DEPARTMENT OF REGULATORY AGENCIES

Passenger Tramway Safety Board

PASSENGER TRAMWAYS

3 CCR 718-1

[Editor's Notes follow the text of the rules at the end of this CCR Document.]

Rule 0.1 Preamble and incorporation by reference.

Section 25-5-704(1)(a) of the Colorado Revised Statutes allows the Colorado Passenger Tramway Safety Board ("Board") to "use as general guidelines the standards contained in the 'American Standard Safety Code for Aerial Passenger Tramways', as adopted by the American Standards Association, Incorporated, as amended from time to time." Since 1965, when this provision was enacted, the American Standards Association, Inc., has been succeeded by the American National Standards Institute, Inc. and the American Standard Safety Code updated. The relevant publications are now known as the "American National Standard for Passenger Ropeways – Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors – Safety Requirements" ("ANSI B77.1-2011") and the "American National Standard for Funiculars – Safety Requirements" ("ANSI B77.2-2004").

The Board adopts and incorporates by reference, with certain additions, revisions, and deletions, the ANSI standards as listed below:

B77.1-1960	June 8, 1960	USA standard Safety Code for Aerial Passenger Tramways
B77.1a-1963	July 1, 1963	Addenda to USA standard Safety Code for Aerial Passenger Tramways
B77.1b-1965	July 26, 1965	Addenda to USA standard Safety Code for Aerial Passenger Tramways
B77.1-1970	March 17, 1970	American National Standard - Safety Requirements for Aerial Passenger Tramways
B77.1-1973	January 25, 1973	American National Standard - Safety Requirements for Aerial Passenger Tramways
B77.1-1976	November 19, 1975	American National Standard - Safety Requirements for Aerial Passenger Tramways
B77.1a-1978	January 17, 1978	Addendum to American National Standard - Safety Requirements for Aerial Passenger Tramways
B77.1-1982	July 16, 1982	American National Standard - for passenger tramways - aerial tramways and lifts, surface lifts and tows – Safety Requirements
B77.1a-1986	December 2, 1985	Supplement to American National Standard - for passenger tramways - aerial tramways and lifts, surface lifts and tows - Safety Requirements
B77.1b-1988	March 14, 1988	Supplement to American National Standard - for passenger tramways - aerial tramways and lifts, surface lifts and tows – Safety Requirements
B77.1-1990	March 26, 1990	American National Standard for Passenger Tramways - Aerial Tramways

		and Lifts, Surface Lifts and Tows - Safety Requirements
B77.1-1992	December 2, 1992	American National Standard for Passenger Tramways - Aerial Tramways, Aerial Lifts, Surface Lifts, Tows - Safety Requirements
B77.1-1999	March 11, 1999	American National Standard for Passenger Ropeways - Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors - Safety Requirements
B77.2-2004	December 31, 2003	American National Standard for Funiculars- Safety Requirements Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors - Safety Requirements
B77.1-2006	April 17, 2006	American National Standard for Passenger Ropeways - Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors - Safety Requirements
B77.1-2011	May 2, 2011	American National Standard for Passenger Ropeways - Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors - Safety Requirements

As used in this document, the term “rules and regulations” means the referenced ANSI Standards and the “State of Colorado Department of Regulatory Agencies Passenger Tramway Safety Board Rules and Regulations.” The Board Rules and Regulations do not include any later amendments to or editions of the standards listed above.

A copy of each of the standards, codes, and guidelines listed above are available for public inspection at the Board office at the Division of Professions and Occupations, Department of Regulatory Agencies, 1560 Broadway, Suite 1350, Denver, Colorado, 80202, and at any state publications depository library. For further information regarding how this material can be obtained or examined, contact the Board's Program Director at 1560 Broadway, Suite 1350, Denver, Colorado, 80202, (303) 894-7785.

Section 1 General Requirements

1.1 Scope.

This document establishes a standard for the design, manufacture, construction, operation and maintenance of the passenger Tramways in the State of Colorado. For this standard, passenger Tramways include:

(1) Aerial Tramways (single and double reversible).

(2) Aerial lifts (detachable lifts, chair lifts, and similar equipment).

(3) Surface lifts (T-bar lifts, J-bar lifts, platter lifts, and similar equipment).

(4) Tows (wire and fiber rope tows).

(5) Funiculars.

(6) Conveyor lifts.

These rules and regulations are promulgated by the Colorado Passenger Tramway Safety Board pursuant to the authority conferred by C.R.S. 25-5-701 et. seq., as amended.

1.2 Purpose.

The purpose of this standard is to develop a system of principles, specifications, and performance criteria that will meet the following objectives:

(1) Reflect the current state of the art of Tramway design, operation, maintenance, and construction

It is recognized that certain dangers and risks are inherent in machines of this type and their operation. It is also recognized that inherent and other risks or dangers exist for those who are in the process of approaching, loading, unloading and departing from passenger Tramways. This system is intended to result in Tramways that are designed, constructed, operated, and maintained in a manner that helps reduce danger and exposure to risk to passengers and maintenance and operational personnel and to encourage improvements in productivity, efficiency, development, and progress consistent with the objectives.

Such a system with these stated objectives constitutes a safety standard.

1.2.3 Exceptions.

Strict application of the provisions of this standard may not be appropriate in every instance. Wherever it may be proposed to depart from the provisions of this standard, the authority having jurisdiction may grant exceptions from the literal requirements or permit the use of other devices or methods that provide features comparable to those included in this standard, providing that after receiving such evidence as the Board may require, the Board determines that:

(a) The granting of such an exception would be consistent with, and would aid in, implementing the legislative policy set forth in C.R.S. 25-5-701, and, either;

(b) Compliance with applicable rules and regulations from which an exception is sought would create an unreasonable operational or design condition; or

(c) Compliance with applicable rules and regulations from which an exception is sought would create an unreasonable economic burden.

1.2.4.1 Existing installations.

Existing tramways, when reinstalled, shall be classified as new installations (see 1.2.4.2). For tramways that have not been relocated, but have not had routine maintenance performed within the previous two years or longer, these tramways shall be subject to an acceptance test as outlined in 2.1.1.11, 3.1.1.11, 4.1.1.11, 5.1.1.11, 6.1.1.11, 7.1.1.11 (ANSI B77.1) and 2.1.1.11 (ANSI B77.2) Acceptance Test. This test and inspection shall verify that the tramway is in compliance with the rules and regulations that were in effect at the time the tramway was originally constructed and current rules that affect all tramways. A tramway modification or alteration shall be defined by 21.1 and meet the requirements of 21.3, 21.4, and 21.5.

If an ANSI B77.1 or CPTSB rule was in existence at the time of the ropeway installation date or modification date of an existing tramway and is absent from the current CPTSB rules and regulations, it shall continue to be required.

1.2.4.2 New Installations.

New installations which have not received their initial registration by the effective date of these rules and regulations shall meet the requirements in effect at the time of initial registration.

1.2.4.3 Major Tramway Modification.

A major Tramway modification shall be defined as an alteration of the current design of the Tramway which results in:

(a) A change in the design speed of the system;

(b) A change in the rated capacity by changing the number of carriers, spacing of carriers, or load capacity of carriers;

(c) A change in the path of the rope;

(d) Any change in the type of brakes and/or backstop devices or components thereof;

(e) A change in the structural arrangements;

(f) A change in power or type of prime mover or auxiliary engine;

(g) A change to control system logic.

1.2.5 Interpretation of Rules and Regulations.

Additional explanation or interpretation of these rules and regulations shall be the responsibility and at the reasonable discretion of the Board. An appeal to the ruling of the Board may be made in conformance with C.R.S. 24-4-106.

1.2.6 Existing Laws or Ordinances.

This standard shall be considered as supplementary to any existing law or ordinance covering the installation or operation of these facilities. All construction shall be in accordance with applicable codes of the state or its political subdivisions and the codes and standards of the industry.

1.4 Definitions.

authority having jurisdiction: The Colorado Passenger Tramway Safety Board is the authority having jurisdiction over passenger tramway facilities in the State of Colorado. Other public or private bodies may exercise a concurrent jurisdiction over a particular installation by virtue of location or other interests. No such joint jurisdiction shall be limited by these rules and regulations; neither shall these requirements be mitigated by others without the concurrence of the Board.

critical components: Critical components are those parts of a tramway or lift system, the failure of which is likely to cause serious injury to the passengers. The list of critical components for a tramway or lift system shall include, but not be limited to the following:

(1) Carrier, including grip, hanger, chair, or gondola;

(2) Haul rope sheaves, sheave units and their attachments;

(3) Terminal sheaves and their attachments;

(4) Tension systems and their attachments;

(5) Wire rope, including haul ropes, track ropes and counterweight ropes.

design integrity: Verification of design integrity means verification that the tramway conforms to the original design accepted by the Board and such modifications as have been authorized by the Board.

Qualified Engineer: An engineer who is licensed as a Professional Engineer in the State of Colorado.

Qualified Software Programmer: A qualified software programmer is a person who, by his/her knowledge, experience, and training in the field of software programming and ropeways, or authorized by the ropeway manufacturer, is capable of developing and changing the software logic to operate the protection, operational and supervision circuits for the aerial ropeway. The software programmer is expected to be familiar with the current CPTSB and ANSI standards.

safety gate: See Stop Gate.

stop gate: A stop gate is a type of automatic stopping device that, when actuated by a passenger's weight, contact, or passage, will automatically stop the tramway. For the purposes of complying with these rules and regulations, stop gate and safety gate shall be considered to have the same meaning.

1.5 Quality assurance program.

Written Quality Assurance (QA) programs shall be developed and utilized to ensure the integrity of the design, manufacture, installation, operation, and maintenance of passenger ropeways. The objective of these QA programs is to assure that passenger ropeways meet the applicable requirements of this standard.

1.5.1 Design.

A Qualified Engineer shall design, or be in responsible charge of the design of new and modified passenger ropeways (see 1.4 – *Qualified Engineer*).

The designer's QA program for new, modified, or relocated ropeways shall include verification and documentation of the design criteria. This program shall include calculations, analysis, and checking procedures.

For relocated ropeways the designer of the relocation shall be responsible for the establishment of the QA program for that installation. The designer shall describe what QA methods were used for the various components of the relocated ropeway. These methods may include sampling procedures, nondestructive testing, and prior satisfactory "in use" service.

1.5.2 Manufacture.

The ropeway manufacturer's QA program for ropeways shall include verification and documentation that manufactured parts conform to the design criteria. For relocated ropeways, this requirement is for newly manufactured parts only.

1.5.3 Construction.

For new or modified ropeways, a qualified engineer shall certify to the owner that the construction and installation has been completed in accordance with the final design criteria for such work.

The installer's QA program for all new or modified ropeways, including rope tows, shall include verification and documentation that the ropeways installation conforms to the design criteria.

1.5.4 Operation and maintenance.

The owner's QA program for all ropeways shall include verification and documentation that the ropeway is operated and maintained in accordance with the design criteria, including the performance of in-use periodic testing by qualified personnel.

Section 2 Aerial Tramways

Note: Timeframes relate to the ropeway installation date or modification date whichever controls, unless otherwise noted.

2.1.1.3.1 Location of power lines. Power lines shall be located a minimum distance equal to the height of poles or support structures from any passenger tramway so that poles and electrical lines cannot touch any portion of the tramway, loading or unloading points or platforms and tow path, if applicable, upon collapse of poles or lines, unless suitable and approved precautions are taken to safeguard human lives.

2.1.1.3.2 Air space requirements.

2.1.1.3.2.1 Structures.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by vertical planes commencing at a point thirty-five (35) feet from the intersection of the vertical planes of the ropes or cables and ground surface.

For purposes of this rule, buildings controlled by the licensee used primarily for maintenance and operation of the lift and other tramways shall not be considered structures; however, buildings must comply with the following.

(1) No flammable liquids may be stored in the building outside of a UL listed container or storage cabinet, unless such flammable liquids are in the original containers and intended for daily usage. Quantities must be consistent with normal daily use. Class I or II flammable storage materials shall be limited to 2 gallons in a UL listed container and must be stored either in an outside storage area or in a UL listed cabinet.

(2) The building must be within the view of the attendant but not impair the sight line of the lift.

(3) Entrances to all machinery, operators', and attendants' rooms shall be locked when not in use. Unattended entrances accessible to public, which may be left open, shall be equipped with barriers to prevent entry.

2.1.1.3.2.2 Cables or ropes.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

Any cable or rope installed on or near a ropeway that may represent a hazard to the ropeway shall be monitored to automatically stop the ropeway if the cable or rope fails. Failure would be defined as per Section 23.1 (g).

EXCEPTION: Track or haul ropes are excluded from this rule.

2.1.1.11.2 Acceptance tests.

Before an aerial tramway that is new or relocated or that has not been operated for routine maintenance within the previous 2 years is opened to the public, it shall be given thorough tests by qualified personnel to verify compliance with the plans and specifications of the designer. The designer or manufacturer shall propose and submit an acceptance test procedure.

Thorough load and operating tests shall be performed under full loading and any partial loadings that may provide the most adverse operating conditions. Test load per carrier shall be 110% of the design live load. The functioning of all manual and automatic stops, limit switches, deropement switches, and communications shall be checked. Acceleration and deceleration rates shall be confirmed under all loadings (see 2.1.2.4, 2.1.2.5). Motive power and all braking devices (see 2.1.2.6) shall be proved adequate under the most adverse loading conditions.

A plot of rope speed versus time shall be recorded for stops that the manufacturer or Qualified Engineer has designated in the acceptance test procedure. As a minimum, the plot shall show the rope speed every 0.2seconds from the initiation of the stop to when the rope is stopped.

The final brake system settings and brake force test values shall be documented in the acceptance test results (see also 2.1.2.6).

Any changes to software logic that would affect a Protection or Operation Circuit after the start of initial testing shall result in a restart of testing to ensure software logic changes have not affected those systems already tested. Retesting for changes in software parameters shall be at the discretion of the Authorities Having Jurisdiction (AHJ).

2.1.1.12 Safety of operating and maintenance personnel.

Provision shall be incorporated in the aerial tramway design to render the system inoperable when necessary for the protection of personnel working on the aerial tramway. See 2.3.1.1 for placement of applicable warning signs.

The aerial tramway shall incorporate an audible warning device that signals of an impending start of the ropeway. After the start button is pressed, the device shall sound an audible alarm for a minimum of 2 seconds and shall continue until the ropeway begins to move. The audible device shall be heard inside and outside all terminals and machine rooms above the ambient noise level.

2.1.2.1.1 Auxiliary power unit.

An auxiliary power unit (APU) with an independent power source shall be provided to move the carrier(s) to a terminal in the event of failure of the primary power unit.

A single auxiliary power unit shall not be used except to unload passengers and for maintenance purposes. This unit shall be electrically wired to meet the requirements of 2.2.1.7.2 so that it can be stopped by the Emergency Shutdown Circuit. The auxiliary power unit shall not depend upon the mechanical integrity of the prime mover to drive the unit. The prime mover shall be disconnectable in event of a mechanical lockup.

The auxiliary power unit shall be designed to become operational and move the carriers to terminal areas within 1 hour from the time of initiating its connection.

2.1.2.5 Brakes.

The aerial tramways shall have the following friction-type brakes:

- service brake (see 2.1.2.5.1);
- drive sheave brake (see 2.1.2.5.2);
- track cable brake (see 2.1.4.3.2).

All drive braking systems shall be designed and monitored to ensure that:

a) once the aerial tramway begins movement in the intended direction, the brakes are maintained in the open position;

b) the service brake shall not open prior to the drive system developing torque;

c) multiple brakes or brake systems shall not be simultaneously applied such that excessive deceleration is applied to the aerial tramway under any condition of loading;

d) the failure of one braking system to properly decelerate the aerial tramway shall automatically initiate a second braking system, if any.

The service brake and drive sheave brake shall be designed such that failure of one braking system shall not impair the function of the other systems, and all brakes shall have the braking force applied by springs, weights, or other approved forms of stored energy.

The service brake and drive sheave brake shall be designed to assure operation under all anticipated conditions.

Deceleration rates specified in 2.1.2.4 shall be achieved by each brake without the aid of other braking devices or drive regeneration.

All drive braking systems shall be capable of operation to comply with the daily inspections and periodic testing.

A qualified engineer shall furnish a written procedure to be followed and specify the auxiliary equipment necessary for periodic testing and adjustment of the holding force of each brake. This procedure shall be performed during the acceptance test, and at the frequency specified, to demonstrate the ability of each brake to produce the required torque.

Such testing shall be accomplished as part of normal maintenance during the operating season, but shall be performed when the aerial tramway is not open to the public.

2.1.2.5.1 Service brake.

The service brake can be located at any point in the drive train such that there is no belt, friction clutch, or similar friction-type device between the brake and the drive sheave.

The service brake shall be an automatic brake to stop and hold the aerial tramway under the most unfavorable design loading condition. The rate of application of this brake shall be adjustable. This brake shall have the design capability to decelerate the aerial tramway at a rate of 2 feet (0.6 meter) per second squared when operating under the most unfavorable condition of overhauling load and at full speed.

2.1.2.5.2 Drive sheave brake.

Drive sheave brake controls shall be located and the brake activated in a manner that deceleration will begin within 3 seconds after the operator or attendant reacts to the stimulus to apply the brake.

The drive sheave brake shall operate on the drive sheave assembly.

Application of the drive sheave brake shall automatically disconnect the power source to the power unit in use. This brake shall act automatically when the speed of the haul rope exceeds the design speed by 15% in either direction or if the carriers travel beyond their normal stopping position in either terminal.

The drive sheave brake shall be an automatic brake to stop and hold the aerial tramway under the most unfavorable design loading condition. The rate of application of this brake shall be adjustable. This brake shall have the design capability to decelerate the aerial tramway operating at full speed, with the design loading condition most unfavorable to stopping, at 1.5 feet (0.5 meter) per second squared and within the parameters specified in 2.1.2.4.

