to support Section 305 of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) Public Law 110-432. The goal of PRIIA is to create a single-level intercity corridor car specification that may be used by any state or agency to procure single-level rolling stock for intercity service.

1.2 Regulations

The PRIIA 305-003/Amtrak 964 cars shall be fully compliant with all applicable federal regulations for safety, operations, design, accessibility, testing and materials standards, as well as numerous industry standards as developed by the American Public Transportation Association (APTA), the American Welding Society (AWS) and others. A complete listing of all regulations, standards, recommended practices and specifications that are referenced in this document can be found in Chapter 2. This is not to be interpreted as a comprehensive and exhaustive list of all regulations and standards that the Contractor must adhere to in the design and manufacture of the rail cars. The Contractor shall retain sole responsibility for complying with all standards, recommended practices and regulations that apply to the design and production of these rail cars.

1.3 Concept

The Single-Level passenger rail cars are intended to be a single-level intercity car fleet for use in medium- to long-distance corridor service, based on the design concepts pioneered in the 1970's by the Budd Company. Amtrak's *Amfleet I and Amfleet II* fleets have established the design baseline for single-level inter-city and long-distance rail equipment. The new cars will be significantly different from the *Amfleet* cars but will include the following features:

- One or two large entry vestibule(s) for high-volume passenger loading and unloading, depending upon car type
- Trainline-controlled side entry doors
- Full compliance with all applicable ADA requirements
- Seat spacing for comfort as well as capacity
- Workstation tables
- A lounge car
- A cab control car and locomotive control trainlines for push-pull service

- Convenience outlets at every seat
- Sufficient space for trash and recyclables
- Exterior crew door control switches
- Accessible toilet room adjacent to the ADA-accessible vestibule
- Checked baggage compartment in the cab car

The PRIIA 305-003/Amtrak 964 Specification creates a new generation of the single-level intercity car design. In order to accommodate the needs and requirements of all potential users of this specification, this document was developed with the following ideologies:

- These cars shall be designed and built for use anywhere in the United States and Canada where their use may be desired, consistent with Amtrak's clearance envelope (Drawing B-05-1355, rev E).
- All specifications shall reflect operational and environmental conditions that may be encountered anywhere the cars may operate, without requiring redesigning or modification. A nationwide perspective was used when specifying component performance.
- The Specification is heavily dependant on accepted industry standards, which have been referenced herein.
- All cars and car types supplied under this technical specification must be capable of fully functional co-mingled operation, both among themselves and when in mixed Amtrak train consists of all types of Amtrak single-level passenger cars in any combination, including if individual cars are turned end-for-end. Complete functional electrical and pneumatic interoperability must be provided with all Amtrak diesel and electrical locomotives, and with all Amtrak single-level cars including *Amfleet I*, *Amfleet II*, *Horizon*, Cab cars and *Viewliners*. All pneumatic trainline, Head End Power (HEP) trainline and communications/door control trainline functionality shall be maintained. Push-pull trainline functionality shall also be provided when coupled to other Amtrak cars and locomotives so equipped. All cars shall be fully compatible for unlimited duration movement when locomotive hauled and locomotive pushed, or when coupled to conventional freight cars as in a freight train. Details shall be presented to the Customer for approval as part of the design review Process.
- The cars shall be designed and manufactured to perform satisfactorily for a minimum of 40 years. The carbody and all its structural elements, including trucks and running gear, shall have a minimum design life of 40 years of operation at full seated passenger load. The design and the selection of materials shall prevent corrosion damage, including the effects of extreme weather conditions, during the 40-year design life.
- Safety, reliability and maintainability are primary objectives of this specification. Because Amtrak is currently the operator for state-run passenger transportation in the United States, maintenance intervals and procedures are specified to match current Amtrak preventive maintenance programs. Use of specialized tools or equipment shall be limited. Ease of access for inspection, maintenance and repairs is a major design consideration.
- One goal of the PRIIA Specification is standardization. To meet this goal, component assemblies and subsystems provided on the first build lot of cars under this Specification must be designed so as to facilitate the exchange and substitution of alternative components for form, fit and function. Subsystem, assembly or component level for interchange will be determined by the Customer.

