

APTA Standard for Vintage / Heritage Trolley Vehicle Equipment

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Abstract: This standard establishes minimum requirements for equipping Vintage Trolley vehicles, also referred to as Heritage Trolleys, for operation on urban Vintage Trolley systems.

Keywords: Vintage Trolley, Heritage Trolley, Streetcar

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Foreword

(This Foreword is not part of the Standard for Vintage / Heritage Trolley Vehicle Equipment).

This Standard for Vintage / Heritage Trolley Vehicle Equipment represents the first major component of a future larger set of recommended practice documents covering Vintage / Heritage Trolley technology, operation and maintenance. The reader will note the inclusion of both vehicle-based and operational criteria in this standard. In preparing this standard, it was felt that this approach places the appropriate emphasis on the critical importance of operating rules and training as part of overall vehicle safety.

As this standard was being prepared, there were currently about 19 active Vintage / Heritage Trolley operations around the country, with numerous additional systems now in the planning process. The types of vehicles employed by these operations range from restored original equipment dating to the early 1900s to newly built “replica” vintage cars. Although these vehicles operate on rails and utilize electric propulsion, there are also numerous and significant differences between Vintage / Heritage Trolleys and the vehicles employed in other forms of rail transit. The service conditions under which Vintage / Heritage Trolley vehicles are operated may also be quite different than those found on a typical Light Rail or other rail transit system.

While the rail transit industry has been steadily generating consensus standards covering many technical aspects of its present generation of equipment, these standards do not make provision for the unique vehicles found in Vintage / Heritage Trolley operations. For this reason, the APTA Heritage Trolley and Streetcar Subcommittee has created this standards document to establish appropriate standards for equipping and operating Vintage / Heritage Trolley vehicles in a urban public transit environment.

This standard is based on the Historical Streetcar section of the California Public Utilities Commission General Order 143B, with many additional criteria added in order to create a more comprehensive standard.

It should be noted that this safety standard has been assembled specifically for Vintage / Heritage Trolleys operating in an urban public transit environment, and is not intended for application to railway museums / trolley museums that may operate similar “heritage” or “Vintage” equipment. Although a museum has the same obligation to conduct safe operations, there are also significant differences in the nature of museum operations versus that of a Vintage Trolley. The requirements of historical accuracy and preservation of original materials are recognized as legitimate museum concerns, and rebuilding or modifying original artifacts for the comparatively heavy service that can be seen on a Vintage / Heritage Trolley raises issues that are beyond the scope of this standard and are therefore not addressed herein.

Introduction

This standard for Vintage Trolley Vehicle Equipment (also equally referred to Heritage Trolleys throughout) represents a common viewpoint of those parties concerned with its provisions, namely, agencies and other organizations operating or planning urban Vintage Trolley operations, manufacturers, consultants, engineers and general interest groups. The application of any standards, practices or guidelines contained herein is purely voluntary. In some cases, federal and/or state regulations govern portions of a rail transit system (or other Vintage Trolley operator's) operations. In those cases, the government regulations take precedence over this Standard. APTA recognizes that for certain applications, the standards or practices, as implemented by individual rail transit systems, may be either more or less restrictive than those given in this document.

This standard prescribes minimum requirements for equipping Vintage Trolley vehicles for operation on urban Vintage Trolley and other transit systems. APTA recommends the use of these practices by:

- Individuals or organizations that design, restore, construct, operate and maintain Vintage Trolleys.
- Individuals or organizations that contract with others for the design, restoration, construction, operation and maintenance of Vintage Trolleys; and
- Individuals or organizations that influence how Vintage Trolleys are designed, restored, constructed, operated and maintained.

The purpose of an APTA Rail Transit Safety Standard is to ensure that each rail transit system achieves a high level of safety for passengers, employees and the public. APTA Rail Transit Safety Standards represent an industry consensus of acceptable safety practices that should be used by a rail transit system. However, APTA recognizes that some rail transit systems (or other Vintage Trolley operators) have unique aspects of their operating environment, that when combined with the levels of service that must be provided, may make strict compliance with every provision of an APTA Rail Transit Safety Standard impossible.

A rail transit system (or other Vintage Trolley operator) that is faced with this dilemma, may use its system safety program plan to specify an alternate means to achieve an equivalent level-of-safety as provided by the APTA Safety Standard. The system safety program plan should:

- Identify the Rail Transit Safety Standard requirements that cannot be met.
- State why each of these requirements cannot be met;
- Describe the alternate means that ensures equivalent safety; and
- Provide a reasonable basis (i.e. operating history or hazard analysis) for why safety is not compromised through the alternate means.