2.1.2.6.1 General.

Moving machine parts that normally may be in reach of personnel shall be fitted with guards conforming to *American National Standard Safety standard for mechanical power transmission apparatus* , ANSI/ASME B15.1-1992.

Protection against static electricity shall be provided.

Fire-fighting device(s) shall be available.

2.1.2.7.4 Egress. Permanent stairs and walkways shall be provided for egress from all machinery areas. The maximum angle of inclination for the stairs shall not exceed 70 degrees. Stairs and walkways shall have a minimum width of 18 inches. Stair treads shall have a minimum depth of 4 inches. Walkway surfaces and stair treads shall be constructed of non-skid bar grating or expanded metal. Handrails shall be provided.

2.1.2.11 Manual and automatic control devices.

All control devices and switches shall conform to the requirements of 2.2.1.7.

2.1.2.11.1 Manual control devices.

The following manual control devices that will initiate a stop shall be installed and conspicuously and permanently marked:

a) a stop device at each terminal platform;

b) a stop device on the conductor's control console in each carrier when a conductor is required in the carrier;

c) a stop device at the operator's station;

d) emergency shutdown device (see 2.1.5 and 2.2.1.7.2).

2.1.2.11.2 Provisions for automatic stop devices.

The following automatic stop devices or systems shall be installed:

a) a device(s) that will be actuated in the event manual or automatic controls fail to reduce aerial tramway speeds to design values at critical control points along the line;

b) a device(s) that will stop the aerial tramway before the carrier reaches its limit of travel. An adequate bumper system shall also be installed;

c) a device(s) that will stop the aerial tramway before any counterweight, other tension system device, or tension sheave carriage reaches either end of its travel, or when the tension system exceeds its range of normal operating travel. When pneumatic or hydraulic tension systems are used, pressure-sensing devices shall also be incorporated that will stop the aerial tramway system in case the operating pressure goes above/below the design pressure range. Such pressure-sensing devices shall be located close to the actual tensioning device. It shall not be possible to isolate the pressure sensor from the actual tensioning device;

d) a device that will be actuated by the application of a track cable brake. These devices shall effect an emergency shutdown;

e) a device that will stop the aerial tramway in the event a cabin door is not closed;

f) a mechanical overspeed device mounted on the driving sheave shall effect an emergency shutdown in the event of a 15% overspeed;

g) a device that will effect a stop of the aerial tramway in the event of inadvertent actuation of the brake system(s);

h) a device that will stop the aerial tramway in the event that the haul rope comes in contact with the track cable or other grounded equipment (bicable systems only).

2.1.3.3.2 Sheave and sheave unit design.

Sheave flanges shall be as deep as possible, considering other features of the system. At the same time, rope attachments shall be designed in relation to the sheave groove so as not to contact sheave flanges during normal operations, taking into consideration the anticipated amount of wear of the sheave liner groove. Attachments shall be allowed to contact sheave flanges adjacent to the haul rope when the carrier swings, provided that this is considered in the design of the attachments and sheaves. Furthermore, rope attachments, sheave flanges, and hanger guides shall be designed so that hangers cannot be caught behind guides, and so that ropes and attachments cannot be deroped from sheaves if the carrier is swinging within design limits as it approaches or passes the tower.

Suitable guards, of sufficient strength to resist the lateral forces caused by an inside deropement, shall be installed.

Construction of the entire sheave unit shall be such that the rope cannot become entangled in the sheave unit in the event the rope leaves the sheave toward the outside.

On each sheave unit, rope-catching devices shall be installed to reduce the risk of the rope moving excessively in the direction of the load on the sheave unit in the event of deropement. These devices shall be located less than one-half the diameter of the sheaves from the normal operating position of the rope and shall extend a minimum of two rope diameters beyond the sheave flange. They shall be designed to permit the passage of the rope and attachments after deropement.

On each sheave unit, suitable devices shall be installed and maintained that will stop the aerial tramway in case of deropement (see 2.1.2.11.2(h)).

If the gage of the haul rope system is varied at any point along the line, the horizontal departure at any one tower shall be provided for in the design so that deropement cannot occur by virtue of such a departure.

Sheave mounts or mounting frames shall be designed to be adjustable, allowing the sheave units to be aligned and held in the plane of the rope.

See also 2.1.1.4 through 2.1.1.4.7 for the effect of tower height and location on sheave units.

2.1.5 Provisions for operating personnel.

Operator and attendant stations shall be located to provide visual surveillance of the station and the line in the vicinity of the station or in a cabin. When enclosed, they shall be heated, ventilated, and lighted as required to perform the function of the station. They shall contain, inside the station when enclosed:

a) the communications and controls required of the station;

b) the operating instructions and emergency procedures;

c) a fire extinguisher.

This does not preclude additional communications and controls located outside the enclosed station. All enclosed stations shall be locked to prevent unauthorized entry when unattended.

The operator shall be located where he/she can observe the aerial tramway in operation and may be located in a cabin. The physical appearance, operation, and location of emergency shutdown devices shall differentiate them from other operating devices or controls. The operator's controls and communicating devices shall be within reach without leaving his/her position.

2.1.6.1 Operational manual.

The designer of each new or reinstalled aerial tramway shall prepare an operational manual for use with each installation. The manual shall describe the function and operation of the components and provide instructions for the correct usage of the installation.

2.2.1.3 Protection.

All transformer stations and other high voltage electrical equipment shall be marked with conspicuous warning signs and shall be protected so as to prevent unauthorized persons from entering the area or

coming in contact with any portion of the equipment or wiring. All power equipment shall be protected against overloads by circuit breakers or fuses.

2.2.1.4 Voltage limitations for overhead circuits.

Signal, communication, and control circuits may be supported between towers that support the aerial tramway. Voltage on overhead or exposed circuits shall be limited to 50 volts with the exception of the intermittent ring-down circuits for telephone systems.

2.2.1.7 Operating control circuits.

2.2.1.7.1 Operating circuits.

All aerial tramway systems shall contain one or more normally de-energized circuit(s) that, when energized, allow(s) the system to start, accelerate to and run at designated speeds, and when interrupted or de-energized by manual stop switches, automatic stop devices, inadvertent ground or a power failure, cause(s) the system to stop.

Operating circuits shall not have anything across or parallel with the contacts of switches, relays, or automatic stopping devices (including solid state devices monitoring the circuits or devices), unless it can be shown that any failure mode of the device placed across the contacts does not defeat the purpose of the operating circuit devices.

All start/run/stop and speed control switches shall be conspicuously and permanently marked with the proper function.

All automatic and manual stop and shutdown devices shall be of the manually reset type. An exception to this requirement is allowed for magnetic or optically operated automatic stop devices, if the operating circuit is such that it indicates that such devices initiated the stop and the circuit is of the manually reset type.

Manual stop switches (push button) shall be positively opened mechanically and their opening shall not be dependent upon springs.

2.2.1.7.2 Emergency shutdown circuit.

All aerial tramway systems shall include a normally de-energized circuit that, when energized, allows the system to run and when interrupted, effects a shutdown (see 1.4.22). The shutdown shall have priority over all other control stops or commands. If, for any reason, the operator has lost control of the aerial tramway while using the operating control circuitry, the controls shall include an emergency shutdown circuit allowing the operator/attendant to stop the aerial tramway. Any one of the following conditions is considered a loss of control of an aerial tramway:

a) Aerial tramway will not SLOW DOWN when given the command to do so;

b) Aerial tramway will not STOP when given the command to do so;

c) Aerial tramway OVERSPEEDS beyond control settings and/or maximum design speed;

d) Aerial tramway ACCELERATES faster than normal design acceleration;

e) Aerial tramway SELF-STARTS or SELF-ACCELERATES without the command to do so;

f) Aerial tramway REVERSES direction unintentionally and without the command to do so.

The shutdown circuit shall not have anything across or parallel with the contacts of switches, relays, or other devices in this circuit, but can have such devices as solid state monitoring devices and microprocessors in series with the manual shutdown device and main control contactor (main control disconnect coil).

This circuit shall include a manual shutdown device at each station and in the machine room. The shutdown device shall be conspicuously and permanently marked and shall be red in color (see 2.1.5).

2.2.1.7.3 Bypass circuits.

A temporary bypass circuit may be installed for malfunctions in operating control circuitry (see 2.3.2.5.9).

2.2.12 Software security.

The “as built” documents shall include a procedure, developed by the aerial lift manufacturer or a Qualified Engineer, to ensure the security of the software logic and operating parameters that will control the aerial lift. Upon completion of the acceptance testing this procedure shall be implemented in a manner that will prevent unauthorized personnel from making changes to the software logic or operating parameters. All programmable logic and parameters shall be documented.

Software programming and changes to the software logic shall be made by a qualified software programmer. Software programmers shall provide documents that include:

1. software logic development date;
2. software logic current revision number;
3. software logic current revision date;
4. list of software logic changes for each revision that explain changes in detail;
5. name of software logic programmer that made each revision;
6. testing procedures for each change of software logic;
7. personnel that completed the testing.

2.3.1.3 Operational plan for transportation of recreational equipment. Each licensee shall have an operational plan that has procedures for transportation of sports equipment and recreational devices by foot passengers. This plan shall be consistent with the tramway manufacturer's specifications and instructions, if any.

2.3.5.5 Software parameter log.

A software parameters log shall be maintained for each aerial lift. This log is intended for changes in software parameters that can be altered which affect the supervision circuit. The log shall include, but not be limited to:

a) current software parameter values;

b) changes to software parameter values;

c) date of changes made;

d) documentation of testing for each change of parameter values;

e) personnel making parameter changes.

Section 3 Detachable grip aerial lifts

Note: Timeframes relate to the ropeway installation date or modification date whichever controls, unless otherwise noted.

3.1.1.3.1 Location of power lines.

Jan, 1, 1977 to Present:

Power lines shall be located a minimum distance equal to the height of poles or support structures from any passenger tramway so that poles and electrical lines cannot touch any portion of the tramway, loading or unloading points or platforms and tow path, if applicable, upon collapse of poles or lines, unless suitable and approved precautions are taken to safeguard human lives.

3.1.1.3.2 Air space requirements.

3.1.1.3.2.1 Structures.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by vertical planes commencing at a point thirty-five (35) feet from the intersection of the vertical planes of the ropes or cables and ground surface.

For purposes of this rule, buildings controlled by the licensee used primarily for maintenance and operation of the lift and other tramways shall not be considered structures; however, buildings must comply with the following.

(1) No flammable liquids may be stored in the building outside of a UL listed container or storage cabinet, unless such flammable liquids are in the original containers and intended for daily usage. Quantities must be consistent with normal daily use. Class I or II flammable storage materials shall be limited to 2 gallons in a UL listed container and must be stored either in an outside storage area or in a UL listed cabinet.

(2) The building must be within the view of the attendant but not impair the sight line of the lift.

(3) Entrances to all machinery, operators', and attendants' rooms shall be locked when not in use. Unattended entrances accessible to public, which may be left open, shall be equipped with barriers to prevent entry.

Jan. 1, 1994 to May 15, 2000:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface

Dec. 30, 1977 to Jan. 1, 1994:

No passenger tramway installation shall be permitted whenever the Passenger Tramway Operator does not have permanent and irrevocable control of the following air space (except when the passenger tramway is located on Forest Service land): the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface

Prior to Dec. 30, 1977:

None required

3.1.1.3.2.2 Cables or ropes.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

Any cable or rope installed on or near a ropeway that may represent a hazard to the ropeway shall be monitored to automatically stop the ropeway if the cable or rope fails. Failure would be defined as per Section 23.1 (g).

EXCEPTION: Track or haul ropes are excluded from this rule.

Prior to May, 15, 2000:

Not required

3.1.1.5.2 Clearances.

Jan, 1, 1984 to Nov. 1, 1991:

Terminals and towers shall be designed and installed to provide the clearances as herein specified and to minimize surge of the line under operating conditions. Local wind conditions shall be taken into consideration.

The minimum distance between passing carriers, each swung 10 degrees inward from the vertical, shall be the greater of the following:

a) 2 feet 6 inches

b) 1/2% of the span length (applies to gondolas only).

The distance between haul ropes, (or track cables), for the purpose of these checks, shall be considered as equal to the gauge of the line.

External structures, posts, or obstructions, other than lift structural components, shall have at least 4 feet (1.22 meters) of clearance from either edge of a loaded open carrier passenger seat or open cabin body (measured from the outermost attachments on or parts of the carrier while the carrier is hanging in a vertical position).

Prior to Jan. 1, 1984:

Terminals and towers shall be designed and installed to provide the clearances as herein specified and to minimize surge of the line under operating conditions. Local wind conditions shall be taken into consideration.

The minimum distance between passing carriers, each swung 10 degrees inward from the vertical, shall be the greater of the following:

a) 2 feet 6 inches

b) 1/2% of the span length (applies to gondolas only).

The distance between haul ropes, (or track cables), for the purpose of these checks, shall be considered as equal to the gauge of the line.

3.1.1.5.3 Terminal clearances.

Prior to Nov. 1, 1991:

Not required.

3.1.1.11.2 Acceptance tests.

Before an aerial lift that is new or relocated or that has not been operated for routine maintenance within the previous 2 years is opened to the public, it shall be given thorough tests by qualified personnel to verify compliance with the plans and specifications of the designer. The designer or manufacturer shall propose and submit an acceptance test procedure.

Thorough load and operating tests shall be performed under full loading and any partial loadings that may provide the most adverse operating conditions. Test load per carrier shall be 110% of the design live load. The functioning of all push-button stops, stop cords, automatic stops, limit switches, deropement switches, and communications shall be checked. Acceleration and deceleration rates shall be confirmed under all loadings (see 3.1.2.4, 3.1.2.5). Motive power and all braking and rollback devices (see 3.1.2.6) shall be proved adequate under the most adverse loadings.

On systems operating at 600 feet per minute (3 meters per second) or greater, a plot of rope speed versus time shall be recorded for stops that the manufacturer or Qualified Engineer has designated in the acceptance test procedure. As a minimum, the plot shall show the rope speed every 0.2 seconds from the initiation of the stop to when the rope is stopped. The final brake system settings and brake test values shall be documented in the acceptance test results.

Any changes to software logic that would affect a Protection or Operation Circuit after the start of initial testing shall result in a restart of testing to ensure software logic changes have not affected those systems already tested. Retesting for changes in software parameters shall be at the discretion of the Authorities Having Jurisdiction (AHJ).

3.1.2.1.3 Power unit interlock.

Prior to May 15, 2006:

Not required.

3.1.2.5 Stops and shutdowns.

For all stops, the minimum average rate of the carrier's horizontal deceleration shall be adequate to prevent carrier collision in the receiving and launching mechanisms.

The maximum rate of the rope deceleration shall be 5 feet per second squared (1.52 meters per second squared). These measurements shall be measured over any one second interval under any operating condition while the carrier is attached to the haul rope and referenced to the rope speed at the drive terminal.

Normal stop: (see 1.4 – *normal stop*). If a service brake is required (see table 3-1), it shall have been applied by the time the aerial lift comes to a stop.

Emergency shutdown: (see 1.4 – *emergency shutdown*) The drive sheave brake shall be applied. The service brake, if installed, shall have been applied by the time the aerial lift comes to a stop. The designer shall designate which control functions of the ropeway system shall initiate an emergency shutdown.

The designer may define other stopping modes other than normal and emergency shutdown. For other stopping modes, the designer shall specify the method of stopping, including the type and timing of brake(s) that may be applied, and the stopping criteria.

Table 3-1 Required Stopping Devices

Aerial lift category	Service Brake	Drive sheave brake	Rollback device	Retarding device (see 3.1.2.4)
Self braking: A lift that decelerates, stops & remains stopped within the service brake performance requirements without a braking device	Required*	Required	Not Required	Not Required
Non-overhauling: A lift that will not accelerate in either direction when it is not driven, but is not self-braking	Required	Required	Not Required	Not Required
Overhauling reverse direction: A lift that will accelerate in the reverse direction when it is not driven	Required*	Required	Required	Not Required
Overhauling forward: A lift that will accelerate in the forward direction when it is not driven	Required	Required	Not Required	Required

* A service brake is not required if the overhauling, reverse direction aerial lift will meet the service brake stopping requirements under the most unfavorable design loading conditions

3.1.2.6 Brakes and rollback devices.

May 15, 2006 to Present:

The aerial lift shall have the following friction-type brakes and other devices as specified in table 3-1:

- service brake (see 3.1.2.6.1);

- drive sheave brake (see 3.1.2.6.2);

- rollback device (see 3.1.2.6.3).

All braking systems shall be designed and monitored to ensure that:

a) once the aerial lift begins movement in the intended direction, the brakes are maintained in the open position;

b) the service brake shall not open prior to the drive system developing sufficient torque to prevent overhauling;

EXCEPTION – For an aerial lift that overhauls only in the reverse direction, a drive train backstop (3.1.2.6.4) may be used in lieu of the above.

c) multiple brakes or brake systems shall not be simultaneously applied such that excessive deceleration is applied to the aerial lift under any anticipated conditions of loading;

d) the failure of one braking system to properly decelerate the aerial lift shall automatically initiate a second braking system, if any.

The service brake, drive sheave brake, and rollback device shall be designed such that failure of one braking system will not impair the function of the other systems. All brakes shall have the braking force applied by springs, weights, or other approved forms of stored energy.

The service brake, drive sheave brake, and rollback device shall be designed to assure operation under all anticipated conditions.

Each braking system shall be capable of operation to comply with daily inspections and periodic testing.

The manufacturer or a Qualified Engineer shall furnish a written procedure to be followed and specify the auxiliary equipment necessary for periodic testing and adjustment of the holding force of each brake, rollback, and backstop device. The procedure shall additionally specify:

e) the minimum and maximum holding force for the service brake and drive sheave brake independently, and;

f) the minimum and maximum stopping distance for the service brake and drive sheave brake independently, with a specified loading condition.