- Various components have been specified by manufacturer and part number in this Specification. The Contractor may propose alternate manufacturers components but the use of alternate components or manufacturers must be approved by the Customer. Proposed alternative components must be interchangeable in form, fit and function with components called out herein.
- For safety critical items, introduction of alternative components will only be considered if such components have an established record, in North America, and/or have undergone an appropriate qualification program that demonstrates an acceptable level of safety, service and reliability for intercity or commuter passenger cars. The data shall be submitted to the Customer for approval.
- Design reviews and mockups will be employed to assess all proposed designs for compliance with specification requirements including safety, maintainability, ergonomics, functionality and passenger comfort. The areas to be created in full-scale mockups for Customer review include:
    - Passenger seating area
    - Café/lounge galley and lounge seating area
    - Accessible toilet room
    - Cab control compartment
    - Side doors
    - Enclosed overhead luggage bins
    - Wheelchair lift

The mockups will allow the Customer, and those invited by the Customer, to review the configuration and layout of the proposed design, to get a feel for the workability, comfort, access and functionality and to fine-tune the design for maximum benefit.

1.4 Summary of PRIIA 305-003/Amtrak 964 Car Specification

Where conflict exists between the descriptions below and the actual chapters, the verbiage in the chapters will be used.

1.4.1 Car Types and Arrangements

This technical specification provides for three distinct types of cars – a coach car, a cab/baggage car and a café/lounge car. See Chapter 9 for conceptual interior layouts.

The three types of cars are summarized as follows:

The coach car is a single-level car with revenue seating:

- Wheelchair access and an adjacent accessible toilet room.
- A smaller (non-accessible) toilet room.
- Enclosed overhead luggage bins are above each seat.
- Revenue seating includes several facing pairs of seats with workstation tables, and other seats with tray tables and footrests.
- All seating areas include carpeting and convenience outlets.

The cab/baggage car is similar to a coach car with the following exceptions:

- A full-width cab control compartment is located at the F-end to provide locomotive control for push-pull operation.
- The cab/baggage car includes a separate room for secure checked baggage storage.
- The forward end of the cab/baggage car conforms to all FRA structural and crashworthiness for cab car forward-facing ends.
- The forward end is fully equipped for push-pull operation, including a replaceable pilot (for protection from snow, ice, grade crossings and other debris).
- All seating is rearward-facing when the cab/baggage car is moving forward, except those seats located at workstation tables, to conform to the FRA's crashworthiness and compartmentalization recommendations. All facing seat pairs shall have a workstation table between them.

The café/lounge car provides the train with food service and non-revenue lounge space as passenger amenities, as well as including revenue seating:

- The food service galley is located in the center of the car.
- The galley is equipped with all required food preparation appliances, including microwave ovens, toaster, freezer, ice well, coffee makers, chilled and dry storage, display case, point-of-sale terminal, hand washing and food preparation sinks and menu holders. A condiment station is located in the lounge area.
- Recycling and trash receptacles are located throughout the car.
- Commissary provisioning is via pre-loaded carts.
- Carts are loaded onto the car at the service vestibule.
- Refrigerated foods are loaded in pre-chilled carts that are kept cold while on board by self-contained chillers.
- One end of the car is dedicated to non-revenue lounge seating, with tables for 1, 2 or 4 passengers.
- The other end of the car is configured for revenue seating, which includes facing pairs of seats with workstation tables. This area could easily be reconfigured for business class or for additional non-revenue seating.

Business class may easily be developed and implemented on these cars through the use of a modular business class service station that bolts into existing seat and wall tracks:

- The business class service station includes a small refrigerator, storage for two service carts (stocked and supplied by the café-lounge car attendant), a holder for a coffee urn (brewed in the café-lounge car and brought to business class by the café attendant) plus counter space for newspapers and breakfast foods, and trash and recycling receptacles.
- This modular design allows flexibility as to the location of the business class section - it may be located in a coach or cab/baggage car, or in the revenue end of the café-lounge car.
- Seat pitch may be adjusted due to the seat mounting in wall and floor tracks, and overhead reading lights are mounted in adjustable-pitch units on the underside of the overhead luggage bins.

