

Passenger Tramway Safety Rules

2012 Vermont Passenger Tramway Rules & Addendum to ANSI B.77.1-2011 with ANSI B.77.1a-2012 Supplement

1000.0 Authority

These rules are adopted under the provisions of 31 VSA § 704 authorizing the Passenger Tramway Board to adopt reasonable rules relating to public safety in the construction, operation, maintenance, and inspection of passenger tramways.

1001.0 Definitions

1001.1 "Commissioner" means the Commissioner of the Department of Labor

1001.2 "Limits of Tramway" means that area defined by the outward swing clearance of the carriers or tow handles as they move around the bullwheel and along the line. This defines the jurisdiction of the Passenger Tramway Board.

1001.3 "Conveyor": a class of outdoor transportation wherein skiers, or passengers with recreational devices, are transported on a flexible moving element. The circulating, flexible moving element (conveyor belt) travels on one path and generally returns underneath.

1001.4 "Other Classifications": tramway configurations that do not conform to any of the classifications specifically provided for in these rules shall be evaluated by the Department on the basis of relevant codes and standards subject to wide enough use to justify a separate category and addition to this code.

1001.5 "Tramway Incident": is defined as any personal injury occurring on, or caused by, a passenger tramway or any

mechanical/electrical failure.

1002.0 General Provisions

1002.1 Variances.

The Tramway Board may, upon written application, grant a variance from the strict application of these rules if it determines that the tramway will be at least as free from danger to persons using it as if it met the express requirements of these rules. The burden of proof shall be on the applicant. Variances shall be in writing. (See ANSI B.77.1 2011 with ANSI B.77.1a-2012 Supplement Section 1.2.3)

1002.2 Application for Registration and Fees.

On or before November 1st in each year, every operator of a tramway shall apply to the Department, on forms prepared by it, for registration. The application shall contain such information as the Department may reasonably require. Fees are variable and are computed in accordance with 31 VSA § 707.

1002.3 Annual Department Inspection.

An annual inspection of the entire installation shall be made by a Department Passenger Tramway Technician and a signed copy of his inspection report shall be filed promptly with the Department and with the area operator. An additional inspection shall be made before any tramway may be used during the non-ski season and/or night operation.

1002.4 Registration.

Except as otherwise provided in these rules, a registration shall be issued only to those operators whose tramways meet the minimum requirements contained in these rules.

No tramway shall be operated for the purpose of transporting passengers, in the summer or winter, without having a valid registration, unless authorized by the Department in writing.

The registration plate shall be posted in public view at the lift to which it pertains.

1002.5 Signs.

Signs not specifically required by the ANSI B.77 Standard or this rule may be required by the Department to cover special needs. Any additional signage that may affect safety and/or wind loading shall have written or verbal Department approval before installation.

1002.6 Incident Reporting

A detailed report of any incident involving personal injury or mechanical/electrical failure, resulting in lift closure, which occurs during public operation of a tramway shall be sent to the Department within 72 hours from the time of the incident. The Incident Form is provided by the Department.

All tramway incidents shall be reported by telephone immediately to the Department or Department's Passenger Tramway Technician. An incident is defined as when there is a tramway-related serious injury or death or when a passenger has fallen six feet or more from the tramway, or when the tramway must be closed for repairs.

A serious injury is defined as one where Rescue Staff are called to assess the injured person and that person is referred to a higher level of care.

All failures of tramways that require lift evacuation by rope or Auxiliary Power Unit (APU) shall be reported immediately.

Items which may warrant immediate tramway shut down by the Department include:

- 1) Failure of protection circuits, operation circuits, supervision circuits etc.
- 2) Improperly functioning brakes or back stops.
- 3) Line sheave failure or potential failure condition, sheave train misalignment.
- 4) Non-functioning or misadjusted APU

- 5) An incomplete daily preoperational lift inspection, or log
- 6) Inadequate counterweight or carriage clearance, restricted counterweight or carriage movement
- 7) Any other condition, which may affect safe operation of tramway.

1002.7 Mechanical/Electrical Failure Log.

A daily log of all mechanical and electrical failures shall be maintained and such failures affecting safety shall be reported to the Department forthwith. All failures of tramways that require lift evacuation by rope or APU shall be reported immediately.

The Department shall be notified immediately anytime that a safety circuit is operated in a bypass mode when open to the public. This shall also be noted in the operational log.

1002.8 Inspections and Maintenance

All aerial tramways shall be dynamically tested at intervals not exceeding seven years. An acceptance test may be required by the Department when changes or modifications occur as defined in ANSI B.77.1-2011 WITH ANSI B.77.1A-2012 SUPPLEMENT section 1.2.4.4 – Ropeway modification.

Each year on all aerial tramways, the minimum grip, clip, hanger and carrier NDT shall be a rotating sample of 10 units or 20% of total units, whichever is greater. If any of the 20% or 10 units, whichever is greater, is rejected per manufacturer's criteria, another 20% or 10 units, whichever is greater, shall be tested. Any rejects in this second sample group shall be cause for 100% testing. If the manufacturer's recommendations are stricter than this, then those recommendations shall be followed. The Passenger Tramway Technician shall be notified of these rejected components.

During the annual inspection, the area operator shall be prepared to demonstrate APU operation and related emergency

procedures during a loss of control power.