Participants

The Vintage Trolley Vehicle Equipment Standards initiative is being undertaken by the APTA Heritage Trolley & Streetcar Subcommittee (formally the Vintage Trolley & Streetcar Task Force). The Task Force was formed to promote the development of Heritage/Vintage Trolley lines and modern streetcar lines, to foster information exchange among those planning or operating such lines, and to encourage reasonable technical and safety standards.

The American Public Transportation Association greatly appreciates the contributions of the following individuals who provided the primary effort in the drafting of the *Standard for Vintage / Heritage Trolley Vehicle Equipment*:

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An initial version of this standard was reviewed at a meeting of the Task Force on June 6, 2003 in San Jose, CA. Several additional drafts were subsequently developed, reviewed and approved using meetings of the Task Force held at various locations around the country including face-to-face discussions with a large number of operators and other interested parties. This standard was balloted by all agencies that have vintage / heritage trolleys or are planning for or considering their addition. This standard was unanimously approved by balloted agencies and subsequently approved for publication by the APTA Rail Standards and Policy Committee on June 12, 2005.

Document Numbering Nomenclature

A prefix of “SS” designates a mandatory safety standard while recommended practices carry the prefix “RP.” A designation for the APTA Heritage Trolley and Streetcar Subcommittee is: HT. Further, a unique – to each committee – three-digit number that indicates the order in which the subcommittee approved the document follows the committee designation. Finally, a two-digit date code is added corresponding to the year of document approval.

Standards vs. Recommended Practices

APTA develops standards and recommended practices, and such distinction between these document types needs to be clear.

Characteristics of a Standard

A standard should be developed when the document:

- a) Covers a system, component, process or task that is safety critical, or
- b) Ensures interoperability between parts or equipment, or
- c) Standardizes a design or process, or
- d) Addresses an FRA or NISB concern, or
- e) May become part of a regulation.

Characteristics of a Recommended Practice

A recommended practice should be developed when:

- a) The document describes only one of several acceptable approaches, or
- b) The document is tutorial in nature, or
- c) The document does not meet one of the characteristics for a standard, or
- d) Consensus could not be reached that the document should be a standard.

Requests for Revisions

Requests for revisions of APTA standards and recommended practices are welcomed from any interested party. Suggestions for changes to documents should be submitted in the form of a proposed change to the text along with the appropriate supporting documentation / rationale for the change.

Occasionally, questions may arise concerning the meaning of portions of these standards as they are specifically applied. APTA will resolve such issues through the Heritage Trolley and Streetcar Subcommittee and the Rail Standards Policy and Planning Committee as necessary. Address comments, questions on interpretation or requests for changes to:

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Standard for Vintage / Heritage Trolley Vehicle Equipment

1. Overview

This Standard for Vintage / Heritage Trolley Vehicle Equipment establishes minimum requirements for equipping Vintage Trolley vehicles. (Herein, the term Heritage Trolley is used synonymously with the term Vintage Trolley). It includes programs and procedures that are to be established and documented in the Vintage Trolley System's System Safety Program Plan (SSPP), as well as equipment-related criteria that are to be documented in the Vehicle Safety Certification process.

1.1. Scope

This Standard is applicable to all Vintage Trolleys operating in an urban public transit environment. This Standard is not intended for application to railway museums / trolley museums which may operate similar "heritage" or "vintage" equipment. Although a museum has the same obligation to conduct safe operations, there are also significant differences in the nature of museum operations versus that of an urban Vintage Trolley. The requirements of historical accuracy and preservation of original materials are recognized as legitimate museum concerns, and rebuilding or modifying original artifacts for the comparatively heavy service of a Vintage Trolley operation raises issues that fall outside the scope of this Standard.

1.2 Purpose

The purpose of this Standard is to provide APTA member transit systems and other Vintage Trolley operators with minimum standards for equipping and operating Vintage Trolley vehicles.

2. References

This standard shall be used in conjunction with the following publications. When the following publications are superseded by an approved revision, the revision shall apply. In the event of a conflict between the standard and a referenced document, this standard shall take precedence, to the extent not preempted by law. Provisions of the referenced documents not in conflict with this standard, shall apply as referenced herein.