- The business class section is easily redeployed to other cars if necessary, including addition to existing cars in single-level fleets. Where there is a Business Class it will include accessible seating and wheelchair space.

1.4.2 Capacity and Consist Performance

1.4.2.1 Capacity

As specified, the PRIIA 305-003/Amtrak 964 cars are configured to have the following passenger capacities:

Coach:	72 revenue seats maximum 1 wheelchair parking location
Cab/Baggage:	40 revenue seats, depending upon baggage room size 1 wheelchair parking location
Café/Lounge:	29 revenue seats 1 wheelchair parking location 21 lounge area (non-revenue) seats 4 crew workstation seats

These capacities may be defined differently in Chapter 23, in which case Chapter 23 takes precedence. This configuration may be changed at the discretion of each customer.

1.4.2.2 Consist Performance

- Trains typically consist of 4 to 10 cars with all trainline functions operating normally.
- Maximum consist of 12 cars for all trainline functions to operate at reduced levels, as specified by the Customer.
- Maximum consist of 24 cars for brake system to operate properly.
- Cars are designed for continuous operation for up to 24 hours and 1200 miles per day.

1.4.3 Dimensions, Clearances and Track Geometry

1.4.3.1 Overall Carbody Dimensions

The cars shall be designed to meet the following overall carbody dimensions:

Overall Length:	85 ft 0 in. (over pulling faces)
Overall Height:	14 ft 6 in. above top of rail
Overall Car Width:	10 ft 6 in. maximum (except at threshold)
Truck Centers:	59 ft 6 in.
Floor Height:	4 ft 3 in. above top of rail
Minimum Side Door Openings:	2 ft 10 in. clear opening

The cars shall be designed and built to conform to the following overall dry weight limitations:

Coach:	104,000 lbs
Cab/Baggage:	108,000 lbs
Café/Lounge:	111,000 lbs

All cars shall be weighed at the Contractor's facility, and shall have weight distribution and balance as follows:

- End-to-end balance within 5% (both at full supplies and no supplies)
- Lateral balance (side to side) within 30,000 inch-pounds (both at full supplies and no supplies)

1.4.3.2 Clearances

The cars shall fully conform to Amtrak's Single-Level Clearance Drawing B-05-1355, rev E. Conformance to this clearance diagram will permit the PRIIA 305-003/Amtrak 964 cars to operate anywhere that *Amfleets*, *Horizons* and *Viewliners* are authorized to operate within the continental United States or Canada, on current Amtrak routes and elsewhere where clearance permits.

1.4.3.3 Track Geometry

- The cars shall be designed and tested for revenue operation at all speeds up to 125 mph, on all classes of track from FRA Class 1 to Class 7. Track quality shall be the minimally compliant for each class of track, per FRA regulations and AREMA standards. Ride quality standards and testing methods are specified.
- The cars shall operate on standard gauge track. Standard gauge is 56.5 in.
- The cars shall be capable of meeting the S-603 braking distances.
- The cars shall be capable of negotiating a 250 ft radius (23 degree) horizontal curve, coupled to other equipment, without damage to any portion of the car, including trucks and suspension, coupler, draft gear, air and electrical connections, carbody, diaphragm or track.
- The cars shall be capable of negotiating a 1000 ft radius vertical curve (concave or convex), coupled to other equipment, without damage to any portion of the trucks and suspension, coupler, draft gear, air and electrical connections, carbody, diaphragm or track.
- The cars shall be stable at all design speeds and at 5mph above maximum design speed, including while stationary.
- The car shall have no more than 50% wheel unloading when stopped on 7 in. superelevation.
- The cars shall be capable of operating up to 5 in. cant deficiency according to 49CFR Section 213.329.
- The cars shall be capable of safely passing other trains that are operating at maximum authorized track speed in either direction on adjacent tracks with 12 ft centers.