This baseline procedure shall be performed at the completion of the acceptance test and then at the frequency specified in order to demonstrate the ability of each brake to produce the required force.

Testing shall be accomplished as part of normal maintenance during the operating season, but shall not be performed when the aerial lift is open to the public. As a minimum, this testing shall be performed monthly during the operating season.

If a device is permanently installed to cause a brake, or rollback device, to be disabled for testing or reverse rotation, it shall be electronically monitored so that the aerial lift cannot be operated in its normal mode when the brake is so disabled.

Prior to May 15, 2006:

The aerial lift shall have the following friction-type brakes and other devices as specified in table 3-1:

- service brake (see 3.1.2.6.1);

- drive sheave brake (see 3.1.2.6.2);

- rollback device (see 3.1.2.6.3).

All braking systems shall be designed and monitored to ensure that:

a) once the aerial lift begins movement in the intended direction, the brakes are maintained in the open position;

b) the service brake shall not open prior to the drive system developing sufficient torque to prevent overhauling;

EXCEPTION – For an aerial lift that overhauls only in the reverse direction, a drive train backstop (3.1.2.6.4) may be used in lieu of the above.

c) multiple brakes or brake systems shall not be simultaneously applied such that excessive deceleration is applied to the aerial lift under any anticipated conditions of loading;

d) the failure of one braking system to properly decelerate the aerial lift shall automatically initiate a second braking system, if any.

The service brake, drive sheave brake, and rollback device shall be designed such that failure of one braking system will not impair the function of the other systems, and all brakes shall have the braking force applied by springs, weights, or other approved forms of stored energy.

The service brake, drive sheave brake, and rollback device shall be designed to assure operation under all anticipated conditions.

Deceleration rates specified in 3.1.2.4 shall be achieved by each brake without the aid of other braking devices or drive regeneration.

Each braking system shall be capable of operation to comply with daily inspections and periodic testing.

A Qualified Engineer shall furnish a written procedure to be followed and specify the auxiliary equipment necessary for periodic testing and adjustment of the holding force of each brake, rollback, and backstop device. This procedure shall be performed during the acceptance test, and then at the frequency specified, to demonstrate the ability of each brake to produce the required torque.

Such testing shall be accomplished as part of normal maintenance during the operating season, but shall be performed when the aerial lift is not open to the public.

If a device is permanently installed to cause a brake, or rollback device, to be disabled for testing or reverse rotation, it shall be electronically monitored so that the aerial lift cannot be operated in its normal mode when the brake is so disabled.

3.1.2.6.1 Service brake.

The service brake can be located at any point in the drive train such that there is no belt, friction clutch, or similar friction-type device between the brake and the drive sheave. The service brake shall not act on the same braking surface as the drive sheave brake.

The service brake shall be an automatic brake to stop and hold the aerial lift under the most unfavorable design loading condition. Deceleration rates specified in 3.1.2.5 shall be achieved by the service brake without the aid of other braking devices or drive regeneration.

The brake shall be in a normally applied position. It shall be held open for operation of the aerial lift and shall be applied when its power is removed or the aerial lift is stopped.

3.1.2.6.2 Drive sheave brake.

The drive sheave brake shall operate on the drive sheave assembly.

The drive sheave brake shall be an automatic brake to stop and hold the aerial lift under the most unfavorable design loading condition. Deceleration rates specified in 3.1.2.5 shall be achieved by the drive sheave brake without the aid of other braking devices or drive regeneration.

Application of the drive sheave brake shall automatically disconnect the power source to the power unit in use. This brake shall act automatically when the speed of the haul rope exceeds the design value by 15% in either direction.

3.1.2.6.3 Rollback device.

The rollback device shall act directly on the drive sheave assembly or on the haul rope. Under the most unfavorable design loading condition, the rollback device shall automatically control reverse rotation of the aerial lift, as defined herein. The rollback device shall bring the aerial lift to a stop if unintentional reverse rotation occurs. The rollback device shall be activated if the haul rope travels in excess of 36 inches (915 mm) in the reverse direction (see 3.2.3.7 for electrical requirements).

3.1.2.6.4 Drive train backstop.

A drive train backstop device may be installed on an aerial lift. If used, it shall conform to the following requirements:

a) A drive train backstop device is a one-way or overrunning clutch device. The drive train shall be so arranged that there is no belt, friction clutch, or similar friction-type device between the backstop device and the drive sheave;

b) The backstop device shall be rated for the maximum design load;

c) Under the most unfavorable design loading condition, the backstop device shall automatically prevent reverse rotation of the aerial lift before the aerial lift travels in excess of 36 inches (915 mm) in the reverse direction.

3.1.2.7.4 Other machinery locations.

Jan. 1, 1988 to present:

The acceleration/deceleration areas, conveyor areas, and associated access ways shall be well ventilated. These areas shall have a permanently installed lighting system which is adequate for proper machinery maintenance and safety of personnel. Access ways shall be provided for inspection and proper maintenance while the equipment is in operation. Access ways shall have:

(1) Stairs or secured ladder.

(2) Skid resistant floors, platforms, or catwalks which provide access as defined in subparagraph three herein to all manual and automatic safety devices (switches) and tensioning system components. Access to other areas shall be denied while equipment is in operation.

(3) A minimum vertical clearance of 80 inches (2 m), and a minimum horizontal clearance of 24 inches (61 cm). If a component crosses the access way, vertical clearance may be reduced as follows: a) a minimum of 60 inches (152 cm), for a maximum distance of 36 inches (92 cm); or b) a minimum of 48 inches (122 cm), for a maximum distance of 12 inches (30.5 cm). If the obstruction exceeds 15 inches (38 cm), in height, above the floor, stairs shall be provided to allow passage over the obstruction.

(4) Railings protecting floor openings and moving machine parts. Moving parts shall be considered guarded if they are located a minimum of 12 inches (30.5 cm) from the vertical plane of the railing. Railings shall consist of a top rail, located 36 42 inches (91 106 cm) from the walking surface; a mid rail, located approximately midway between top rail and walking surface; and a 4 inch high (10 cm) solid toe plate. Railings shall be designed and constructed to resist anticipated loadings.

The requirements of rules 3.1.2.6.1 and 3.1.2.6.4, as revised, shall be in effect for all installations constructed subsequent to January 1, 1988. For all installations completed prior to January 1, 1988 reasonable compliance with Rules 3.1.2.6.1 and 3.1.2.6.4 as revised shall be accomplished prior to November 1, 1990.

Prior to Jan 1, 1988:

Not required.

3.1.2.7.5 Egress.

Jan. 1, 1994 to Present:

Permanent stairs and walkways shall be provided for egress from all machinery areas. The maximum angle of inclination for the stairs shall not exceed 70 degrees. Stairs and walkways shall have a minimum width of 18 inches. Stair treads shall have a minimum depth of 4 inches. Walkway surfaces and stair treads shall be constructed of non-skid bar grating or expanded metal. Handrails shall be provided.

Prior to Jan 1, 1994:

Not required.

3.1.2.8.2 Hall rope terminal sheaves (Bullwheel and deflection sheaves):

Haul rope terminal sheave frames shall be designed to retain the rope in the event of the failure of the sheave, shaft, or mounting. In instances where the sheave is cantilevered, the design working stresses shall not be more than 60% of those otherwise allowable.

The minimum diameter of terminal sheaves shall be 72 times the nominal diameter of the haul rope. The sheave assembly shall be designed to retain the haul rope in the event of a deropement from the sheave. A flange extension of 1-½ times the rope diameter (measured from the bottom of the rope groove) shall be deemed adequate for retention.

Haul rope terminal sheaves that act as driving, braking, or holding sheaves shall be so designed tht the haul rope does not slip in the sheave groove. The design coefficient of friction for a particular sheave liner shall not exceed the following values:

Sheave Liner	Coefficient of Friction
Steel or cast iron grooves	0.070
Leather	0.150
Rubber, neoprene, or other	0.205

3.1.2.10 Tension systems.

Prior to May 15, 2006:

Counterweights, hydraulic and pneumatic cylinders, or other suitable devices shall be used to provide the tensioning requirements of the particular installation. All devices used to provide the tension shall have sufficient travel to adjust to all normal operating changes in loading and temperature.

The tension for haul ropes and track cables for all modes of operation shall be determined by the design engineer. Tension systems may be automatic or manual; however, all systems shall have monitoring equipment that will automatically prevent operation outside of design limits (see 3.1.2.11.2(c)).

Tension systems may be adjustable to provide proper tensions for different modes of aerial lift operation.

The tension system design shall consider changes, for each mode of operation, in tensions due to rope elongation, friction, and other forces affecting traction on driving, braking, or holding sheaves, tower and sheave loading, and maximum vertical loads on grips to assure that tensions remain within design limits.

3.1.2.10.1 Hydraulic and pneumatic systems. (Previously 3.1.2.9.1 in ANSI 1999)

Hydraulic and pneumatic cylinders, when used, shall have sufficient ram travel to accommodate all normal operating changes in loading and temperature. Provisions shall be made to keep the cylinder free from climatic-induced conditions and contaminants that may interfere with free movement.

If the system fails to provide the design operating pressure, the aerial lift shall be able to be operated to unload passengers.

Cylinders and their attachments shall each have a minimum factor of safety of 5. The factor of safety is equal to the ultimate tensile strength of the cylinder divided by the maximum steady state design tension.

The systems providing operating pressure for the cylinder shall have a minimum factor of safety of 5 unless a high velocity check valve or flow control device is used where the pressure line is connected to the cylinder. The check valve shall be rated to hold twice the normal operating pressure. The remainder of the system shall not exceed the manufacturer’s published working pressure. Provisions shall be made to restrict the movement of pressure lines or hoses should they become severed under pressure. When pneumatic storage cylinders, accumulators, or other similar devices are used, they shall be located so that they cannot be knocked over or damaged.

3.1.2.10.2 Counterweights. (Previously 3.1.2.9.2 in ANSI 1999)

Counterweights, when used, shall be arranged to move freely up and down. Enclosures for counterweights shall be provided where necessary to prevent snow, ice, water, and other materials from accumulating under and around the counterweights and interfering with their free movement. Visual access shall be provided to areas beneath and above all counterweights

contained in enclosures or pits. When a counterweight is contained in a structural frame, guides shall be provided to protect the frame and to ensure free movement of the counterweight. Where snow enclosures are not required, guardrails or enclosures shall be provided to prevent unauthorized persons from coming in contact with or passing under counterweights.

3.1.2.10.3 Wire ropes in tension systems. (Previously 3.1.2.9.3 in ANSI 1999)

Wire ropes in tension systems shall have a minimum factor of safety of 6 when new (see 7.1.3.1). On arrangements involving rope reeving, the maximum design static tension with sheave friction taken into account shall be the basis for determining the factor of safety. See 7.3 for additional requirements. No rotation-resistant ropes shall be used in tension systems (see 1.4 B *rotation-resistant rope*).

Wire ropes in tension systems shall be adjusted so that the counterweight will reach the end of its travel before the attached tension sheave carriage comes within 6 inches (150 mm) of the end of its travel. When wire ropes are used with pneumatic or hydraulic cylinders, they shall be adjusted so that connecting devices will not contact the reeving devices before the ram reaches the travel limits of the cylinder.

3.1.2.10.4 Chains in tension systems. (Previously 3.1.2.9.4 in ANSI 1999)

Roller, leaf, or welded link chains may be used in tension systems (see section 7).

For chain used as a tensioning component, where the chain does not pass through or around sprockets, the minimum factor of safety shall be 5 (see 7.1.3.3). For applications of chain where any sprockets are used, the minimum factor of safety shall be 6.

3.1.2.10.5 Cable winches or chain-adjusting devices. (Previously 3.1.2.9.5 in ANSI 1999)

Winches or other mechanical devices that are used for take-up and remain part of the system shall have a minimum factor of safety of 6 against their ultimate capacity. They shall have a positive lock against release. Where this factor cannot be established by the manufacturer's endorsement, a device shall be installed on the tension system rope or chain ahead of the winch/mechanical device that will keep the tension system intact in the event of a failure or release of the device.

The diameter of the winding drum shall not be less than the specified minimum sheave diameters referenced as Condition C in 3.1.2.7.3 for rope.

3.1.3.1 Towers.

Prior to Nov. 1, 1991:

The design of the tower structure and foundation shall be in accordance with the requirements of 3.1.1.6. Where guyed towers are used and guys intersect the ground within or near ski runs, the guys shall be marked for visibility.

Means shall be provided for ready access from the ground to all tower tops. Permanent ladders are required for heights above those accessible by portable ladders.

Portable ladders, if used, shall be in at least sufficient quantity to be available at each point where attendants are positioned. Portable ladders extending more than 20 feet (6.10 meters) shall not be used.

Towers shall be identified with successive numbers clearly visible to passengers.

Where towers are designed to permit variations in rope height, sheave unit supports shall be guided and attached so as to prevent misalignment by rotation

3.1.3.3.2 Sheave and sheave unit design

May 15, 1994 to May 15, 2006:

Sheave flanges shall be as deep as possible, considering other features of the system. At the same time, rope grips shall be designed in relation to the sheave groove so as not to contact sheave flanges during normal operations, taking into consideration the anticipated amount of wear of the sheave liner groove. Grips shall be allowed to contact sheave flanges adjacent to the haul rope when the carrier swings, provided that this is considered in the design of the grips and sheaves. Furthermore, rope grips, sheave flanges, and hanger guides shall be designed so that hangers cannot be caught behind guides, and so that haul ropes and grips cannot be deroped from sheaves if the carrier is swinging within design limits as it approaches or passes the tower.

Suitable guards, of sufficient strength to resist the lateral forces caused by an inside deropement, shall be installed.

Construction of the entire sheave unit shall be such that the haul rope cannot become entangled in the sheave unit in the event the rope leaves the sheave toward the outside.

On each sheave unit, rope-catching devices shall be installed to reduce the risk of the haul rope moving excessively in the direction of the load on the sheave unit in the event of deropement. These devices shall be located less than one-half the diameter of the sheaves from the normal operating position of the rope and shall extend a minimum of two rope diameters beyond the sheave flange. Alternatively, when the catcher is located so that the rope cannot move in the direction of the load when it passes from the edge of the sheave to a position in the catcher, the catcher shall extend a minimum of two rope diameters beyond the center of the rope when the rope has reached the point where the deropement switch device initiates a stop. Rope-catching devices shall be designed to permit the passage of the haul rope and grips after deropement. The catcher shall be independent from the sheave.

On each sheave unit, suitable deropement switch devices shall be installed and maintained that will stop the lift in case of deropement.

On lifts where the carrier speed exceeds 600 feet per minute (3.0 meters per second), at least one device that senses the position of the rope shall be installed on each sheave unit. The device shall initiate a stop before the rope leaves the sheave in the horizontal direction or when the rope is displaced in the vertical direction by one rope diameter plus the distance that the rope is displaced vertically from the sheave by the grip.

If the gage of the haul rope system is varied at any point along the line, the horizontal departure at any one tower shall be provided for in the design so that deropement cannot occur by virtue of such a departure.

Sheave mounts or mounting frames shall be designed to be adjustable, allowing the sheave units to be aligned and held in the plane of the rope.

See also 3.1.1.4 through 3.1.1.4.7 for the effect of tower height and location on sheave units.

Prior to May 15, 1994:

Sheave flanges shall be as deep as possible, considering other features of the system. At the same time, rope grips shall be designed in relation to the sheave groove so as not to contact

sheave flanges during normal operations, taking into consideration the anticipated amount of wear of the sheave liner groove. Grips shall be allowed to contact sheave flanges adjacent to the haul rope when the carrier swings, provided that this is considered in the design of the grips and sheaves. Furthermore, rope grips, sheave flanges, and hanger guides shall be designed so that hangers cannot be caught behind guides, and so that haul ropes and grips cannot be deroped from sheaves if the carrier is swinging within design limits as it approaches or passes the tower.

Suitable guards, of sufficient strength to resist the lateral forces caused by an inside deropement, shall be installed to prevent the rope from falling into a dangerous position within the tower structure.

Construction of the entire sheave unit shall be such that the haul rope cannot become entangled in the sheave unit in the event the rope leaves the sheave toward the outside.

On each sheave unit, rope-catching devices shall be installed to reduce the risk of the haul rope moving excessively in the direction of the load on the sheave unit in the event of deropement. These devices shall be located less than one-half the diameter of the sheaves from the normal operating position of the rope and shall extend a minimum of two rope diameters beyond the sheave flange. They shall be designed to permit the passage of the haul rope and grips after deropement.

On each sheave unit, suitable deropement switch devices shall be installed and maintained that will stop the lift in case of deropement.

If the gage of the haul rope system is varied at any point along the line, the horizontal departure at any one tower shall be provided for in the design so that deropement cannot occur by virtue of such a departure.

Sheave mounts or mounting frames shall be designed to be adjustable, allowing the sheave units to be aligned and held in the plane of the rope.

See also 3.1.1.4 through 3.1.1.4.7 for the effect of tower height and location on sheave units.

3.1.4.4.2 Cabin.

May 15, 2000 to May 15, 2006:

Fully enclosed passenger cabins shall be ventilated. They shall be equipped with doors that fill the entire entrance opening. The minimum clearance width opening shall be 32 inches (815 mm). Each door shall be provided with a lock located in such a manner that it can be unlocked only by authorized persons or by automatic means.

The horizontal gap between the cabin door opening floor edge and platform edge shall not be greater than 1 inch (25.4 mm). The height of the cabin floor to the platform shall be within ± ½ inch (±12.7 mm). Where it is not operationally or structurally practical to meet these requirements, platform devices, vehicle devices, system devices, or bridge plates shall be provided for independent loading.

All windows shall be of shatter-resistant material.

Means of emergency evacuation of passengers shall be provided.

The maximum capacity of each cabin, both in pounds and kilograms and number of passengers, shall be posted in a conspicuous place in each cabin (see table D-1(r)).