APTA RT-S-VIM-002-02 Recommended Practice for Pantograph Current Collection Equipment Periodic Inspection and Maintenance

APTA RT-S-VIM-003-02 Standard for Air Supply and Air Storage Systems
Periodic Inspection and Maintenance

APTA RT-S-VIM-007-02 Standard for Friction Brake Equipment Periodic
Inspection and Maintenance

APTA RT-RP-VIM-005-02 Recommended Practice for Door System Periodic
Inspection and Maintenance

APTA RT-RP-VIM-009-02 Recommended Practice for Battery Systems Periodic
Inspection and Maintenance

APTA RT-RP-VIM-010-02 Recommended Practice for Electric Motor Periodic
Inspection and Maintenance

APTA RT-RP-VIM-018-03 Recommended Practice for Propulsion Controls
Periodic Inspection and Maintenance

3. Definitions, abbreviations and acronyms

AC Inverter - A device for converting direct current (DC) electricity into alternating current (AC) electricity using partial DC voltage rectification to simulate AC current at a specified frequency, usually 60 Hz in North America.

ADA (Americans With Disabilities Act) - A civil rights law passed by Congress in 1990 which makes it illegal to discriminate against people with disabilities in employment, services provided by state and local governments, public and private transportation, public accommodations and telecommunications.

AW Passenger Weight Loadings -

- AW0- Empty car weight ready to run.
- AW1- Car weight with seated load. Weight based on 155 lbs. (70.3 kg) per passenger.
- AW2- Car weight with seated load plus standees at 1 person per 2.7 sq. ft. (4 persons / square meter). Weight based on 155 lbs. (70.3 kg) per passenger.
- AW3- Car weight with full load, which is seated load, plus standees at 1 person per 1.35 square feet or 8 people per square meter. Weight based on 155 lbs. (70.3 kg) per passenger.

California Public Utilities Commission General Order 143B - A set of rules and regulations issued to establish safety requirements governing the design, construction, operation, and maintenance of light-rail transit systems in the State of California.

DC - Direct current; non-alternating in magnitude.

Drop-Action Fender (“Lifeguard”) - A device mounted under the end of a trolley or light rail vehicle in front of the trucks, designed to trap foreign objects on the track and prevent them from becoming caught under the wheels. The most common form of drop-action fender (commonly referred to as a “lifeguard”), is arranged so that the fender tray drops to the rail head if an object strikes the leading trip bar.

Elevated Guideway - A guideway, which is positioned above the normal street activity level (e.g. elevated over a street).

Hazard Analysis Process - An analysis performed to identify hazardous conditions for the purpose of their elimination or control.

Light Rail - An electric railway system characterized by its ability to operate single or multiple car consists along exclusive rights-of-way at ground level, on aerial structures, in subways or in streets, able to board and discharge passengers at station platforms or at street, track, or car-floor level and is normally powered by overhead electrical wires.

Lightning Arrester - A circuit protection device designed to protect trolley electrical circuits in the event lightning strikes the overhead contact system. Functions by shunting the high voltage lightning charge to earth ground.

NFPA 10 - (Standard for Portable Fire Extinguishers) Standard issued by the National Fire Protection Association (NFPA) covering the selection, installation, inspection, maintenance, and testing of portable extinguishing equipment.

NFPA 130 - (Standard for Fixed Guideway Transit and Passenger Rail Systems)- Standard issued by NFPA covering fire protection requirements for underground, surface, and elevated fixed guideway transit systems including trainways, vehicles, transit stations, vehicle maintenance and storage areas; and for life safety from fire in transit stations, trainways, vehicles, and outdoor vehicles maintenance and storage areas.

Overhead Contact System - One or more overhead wires situated over rail tracks for the purpose of transmitting electrical energy to railcars. The wires are energized to a high electrical potential by connection to feeder stations at regular intervals.

PCC-Type Streetcars - A streetcar design introduced in North America in the 1930s by the Presidents' Conference Committee of U.S. streetcar operators. More than 5000 were built from 1936-1952 for US and Canadian cities.

Pilot - A rigid device mounted under the end of a trolley or other rail vehicle in front of the trucks, designed to deflect foreign objects on the track and prevent them from becoming caught under the wheels.

Subway - Underground rail alignment.

System Safety Program Plan (SSPP) - A document adopted by a transit agency or other transit provider detailing its safety policies, objectives, responsibilities, and procedures.

Vehicle Safety Certification - The vehicle component of the overall system safety certification program. The objective of the Safety Certification program is to produce a formal document that ensures at the time of operation, the system and all its components is safe for passengers, employees, emergency responders, and the general public. Safety Certification is the process of verifying that certifiable elements comply with a formal list of safety requirements. The requirements are defined by design criteria, contract specifications, applicable codes, and industry safety standards.