The cars shall be capable of negotiating a number 8 crossover between two tracks with centers 12 ft apart, coupled to other equipment, without damage.

1.4.3.4 Catenary Wire

The Amtrak Northeast Corridor and Harrisburg Line are equipped with an overhead catenary power supply system, operating at 3 voltage potentials. The minimum wire height is 15 ft for 11,500V, 25 Hz catenary and 15 ft 6 in. for both 13,200V, 60 Hz catenary and 25,000V, 60 Hz catenary. All wire heights are measured from the top of the running rail to the bottom of the contact wire. The Contractor is responsible to insure that the cars to be supplied are immune from the effects of any electrical interference from the catenary system, including induced electrical currents into the carbody and potential ground return currents through the trucks and wheelset journal bearings, and that the cars are in compliance with all aspects of the Amtrak Clearance Drawing B-05-1355, Rev E.

1.4.3.5 Third Rail

Portions of the Amtrak Northeast Corridor are equipped with segments of both overrunning and underrunning wayside third rail, operating at a potential of up to 750VDC. The Contractor is responsible to insure that the cars to be supplied are immune from the effects of any electrical interference from the third rail system, and that the cars are in compliance with all aspects of the Amtrak Clearance Drawing B-05-1355, Rev E.

1.4.3.6 Passenger Stations

The single-level passenger car operates at both high-level and low-level boarding passenger station platforms with the following characteristics:

- Design height of high-level platform above top of rail: 4 ft
- Minimum distance of high-level platform edge to centerline of track: 5 ft 7 in.
- Design height of low-level platform above top of rail: 8 in.
- Minimum distance of low-level platform edge to centerline of track: 5 ft 1 in.

The Amtrak maintenance facilities and storage yards only have ground-level access at trackbed height. It is required that the cars have the capability for ground-level access for maintenance access, passenger emergency evacuation and fire/rescue access to the car interior.

1.4.3.7 Wayside Signal System

The Amtrak Northeast Corridor signal system consists of wayside signals and cab signals controlled by 100 Hz and 200 Hz double-rail track circuits. US&S Tru-II, GRS Phase Selective and US&S Phase Selective vital track relays are used. Pickup current values vary depending upon the manufacturer. The Contractor is required to verify these values with the manufacturer during emissions testing. Train detection at highway grade crossings is performed by audio frequency overlay track circuits. The minimum cab signal system in-rail current is 2.0 amp at the entering end of a track circuit.

1.4.4 Carbody (Chapter 4)

- Stainless steel carshell with Low-Alloy, High-Tensile (LAHT) end underframe and other primary structural components.
- The design of the carshell shall contain CEM features.
- Corrugated stainless steel roof for longitudinal structure and durability.
- Carshell shall be fully compliant with FRA's requirements for structural strength, crashworthiness and testing per 49CFR Part 238:
  - Meets or exceeds 49CFR Part 238 Tier 1 structural requirements
  - Meets or exceeds APTA Standard SS-C&S–034-99 for the Design and Construction of Passenger Rolling Stock
  - Carshell tested to 800,000 lb buff load
  - 300,000 lb collision post load test
  - All components attached to withstand longitudinal/lateral/vertical accelerations of 8/4/4g
- Each car has two side entries, except the cab/baggage car may have only one for passenger use.
- All cars feature large picture windows with glass or Lexan panes. All cars will have emergency exit windows in full compliance with FRA regulations.
- The basic car design features two carborne powered wheelchair lifts.

1.4.5 Trucks (Chapter 5)

- The specification provides for either cast or fabricated trucks.
- All trucks will use standard Amtrak wheelsets, with 36 in. nominal new wheels, type F outside bearings, and tread and disc brakes.
- Primary and secondary suspension is provided through the use of steel coil springs, or air springs or chevrons as approved by the Customer.

1.4.6 Couplers (Chapter 6)

- All cars use energy absorbing couplers as specified in Chapter 6.
- Couplers, coupler carriers and uncoupling mechanisms shall be compliant with FRA standards and requirements.