The minimum clear floor space in accessible cabins shall be 48 inches by 30 inches (1220 mm x 760 mm). Where special accessible cabins are used, it is recommended the waiting interval should not exceed 10 minutes.

All carriers shall be clearly identified with numbers located on each end of each carrier.

Semi-open carriers shall meet applicable requirements for enclosed cabins and open chairs.

Jan. 1, 1994 to May 15, 2000:

Fully enclosed passenger cabins shall be ventilated. They shall be equipped with doors that fill the entire entrance opening. Each door shall be provided with a lock located in such a manner that it can be unlocked only by authorized persons or by automatic means.

All windows shall be of shatter-resistant material.

Means of emergency evacuation of passengers shall be provided.

The maximum capacity of each cabin, both in pounds and kilograms and number of passengers, shall be posted in a conspicuous place in each cabin.

If passengers are to remain standing, floor space of 2.5 square feet (0.23 square meter) per person shall be available; the width of cabin seats shall be at least 18 inches (46 cm) per person.

All carriers shall be clearly identified with numbers located on each end of each carrier.

Semi-open carriers shall meet applicable requirements for enclosed cabins and open chairs.

3.2.1.1 Applicable codes.

May 15, 2000 to May 15, 2006:

All electrical systems shall comply with 3.2.1.1 Applicable codes of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical systems shall comply with 3.2.1.1 Applicable codes of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical systems shall comply with 3.2.1.1 Applicable codes of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical systems shall comply with 3.2.1.1 Applicable codes of the B77.1-1982 ANSI Standard.

Jan 1, 1977 to Jan. 1, 1984:

All electrical work shall comply with 3.2.1.1 Applicable codes of the B77.1-1976 ANSI Standard.

Jan 1, 1974 to Jan. 1, 1977:

All electrical work shall comply with 3.2.1.1 Applicable codes of the B77.1-1973 ANSI Standard.

Jan 1, 1972 to Jan 1, 1974:

All electrical work shall comply with 3.2.1.1 Applicable codes of the B77.1-1970 ANSI Standard.

Prior to Jan 1, 1972:

All electrical work shall comply with 3.2.1.1 Applicable codes of the B77.1-1960 ANSI Standard.

3.2.1.2 Location.

May 15, 2000 to May 15, 2006:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 3.2.1.2 Location of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 3.2.1.2 Location of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 3.2.1.2 Location of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 3.2.1.2 Location of the B77.1-1982 ANSI Standard.

Prior to Jan. 1, 1984:

All exposed electrical power transmission wiring shall be so located that in case of collapse or breakage of the power line it will not come into contact with carriers, ropes, or passengers.

3.2.1.3 Protection.

Prior to May 15, 2006:

All transformer stations and other high voltage electrical equipment shall be marked with conspicuous warning signs and shall be protected so as to prevent unauthorized persons from entering the area or coming in contact with any portion of the equipment or wiring. All power equipment shall be protected against overloads by circuit breakers or fuses.

3.2.1.4 Overhead cables.

Prior to May 15, 2006:

Signal, communication, and control circuits may be supported between towers that support the aerial lift. Voltage on overhead or exposed circuits shall be limited to 50 volts with the exception of the intermittent ring-down circuits for telephone systems.

3.2.1.5.5 Ground fault interrupter protection.

Prior to May 15, 2006:

Not required.

3.2.1.6.3 Haul rope grounding.

Jan 1, 1984 to Present:

Grounding sheaves with conductive liners or equivalent means should be provided at each end of the tramway for the he purpose of grounding haul ropes and track cables, as applicable, for static electrical discharge. For the haul rope on bicable systems or monocable systems with an isolated or insulated haul rope incorporated in the operating circuitry, no means of grounding are required when the operating circuit takes into consideration static electrical discharge.

Prior to Jan 1, 1984:

Not required.

3.2.3.2 Stop gates.

On aerial lifts using chairs, an automatic stopping device beyond each unloading area are required where passengers wearing skis are required to disembark. The device shall automatically stop the aerial lift in the event a passenger rides beyond the intended point of unloading. The operation of the automatic stop device may be delayed or overridden momentarily by the operator or attendant.

3.2.9 Manual control devices.

Prior to May 15, 2006:

All automatic and manual stop and shutdown devices shall be of the manually reset type. An exception to this requirement is allowed for magnetic or optically operated automatic stop devices, if the operating circuit is such that it indicates that such devices initiated the stop and the circuit is of the manually reset type. Manual stop switches (push button) shall be positively opened mechanically and their opening shall not be dependent upon springs.

Manual control devices shall be installed in all attendants' and operators' work positions, in machine rooms, and out-of-doors in proximity to all loading and unloading areas. As a minimum at downhill loading stations, each of these control locations shall include an Emergency Shutdown device or a Normal Stop device. All manual control devices located in or on a control cabinet shall be mounted so that they are in the same plane or face of the cabinet. The control devices shall not be located in a position that would require the operator or attendant to pass through the path of moving carriers in order to operate the controls.

The devices listed in Annex E shall be conspicuously and permanently marked with the proper function and color code.

3.2.12 Software security.

The "as built" documents shall include a procedure, developed by the aerial lift manufacturer or a Qualified Engineer, to ensure the security of the software logic and operating parameters that will control the aerial lift. Upon completion of the acceptance testing this procedure shall be implemented in a manner that will prevent unauthorized personnel from making changes to the software logic or operating parameters. All programmable logic and parameters shall be documented.

Software programming and changes to the software logic shall be made by a qualified software programmer. Software programmers shall provide documents that include:

1. software logic development date;

2. software logic current revision number;

3. software logic current revision date;

4. list of software logic changes for each revision that explain changes in detail;

5. name of software logic programmer that made each revision;

6. testing procedures for each change of software logic;

7. personnel that completed the testing.

3.3.1.2.1 Requirements for signs.

(a) The design of any sign as well as its support and the installation procedure of such sign shall be considered a minor modification if the sign or aggregate of signs on a given tower is greater than three feet square (nine square feet).

(b) Signs, fasteners, or supporting members shall not interfere with the operation of the tramway.

(c) The design of structural components shall be reviewed to consider the increase in loading caused by any sign.

(d) Signs shall not interfere with passenger or attendant vision.

3.3.1.3 Operational plan for transportation of recreational equipment. Each licensee shall have an operational plan that has procedures for transportation of sports equipment and recreational devices by foot passengers. This plan shall be consistent with the tramway manufacturer's specifications and instructions, if any.

3.3.4.3.1 Acceptance criteria for grips and hangers - minimum requirements. [Repealed eff. 05/15/2014]

3.3.5.5 Software parameter log.

A software parameters log shall be maintained for each aerial lift. This log is intended for changes in software parameters that can be altered which affect the supervision circuit. The log shall include, but not be limited to:

a) current software parameter values;

b) changes to software parameter values;

c) date of changes made;

d) documentation of testing for each change of parameter values;

e) personnel making parameter changes.

Section 4 Fixed grip aerial lifts

Note: Timeframes relate to the ropeway installation date or modification date whichever controls, unless otherwise noted.

4.1.1.3.1 Location of power lines.

Jan, 1, 1977 to Present:

Power lines shall be located a minimum distance equal to the height of poles or support structures from any passenger tramway so that poles and electrical lines cannot touch any portion of the tramway, loading or unloading points or platforms and tow path, if applicable, upon collapse of poles or lines, unless suitable and approved precautions are taken to safeguard human lives.

4.1.1.3.2 Air space requirements.

4.1.1.3.2.1 Structures.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by vertical planes commencing at a point thirty-five (35) feet from the intersection of the vertical planes of the ropes or cables and ground surface.

For purposes of this rule, buildings controlled by the licensee used primarily for maintenance and operation of the lift and other tramways shall not be considered structures; however, buildings must comply with the following.

(1) No flammable liquids may be stored in the building outside of a UL listed container or storage cabinet, unless such flammable liquids are in the original containers and intended for daily usage. Quantities must be consistent with normal daily use. Class I or II flammable storage materials shall be limited to 2 gallons in a UL listed container and must be stored either in an outside storage area or in a UL listed cabinet.

(2) The building must be within the view of the attendant but not impair the sight line of the lift.

(3) Entrances to all machinery, operators', and attendants' rooms shall be locked when not in use. Unattended entrances accessible to public, which may be left open, shall be equipped with barriers to prevent entry.

Jan. 1, 1994 to May 15, 2000:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface.

Dec. 30, 1977 to Jan. 1, 1994:

No passenger tramway installation shall be permitted whenever the Passenger Tramway Operator does not have permanent and irrevocable control of the following air space

(except when the passenger tramway is located on Forest Service land): the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface.

Prior to Dec. 30, 1977:

None required

4.1.1.3.2.2 Cables or ropes.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

Any cable or rope installed on or near a ropeway that may represent a hazard to the ropeway shall be monitored to automatically stop the ropeway if the cable or rope fails. Failure would be defined as per Section 23.1 (g).

EXCEPTION: Track or haul ropes are excluded from this rule.

Prior to May 15, 2000:

Not required

4.1.1.5.2 Clearances.

Jan, 1, 1984 to Nov. 1, 1991:

Terminals and towers shall be designed and installed to provide the clearances as herein specified and to minimize surge of the line under operating conditions. Local wind conditions shall be taken into consideration.

The minimum distance between passing carriers, each swung 10 degrees inward from the vertical, shall be the greater of the following:

a) 2 feet 6 inches

b) 1/2% of the span length (applies to gondolas only).

The distance between haul ropes, (or track cables), for the purpose of these checks, shall be considered as equal to the gauge of the line.

External structures, posts, or obstructions, other than lift structural components, shall have at least 4 feet (1.22 meters) of clearance from either edge of a loaded open carrier passenger seat or open cabin body (measured from the outermost attachments on or parts of the carrier while the carrier is hanging in a vertical position).

Dec. 31, 1977 to Jan. 1, 1984:

Terminals and towers shall be designed and installed to provide the clearances as herein specified and to minimize surge of the line under operating conditions. Local wind conditions shall be taken into consideration.

The minimum distance between passing carriers, each swung 10 degrees inward from the vertical, shall be the greater of the following:

a) 2 feet 6 inches

b) 1/2% of the span length (applies to gondolas only).

The distance between haul ropes, (or track cables), for the purpose of these checks, shall be considered as equal to the gauge of the line.

Prior to Dec. 31, 1977:

All towers shall be equipped with guards to prevent contact of carriers or hangers with a tower structure or tower machinery except that such guards shall not be required if such contact does not occur when the carrier is swung freely 15 degrees from the vertical position.

In the absence of guards described herein, the following minimum clearances shall prevail when the carrier is swung inward 10 degrees from the vertical position:

(1) on chair lifts

(a) 18 inches between inside limit of passenger seat and tower clearance line or surface.

(b) 12 inches between innermost point on chair structure and tower clearance line or structure.

(2) on Gondola lifts:

(a) With the windows open on the tower side, 18 inches between innermost point on carrier and tower clearance line or structure.

(b) With screened or closed windows on the tower side, 12 inches.

Guards shall be so shaped and located that a 30- degree lateral swing from vertical shall not place and part of the loaded or empty carrier on the inner side of the guard.

On all towers, with or without guards, when a carrier is swung longitudinally by 15 degrees, there shall be no contact between any obstruction and any part of the carrier.

4.1.1.5.2.2 Special requirements for chair lifts.

The following clearance requirements shall be met to prevent entanglement of skis with tower structure. Clearance is here defined to mean the distance between inner limit of passenger seat and clearance line or surface of tower.

With the chair swinging laterally 10 degrees from the vertical position, or to the limit permitted by the guards, if any, if clearance is less than 24 inches from any open frame tower or 18 inches from any closed tubular tower, guards shall be provided on the up-going side to keep skis from being caught in the structure. Such guards shall be at least 72 inches in height, extending 36 inches above and below average foot level.

A tubular tower with permanent ladder rungs shall be considered as an open frame tower, with the following exceptions:

(1) If the ladder rungs are on the uphill side and are covered by simple fascia boards or equivalent over the previously mentioned 72-inch range, the tower may be considered as a closed tubular tower with respect to uphill skier traffic.

(2) If it can be demonstrated that ski tips can not be caught in the rungs of the ladder, the tower may be considered as a closed tubular tower.

4.1.1.5.3 Terminal Clearances.

Prior to Nov. 1, 1991:

Not required.

4.1.1.11.2 Acceptance tests.

Before an aerial lift that is new or relocated or that has not been operated for routine maintenance within the previous 2 years is opened to the public, it shall be given thorough tests by qualified personnel to verify compliance with the plans and specifications of the designer. The designer or manufacturer shall propose and submit an acceptance test procedure.

Test load per carrier shall be 110% of the design live load. Thorough load and operating tests shall be performed under full loading and any partial loadings that may provide the most adverse operating conditions. The functioning of all push-button stops, automatic stops, limit switches, deropement switches, and communications shall be checked. Acceleration and deceleration rates shall be satisfactory under all loadings (see 4.1.2.4). Motive power and all braking and rollback devices (see 4.1.2.6) shall be proved adequate under the most adverse loadings.

On systems operating at 600 feet per minute (3 meters per second) or greater, a plot of rope speed versus time shall be recorded for stops that the manufacturer or Qualified Engineer has designated in the acceptance test procedure. As a minimum, the plot shall show the rope speed every 0.2 seconds from the initiation of the stop to when the rope is stopped. The final brake system settings and brake test values shall be documented in the acceptance test results.

Any changes to software logic that would affect a Protection or Operation Circuit after the start of initial testing shall result in a restart of testing to ensure software logic changes have not affected those systems already tested. Retesting for changes in software parameters shall be at the discretion of the Authorities Having Jurisdiction (AHJ).

4.1.2.1.3 Power unit interlock.

Prior to May 15, 2006:

Not required.

4.1.2.6 Brakes and rollback devices.

May 15, 2006 to Present:

The aerial lift shall have the following friction-type brakes and other devices as specified in table 4-3:

- service brake (see 4.1.2.6.1);

- drive sheave brake (see 4.1.2.6.2);

- rollback device (see 4.1.2.6.3);

- drive train backstop (see 4.1.2.6.4).

All braking systems shall be designed to ensure that:

a) once the aerial lift begins movement in the intended direction, the brakes are maintained in the open position;

b) the service brake shall not open prior to the drive system developing sufficient torque to prevent overhauling.

EXCEPTION – For an aerial lift that overhauls only in the reverse direction, a drive train backstop may be used in lieu of the above.

c) multiple brakes or brake systems shall not be simultaneously applied such that excessive deceleration is applied to the aerial lift under any anticipated conditions of loading;

d) the failure of one braking system to properly decelerate the aerial lift shall automatically initiate a second braking system, on an overhauling forward direction aerial lift.

The service brake, drive sheave brake, rollback device, and drive train backstop device shall be designed such that failure of one system will not impair the function of the other systems. All brakes shall have the braking force applied by springs, weights, or other approved forms of stored energy.

The service brake, drive sheave brake, rollback, and drive train backstop devices shall be designed to assure operation under all anticipated conditions.

Each braking system shall be capable of operation to comply with daily inspections and periodic testing.

The manufacturer or a Qualified Engineer shall furnish a written procedure to be followed, and specify the auxiliary equipment necessary for periodic testing and adjustment of the holding force of each brake and backstop device. The procedure shall additionally specify:

e) the minimum and maximum holding force for the service brake and drive sheave brake independently; and

f) the minimum and maximum stopping distance for the service brake and drive sheave brake independently, with a specified loading condition.

This baseline procedure shall be performed at the completion of the acceptance test and then at the frequency specified in order to demonstrate the ability of each brake to produce the required force.

Testing shall be accomplished as part of normal maintenance during the operating season, but shall not be performed when the aerial lift is open to the public. As a minimum, this testing shall be performed monthly during the operating season.

If a device is permanently installed to cause a brake, rollback, or drive train backstop device to be disabled for testing, it shall be electronically monitored so that the aerial lift cannot be operated in its normal mode when the brakes are so disabled.

Table 4-3 - Required stopping devices

Lift category	Service Brake	Drive Sheave Brake	Rollback device	Drive train backstop	Retarding device (see 4.1.2.4)
Self-braking: A lift that decelerates, stops, & remains stopped within the service brake performance requirements without a braking device	Not Required	Required	Not Required	Not Required	Not Required
Nonoverhauling: A lift that will not accelerate in either direction when it is not driven, but is not self-braking	Required*	Required	Not Required	Not Required	Not Required
Overhauling, reverse direction: A lift that will accelerate in the reverse direction when it is not driven	Required	Required	Required	Required	Not Required
Overhauling, forward direction: A lift that will accelerate in forward direction when it is not driven	Required	Required	Not Required	Not Required	Required

* A service brake is not required if the overhauling, reverse direction lift will meet the service brake stopping requirements under most unfavorable design loading conditions.

Prior to May 15, 2006:

The aerial lift shall have the following friction-type brakes and other devices as specified in table 4-3:

- service brake (see 4.1.2.6.1);
- drive sheave brake (see 4.1.2.6.2);
- rollback device (see 4.1.2.6.3);
- drive train backstop (see 4.1.2.6.4).

All braking systems shall be designed to ensure that:

a) once the aerial lift begins movement in the intended direction, the brakes are maintained in the open position;

b) the service brake shall not open prior to the drive system developing sufficient torque to prevent overhauling.

EXCEPTION – For an aerial lift that overhauls only in the reverse direction, a drive train backstop may be used in lieu of the above.

The service brake, drive sheave brake, rollback device, and drive train backstop device shall be designed such that failure of one system will not impair the function of the other systems, and all brakes shall have the braking force applied by springs, weights, or other approved forms of stored energy.

The service brake, drive sheave brake, rollback, and drive train backstop devices shall be designed to assure operation under all anticipated conditions.

Stopping distances specified in 4.1.2.5.1 shall be achieved by each brake without the aid of other braking devices or drive regeneration.