Vintage Trolley (or "Heritage Trolley") - An electrically propelled rail vehicle for the conveyance of passengers, originally manufactured prior to January 1, 1956, or a new vehicle designed to replicate the appearance and function of such vehicles. Term also used to describe similar rail vehicles which are not electrically propelled, but have the same appearance and function.

Wheel Chock - A removable device that is manually applied to the railhead on either side of one wheel to deter a standing railcar wheel from rolling.

4. Programs and procedures applicable to all Vintage Trolley operations

The Vintage Trolley system's System Safety Program Plan (SSPP) shall establish and document the programs and procedures outlined in Items 4.1 through 4.4 below. These items are intended to demonstrate that written rules and procedures, along with a program of instruction and system of maintaining auditable records, are in place.

4.1. Operating Rules

The Vintage Trolley system shall establish rules of operating procedure that cover each type of trolley being operated on the system, including the maximum authorized speeds for each section of right-of-way. These rules shall be checked for compliance with applicable federal, state, and local safety rules and regulations. All employees whose duties are governed by the operating rules shall be given a copy of the applicable rules. All work activities shall be performed in strict accordance with the operating rules.

4.2. Program of Instruction

The Vintage Trolley system shall adopt a program of instruction for all employees. Refresher courses and testing shall be provided at least every two (2) years covering vehicle operation and the meaning and application of the operating rules. A policy and procedure shall be in place to maintain records showing compliance with this requirement, with records maintained for a period of not less than four (4) calendar years.

4.3. Maintenance Procedures and Instruction

The Vintage Trolley system shall institute systematic inspection and maintenance practices for each type of trolley being operated on the system, using a mileage, hourly or other periodic basis. Written inspection and maintenance procedures shall be established along with a system for maintaining records of inspection and the maintenance work performed. A system (including written documentation) shall be in place to provide instruction to maintainers as to the requirements of their work.

4.4. Maintenance Facility

The Vintage Trolley system shall establish an appropriate maintenance area to facilitate systematic vehicle inspection and record keeping. At a minimum, the maintenance area shall provide a means for appropriate inspection and maintenance of vehicle underbody, including trucks, and rooftop apparatus.

Note (advisory material): An inspection pit is the most commonly used means to facilitate inspection and maintenance of trucks and underbody equipment.

5. Minimum Vehicle Equipment Requirements

All Vintage Trolley vehicles shall comply with the requirements of Section 5. Compliance shall be documented in the Vehicle Safety Certification process.

5.1. Service Braking System

Each trolley shall be equipped with a documented, tested braking system adequate to control the movement of and to stop and hold stationary such vehicle in a safe manner under all conditions of passenger weight loading between AW0 and AW3 inclusively on any track grade experienced during operation. Written procedures shall be established for maintenance and inspection of the braking system.

Note (advisory material): For trolleys equipped with airbrake systems, maintenance and inspection procedures typically include standards for maximum allowable wear of braking rigging and brake shoes / pads, as well as maximum allowable brake cylinder piston travel, brake cylinder air leakage and overall system air leakage. Also, all system air pressure settings are typically designated including compressor governor cut in/cut out settings, safety valve settings and, where applicable, brake pipe and feed valve settings and/or any pressure switch settings.

5.2. Redundant Braking

Each trolley shall be equipped with a redundant form of braking that can be utilized to stop the trolley in the event the service braking system fails. Motor braking combined with handbrake use is a common and effective form of redundant braking on Vintage Trolleys. The redundant form of braking shall be tested and the results documented.

5.3. Parking Brakes

Each trolley shall be equipped with a parking brake that is adequate to hold the trolley stationary under all conditions of loading for any grade on which the trolley is operated, through the full range of specified wheel and shoe wear conditions. The parking brake shall be capable of holding the trolley stationary with line voltage removed and the primary braking system released. Wheel chocks, used in accordance with a documented procedure, may be used to supplement the parking brake, but not as a replacement for a parking brake. The parking brakes must meet all specifications herein described without the need for wheel chocks or any other braking system. The parking brake system shall be tested under actual operating conditions on the system's steepest track grade, and the test results documented.

5.4. Air Gauge & Low-Air Alarm

If equipped with air brakes, each trolley shall be equipped with an air gauge that indicates, at a minimum, main reservoir pressure. The air gauge shall be mounted within

the operator's immediate field of vision and shall be readable at all times during operation. As a secondary indicator, the vehicle shall also be equipped with a low-air alarm in the form of an audible and/or visual alarm that will automatically actuate if the main reservoir air supply drops below the preset minimum safe working pressure. Visual indicators for the low-air alarm shall be mounted within the operator's immediate field of vision and of sufficient size or intensity to be always observable. Audible alarms shall be sufficiently loud to be heard over the noises associated with all car operation. The low-air alarm shall not be equipped with an operator-accessible means of disabling or muting the alarm function.