1.4.7 Brakes (Chapter 7)

- Pneumatic air brake system uses conventional type 26C schedule.
- Truck-mounted air brake components shall use Amtrak standard brake shoes and pads.
- Locomotive supplies air for brake pipe and main reservoir functions:
  - 110 psi brake pipe operation (for train air brake control)

  - 140 psi main reservoir operation (for auxiliary functions such as water pressure, toilet flushing, etc)
- Braking rates:
  - Full service: minimum of 1.35 miles per hour per second (mphps) deceleration from 125 mph down to 70 mph, then increasing to not less than 2.00 mphps average below 70 mph.
  - Emergency: minimum of 2.50 mphps below 70 mph.
- Tread and disc brakes on all axles. Track brakes are not used.
- Wheelslide protection provided on all axles and controlled on a per-truck basis.
- Electric and pneumatic brake applied/released indicators are provided on the side of each car.
- All cars are equipped with a handbrake, located at the B-end. A spring applied parking brake is allowed as approved by the Customer.
- Cab/baggage cars are equipped with a pneumatic holding brake.

1.4.8 Door Systems (Chapter 8)

- All cars feature two side entry doors and sliding pocket body end doors.
- Side doors throughout the train can be controlled from any door control station located on the same side of the car as the door control station, and can also be trainlined or opened individually.
- The door system complies with all FRA safety provisions, including obstruction detection, traction interlock, zero-speed protection, status lights and signage, emergency release, and crew control.
- Side doors feature enhanced access for maintenance of door operator hardware.
- All cars have exterior side door crew key switches for employee access.
- Body end doors are sliding pocket doors with upper and lower press plates (except the F-end door panel), obstruction detection, manual isolation, Type 1 glazing in the window and a removable panel in the lower half of the door, as required by the FRA.

1.4.9 Interiors (Chapter 9)

- All cars shall be equipped with reclining seats, energy-absorbing workstation tables, carpet, curtains and convenience outlets at every seat, and enclosed overhead luggage bins.
- Interior surfaces shall be made of fiberglass-reinforced plastic, decorative laminates and fabric-covered wainscot panels below the windows.
- Each car shall have two toilet rooms except the café/lounge, which will have none.
- All cars will be fully equipped with emergency signage and low-location exit path markings, in conformance with APTA standards and FRA requirements.
- The interior and furnishing shall present a clean, pleasing appearance and require little maintenance and be easy to clean.
- Interior décor shall be developed by the Contractor, to provide a comprehensive look to the interior of the car through coordination of seat fabrics, curtains, carpet and other

color palettes. The Contractor shall provide several storyboard options for the interior décor for the Customer to choose from.

- Seats shall be selected at the discretion of each Customer in order to accommodate differences in operations and passenger preferences. All seats and workstation tables shall be mounted in seat tracks for easy installation, and to allow different seat pitches at the direction of the Customer.
- Reading light units shall be installed on the underside of the overhead luggage bin, and shall be track-mounted to permit different spacing based on seat pitch.

1.4.10 Heating, Ventilation and Air Conditioning (Chapter 10)

- The Heating, Ventilation and Air Conditioning (HVAC) system will use efficient scroll compressors, environmentally friendly R400-series refrigerants, microprocessor controls and multiple temperature sensors for system operation.
- The HVAC system shall be a hermetically sealed, packaged unit that is roof top mounted.
- Two identical HVAC units will provide cooling and overhead heat for each car.
- The HVAC system shall maintain the car interior, including the Engineer's cab, to the specified temperature of 68°F to 76°F, with the car operating anywhere in the continental United States.
- The HVAC system performance requirements specify system operations under a variety of climatic extremes, from the hot and dusty California desert to the snow-packed Midwest.
- Maximum interior sound levels are specified to minimize blower and diffuser noise.
- Filters are easy to access and replace.
- Water system components are equipped with freeze protection.
- Side door thresholds are heated.