Each braking system shall be capable of operation to comply with daily inspections and periodic testing.

A Qualified Engineer shall furnish a written procedure to be followed, and specify the auxiliary equipment necessary for periodic testing and adjustment of the holding force of each brake and backstop device. This procedure shall be performed during the acceptance test, and at the frequency specified, to demonstrate the ability of each brake to produce the required torque.

Such testing shall be accomplished as part of normal maintenance during the operating season, but shall be performed when the aerial lift is not open to the public.

If a device is permanently installed to cause a brake, rollback, or drive train backstop device to be disabled for testing, it shall be electronically monitored so that the aerial lift cannot be operated in its normal mode when the brakes are so disabled.

Table 4-3 - Required stopping devices

Lift category	Service Brake	Drive Sheave Brake	Rollback device	Drive train backstop	Retarding device (see 4.1.2.4)
Self-braking: A lift that decelerates, stops, & remains stopped within the service brake performance requirements without a braking device	Not Required	Required	Not Required	Not Required	Not Required
Nonoverhauling: A lift that will not accelerate in either direction when it is not driven, but is not self-braking	Required*	Required	Not Required	Not Required	Not Required
Overhauling, reverse direction: A lift that will accelerate in the reverse direction when it is not driven	Required	Required	Required	Required	Not Required
Overhauling, forward direction: A lift that will accelerate in forward direction when it is not driven	Required	Required	Not Required	Not Required	Required

* A service brake is not required if the overhauling, reverse direction lift will meet the service brake stopping requirements under most unfavorable design loading conditions.

4.1.2.6.1 Service brake.

The service brake shall be located at any point in the drive train such that there is no belt, friction clutch, or similar friction-type device between the brake and the drive sheave. The service brake shall not act on the same braking surface as the drive sheave brake.

The service brake shall be an automatic brake to stop and hold the aerial lift under the most unfavorable design loading condition. The deceleration rate or stopping distance specified in

4.1.2.5 shall be achieved by the service brake without the aid of other braking devices or drive regeneration.

The brake shall be in a normally applied position. It shall be held open for operation of the aerial lift and shall be applied when the aerial lift is stopped.

4.1.2.6.2 Drive sheave brake.

The drive sheave brake shall operate on the drive sheave assembly.

The drive sheave brake shall be capable of being activated both manually and automatically to stop and hold the aerial lift under the most unfavorable design loading condition. Deceleration rates or stopping distances specified in 4.1.2.5 shall be achieved by the drive sheave brake without the aid of other braking devices or drive regeneration.

Application of the drive sheave brake shall automatically disconnect the power source to the power unit in use. This brake shall act automatically when the speed of the haul rope exceeds the design value by 15% in either direction of an overhauling lift.

4.1.2.6.3 Rollback device.

The rollback device shall act directly on the drive sheave assembly or on the haul rope. When it has been determined that under the most unfavorable design loading condition, haul rope slippage will not occur, the rollback device may be located at the return sheave assembly. However, the rollback device shall not be located at other than the drive station, unless its location will not decrease the factor of safety of the haul rope below the minimum permissible value whenever the rollback device is statically engaged.

Under the most unfavorable design loading condition, the rollback device shall automatically stop reverse rotation of the aerial lift before the haul rope travels in excess of 36 inches (915 mm) in the reverse direction (see 4.2.3.7 for electrical requirements).

4.1.2.6.4 Drive train backstop.

A drive train backstop device shall conform to the following requirements:

a) A drive train backstop device is a one-way or overrunning clutch device. The drive train shall be so arranged that there is no belt, friction clutch, or similar friction-type device between the backstop device and the drive sheave;

b) The backstop device shall be rated for the maximum design load;

c) Under the most unfavorable design loading condition, the backstop device shall automatically prevent reverse rotation of the aerial lift before the aerial lift travels in excess of 36 inches (915 mm) in the reverse direction.

4.1.2.7.4 Egress.

Jan. 1, 1994 to Present:

Permanent stairs and walkways shall be provided for egress from all machinery areas. The maximum angle of inclination for the stairs shall not exceed 70 degrees. Stairs and walkways shall have a minimum width of 18 inches. Stair treads shall have a minimum depth of 4 inches. Walkway surfaces and stair treads shall be constructed of non-skid bar grating or expanded metal. Handrails shall be provided.

Prior to Jan 1, 1994:

Not required.

4.1.2.8.2 Hall rope terminal sheaves (Bullwheel and deflection sheaves):

Haul rope terminal sheave frames shall be designed to retain the rope in the event of the failure of the sheave, shaft, or mounting. In instances where the sheave is cantilevered, the design working stresses shall not be more than 60% of those otherwise allowable.

The minimum diameter of terminal sheaves shall be 72 times the nominal diameter of the haul rope. The sheave assembly shall be designed to retain the haul rope in the event of a deropement from the sheave. A flange extension of 1-½ times the rope diameter (measured from the bottom of the rope groove) shall be deemed adequate for retention.

Haul rope terminal sheaves that act as driving, braking, or holding sheaves shall be so designed tht the haul rope does not slip in the sheave groove. The design coefficient of friction for a particular sheave liner shall not exceed the following values:

Sheave Liner	Coefficient of Friction
Steel or cast iron grooves	0.070
Leather	0.150
Rubber, neoprene, or other	0.205

4.1.2.10 Tension systems.

Prior to May 15, 2006:

Counterweights, hydraulic and pneumatic cylinders, or other suitable devices shall be used to provide the tensioning requirements of the particular installation. All devices used to provide the tension shall have sufficient travel to adjust to all normal operating changes in loading and temperature.

The tension for haul ropes for all modes of operation shall be determined by the design engineer. Tension systems may be automatic or manual; however, all systems shall have monitoring equipment that will automatically prevent operation outside of design limits (see 4.1.2.11.2(c)).

Tension systems may be adjustable to provide proper tensions for different modes of aerial lift operation.

The tension system design shall consider changes, for each mode of operation, in tensions due to rope elongation, friction and other forces affecting traction on driving, braking, or holding sheaves, tower and sheave loading, and maximum vertical loads on grips to assure that tensions remain within design limits.

4.1.2.10.1 Hydraulic and pneumatic systems. (Previously 4.1.2.9.1 in ANSI 1999)

Hydraulic and pneumatic cylinders, when used, shall have sufficient ram travel to accommodate all normal operating changes in loading and temperature. Provisions shall be made to keep the cylinder free from climatic-induced conditions and contaminants that may interfere with free movement.

If the system fails to provide the design operating pressure, the aerial lift shall be able to be operated to unload passengers.

Cylinders and their attachments shall each have a minimum factor of safety of 5. The factor of safety is equal to the ultimate tensile strength of the cylinder divided by the maximum steady-state design tension.

The systems providing operating pressure for the cylinder shall have a minimum factor of safety of 5 unless a high-velocity check-valve or flow-control device is used where the pressure line is connected to the cylinder. The check-valve shall be rated to hold twice the normal operating pressure. The remainder of the system shall not exceed the manufacturer's published working pressures. Provisions shall be made to restrict the movement of pressure lines or hoses should they become severed under pressure. When pneumatic storage cylinders, accumulators, or other similar devices are used, they shall be located so that they cannot be knocked over or damaged.

4.1.2.10.2 Counterweights. (Previously 4.1.2.9.2 in ANSI 1999)

Counterweights, when used, shall be arranged to move freely up and down. Enclosures for counterweights shall be provided where necessary to prevent snow, ice, water, and other materials from accumulating under and around the counterweights and interfering with their free movement. Visual access shall be provided to areas beneath and above all counterweights contained in enclosures or pits. When a counterweight is contained in a structural frame, guides shall be provided to protect the frame and to ensure free movement of the counterweight. Where snow enclosures are not required, guardrails or enclosures shall be provided to prevent unauthorized persons from coming in contact with or passing under counterweights.

4.1.2.10.3 Wire ropes in tension systems. (Previously 4.1.2.9.3 in ANSI 1999)

Wire ropes in tension systems shall have a minimum factor of safety of 6 when new (see 7.1.3.1). On arrangements involving rope reeving, the maximum design static tension with sheave friction taken into account shall be the basis for determining the factor of safety. See 7.3 for additional requirements. No rotation-resistant ropes shall be used in tension systems (see 1.4 B *rotation-resistant ropes*).

Wire ropes in tension systems shall be adjusted so that the counterweight will reach the end of its travel before the attached tension sheave carriage comes within 6 inches (150 mm) of the end of its travel. When wire ropes are used with pneumatic or hydraulic cylinders, they shall be adjusted so that connecting devices will not contact the reeving devices before the ram reaches the travel limits of the cylinder.

4.1.2.10.4 Chains in tension systems. (Previously 4.1.2.9.4 in ANSI 1999)

Roller, leaf, or welded link chains may be used in tension systems (see section 7).

For chain used as a tensioning component, where the chain does not pass through or around sprockets, the minimum factor of safety shall be 5 (see 7.1.3.3). For applications of chain where any sprockets are used, the minimum factor of safety shall be 6.

4.1.2.10.5 Cable winches or chain adjusting devices. (Previously 4.1.2.9.5 in ANSI 1999)

Winches or other mechanical devices that are used for take-up and remain part of the system shall have a minimum factor of safety of 6 against their ultimate capacity. They shall have a positive lock against release. Where this factor cannot be established by the manufacturer's endorsement, a device shall be installed on the tension system rope or chain ahead of the winch/mechanical device that will keep the tension system intact in the event of failure or release of the device.

The diameter of the winding drum shall not be less than the specified minimum sheave diameters referenced as Condition C in 4.1.2.7.3 for rope.

4.1.3.1 Towers.

Prior to Nov. 1, 1991:

The design of the tower structure and foundation shall be in accordance with the requirements of 4.1.1.6. Where guyed towers are used and guys intersect the ground within or near ski runs, the guys shall be marked for visibility.

Means shall be provided for ready access from the ground to all tower tops. Permanent ladders are required for heights above those accessible by portable ladders.

Portable ladders, if used, shall be in at least sufficient quantity to be available at each point where attendants are positioned. Portable ladders extending more than 20 feet (6.10 meters) shall not be used.

Towers shall be identified with successive numbers clearly visible to passengers.

Where towers are designed to permit variations in rope height, sheave unit supports shall be guided and attached so as to prevent misalignment by rotation

4.1.3.3.2 (g) Sheave and sheave unit design.

Prior to May 15, 1994:

Sheave flanges shall be as deep as possible, considering other features of the system. At the same time, rope grips shall be designed in relation to the sheave groove so as not to contact sheave flanges during normal operations, taking into consideration the anticipated amount of wear of the sheave liner groove. Grips shall be allowed to contact sheave flanges adjacent to the haul rope when the carrier swings, provided that this is considered in the design of the grips and sheaves. Furthermore, rope grips, sheave flanges, and hanger guides shall be designed so that hangers cannot be caught behind guides, and so that haul ropes and grips cannot be deroped from sheaves if the carrier is swinging within design limits as it approaches or passes the tower.

Suitable guards, of sufficient strength to resist the lateral forces caused by an inside deropement, shall be installed.

Construction of the entire sheave unit shall be such that the haul rope cannot become entangled in the sheave unit in the event the rope leaves the sheave toward the outside.

On each sheave unit, rope-catching devices shall be installed to reduce the risk of the rope moving excessively in the direction of the load on the sheave unit in the event of deropement. These devices shall be located less than one-half the diameter of the sheaves from the normal operating position of the rope and shall extend a minimum of two rope diameters beyond the sheave flange. Alternatively, when the catcher is located so that the rope cannot move in the direction of the load when it passes from the edge of the sheave to a position in the catcher, the catcher shall extend a minimum of two rope diameters beyond the center of the rope when the rope has reached the point where the deropement switch device initiates a stop. Rope-catching devices shall be designed to permit the passage of the haul rope and grips after deropement. The catcher shall be independent from the sheave.

On each sheave unit, suitable deropement switch devices shall be installed and maintained that will stop the lift in case of deropement.

On lifts where the carrier speed exceeds 600 feet per minute (3.0 meters per second), at least one device that senses the position of the rope shall be installed on each sheave unit. The device shall initiate a stop before the rope leaves the sheave in the horizontal direction or when the rope is displaced in the vertical direction by one rope diameter plus the distance that the rope is displaced vertically from the sheave by the grip.

If the gage of the haul rope system is varied at any point along the line, the horizontal departure at any one tower shall be provided for in the design so that deropement cannot occur by virtue of such a departure.

Sheave mounts or mounting frames shall be designed to be adjustable, allowing the sheave units to be aligned and held in the plane of the rope.

See also 4.1.1.4 through 4.1.1.4.3 for the effect of tower height and location on sheave units.

4.1.4.4.2 Cabin.

May 15, 2000 to May 15, 2006:

Fully enclosed passenger cabins shall be ventilated. They shall be equipped with doors that fill the entire entrance opening. The minimum clearance width opening shall be 32 inches (815 mm). Each door shall be provided with a lock located in such a manner that it can be unlocked only by authorized persons or by automatic means.

The horizontal gap between the cabin door opening floor edge and platform edge shall not be greater than 1 inch (25.4mm). The height of the cabin floor and the platform shall be within ± ½ inch (±12.7mm). Where it is not operationally or structurally practical to meet these requirements, platform devices, vehicle devices, system devices, or bridge plates shall be provided for independent loading.

All windows shall be of shatter-resistant material.

Means of emergency evacuation of passengers shall be provided.

The maximum capacity of each cabin, both in pounds and kilograms and number of passengers, shall be posted in a conspicuous place in each cabin (see Annex D).

The minimum clear floor space in accessible cabins shall be 48 inches by 30 inches (1220 mm X 760 mm). Where special accessible cabins are used, it is recommended the waiting interval should not exceed 10 minutes.

All carriers shall be clearly identified with numbers located on each end of each carrier.

Semi-open carriers shall meet applicable requirements for enclosed cabins and open chairs.

Jan. 1, 1994 to May 15, 2000:

Fully enclosed passenger cabins shall be ventilated. They shall be equipped with doors that fill the entire entrance opening. The minimum opening door width shall be 32 inches (815 mm). Each door shall be provided with a lock located in such a manner that it can be unlocked only by authorized persons or by automatic means.

The horizontal gap between the cabin door opening floor edge and platform edge shall not be greater than 1 inch (25.4mm). The height of the cabin floor and the platform shall be within 2 inch (12.7mm). Where it is not operationally or structurally practical to meet these requirements,

platform devices, vehicle devices, system devices, or bridge plates shall be provided for independent loading.

All windows shall be of shatter-resistant material.

Means of emergency evacuation of passengers shall be provided.

The maximum capacity of each cabin, both in pounds and kilograms and number of passengers, shall be posted in a conspicuous place in each cabin.

The width of cabin seats shall be at least 18 inches (460 mm) per person. If passengers are to remain standing, floor space of 2.5 square feet (0.232 square meter) per person shall be available. The minimum clear floor space in accessible cabins shall be 48 inches by 30 inches (1220 mm X 760 mm). Where special accessible cabins are used, it is recommended the waiting interval should not exceed 10 minutes.

All carriers shall be clearly identified with numbers located on each end of each carrier.

Semi-open carriers shall meet applicable requirements for enclosed cabins and open chairs.

4.1.4.5.4 Chair safety details.

Prior to May 15, 1999:

Each chair shall be equipped with a railing at each side, to a height of not less than 4 inches (10 cm) above the seat for a distance of not less than 12 inches (30 cm) from the back of the seat.

For aerial lifts operating primarily for foot passengers, each chair shall be equipped with a restraining device that will not open under forward pressure.

4.2.1.1 Applicable codes.

May 15, 2000 to May 15, 2006:

All electrical systems shall comply with 4.2.1.1 Applicable codes of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical systems shall comply with 4.2.1.1 Applicable codes of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical systems shall comply with 4.2.1.1 Applicable codes of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical systems shall comply with 4.2.1.1 Applicable codes of the B77.1-1982 ANSI Standard.

Jan 1, 1977 to Jan. 1, 1984:

All electrical work shall comply with 4.2.1.1 Applicable codes of the B77.1-1976 ANSI Standard.

Jan 1, 1974 to Jan. 1, 1977:

All electrical work shall comply with 4.2.1.1 Applicable codes of the B77.1-1973 ANSI Standard.

Jan 1, 1972 to Jan 1, 1974:

All electrical work shall comply with 4.2.1.1 Applicable codes of the B77.1-1970 ANSI Standard.

Prior to Jan 1, 1972:

All electrical work shall comply with 4.2.1.1 Applicable codes of the B77.1-1960 ANSI Standard.

4.2.1.2 Location.

May 15, 2000 to May 15, 2006:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 4.2.1.2 Location of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 4.2.1.2 Location of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 4.2.1.2 Location of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 4.2.1.2 Location of the B77.1-1982 ANSI Standard.

Prior to Jan. 1, 1984:

All exposed electrical power transmission wiring shall be so located that in case of collapse or breakage of the power line it will not come into contact with carriers, ropes, or passengers.

4.2.1.3 Protection.

Prior to May 15, 2006:

All transformer stations and other high voltage electrical equipment shall be marked with conspicuous warning signs and shall be protected so as to prevent unauthorized persons from entering the area or coming in contact with any portion of the equipment or wiring. All power equipment shall be protected against overloads by circuit breakers or fuses.

4.2.1.4 Overhead cables.

Prior to May 15, 2006:

Signal, communication, and control circuits may be supported between towers that support the aerial lift. Voltage on overhead or exposed circuits shall be limited to 50 volts with the exception of the intermittent ring-down circuits for telephone systems.

4.2.1.5.5 Ground fault interrupter protection.

Prior to May 15, 2006:

Not required.

4.2.1.6.3 Haul rope grounding.

Jan 1, 1984 to Present:

Grounding sheaves or equivalent means shall be provided at each end of the tramway for the purpose of grounding haul ropes, as applicable, for static electrical discharge. For systems with an isolated or insulated haul rope incorporated in the operating circuitry, no means of grounding are required when the operating circuit takes into consideration static electrical discharge.