5.5. Stopping Distance

Each trolley shall meet the established stopping distance standard required by applicable state or local regulations. In the absence of superseding requirements, the stopping distance standard shall be that the trolley must be capable of being brought to a complete stop in less than 120 feet from the point of first operation of the brake control at 20 mph on level, dry, tangent track under all conditions of loading. Each trolley shall be tested for stopping distance while loaded at AW0 and not less than AW3. Results shall be documented.

5.6. Sanders

Each trolley shall be equipped with an operator controlled device that directs a flow of sand onto the head of the rail in front of one or both leading wheel(s). Wherever the basic design of the car's equipment can be readily adapted to do so, sanders shall also apply automatically during emergency application of the braking system. Sander operation shall be tested and the results documented.

Note (advisory material): Because the rails typically serve as the ground return in trolley systems, excessive use of sand could result in wheels losing electrical conductivity with the rails. For this reason, sanding apparatus on some trolleys is designed to only sand one rail. Sander operation, number of sanders and the rate and consistency of sand flow should be based on an operational hazard analysis of the particular Vintage Trolley operation.

5.7. Electrical Systems

5.7.1. Documentation, Inspection & Testing

The wiring and electrical apparatus on each trolley shall be inspected and tested, and the results documented, to determine that they are in safe working order and are suitable for the intended operation.

All electrical systems on the trolley shall be documented in written form, and all controls on the vehicle clearly labeled including proper status indication such as ON and OFF.

5.7.2. Equipment Arrangement

All wiring and electrical apparatus shall be installed on the car in such a manner that the danger of fire from heat, arcing or component failure is minimized. Components shall be mounted in such a manner that the heat produced by their operation does not damage themselves, other devices, or the car structure. Appropriate heat shields are to be incorporated as required, with special care taken to isolate potential heat sources from wooden portions of the car.

All wiring and electrical apparatus shall be installed on the car in such a manner that passengers and crew are protected from contacting energized components.

All wiring and electrical apparatus shall be installed on the car in a manner which provides adequate clearance for the normal movement of trucks, brake rigging and current collectors, and which protects against the entry or continued exposure to wheel wash or other sources of water.

5.7.3. Wiring

Conductor sizes shall be selected on the basis of current-carrying capacity, mechanical strength, temperature and flexibility requirements, and maximum allowable voltage drops. Conductors of all sizes shall be provided with appropriate mechanical and environmental protection.

5.7.4. Control Arrangement

The propulsion system shall be equipped with an alternative means for the operator to shut off power in the event of a mechanical failure that may cause the primary control handle or pedal to jam.

5.7.5. Overload Protection

All electrical systems on each trolley shall incorporate suitable overload protection devices.

5.7.6. Propulsion Line Breaker

Each trolley shall be equipped with a main automatic circuit line breaker or line switch and overload relay for the protection of the power circuits. The circuit breaker or line switch arc chute shall be vented directly to the outside air.

5.7.7. Main Fuse Protection

Cartridge type fuses, if used in addition to the automatic circuit breaker, shall be installed in approved boxes or cabinets. Railway-type ribbon fuses, if used, shall be in boxes designed specifically for this purpose and shall be equipped with arc blowout aids.

5.7.8. Auxiliary Circuits

Circuits used for purposes other than propelling the vehicle shall be connected to the main cable at a point between the current collector and the protective device for the traction motors.

Each circuit or group of circuits shall be equipped with at least one circuit breaker, fused switch, or fuse located as near as practicable to the point of connection to the auxiliary circuit.

5.7.9. Lighting Circuits

Vintage Trolley systems operating restored original trolleys using lighting powered at electrical line potential shall provide training to operating crews on safe procedures associated with this style of lighting. Newly constructed replica trolleys shall not incorporate lighting circuits that are powered using electrical line potential, but instead use lighting circuits powered by low-voltage DC or an AC inverter.

5.7.10. Lightning Protection

Each trolley that is supplied power from an overhead contact system shall be equipped with a suitable and effective lightning arrester for the protection of all electrical circuits.

5.7.11. Portable Fire Extinguishers

Each trolley shall be equipped with an approved portable fire extinguisher, selected, inspected, and maintained in compliance with NFPA 10.