1.4.11 Lighting (Chapter 11)

- Interior lighting relies on Light Emitting Diodes (LEDs) for energy efficiency and reliability. All LED passenger lighting shall be powered from the 74VDC battery system. Emergency lighting will have individual battery back-up. Fluorescent lights can be used in Customer approved areas. Halogen lights are not to be used. Incandescent lights are not used anywhere on the car except for marker lights and cab/baggage car headlights and crossing lights.
- The normal and emergency lighting system meets all new APTA standards and FRA requirements for charging and emergency light levels.
- Emergency lighting relies on LED lamps and high-efficiency capacitors for power source.

1.4.12 Communications and Passenger Information (Chapter 12)

- All cars will feature a Public Address (PA) system, intercom and a passenger information system.
- PA and intercoms are compliant with FRA requirements for emergency communication.

- Specifications for passenger WiFi and on-train information systems will be consistent with Amtrak nationwide standards for these systems.
- On Board Train Information System (OTIS) provides an Ethernet-based data backbone for intra-car and car-to-car communication and data transfer. System capabilities include passenger wireless internet access, real-time ticketing and manifest generation, credit card transactions, component or system status monitoring and food inventory management.
- OTIS is compliant with ADA.

1.4.13 Electrical (Chapter 13)

- Primary power source is locomotive-provided 480 Volt Alternating Current (VAC) Head End Power (HEP).
- Power distribution system converts the HEP to 120VAC, 74VDC and 24VDC, (Cab/baggage car only) for use throughout the car.
- The batteries and battery charger system provide the low-voltage power supply for systems requiring power when HEP is lost (PA, door operators, lights, cab controls).
- All cars will be equipped with standard trainlines:
  - 480VAC HEP trainline (in compliance with APTA Recommended Practice RP-E-106-99)
  - 27-Point Multiple Unit (MU) Trainline (in compliance with APTA Recommended Practice RP-E-017-99)
  - 27-Point Communication (COMM) Trainline (in compliance with APTA Recommended Practice RP-E-017-99)
- Receptacles will be located on both sides of each car for maximum flexibility in building train consists (either end of any car can be connected to either end of any other car).
- 120Vac utility outlets will be located in all toilet rooms, equipment rooms, the electrical locker, operating cab and utility rooms, for ease of maintenance and cleaning.

1.4.14 Food Service (Chapter 14)

The café/lounge car includes the following features, in addition to those listed above:

- Convenience outlets will be located in the revenue and lounge areas, for passenger use.
- PA and intercom located at the crew workstation, for convenience and passenger safety.
- The revenue seating area will include all elements of the seating area in a coach car, including overhead luggage bins and reading lights.
- The galley area of the café/lounge car will conform to all applicable requirements for a food preparation area, in accordance with Food and Drug Administration (FDA) regulations.
- A crew workstation will be located on the lounge side of the café-lounge car, and will be equipped with extra electrical outlets, secure storage, PA and intercom station.
- A secure storage area will be provided for café/lounge employee belongings.

1.4.15 Water and Waste (Chapter 15)

- Fresh water (112-gal storage capacity for cab/baggage and coach, 224-gal for café/lounge) will be used for toilet room functions such as toilet flush and hand washing.
- Particulate and antibacterial filtration will be used to provide potable water at drinking stations on both levels, as well as supply water for use in the galley of the café/lounge car (for coffee, hand washing and food preparation).
- All waste water will be captured and stored in a 225-gal waste retention tank at the B-end of each car.

1.4.16 Cab and Controls (Chapter 16)

- Each cab/baggage car will be equipped with a locomotive control cab at the forward end.
- The cab will be full width, and will provide seating for an engineer and an assistant.
- FRA Type 1 windshields will be provided on the end of the car for the engineer and the assistant. These windshields will be heated for defrosting and defogging. Opening windows will be provided on each side of the cab for sideways visibility.
- The Engineer will have access to all locomotive train controls and indicators to operate the train safely in push-pull service.
- Federally mandated safety systems such as an event recorder, alerter and Positive Train Control (PTC) shall be incorporated into the design of the cab.
- Secure cabinets will be located behind the cab for emergency equipment, storage of crew belongings and a refrigerator. A secure locker will be provided for data storage from the event recorder and PTC systems.
- The cab end of the cab/baggage car will include streamlined styling for reduced wind resistance, which reduces fuel consumption and enhances locomotive performance at high speeds when in push mode.