Prior to Jan 1, 1984:

Not required.

4.2.2 Electrical system circuit design and classification.

Prior to May 15, 2006:

Not required.

4.2.3.8 Acceleration/deceleration monitoring.

Prior to May 15, 2006:

Not required.

4.2.9 Manual control devices.

Prior to May 15, 2006:

All automatic and manual stop and shutdown devices shall be of the manually reset type. An exception to this requirement is allowed for magnetic or optically operated automatic stop devices, if the operating circuit is such that it indicates that such devices initiated the stop and the circuit is of the manually reset type. Manual stop switches (push button) shall be positively opened mechanically and their opening shall not be dependent upon springs.

Manual control devices shall be installed in all attendants' and operators' work positions, in machine rooms, and out-of-doors in proximity to all loading and unloading areas. As a minimum at downhill loading stations, each of these control locations shall include an Emergency Shutdown device or a Normal Stop device. All manual control devices located in or on a control cabinet shall be mounted so that they are in the same plane or face of the cabinet. The control devices shall not be located in a position that would require the operator or attendant to pass through the path of moving carriers in order to operate the controls.

The devices listed in Annex E shall be conspicuously and permanently marked with the proper function and color code.

4.2.10 Safety of operating and maintenance personnel.

Prior to May 15, 1999:

The sign "Personnel Working on Lift - Do Not Start" or a similar warning sign shall be hung on the main disconnect switch or at control points for starting the power unit(s) when persons are working on the aerial lift.

Provision shall be incorporated in the ropeway design to render the system inoperable when necessary for the Lock-out Tag-out protection of personnel working on the aerial lift.

4.2.12 Software security.

The “as built” documents shall include a procedure, developed by the aerial lift manufacturer or a Qualified Engineer, to ensure the security of the software logic and operating parameters that will control the aerial lift. Upon completion of the acceptance testing this procedure shall be implemented in a manner that will prevent unauthorized personnel from making changes to the software logic or operating parameters. All programmable logic and parameters shall be documented.

Software programming and changes to the software logic shall be made by a qualified software programmer. Software programmers shall provide documents that include:

1. software logic development date;

2. software logic current revision number;

3. software logic current revision date;

4. list of software logic changes for each revision that explain changes in detail;

5. name of software logic programmer that made each revision;

6. testing procedures for each change of software logic;

7. personnel that completed the testing.

4.3.1.2.1 Requirements for signs.

(a) The design of any sign as well as its support and the installation procedure of such sign shall be considered a minor modification if the sign or aggregate of signs on a given tower is greater than three feet square (nine square feet).

(b) Signs, fasteners, or supporting members shall not interfere with the operation of the tramway.

(c) The design of structural components shall be reviewed to consider the increase in loading caused by any sign.

(d) Signs shall not interfere with passenger or attendant vision.

4.3.1.3 Operational plan for transportation of recreational equipment. Each licensee shall have an operational plan that has procedures for transportation of sports equipment and recreational devices by foot passengers. This plan shall be consistent with the tramway manufacturer's specifications and instructions, if any.

4.3.4.3.1 Carrier inspection plan.

The carrier inspection plan shall include the following:

a) Sampling size and frequency – The inspection plan shall identify the components to be inspected to assure a rotating minimum test sample of 20% of each aerial lifts’ carriers (to include at least 10) every year, or after a maximum of 2000 hours of operations, whichever comes first.

EXCEPTION: For chairlifts utilizing insert clips, the sample size shall be a minimum of 33% every two years during the relocation of clips.

b) Inspection requirements – The documented inspection criteria shall include:

1) types and methods of inspections to be performed;

2) inspector qualifications;

3) identification and labeling of critical and non-critical components areas;

4) pre-inspection preparation and post test inspection treatment of components;

5) acceptance criteria;

6) additional sampling and retesting requirements.

4.3.5.5 Software parameter log.

A software parameters log shall be maintained for each aerial lift. This log is intended for changes in software parameters that can be altered which affect the supervision circuit. The log shall include, but not be limited to:

a) current software parameter values;

b) changes to software parameter values;

c) date of changes made;

d) documentation of testing for each change of parameter values;

e) personnel making parameter changes.

Section 5 Surface lifts

Note: Timeframes relate to the ropeway installation date or modification date whichever controls, unless otherwise noted.

5.1.1.3.4 Location of power lines.

Jan, 1, 1977 to Present:

Power lines shall be located a minimum distance equal to the height of poles or support structures from any passenger tramway so that poles and electrical lines cannot touch any portion of the tramway, loading or unloading points or platforms and tow path, if applicable, upon collapse of poles or lines, unless suitable and approved precautions are taken to safeguard human lives.

5.1.1.3.5 Air space requirements.

5.1.1.3.5.1 Structures.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by vertical planes commencing at a point thirty-five (35) feet from the intersection of the vertical planes of the ropes or cables and ground surface.

For purposes of this rule, buildings controlled by the licensee used primarily for maintenance and operation of the lift and other tramways shall not be considered structures; however, buildings must comply with the following.

(1) No flammable liquids may be stored in the building outside of a UL listed container or storage cabinet, unless such flammable liquids are in the original containers and intended for daily usage. Quantities must be consistent with normal daily use. Class I or II flammable storage materials shall be limited to 2 gallons in a UL listed container and must be stored either in an outside storage area or in a UL listed cabinet.

(2) The building must be within the view of the attendant but not impair the sight line of the lift.

(3) Entrances to all machinery, operators', and attendants' rooms shall be locked when not in use. Unattended entrances accessible to public, which may be left open, shall be equipped with barriers to prevent entry.

Jan. 1, 1994 to May 15, 2000:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface

Dec. 30, 1977 to Jan. 1, 1994:

No passenger tramway installation shall be permitted whenever the Passenger Tramway Operator does not have permanent and irrevocable control of the following air space (except when the passenger tramway is located on Forest Service land): the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface

Prior to Dec. 30, 1977:

Not required

5.1.1.3.5.2 Cables or ropes.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

Any cable or rope installed on or near a ropeway that may represent a hazard to the ropeway shall be monitored to automatically stop the ropeway if the cable or rope fails. Failure would be defined as per Section 23.1 (g).

EXCEPTION: Track or haul ropes are excluded from this rule.

Prior to May 15, 2000:

Not required

5.1.1.5.2 Clearances.

Prior to Dec. 31, 1977:

A minimum clearance of 36 inches shall be maintained between the base of the tower and the vertical plane of the upward traveling cable. With respect to the downward traveling cable, a minimum clearance of 24 inches shall be provided between towing outfit in its normal position and the tower. This paragraph is not to be construed as preventing the authority having jurisdiction from requiring larger minimum clearances, at its discretion. A definite need for additional clearances arises when it is proposed to transport more than two skiers per towing outfit.

5.1.2.8.2 Haul rope terminal sheaves (Bullwheel and deflection sheaves):

Haul rope terminal sheave frames shall be designed to retain the rope in the event of the failure of the sheave, shaft, or mounting. In instances where the sheave is cantilevered, the design working stresses shall not be more than 60% of those otherwise allowable.

The minimum diameter of terminal sheaves shall be 72 times the nominal diameter of the haul rope. The sheave assembly shall be designed to retain the haul rope in the event of a deropement from the sheave. A flange extension of 1-½ times the rope diameter (measured from the bottom of the rope groove) shall be deemed adequate for retention.

Haul rope terminal sheaves that act as driving, braking, or holding sheaves shall be so designed tht the haul rope does not slip in the sheave groove. The design coefficient of friction for a particular sheave liner shall not exceed the following values:

Sheave Liner	Coefficient of Friction
Steel or cast iron grooves	0.070
Leather	0.150
Rubber, neoprene, or other	0.205

5.1.3.1 Towers.

Prior to Nov. 1, 1991:

The design of the tower structure and foundation shall be in accordance with the requirements of 5.1.1.6. Where guyed towers are used and guys intersect the ground within or near ski runs, the guys shall be marked for visibility.

Means shall be provided for ready access from the ground to all tower tops. Permanent ladders are required for heights above those accessible by portable ladders.

Portable ladders, if used, shall be in at least sufficient quantity to be available at each point where attendants are positioned. Portable ladders extending more than 20 feet (6.10 meters) shall not be used.

Towers shall be identified with successive numbers clearly visible to passengers.

Where towers are designed to permit variations in rope height, sheave unit supports shall be guided and attached so as to prevent misalignment by rotation

5.2.1.1 Applicable codes.

May 15, 2000 to May 15, 2006:

All electrical systems shall comply with 5.2.1.1 Applicable codes of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical systems shall comply with 5.2.1.1 Applicable codes of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical systems shall comply with 5.2.1.1 Applicable codes of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical systems shall comply with 5.2.1.1 Applicable codes of the B77.1-1982 ANSI Standard.

Jan 1, 1977 to Jan. 1, 1984:

All electrical work shall comply with 5.2.1.1 Applicable codes of the B77.1-1976 ANSI Standard.

Jan 1, 1974 to Jan. 1, 1977:

All electrical work shall comply with 5.2.1.1 Applicable codes of the B77.1-1973 ANSI Standard.

Jan 1, 1972 to Jan 1, 1974:

All electrical work shall comply with 5.2.1.1 Applicable codes of the B77.1-1970 ANSI Standard.

Prior to Jan 1, 1972:

All electrical work shall comply with 5.2.1.1 Applicable codes of the B77.1-1960 ANSI Standard.

5.2.1.2 Location.

May 15, 2000 to May 15, 2006:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 5.2.1.2 Location of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 5.2.1.2 Location of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 5.2.1.2 Location of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 5.2.1.2 Location of the B77.1-1982 ANSI Standard.

Prior to Jan. 1, 1984:

All exposed electrical power transmission wiring shall be so located that in case of collapse or breakage of the power line it will not come into contact with carriers, ropes, or passengers.

5.2.1.3 Protection.

Prior to May 15, 2006:

All transformer stations and other high voltage electrical equipment shall be marked with conspicuous warning signs and shall be protected so as to prevent unauthorized persons from entering the area or coming in contact with any portion of the equipment or wiring. All power equipment shall be protected against overloads by circuit breakers or fuses.

5.2.1.4 Overhead cables.

Prior to May 15, 2006:

Signal, communication, and control circuits may be supported between towers that support the aerial lift. Voltage on overhead or exposed circuits shall be limited to 50 volts with the exception of the intermittent ring-down circuits for telephone systems.

5.2.1.5.5 Ground fault interrupter protection.

Prior to May 15, 2006:

Not required.

5.2.2 Electrical system circuit design and classification.

Prior to May 15, 2006:

Not required.

5.2.10 Safety of operating and maintenance personnel.

Prior to May 15, 2006:

The sign “Personnel Working on Lift - Do Not Start” or a similar warning sign shall be hung on the main disconnect switch or at control points for starting the power unit(s) when persons are working on the aerial lift.

Provision shall be incorporated in the ropeway design to render the system inoperable when necessary for the Lock-out Tag-out protection of personnel working on the aerial lift.

5.3.1.2.1 Requirements for signs.

(a) The design of any sign as well as its support and the installation procedure of such sign shall be considered a minor modification if the sign or aggregate of signs on a given tower is greater than three feet square (nine square feet).

(b) Signs, fasteners, or supporting members shall not interfere with the operation of the tramway.

(c) The design of structural components shall be reviewed to consider the increase in loading caused by any sign.

(d) Signs shall not interfere with passenger or attendant vision.

5.3.1.3 Operational plan for transportation of recreational equipment. Each licensee shall have an operational plan that has procedures for transportation of sports equipment and recreational devices by foot passengers. This plan shall be consistent with the tramway manufacturer's specifications and instructions, if any.

Section 6 Tows

Note: Timeframes relate to the ropeway installation date or modification date whichever controls, unless otherwise noted.

6.1.1.3.3 Location of power lines.

Jan, 1, 1977 to Present:

Power lines shall be located a minimum distance equal to the height of poles or support structures from any passenger tramway so that poles and electrical lines cannot touch any portion of the tramway, loading or unloading points or platforms and tow path, if applicable, upon collapse of poles or lines, unless suitable and approved precautions are taken to safeguard human lives.

6.1.1.3.4 Air space requirements.

6.1.1.3.4.1 Structures.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by vertical planes commencing at a point thirty-five (35) feet from the intersection of the vertical planes of the ropes or cables and ground surface.

For purposes of this rule, buildings controlled by the licensee used primarily for maintenance and operation of the lift and other tramways shall not be considered structures; however, buildings must comply with the following.

(1) No flammable liquids may be stored in the building outside of a UL listed container or storage cabinet, unless such flammable liquids are in the original containers and intended for daily usage. Quantities must be consistent with normal daily use. Class I or II flammable storage

materials shall be limited to 2 gallons in a UL listed container and must be stored either in an outside storage area or in a UL listed cabinet.

(2) The building must be within the view of the attendant but not impair the sight line of the lift.

(3) Entrances to all machinery, operators', and attendants' rooms shall be locked when not in use. Unattended entrances accessible to public, which may be left open, shall be equipped with barriers to prevent entry.

Jan. 1, 1994 to May 15, 2000:

No passenger tramway installation shall be permitted to operate when a structure encroaches into the air space of the passenger tramway, defined as the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface

Dec. 30, 1977 to Jan. 1, 1994:

No passenger tramway installation shall be permitted whenever the Passenger Tramway Operator does not have permanent and irrevocable control of the following air space (except when the passenger tramway is located on Forest Service land): the area bounded by planes having an outward slope of one horizontal and two vertical and commencing at a point twenty (20) feet horizontally outside of the intersection of the vertical planes of ropes or cables and ground surface

Prior to Dec. 30, 1977:

Not required

6.1.1.3.4.2 Cables or ropes.

Note: Timeframes stated for this rule define the air space requirements for each ropeway at the time when the encroachment was known to the area and DO NOT pertain to the installation date of the ropeway.

May 15, 2000 to Present:

Any cable or rope installed on or near a ropeway that may represent a hazard to the ropeway shall be monitored to automatically stop the ropeway if the cable or rope fails. Failure would be defined as per Section 23.1 (g).

EXCEPTION: Track or haul ropes are excluded from this rule.

Prior to May 15, 2000:

Not required

6.2.1.1 Applicable codes.

May 15, 2000 to May 15, 2006:

All electrical systems shall comply with 6.2.1.1 Applicable codes of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical systems shall comply with 6.2.1.1 Applicable codes of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical systems shall comply with 6.2.1.1 Applicable codes of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical systems shall comply with 6.2.1.1 Applicable codes of the B77.1-1982 ANSI Standard.

Jan 1, 1977 to Jan. 1, 1984:

All electrical work shall comply with 6.2.1.1 Applicable codes of the B77.1-1976 ANSI Standard.

Jan 1, 1974 to Jan. 1, 1977:

All electrical work shall comply with 6.2.1.1 Applicable codes of the B77.1-1973 ANSI Standard.

Jan 1, 1972 to Jan 1, 1974:

All electrical work shall comply with 6.2.1.1 Applicable codes of the B77.1-1970 ANSI Standard.

Prior to Jan 1, 1972:

All electrical work shall comply with 6.2.1.1 Applicable codes of the B77.1-1960 ANSI Standard.

6.2.1.2 Location.

May 15, 2000 to May 15, 2006:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 6.2.1.2 Location of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 6.2.1.2 Location of the B77.1-1992 ANSI Standard.

Nov. 1, 1991 to Jan 1, 1994:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 6.2.1.2 Location of the B77.1-1990 ANSI Standard.

Jan. 1, 1984 to Nov 1, 1991:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 6.2.1.2 Location of the B77.1-1982 ANSI Standard.

Prior to Jan. 1, 1984:

All exposed electrical power transmission wiring shall be so located that in case of collapse or breakage of the power line it will not come into contact with carriers, ropes, or passengers.

6.2.1.3 Protection.

Prior to May 15, 2006:

All transformer stations and other high voltage electrical equipment shall be marked with conspicuous warning signs and shall be protected so as to prevent unauthorized persons from entering the area or coming in contact with any portion of the equipment or wiring. All power equipment shall be protected against overloads by circuit breakers or fuses.

6.2.1.4 Overhead cables.

Prior to May 15, 2006:

Signal, communication, and control circuits may be supported between towers that support the aerial lift. Voltage on overhead or exposed circuits shall be limited to 50 volts with the exception of the intermittent ring-down circuits for telephone systems.

6.2.1.5.5 Ground fault interrupter protection.

Prior to May 15, 2006:

Not required.

6.2.2 Electrical system circuit design and classification.

Prior to May 15, 2006:

Not required.

6.3.1.2.1 Requirement for signs.

(a) The design of any sign as well as its support and the installation procedure of each sign shall be considered a minor modification if the sign or aggregate of signs on a given tower is greater than three feet square (nine square feet).

(b) Signs, fasteners, or supporting members shall not interfere with the operation of the tramway.

(c) The design of structural components shall be reviewed to consider the increase in loading caused by any sign.

(d) Signs shall not interfere with passenger or attendant vision.

6.3.1.3 Operational plan for transportation of recreational equipment. Each licensee shall have an operational plan that has procedures for transportation of sports equipment and recreational devices by foot passengers. This plan shall be consistent with the tramway manufacturer's specifications and instructions, if any.

Section 7 Conveyors

Note: Timeframes relate to the ropeway installation date or modification date whichever controls, unless otherwise noted.

7.2.1.1 Applicable codes.

May 15, 2000 to May 15, 2006:

All electrical systems shall comply with 8.2.1.1 Applicable codes of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical systems shall comply with 6.2.1.1 Applicable codes of the B77.1-1992 ANSI Standard.

7.2.1.2 Location.

May 15, 2000 to May 15, 2006:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 8.2.1.2 Location of the B77.1-1999 ANSI Standard.