5.7.12. Periodic Inspection & Training

To verify that electrical components on each trolley are in safe working order, they shall be periodically inspected and tested in conformance with the procedures established under Section 4.3 of this document.

Operating crews shall be trained on specific procedures for responding to indications of fire or overheated equipment. These procedures shall include appropriate emphasis on the importance of prompt removal of the trolley pole or other current collection apparatus from the overhead line in the event of fire.

5.8. Wheel-to-Rail Interface

The wheel profile used on each trolley shall be evaluated to ensure it will provide safe wheel-to-rail interface on the type of trackwork in use on the system. Factors to be considered in evaluating wheel-to-rail interface include the type of track construction and wheel profile, as well as operating conditions including wheel and rail condition and operating speeds.

Specific wheelset elements to be examined include tread width, wheel profile including flange dimensions, check gauge and back-to-back wheel spacing.

Trackwork elements to be examined include rail profile, allowed gauge variation, characteristic elements of switch points and frogs, groove width for street trackage and guard rail use and configuration.

Note (advisory material): In general, trolleys equipped with narrow-tread/shallow flange streetcar profile wheels are not compatible with heavy rail infrastructure, and trolleys with railroad profile wheels may not be compatible with certain elements of streetcar-type infrastructure. In either case, significant changes to the infrastructure and/or vehicles may be necessary in order to achieve a safe wheel/rail interface.

5.9. Tamper-Resistant Controls

The operating and auxiliary controls on each trolley shall be arranged to prevent unauthorized operation.

Note (advisory material): Common practice for Vintage Trolley vehicles is to use removable operating handles for the primary propulsion and braking controls and in the case of double-ended cars, to carry only a single set of handles which the operator moves from one control position to the other. Whenever the basic design of the car's equipment can be readily adapted to do so, removable handles should be arranged so that the handle can only be removed in the OFF position on propulsion controls, and only in the brakes applied position on braking controls. The Task Force recognizes that on many restored original trolleys, the brake valves on double-ended cars are designed to have the handle removable in a LAP position. In such instances, operating procedures should provide for making an appropriate service brake application before moving the handle to the LAP position and removing it.

5.10. Emergency Exits

Each trolley shall be equipped so that in case of emergency, the doors or doorways can be easily opened by a passenger by a readily apparent or disclosed means. In case of operation on bridges, tunnels or elevated right-of-way, the doors or doorways shall be

arranged, or access otherwise controlled, so that passengers can not readily exit into an unsafe condition.

5.11. Door Interlocks

Trolleys may be equipped with various devices, including doors, to protect car entranceways. Some trolleys utilize an open design with no passenger barriers on portions of the car. In all cases, the function of appropriate barriers and their impact on passenger safety shall be carefully evaluated. An additional increase in safety may be obtained by interlocking the doors with the trolley propulsion and/or braking systems. The function of door interlocks and their impact on passenger safety shall be carefully evaluated using a hazard analysis process, especially where cars are operated with a single person crew or have entrance-ways out of the operator's immediate unreflected view.

5.12. On Board Safety Equipment

Each trolley shall be equipped with an appropriate fire extinguisher, as well as appropriate emergency devices in compliance with applicable state or local regulations.

Note (advisory material) Examples of emergency devices typically carried include such warning devices as bi-directional emergency reflective triangles, red flags, and flashlights.

5.13. Audible Warning Devices

Each trolley shall be equipped with an audible warning device(s) capable of producing a clearly audible warning that complies with applicable local regulations. Typical audible warning devices on a Vintage Trolley are gongs and air whistles.

5.14. Interior Lighting

If operated during hours of darkness, each trolley shall be equipped with lights in the passenger compartment, arranged so as to illuminate the whole interior of the vehicle. Appropriate measures shall be taken to ensure that windshield reflection will be minimized so as not to impair the operator's ability to observe the right of way in front of him.

Note (advisory material) Common methods used to address windshield reflections include windshield slope, as well as the use of retractable curtains, switchable platform lighting (including both manual control of platform lights as well as automatic control in conjunction with door operation), and light shields.

5.15. Headlights

If operated during hours of darkness, each trolley shall be equipped with a headlight that, in conjunction with ambient lighting, is capable of revealing a person or motor vehicle at a specified distance in compliance with applicable state or local regulations.

5.16. Taillights

If operated during hours of darkness, each trolley shall be equipped with tail lighting (marker lights) that during hours of darkness are visible to the rear at a distance that is in compliance with applicable state or local regulations.