1.4.17 Emergency Equipment (Chapter 17)

- All cars will be equipped with emergency equipment as required by the FRA, including, but not limited to, fire extinguishers, pry bar, sledge hammer, first aid kit and light sticks.
- Signage for the emergency equipment shall meet all applicable FRA requirements.

1.4.18 Materials and Workmanship (Chapter 18)

All materials, parts and workmanship that go into the design and manufacture of the rail cars are subject to rigorous standards for quality, performance, method of assembly and compliance with applicable regulations and industry standards.

1.4.19 Testing Requirements (Chapter 19)

The cars will undergo extensive testing as prescribed in the Specification, to ensure that the cars meet all requirements for design, performance and quality.

Four major categories of tests are specified:

- Material certifications

  These tests are performed on the materials that are used to manufacture the cars, to ensure that they are manufactured in accordance with all specified requirements. These are usually performed at material testing laboratories or manufacturer facilities.

- Proof of design tests

  Proof of design tests are performed to validate the concept of a component or system, to ensure that the design of the component or system performs as intended or specified, with no adverse or unexpected consequences. Proof of design tests are normally conducted on the first components or assembled systems, and the first completed cars, so that subsequent cars or components may be redesigned to resolve design problems.

- Production tests

  Production tests are required for all cars and selected components (such as truck frames) where safety is critical. Production tests are conducted at the Contractor's facility, and at the facility of the major component suppliers.

- Acceptance tests

  Acceptance tests are conducted on each car at the Customer's facility to verify all car functionality, including train consist compatibility, prior to placement of the car into revenue service.

1.4.20 Documentation and Training (Chapter 22)

- Support documentation, such as maintenance and operating manuals, as-built drawings, parts lists and troubleshooting guides, are included in the technical specification.
- A training program is established for familiarizing operating, mechanical and supervisory staff on the proper maintenance, repair, troubleshooting and operation of the equipment.

1.4.21 Customer Variables (Chapter 23)

- This chapter describes those features of the car that change from one customer to another, such as exterior graphics, interior décor considerations, seats and interior layout, testing with existing fleets, and other aspects of the car design that may be exclusive or particular to a customer.
- Specific components may be called out here by the Customer, for example: trucks, HVAC units, couplers and windows.

1.4.22 Standard Keys

A total of two types of standard keys shall be used on the various car types, a coach (Conductor's) key and a cab master controller key, along with provisions in the café/lounge car for use of crew-supplied padlocks.

The coach key is used by the train crew, and shall be used as the general key for door control and to open all doors and car interior access covers that specify a key-locked door. All such coach key locks and key control switches shall accept the standard Amtrak coach key, J.L. Howard Part No. 2555, or approved equal, in accordance with the latest revision of Amtrak Drawing B-144. The coach key shall operate the Conductor door control panels, side door mechanical locks, end doors, cab door, cab side window lock, communication system, equipment and storage lockers and crew lockers. Wherever an electrical switch is operated by the coach key, the tumbler shall be set back at least 0.5 in. from the face and protected by a fixed keyway spacer to prevent operation by a screwdriver or similar device.

The cab master controller key shall be used by the Engineer to activate the cab electrical controls and propulsion system master controller. It shall be a simple reverse-handle type design interchangeable with the current reverser handle used on the Amtrak AEM-7 electric locomotives. The Customer will supply details to the Contractor of the handle design.

Amtrak Lead Service Attendants (LSAs) will provide their own personal padlocks to secure the food service storage lockers and serving area of the food service car. The Contractor shall provide approved lock hasps for the application of padlocks by Amtrak crew. This shall include completely locking the galley area when closed and not in service.

The Contractor shall submit for approval, a matrix of the key type used in each lock or key switch.

* End of Chapter 1 *