Jan. 1, 1994 to May 15, 2000:

All electrical power transmission wiring located near or proposed to cross over aerial lifts shall comply with 6.2.1.2 Location of the B77.1-1992 ANSI Standard.

7.2.1.3 Protection.

Prior to May 15, 2006:

All transformer stations and other high voltage electrical equipment shall be marked with conspicuous warning signs and shall be protected so as to prevent unauthorized persons from entering the area or coming in contact with any portion of the equipment or wiring. All power equipment shall be protected against overloads by circuit breakers or fuses.

7.2.1.5.5 Ground fault interrupter protection.

Prior to May 15, 2006:

Not required.

7.2.2 Electrical system circuit design and classification.

Prior to May 15, 2006:

Not required

7.2.3.3 Belt transition device.

Prior to May 15, 2006:

A belt transition stop device shall be provided. If an object continues to follow the belt past the belt transition stop device, the device shall move to relieve the pinch point and initiate the stop.

As a minimum, the belt transition stop device shall have the following features:

a) The leading edge of the device shall be marked with yellow and black warning stripes.

Exception: If the tramway utilizes rollers for the transition device, the yellow and black stripes are not required;

b) reserved

c) a stop shall be initiated by a force on the transition device not to exceed 30 pounds (133 newtons). The activating force shall be applied tangentially to the belt surface at the leading edge of the belt transition stop device. See Figure 7-1, ANSI 2006;

d) reserved

e) the distance between the belt surface and the belt transition device shall be minimized in the normal operating position;

f) the stop shall be initiated before the leading edge of the device moves 5/8 inch (15 mm) in the direction of its travel;

g) if the belt transition stop device is activated, the conveyor belt must stop within a belt travel distance of 12 inches (305 mm). At no time may the stopping distance be greater than ½ of the circumference of the drum;

h) if an object becomes entangled between the conveyor belt and the belt guard, the guard shall move to relieve the pinch point and initiate the stop. The guard shall be capable of moving the lesser of 5 inches (125 mm) or 150% of the distance required to stop the empty conveyor belt operating at full speed.

Section 8 Reserved

Section 9 Funiculars (ANSI B77.2-2004)

2.1.1.8 Internal combustion engine installation. This rule is superceded by ANSI B77.1-2006 Annex F Combustion engine(s) and fuel handling. *[Eff. 09/01/2006]*

Section 10 Reserved

Section 11 Reserved

Section 12 Reserved

Section 13 Reserved

Section 14 Reserved

Section 15 Reserved

Section 16 Reserved

Section 17 Reserved

Section 18 Reserved

Section 19 Reserved

Section 20 Tramway Licensing

20.1 License Required.

A passenger Tramway not in compliance with these rules and regulations may be licensed if it has been granted the necessary exceptions pursuant to Section 1.2.3. Terms, conditions or requirements limiting any license may be imposed if reasonably necessary to effect compliance with these rules and regulations or to protect the safety of the public.

20.2 Issuance of license. *[Eff. 07/01/2009]*

No license applied for shall be issued by the Board until it has received a letter from the area's designated agent or appointed substitute designee stating that all the deficiencies listed in the inspection report have been corrected and the authority appointed by the Board has corroborated such letter. Such corroboration may be made by review of the above verified letter; subsequent inspection; the Board's own investigation; the receipt of additional documentation requested by the Board; or any other means which the Board or appointed authority deems appropriate. Such letter shall bear a recognizable signature, printed name, and title and be submitted as an original or transmitted by electronic means. The certificate shall be issued as soon as possible, but no later than seven (7) days after receipt of such letter, unless the Board has reasonable grounds to delay issuance and has given notice of such action and its reasons to the area operator affected prior to expiration of such seven (7) day period. The license, or copy thereof, shall be displayed prominently at the place where passengers are loaded.

20.3 Expiration of licenses.

Tramways are licensed during the fall licensing period or the spring licensing period as designated by the Board for one calendar year.

1. The fall licensing period shall be prior to the winter operating season.

2. The spring licensing period shall be prior to the summer operating season.

   If the Tramway is closed, the requirements of X.3.3 Maintenance must be current before the Tramway can reopen for public operation. Licenses shall expire one calendar year from the date of issue.

Section 21 New Installations and Modifications

21.1 Definitions.

21.1.1 New Installation.

"New Installation" means any passenger Tramway installation not previously licensed and shall include both new and relocated passenger Tramways (also reference rules 1.2.4.1 and 1.2.4.2).

21.1.2 Major Tramway Modification.

"Major Tramway Modification" means any modification to a passenger Tramway which alters its verified design or verified construction and which results in a substantive change:

(a) in design speed of the system; or

(b) in capacity by changing the number of carriers, spacing of carriers, or load capacity of carriers; or

(c) in the path of the rope; or

(d) in the type of brakes and/or backstops or components thereof; or

(e) in structural arrangements; or

(f) in power or type of prime mover or auxiliary engine; or

(g) to control system logic.

Design and construction verifications are required. A major Tramway modification may be deemed a new installation by the Board and current requirements shall be applicable (reference rule 1.2.4.3).

21.1.3 Minor Modification.

"Minor Modification" means any modification, addition, or deletion to a passenger Tramway which does not meet the criteria of a major modification but which results in a significant change in the Tramway's verified design or verified construction and materially affects its integrity, operation or control. A design verification is required, however, no construction verification is required. A minor modification may be considered a major modification at the discretion of the Board. If the authority appointed by the Board disagrees with the classification of the modification as "minor" , the matter may be referred to the Board for a final decision.

21.1.4 Minor Alteration.

"Minor Alteration" means any other addition or deletion to a passenger Tramway which does not meet the criteria of a major or minor modification or one for one replacement, and which does not materially affect the Tramway's integrity, operation or control. No design or construction verification is required. A minor alteration may be considered a minor modification or a major modification at the discretion of the Board.

21.1.5 One for One Replacement.

"One for One Replacement" means the replacement of a component with an equal component. A one for one replacement shall be considered as normal maintenance and not as a modification. No design or construction verification is required.

21.2 Procedures Prior To Public Operation for New and Relocated Installations.

21.2.1 Submittal of Notice of New or Relocated Installation.

Before construction of the new or relocated installation begins, the area operator shall give notice of such activity to the Board on the required forms and include the appropriate fee.

21.2.2 Acknowledgment of New or Relocated Installation.

Upon receipt of the notice, the Board shall send an acknowledgment of such to the area operator together with the appropriate forms and requirements to complete the procedure as set forth in these rules and regulations.

21.2.3 Submittal of Request for Exception.

If the area operator proposes to depart from these rules and regulations, a request for exception must be made in writing by the area operator as set forth in rule 1.2.3.

21.2.4 Exception Request Procedure.

Within thirty (30) days after receipt of the request for exception as provided for in 21.2.3, the Board shall notify the area operator in writing of its action on the requested exception. If the Board denies or limits the requested exception, the Board's notification shall set forth the reasons for such action. Within sixty (60) days of the mailing of such notification, the area operator may appeal the Board's decision as provided for in Article 4 of Title 24 of the Colorado Revised Statutes.

21.2.5 Submittal of Verification of Design.

Before construction of the new installation is begun, the Professional Engineer in responsible charge of the design shall verify to the Board on the appropriate forms that the passenger Tramway design conforms to all rules and regulations of the Board. Copies of such designs, plans and specifications shall be submitted with this written verification.

21.2.6 Submittal of Acceptance Test Request.

Acceptance tests will be scheduled by the Board on a first come, first served basis. At least thirty (30) days before a requested acceptance test, the area operator shall notify the Board of a projected date for the required acceptance test. Upon receipt of such notification the Board shall establish a tentative acceptance test date for such passenger Tramway and shall notify the area operator of the same. If the projected date changes the area operator shall immediately notify the Board of same, and the Board shall reschedule the acceptance test. No later than three (3) days before the date of the acceptance test, the area operator shall notify the Board that the passenger Tramway is completed and ready for testing. The area operator shall verify to the Board that the required hours of continuous operation have been accomplished in accordance with 2.1.1.11.2 or 3.1.1.11.2 or 4.1.1.11.2. Upon receipt of such timely notifications, the initial inspection and acceptance test shall proceed as scheduled.

21.2.7 Submittal of acceptance test procedure.

At least thirty (30) days before the scheduled acceptance test date, the area operator shall submit an acceptance test procedure which was prepared by the Professional Engineer in responsible charge of the design (see 2.1.1.11, 3.1.1.11, 4.1.1.11, 5.1.1.11, 6.1.1.11, 8.1.1.11, or 2.1.1.11 ANSI B77.2-2004) for approval by the Board or the authority appointed by the Board.

21.2.8 Submittal of Verification of Construction.

After the new installation or relocation is completed and before the initial inspection is conducted, and before the acceptance test is observed, the Professional Engineer in responsible charge of the Tramway construction shall verify to the Board on the appropriate forms that the foundations, soils and concrete test samples have been inspected and completed according to the design, plans and specifications for such work. This document shall be required prior to the acceptance test.

21.2.9 Submittal of As-Built Drawings and Additional Documents.

Prior to or during the acceptance test, the “As-Built” designs, plans, specifications and drawings signed and sealed by the design engineer shall be submitted to the Board.

Within thirty (30) days after the acceptance test, the authority appointed by the Board shall notify the area operator of any additional documents which must be submitted.

21.2.10 Inspection and Acceptance Test.

All inspections and acceptance tests shall be according to these rules and regulations. Items failing to pass the acceptance test shall be retested if so directed by the Board.

21.2.11 Submittal of Verification of Initial Inspection and Acceptance Test.

The Board inspector shall report to the Board the results of the Acceptance Test and any deficiencies.

21.3 Procedures Prior to Public Operation for Tramways with Major Tramway Modifications.

In addition to the applicable requirements of Section 20 and rule 1.2, the following procedure shall be completed prior to public operation of the passenger Tramway.

21.3.1 Submittal of Notice of Modification.

Before the major Tramway modification commences, the area operator shall give notice of such activity to the Board on the required forms and include the appropriate fee.

21.3.2 Acknowledgment of Major Tramway Modification.

Upon receipt of the notice, the Board shall send an acknowledgment of such to the area operator together with the appropriate forms and requirements to complete the procedure as set forth in these rules and regulations.

21.3.3 Submittal of Request for Exception.

If the area operator proposes to depart from these rules and regulations, a request for exception must be made in writing by the area operator as set forth in rule 1.2.3.

21.3.4 Exception Request Procedure.

Within thirty (30) days after receipt of the request for exception as provided for in 21.3.3, the Board shall notify the area operator in writing of its action on the request. If the Board denies or limits the requested exception, the Board's notification shall set forth the reasons for such action. The area operator may appeal the Board's decision as provided for in Article 4 of Title 24 of the Colorado Revised Statutes.

21.3.5 Submittal of Verification of Design.

Before construction of the major Tramway modification is begun, the Professional Engineer in responsible charge of the design of the Tramway major modification shall verify to the Board on the appropriate forms that the design, plans and specifications for the major Tramway modification conforms to all rules and regulations of the Board and is compatible with the existing Tramway design. Copies of such designs, plans and specifications shall be submitted with this written verification.

21.3.6 Submittal of Acceptance Test Request.

Acceptance tests will be scheduled by the Board on a first come, first served basis. At least thirty (30) days before a requested acceptance test, the area operator shall notify the Board of a projected date for the acceptance test. Upon receipt of such notification, the Board shall establish a tentative acceptance test date for such passenger Tramway and shall notify the area operator of the same. If the projected date changes, the area operator shall immediately notify the Board of same and the Board shall reschedule the acceptance test. No later than three (3) days before the date of the acceptance test, the area operator shall notify the Board that the passenger Tramway modification is completed and ready for testing.

21.3.7 Submittal of Acceptance Test Procedure.

At least thirty (30) days before the scheduled acceptance test date, the area operator shall submit an acceptance test procedure which was prepared by the Professional Engineer in responsible charge of the design of the major Tramway modification for approval by the Board or the authority appointed by the Board. The acceptance test procedure shall take into consideration the modification which was made to the passenger Tramway and should be tailored to test the critical components of said modification.

21.3.8 Submittal of Verification of Construction.

After the major Tramway modification is completed and before the initial inspection is conducted and before the acceptance test is observed, the Professional Engineer in responsible charge of the construction of the modification shall verify to the Board on the appropriate form that the construction and/or installation of the modification has been completed according to the design, plans and specifications for such work. This document shall be required prior to the acceptance test.

21.3.9 Submittal of As-Built Drawings and Additional Documents.

Prior to or during the acceptance test, the “As-Built” designs, plans, specifications and drawings signed and sealed by the design engineer shall be submitted to the Board.

Within thirty (30) days after the acceptance test, the authority appointed by the Board shall notify the area operator of any additional documents which must be submitted.

21.3.10 Inspection and Acceptance Test.

All inspections and acceptance tests shall be according to these rules and regulations. Items failing to pass the acceptance test shall be retested if so directed by the Board.

21.3.11 Submittal of Verification of Initial Inspection and Acceptance Test.

The Board inspector shall report to the Board the results of the Acceptance Test and any deficiencies.

21.4 Procedures for Tramways with Minor Modifications.

21.4.1 Submittal of Notice of Modification.

Before the minor modification commences, the area operator shall give notice of such activity to the Board on the required forms.

21.4.2 Acknowledgment of Minor Modification.

Upon receipt of the notice, the Board shall send an acknowledgment of such to the area operator together with the appropriate forms and requirements to complete the procedure as set forth in these rules and regulations.

21.4.3 Documentation of Minor Modifications.

The area operator shall keep a log documenting all minor modifications made to each of its passenger Tramways. Such log shall be readily available for inspection by the Board or designated representatives of the Board and shall contain at a minimum the following information:

(a) Tramway name or other means of identification;

(b) name of design engineer;

(c) verification of design engineer on form approved by the Board;

(d) date of modification;

(e) purpose of modification;

(f) description of modification;

(g) names of personnel performing such modification;

(h) date of modification review and acceptance by area operator or its authorized agent.

Each area operator's log of minor modifications shall be readily available to the Board's inspectors during every inspection.

21.5 Documentation of Minor Alterations.

The area operator shall keep a log documenting all minor alterations made to each of its passenger Tramways. Such log shall be readily available for inspection by the Board or designated representatives of the Board and shall contain at a minimum the following information:

(a) Tramway name or other means of identification;

(b) date of alteration;

(c) purpose of alteration;

(d) description of alteration;

(e) names of personnel performing such alteration;

(f) date of alteration review and acceptance by area operator or its authorized agent.

Each area operator's log of minor alterations shall be readily available to the Board's inspectors during every inspection.

Section 22 Inspections

22.1 Duty of the Area Operator.

It is the primary responsibility of the area operator to perform such inspections on passenger Tramways that are necessary to protect the safety of the public.

22.2 Duty of the Board.

The Board may cause to be made such inspections of passenger Tramways as it may reasonably require and may require the area operators to keep such records, make such tests, and produce such evidence as may be necessary in order to make the following determinations:

(a) compliance with these rules and regulations and C.R.S. 25-5, Part 7;

(b) compliance with any terms, conditions and requirements of licensure;

(c) compliance with any requirements of a granted exception (variance);

(d) inspection disclosed no unreasonable safety hazard.

22.3 Required Inspections

22.3.1 Annual Licensing Inspection.

The annual licensing inspection shall be made prior to approval of any application for licensure.

22.3.2 Annual Unannounced Inspection.

(1) In addition to the annual licensing inspection, an unannounced inspection of every passenger Tramway shall be made at least once a year during the high-use season. No passenger Tramway shall be shut down for an unannounced inspection during normal operating hours, unless sufficient daylight is not available for the inspection. Up to five Tramway stops, not to exceed three (3) minutes in the aggregate, may be ordered by an inspector during normal operating hours. If additional stop time is required, it shall be done before or after normal operating hours.

Notwithstanding the provisions of this subsection, the Board reserves the authority to order a shutdown of a passenger Tramway for any reason set forth in these rules and regulations or in the Act.

(2) The inspector conducting the annual unannounced inspection shall take particular note of any deficiencies noted in the annual licensing inspection report. The inspector shall note any uncorrected deficiencies in the inspection report. Any uncorrected deficiencies noted in the prior inspection may be grounds for revocation or suspension of license.

22.3.3 Acceptance Test Inspection. All new Tramways, Tramways on which major Tramway modifications have been performed, and Tramways which have not been operated for routine maintenance within the previous 2 years shall have an acceptance test inspection in accordance with 21.2.10 and 21.3.10.

22.3.3.1 Acceptance test inspection during operating season.

Tramways that require relocation or a major modification during the Tramway's operational season shall have an acceptance test inspection in accordance with 21.2.10 and 21.3.10.

22.3.4 Special inspections. In addition to the annual licensing and unannounced inspection of each passenger tramway, the Board may order such special inspections as it may require.

If events are warranted, this determination can be made for the Board by the Board Chair and the Supervisory Tramway Engineer. In the event that the Board Chair does not have technical experience with tramways, another Board member with such experience may assist the Chair in the evaluation. If the Board or its designees determine that an unreasonable hazard requiring emergency shutdown exists, procedures set forth in § 25-5-716, C.R.S. shall be followed.

Depending on the circumstances, the Board may reasonably require special procedures and conditions to be followed, including but not limited to, the following:

(a) that such special inspections be unannounced;

(b) that the inspection be conducted by a person other than a regular inspector employed by the Board when special expertise is required;

(c) that, in appropriate cases, the area operator conduct the inspection;

(d) that the inspection be completed in a time frame as specified by the Board;

(e) that the results of the inspection shall be communicated to the Board office within the time period set forth in the inspection order;

(f) that the ropeway be shut down during the inspection and that the inspection be completed before the public is allowed to ride, or continue to ride, the ropeway.