5.17. Battery Backup / Emergency Lighting

If operated during hours of darkness, each trolley shall be equipped with a battery for supplying automatic emergency lighting in the event that line voltage is lost. Emergency lighting shall provide illumination of the passenger compartment that is sufficient in intensity and duration to permit emergency evacuation of the car. The emergency lighting arrangement shall also provide for tail lighting to remain illuminated for a period compliant with applicable state or local regulations.

5.18. Grab Handles

Each trolley shall be equipped with grab handles, stanchions, bars or similar devices for the use of standing passengers and for the use of persons boarding or leaving.

5.19. Pilot or Fender

Each trolley shall be equipped with a rigid pilot or a rigid or drop-type fender, installed full-width in front of the leading wheels to deflect or trap foreign objects from the wheel's immediate path. An operational hazard analysis of the particular Vintage Trolley operation shall be conducted to determine whether a fender or a rigid pilot is more appropriate.

Note (advisory material): A drop-action fender located under the carbody (commonly referred to as a "lifeguard"), arranged so that the fender tray drops to the rail head if an object strikes the leading trip bar, is the most commonly employed type of fender for Vintage Trolleys. This type of fender was designed for use on systems with primarily street-running or other rights-of-way with a paved surface to rail head. The hazard analysis process should be used in the evaluation of the type of fender to be used in a particular Vintage Trolley operation.

5.20. Windshields and Windows

Each trolley shall be equipped with windshields installed using laminated safety glazing. Windows fitted to other portions of the car shall be installed with either laminated or

tempered safety glazing. Decorative clerestory glazing is exempted from this requirement.

5.21. Mirrors

Each trolley shall be equipped with rear vision mirrors or other means of observation, located so as to allow the operator a view to the rear along both sides of the trolley, as well as a view of the trolley's interior including the rear stepwell.

6. Additional Vehicle Equipment, Applicable Where Conditions Warrant

The following list of features and equipment is based on best practice from the transit industry, both past and present. The necessity of equipping trolleys with these items shall be based upon an operational hazard analysis of the particular Vintage Trolley operation. Where local conditions dictate the application of equipment listed in this section, compliance shall be documented in the Vehicle Safety Certification process.

The following operating conditions will significantly influence the application of these additional safety devices, and are to be considered in the hazard analysis process. These conditions include, but are not limited to:

- Single-person vs. two-person crew
- Street running vs. private right-of-way operation
- The number of cars in operation simultaneously
- Interaction between Vintage Trolleys and LRV equipment/infrastructure in cases where Vintage Trolleys operate on a Light Rail system
- Highway grade crossings
- Crossing of other rail systems at grade
- Clearances
- Grades
- Operating speeds

6.1. Deadman Interlock

Where local conditions warrant its application, each trolley should be equipped with a deadman system that requires the operator's continued presence at the controls in order for the car to remain in motion. The deadman system shall utilize a hand-operated or foot-operated control that must be continuously actuated by the operator while the braking system is in release. Any newly constructed replica Vintage Trolleys shall incorporate a deadman system.

6.2. Low-Air Interlock

Where local conditions warrant its application, all trolleys with air brakes should be equipped with a low-air interlock that will prevent the propulsion circuit from operating if the main reservoir air drops below a minimum safe working pressure. Any newly constructed replica Vintage Trolleys equipped with air brakes shall incorporate a low-air interlock.

6.3. Speedometer

Where local conditions warrant its application, each trolley should be equipped with a speedometer in clear view of the operator which is readable at all times during operation.

6.4. Turn & Stop Indicators

Where local conditions warrant their application, each trolley should be equipped with turn indicators that can be easily activated by the operator, and that are clearly visible to motorists and pedestrians on the street. Where local conditions warrant their application, each trolley should also be equipped with rear-facing stop indicators, clearly visible to motorists and pedestrians and any following trolleys, arranged to illuminate automatically when the vehicle's brakes are applied.

6.5. Windshield Wipers / Defrosters

Where local conditions are likely to cause ice, frost, fog, or moisture to collect on the windshield, each trolley should be equipped with appropriate window wipers and an effective means to prevent or remove such collection of ice, frost, fog, or moisture.

Annex A:

(Informative)

Other Factors Affecting Vintage Trolley Design and Operation

1. Vehicle Structural Requirements

The Task Force recognizes that structural design and integrity is a significant issue facing potential operators of vintage equipment and/or newly constructed “replica” Vintage Trolleys. However, owing to the wide variation in the types and ages of vintage vehicles as well as the varying conditions of service, it is not practical to provide a universal standard.