Inspection orders shall be in writing. Service of inspection orders shall be made by delivering it to the area operator or the area operator's agent by handing it to such person, leaving it at the person's office with a clerk or other person in charge, or mailing it to the person's last known address. Service by mail is complete on mailing.

22.3.5 Additional required inspection.

In addition to the annual licensing and unannounced inspections for each passenger Tramway , there may be additional required inspections after each 2000 hours of operation.

22.4 Inspection Procedures for Annual Licensing and Unannounced Inspections

22.4.1 Inspection of Equipment.

The inspector employed by the Board shall conduct a visual and audible inspection. The inspection shall determine whether any item of equipment does not appear to be in proper working order.

The inspector is not required to conduct specialized testing or inspection of devices which can only be accomplished by persons with special expertise, but the inspector shall recommend to the Board that further, specialized inspections be conducted if either visual and audible inspection, review of the relevant records and documents, or presentation of any other evidence reasonably indicates that such a inspection is warranted.

22.4.2 Inspection of Records and Other Documents

(1) The inspector, employed by the Board, shall reasonably review the required logs, manuals, test reports of required self inspections, and manufacturer's recommended operation and maintenance manuals.

(2) If the logs and records required by these rules and regulations or by order of the Board are not properly kept, the inspector shall so advise the Board in writing. If any of the documents to be inspected exist, but are not present for the inspection, the inspector shall not certify the passenger Tramway being inspected to the Board for licensure until he has had an opportunity to review such documents.

22.4.3 Other Areas of Inspection.

The Board shall determine whether the area operator has established a reasonable training program for its operation and maintenance personnel and whether practices reasonably necessary for safe operations are being followed.

22.4.4 Inspection report. *[Eff. 07/01/2009]*

Upon completion of the inspection, the inspector shall provide the area operator of the passenger tramway(s) being inspected, or his agent, with a copy of the preliminary report of observations made during the inspection. As soon as possible, but no later than fifteen (15) days after the completion of the inspection, the inspector shall transmit to the Board a final report. This report shall include a statement as to whether it reasonably appears to the inspector that the passenger tramway(s) inspected comply with the statutes, these rules and regulations, and any other applicable orders of the Board, and that the inspection of such passenger tramway(s) disclosed no unreasonable safety hazards.

For each passenger tramway inspected, the inspector shall list the items not in compliance with these rules and regulations. The area operator of the passenger tramway(s) inspected shall also receive a copy of the inspector's final report.

Deficiencies stated in the annual inspection report shall be remedied as set forth in section 20.2.

Deficiencies stated in the annual unannounced inspection report and in any additional required inspection report(s) shall be remedied. A letter from the area’s designated agent or appointed substitute designee stating that all the deficiencies listed in the inspection report have been corrected, must be received by the Board office within twenty-eight (28) days from the completion of the inspection. Such letter shall bear a recognizable signature, printed name, and title and be submitted as an original or transmitted by electronic means.

Deficiencies stated in an acceptance test report(s) as required in 22.3.3.1 shall be remedied. A letter from the area’s designated agent or appointed substitute designee stating that all the deficiencies listed in the inspection report have been corrected, must be received and acknowledged by the Board office before the tramway can open for public operation. Such letter shall bear a recognizable signature, printed name, and title and be submitted as an original or transmitted by electronic means.

The inspection completion date shall be noted on both the preliminary and final inspection report.

22.4.5 Report of Unreasonable Hazard.

If the inspector finds a condition in the passenger Tramway construction, operation or maintenance, logs, records or other documents (including the absence of these documents) exists which may endanger the safety of the public, the inspector shall immediately notify the area operator, or his agent, in writing, to this effect at the time of the inspection. The inspector shall also issue an immediate report to the Board for appropriate investigation and order. In the event that any of the documents required to be inspected or the lack thereof indicates that a violation of the Board's rules and regulations exists, or that a condition in passenger Tramway construction, operation, and maintenance exists, either of which may endanger the safety of the public, the inspector shall not certify the passenger Tramway being inspected to the Board for licensure. Additionally, an immediate report shall be made to the Board for appropriate investigation and order.

22.5 Qualified Inspectors

22.5.1 General Inspectors.

All required inspections as listed in Rule 22.3 in these rules and regulations shall be conducted by qualified engineers who shall have demonstrated to the Board's satisfaction that they have a working knowledge of the Board's current rules and regulations and inspection procedures.

22.5.2 Inspector conflict of interest.

No person, except a full-time employee of the Board, shall observe an acceptance test or conduct an inspection of a passenger Tramway if:

(a) during the past two (2) years the inspector has been an employee of the owner or area operator of the Tramway; or,

(b) the inspector was involved at any level of the design, construction or modification of any Tramway at that area in the past five years; or,

(c) the inspector provided any other services to that area in the past five years.

Each year, prior to July 1st, each contract inspector shall make known all potential conflicts of interest on appropriate forms provided by the Board.

Inspectors shall disclose all known and potential conflicts of interest, business association or other circumstances that could influence their judgment or the quality of their inspections each year prior to July 1 st on appropriate forms provided by the Board. Should any conflicts arise during the year, the inspector is obligated to report them to the Board staff immediately.

This policy is not intended per se to prohibit employees or members of an inspector's firm or company from doing work for an area operator, provided that disclosures of potential conflict are made and that appropriate measures are in place to ensure that the inspector is not involved in, or privy to, information concerning the work.

Section 23 Passenger Tramway Incidents

23.1 Definitions.

“Reportable passenger Tramway incident” is defined as the following.

(a) Any incident from a possible malfunction of a passenger Tramway in which a person is injured or killed. The Tramway shall cease operation as defined by Section 23.3 Limitation of operation.

For the purposes of Section 23, the term “injured” is defined as bodily damage requiring immediate medical attention.

(b) Any incident in which a passenger is injured falling or jumping from a chair which is outside of the load or unload zone.

For the purposes of this rule, the “load zone” is defined as the area from the “wait here” sign to a point where the “no ski closure” ends or in the event there are no ski closures, at a point where the vertical clearance of the lift line is greater than eight (8) feet. This is measured from the bottom of the chair seat of an open carrier to the terrain or snow surface.

For the purposes of this rule, the “unload zone” is defined is the area approaching the unload area where the vertical clearance is less than eight (8) feet. This is measured from the bottom of an open carrier to the terrain or snow surface.

(c) Any unintentional deropement of an aerial Tramway regardless of whether or not the Tramway is evacuated. This does not apply to Surface Lifts, Tows and Conveyors.

(d) Any unplanned evacuation other than by prime mover or auxiliary power unit, regardless of cause. This does not apply to Surface Lifts, Tows and Conveyors.

(e) Any fire involving Tramway equipment or structures that poses a risk to passengers, operating personnel or the structural integrity of the Tramway .

(f) Failure of any electrical or mechanical component which results in the loss of control of the Tramway , unless the loss of control is a direct result of the malfunction of a single manual stop or speed control switch. Any of the following five (5) conditions is considered a loss of control:

(1) Tramway will not slow down when given the command to do so;

(2) Tramway will not stop when given the command to do so;

(3) Tramway accelerates faster than normal design acceleration;

(4) Tramway self starts or self accelerates without the command to do so;

(5) Tramway reverses direction unintentionally and without the command to do so.

(g) The failure of the following components or their primary connections are reportable:

Failure is defined as the inability of the listed components to continue to function as designed and continued operation would represent a hazard.

(1) Terminal Structure;

(2) Bullwheel;

(3) Brake System Components;

(4) Tower Structure;

(5) Sheave, Axle or Sheave Assembly;

(6) Carrier;

(7) Grip;

(8) Haul, Track or Counterweight Cable.

23.2 Reporting to the Board

(a) All reportable passenger Tramway incidents occurring during public operation shall be orally reported to a Board member or the authority appointed by the Board as soon as reasonably possible but no later than twenty-four (24) hours after the time of such incident or within twenty-four (24) hours after the incident becomes known to the area personnel. A written report shall be delivered to the Board on forms approved by the Board postmarked within five (5) days of such incident or postmarked within five (5) days after the incident becomes known to the area personnel.

(b) A reportable incident discovered on dates when the lift is not open to the public shall be orally reported to a Board member or the authority appointed by the Board as soon as reasonably possible, but no later than seventy-two (72) hours after such incident becomes known to the area personnel. A written report shall be delivered to the Board on forms approved by the Board or postmarked within fifteen (15) days following the verbal report. However, all oral reports must be made prior to reopening a lift.

Area personnel is defined as personnel involved with the operation, supervision and maintenance of the Tramway . This includes, but is not limited to, lift maintenance, lift operations, ski patrol and all supervisory staff.

23.3 Limitation of Operation.

When a death or injury results from a possible malfunction of a passenger Tramway , as defined in Section 23.1 (a), the owner or area personnel of the Tramway shall immediately cease operation and notify the Supervisory Tramway Engineer or a member of the Board by telephone. No part of the Tramway shall be removed or disturbed before permission has been given by a Board member, the Supervisory Tramway Engineer, or his designated representative, except to the extent that such action is necessary to avoid further death or serious injury.

An investigation of the occurrence shall then be initiated within 24 hours and shall precede any authorization to resume public operation of the Tramway. The report of investigation shall include a factual account of the incident, the nature and extent of injuries to persons, damage to the passenger Tramway , any witness statements, any other pertinent details, and recommendations for remedial measures to be taken prior to resuming operating.

23.4 Logs - Components.

Area operators shall maintain a log in a format approved by the Board which shall contain reports of components replaced or repaired that do not meet the definitions of CPTSB section 23.1(g) and are not part of maintenance due to normal wear. These reports shall be submitted during public operation to the Board at monthly intervals not to exceed 60 days from the date of occurrence. When the lift is not open to the public, the Component Log shall be submitted on a monthly basis when routine maintenance is being performed.

This log shall be available for inspection and, if requested by the Board or its duly authorized representative, the area operator shall make copies available of the relevant records relating to any of the components.

23.5 Logs - Stoppages.

Area operators shall maintain a passenger Tramway log which shall contain reports of all passenger Tramway stoppages over ten (10) minutes. For each such stoppage, the log shall contain the following information:

(a) name and/or number of the passenger Tramway ;

(b) date of stoppage;

(c) reason for stoppage;

(d) description of any mechanical, structural, electrical, or other problem (if known);

(e) under investigation (yes or no);

(f) action taken, if any;

(g) length of time the Tramway was down.

This log shall be available for inspection and, if requested by the Board or its duly authorized representative, the area operator shall make copies available of the relevant records relating to any of the stoppages.

23.6 Logs - Loading, Unloading Incidents and Passengers Falling or Jumping from Lifts

Area operators shall maintain a log which shall contain reports of all loading and unloading incidents in which injury occurs. This log shall also contain any incident in which a passenger falls or jumps from a chair with no injury, of which the area personnel has knowledge, that is outside the load or unload zone. For the purposes of this rule, the “load zone” and “unload zone” is defined in 23.1(b).

For each such loading and unloading incident, the log shall contain the following information:

(a) name and/or number of the passenger Tramway ;

(b) date the incident occurred;

(c) name, address and age of person injured;

(d) description of the injury;

(e) description of the incident;

(f) under investigation (yes or no).

For each such fall or jumping incident, the log shall contain the following information:

(a) name and/or number of the passenger Tramway ;

(b) date the incident occurred;

(c) age and gender of person involved, if known;

(d) location of incident;

(e) under investigation (yes or no).

This log shall be available for inspection and, if requested by the Board or its duly authorized representative, the area operator shall make copies available of the relevant records relating to any of the incidents.

Section 24 Rules of board procedure.

24.1 Declaratory orders.

24.1.1 Basis of declaratory orders.

Any person may petition the board for a Declaratory Order to terminate controversies or to remove uncertainties as to the applicability to the petitioner of any statutory provision or of any rule or order of the board.

24.1.2 Board discretion in considering petitions.

The board will determine, in its discretion and without notice to petitioner, whether to rule upon any such petition. If the board determines that it will not rule upon such a petition, the board shall promptly notify the petitioner of its action and state the reasons for such action.

24.1.3 Basis of board consideration of petitions.

In determining whether to rule upon a petition filed pursuant to this rule, the board will consider the following matters, among others.

(a) Whether a ruling on the petition will terminate a controversy or remove uncertainties as to the applicability to the petitioner of any statutory provision or rule or order of the board.

(b) Whether the petition involves any subject, question, or issue that is the subject of a formal or informal matter of investigation currently pending before the board or a court involving one or more of the petitioners.

(c) Whether the petition involves any subject, question, or issue that is the subject of a formal or informal matter or investigation currently pending before the board or a court but not involving any petitioner.

(d) Whether the petition seeks a ruling on a moot or hypothetical question or will result in an advisory ruling or opinion.

(e) Whether the petitioner has some other adequate legal remedy, other than an action for declaratory relief pursuant to Rule 57, Colorado Rules of Civil Procedure, that will terminate the controversy or remove any uncertainty as to the applicability to the petitioner of the statute, rule or order in question.

24.1.4 Requirements of petitioner.

Any petition filed pursuant to this rule shall set forth all of the following.

(a) The name and address of the petitioner and whether the petitioner is licensed pursuant to Section 12-25-101 et seq. or Section 12-25-201 et seq., C.R.S.

(b) The statute, rule, or order to which the petition relates.

(c) A concise statement of all of the facts necessary to show the nature of the controversy or uncertainty and the manner in which the statute, rule, or order in question applies or potentially applies to the petitioner.

24.1.5 Applicable procedures.

If the board determines that it will rule on the petition, the following procedures shall apply.

(a) The board may rule upon the petition based solely upon the facts presented in the petition. In such a case, the following applies.

(i) Any ruling of the board will apply only to the extent of the facts presented in the petition and any amendment to the petition.

(ii) The board may order the petitioner to file a written brief, memorandum, or statement of position.

(iii) The board may set the petition, upon due notice to the petitioner, for a non-evidentiary hearing.

(iv) The board may dispose of the petition on the sole basis of the matters set forth in the petition.

(v) The board may request the petitioner to submit additional facts, in writing. In such event, such additional facts will be considered as an amendment to the petition.

(vi) The board may take administrative notice of facts pursuant to the Administrative Procedures Act (Section 24-4-105(8), C.R.S.) and may utilize its experience, technical competence, and specialized knowledge in the disposition of the petition.

(vii) If the board rules upon the petition without a hearing, it shall promptly notify the petitioner of its decision.

(b) The board may, in its discretion, set the petition for hearing, upon due notice to petitioner, for the purpose of obtaining additional facts or information or to determine the truth of any facts set forth in the petition or to hear oral argument on the petition. The notice to the petitioner setting such hearing shall set forth, to the extent necessary, that the petitioner shall have the burden of proving all of the facts stated in the petition, all of the facts necessary to show the nature of the controversy or uncertainty and the manner in which the statute, rule, or order in question applies or potentially applies to the petitioner, and any other facts the petitioner desires the board to consider.

24.1.6 Parties to the proceeding.

The parties to any proceeding pursuant to this rule shall be the board and the petitioner. Any other person may seek leave of the board to intervene in such a proceeding, and

leave to intervene will be granted at the sole discretion of the board. A petition to intervene shall set forth the same matters as required by Rule 24.1.4. Any reference to a "petitioner" in this rule also refers to any person who has been granted leave to intervene by the board.

24.1.7 Standing of declaratory orders.

Any Declaratory Order or other order disposing of a petition pursuant to this rule shall constitute an agency action subject to judicial review pursuant to Section 24-4-106, C.R.S.

Annex E Operator control devices (Normative)

Table E-1 – Device function and characteristics

FUNCTION	COLOR	LABEL	FEATURES
Normal Stop	RED	STOP	Mushroom actuator with a minimum diameter of 1-3/8 inches (38 mm)
Emergency Shutdown	RED	EMERGENCY SHUTDOWN	Actuator must be visible but shielded to prevent inadvertent operation. *Exception: Shield is not required if the emergency shutdown stop is the only stop at the control location.*

Annex F Combustion engine(s) and fuel handling

F.3.1 (c) Evacuation power unit.

Prior to December 2, 2002:

Not required.

F.4.1 Structural members used as fuel tanks.

Prior to October 15, 2001:

Not required.

F.4.4 Outside aboveground or underground fuel supply tanks.

Prior to October 15, 2001:

Not required.

F.4.6 Provisions for internal corrosion.

Prior to October 15, 2001:

Not required.

F.4.7.3 Supply tanks.

Prior to October 15, 2001:

Not required.

F.4.10.11 Fill pipes.

Prior to October 15, 2001:

Not required.

Annex G Welded link chain

G.1.1 Chain Specifications.

Prior to May 15, 2006:

Not required.

G.1.2 Breaking strength.

Prior to May 15, 2006:

Not required.

G.1.3 Test procedures.

Prior to May 15, 2006:

Not required.

G.1.4 Chain test reports.

Prior to May 15, 2006:

Not required.

Editor's Notes

History

Sections 1, 24 eff. 05/01/2007.

Section 24.1 eff. 05/01/2008.

Sections 20, 22.4 eff. 01/01/2009.

Sections 20.2, 22.4.4 eff. 07/01/2009.

Section 22.3.4 eff. 11/01/2009.

Rule 0.1, Section 1.2.4.1, Rules 2, 3, 4, 5, 6, 7, Annexes E, F, G eff. 05/15/2010.

Section 3.1.3.3.2 eff. 05/15/2011.

Rule 0.1, 1.5 eff. 05/15/2012.

Sections 1.4, 2.1.1.11.2, 2.2.12, 2.3.5.5, 3.1.1.11.2, 3.2.9, 3.2.12, 3.3.5.5, 4.1.1.11.2, 4.2.9, 4.2.12, 4.3.5.5 eff. 09/01/2012.

Section 4.3.4.3.1 eff. 07/01/2013; Annex E repealed eff. 07/01/2013.

Section 3.3.4.3.1 repealed eff. 05/15/2014.

Annex E eff. 07/01/2014.

Rule .01, Section 1.2.4.1 eff. 11/01/2014.