In considering the design of new “replica” Vintage Trolley vehicles, structural integrity and state and local requirements for same must be carefully considered. Vintage Trolley operators are strongly encouraged to develop a suitable standard for their particular operation based on a hazard analysis process. The operational factors detailed in Section 6 of this Standard provide a starting point for factors to be considered in the hazard analysis process.

For operators considering the use of restored original equipment, the Task Force recommends that whenever replacements or repairs are made to structural elements of the vehicle, care should be taken to ensure that the strength and integrity of the original construction is not reduced.

2. Fire Safety

The Task Force recognizes the importance of fire safety countermeasures for all rail transit operations, including Vintage Trolleys. Section 5.7 “Electrical Systems” of this Standard covers practices of critical importance in preventing vehicle fires. Vintage / Heritage Trolley operators should carefully review the criteria in Section 5.7 and establish appropriate fire safety countermeasures based on an operational hazard analysis of their particular operation, taking into account the types of rights-of-way over which the vehicles are operated.

Additionally, NFPA 130, “Standard for Fixed Guideway Transit and Passenger Rail Systems” is an accepted standard in the rail transit industry, and includes a comprehensive section on vehicles. NFPA 130, and other similar documents are, however, based on certain assumptions regarding the vehicles being utilized, particularly with regard to the types of materials incorporated in their construction. By their nature, Vintage / Heritage Trolley vehicles typically incorporate large amounts of wood, obsolete upholstery materials, canvas roof coverings and other traditional car construction and

finishing materials that are no longer found in the current generation of rail transit equipment. Because of this inherent difference in their construction, many Vintage Trolley vehicles will fall outside the scope of NFPA 130.

Note (advisory material) Section 1.1 Scope, subsection 1.1.3 of NFPA 130 specifically excludes “tourist, scenic, historic, or excursion operations”.

3. ADA Issues

The Task Force recommends that all Vintage / Heritage Trolley systems make themselves aware of ADA requirements and fully evaluate the impacts on their respective operations. The Task Force recognizes that meeting the accessibility requirements of the ADA using Vintage Trolleys may present major challenges. Because of the wide variation in the types and ages of vintage vehicles, the Task Force is not able to offer detailed guidance in this document.

For new projects, the Task Force recommends that any restored original or newly constructed “replica” Vintage / Heritage Trolleys be designed with ADA compliance in mind. There are many different accessibility solutions available to Vintage Trolley systems, and a future recommended practices document from the Task Force may address some of the more commonly used approaches.

Annex B:

(Informative)

Differences between Light Rail and Vintage / Heritage Trolley

Transportation Research Board definition of Light Rail: “Light rail transit is a metropolitan electric railway system characterized by its ability to operate single cars or short trains along exclusive rights-of-way at ground level, on aerial structures, in subways or, occasionally, in streets, and to board and discharge passengers at track or car-floor level”.

Among the commonly used definitions for types of rail transit, Light Rail is the closest to Vintage Trolley. This having been said, it is important to distinguish that although they have some characteristics in common, Vintage Trolleys are designed for a distinctively different type of service than Light Rail Vehicles (LRVs).

To summarize some of the important characteristics of a Vintage Trolley operation, and the differences between this type of service and Light Rail:

- Vintage Trolley operations provide the rider with an experience distinctly different than other forms of public transportation. From the sights, sounds and smells of the trolley traveling on the rail, the rider is made aware that they are traveling on a vintage conveyance, and the speed is slow enough, and stops close enough together, to enjoy the local scenery.
- Vintage Trolley vehicles and right-of-way are intentionally kept simple, consistent with safety, keeping construction, operation and maintenance costs substantially lower than for Light Rail.
- Passenger expectations for Vintage Trolley are different than for Light Rail (the expectation for Light Rail is modern, the expectation for Vintage Trolley is vintage), and a large percentage of Vintage Trolley passengers are often tourists.
- Vintage Trolleys are operated at much lower speeds than Light Rail, the lines are shorter, and they also do not typically include subway and elevated guideway operation. There are two broadly defined speed categories - traditional streetcars running under 25 mph, and PCC-type streetcars running at 40 mph and under.
- In contrast to air conditioned LRVs, many Vintage Trolleys use open windows and some have “open air” sections and open doorways.

- In contrast to LRVs, wood is often a major construction material in Vintage Trolleys. Even newly-constructed replica Vintage Trolleys still have substantial wood content to provide the authentic appearance of an older car.

Not all Vintage Trolleys are the same

It is also worth noting that Vintage Trolleys cover a sixty-year period in the development of transit equipment, from the 1890s through the end of domestic PCC car production in 1952. As a result their construction and performance varies widely.