In the event a communication line is repaired or replaced the area operator shall;

1) Notify the Passenger Tramway Technician and the Lift Manufacturer, if they are still in business, as soon as possible.

2) Verify and document proper switch function and annunciation.

The area operator shall be prepared to demonstrate a 110% dynamic test of any replacement, rebuild or repair that effects the operation of the APU.

1002.9 Brake Testing

All brakes shall be torque tested at an interval not to exceed 30 days of operation.

A brake testing log shall be posted at each drive which will give the most recent test results, the date, and shall be signed by the person performing the test on all brakes.

1002.10 Lift Speed Protocol for Detachable Grip Lifts.

For areas that are installing their first detachable lift, the following protocol will be in effect.

Before a detachable lift may be operated at design speed for the public it must be run at:

1. 75% of full design speed for 32 hours.
2. 90% of full design speed for 64 hours.

During this reduced speed period the lift may be operating for the public.

1002.11 Fire Alarm Systems

Fire alarm systems are to be installed in all drive and return terminals that are not visible to the operator. The system

shall be monitored at the operator's work position.

Any structure closer than 100 feet, measured from the centerline of the haul, tension or backstay ropes, shall have a method to notify the lift operator of a fire.

NOTE: Any building connected to a passenger tramway shall comply with the rules of the Fire Prevention Division of the Department Public Safety

1002.12 Carbon Monoxide Detectors

Carbon monoxide detectors are to be installed in all lift buildings where emission-producing fuels are burned.

1002.13 Personnel

Resort operators shall ensure that all lift attendants have sufficient training and experience to be able to read and understand lift instructions and to give and receive verbal communication from other attendants and passengers.

1002.14 Certifications

All Non-destructive testing (NDT) certifications and annual eye exams, including outside contractors, shall be on file in one location and shall be available to the Passenger Tramway Technician upon request.

Training of all NDT personnel shall be per ASNT-TC-1A. Reference document ASNT CP-189-2001 for certifying NDT Technicians is permitted.

All areas utilizing an in-house NDT program shall have their program, including certifications and specific written practices, audited every five years by an independent NDT Level III Technician. The results of this audit are to be forwarded to the Department of Labor, Tramway Division.

1003.0 Special Provisions

1003.1 Devices Transported on a Tramway

Before hang-gliders, ski bobs, tubes, sleds (other than first aid sleds or toboggans) bicycles or other devices can be transported on a tramway, application in writing to transport them shall be made to the Department specifying the lift's registration number. Area operators must obtain written approval from the manufacturer or, if the original equipment manufacturer is no longer in business, a qualified engineer. In subsequent years the area operator only needs to notify the Tramway Technician of their intentions to transport these devices.

1003.2 Skier Notification of Reverse Operation.

For any lift that is designed to operate in reverse direction, the area operator shall post signs for the public notifying them that the lift may operate in a controlled manner in reverse.

1004.0 Plans and Orders

1004.1 Submission of Plans

Three weeks prior to construction, modification or relocation of a tramway the owner must submit to the Department for review a complete set of design specifications written in the English language and stamped by a Professional Engineer licensed in the State of Vermont. This shall include a profile of the lift line, the anchoring system, and a plan showing the proximity of power lines, highways and rivers, lifts, and other structures.

Any changes or modifications to the design or specifications shall be submitted to the Department for review prior to making the change or modification

The Department shall be notified at least 48 hours in advance of any drilling of holes, setting of anchors or proof testing of anchors. The type of bolt and system of anchoring shall be mechanical and shall be approved by the Department. Installation, testing and design shall conform to the recommendations of the anchor system manufacturer or

application designer. A Passenger Tramway Technician, qualified engineer or their assignee shall witness the drilling of rock anchor holes and the placing, tensioning and locking of all rock anchors.

1004.2 Orders

If the Department finds that a violation of any of these rules exists, or that there is a condition in passenger tramway construction, operation or maintenance or any other condition endangering the safety of users of the tramway, the Department shall issue a written order setting forth its findings, the corrective action to be taken and fixing a reasonable time for compliance therewith. The order shall be served upon the operator, either in person or by certified mail and shall become final unless the operator applies to the Board for a hearing in the manner provided in 31VSA section 709. Whenever a condition is deemed to be imminently hazardous, the Department's representative shall be authorized to order the operator in writing to immediately suspend operation of the tramway until such time as the hazardous condition has been remedied.

1004.3 Location

No exposed power line in excess of 50 volts shall be located nearer than 100 feet of a tramway line, measured from the centerline of the haul rope, without the written approval of the Department. Blasting with high explosives within 100 feet of any tramway location shall require verbal permission from the Department. Excavation deeper than 12 inches within 15 feet of any tramway structure shall require written permission of the Department.

Tramways shall not be located so close to electric power lines, features of terrain, trees or structures so as to be considered a hazard to the safe operation of the tramway. Exposed distribution or transmission power lines shall be

located so that, in the event of failure, no portion of the energized line will contact the lift.

1004.4 Placement of Concrete

Before any concrete is placed in any foundation or for the base of a tower, a Passenger Tramway Technician of the Department shall ascertain that the foundation extends below the frost line or is adequately anchored to rock. The frost line is assumed to be a minimum 4 feet. The Passenger Tramway Technician, a qualified engineer or their assignee shall witness the placing of the concrete, insure proper testing and taking of samples to assure that the concrete work is executed in accordance with the plans and specifications. The Department shall be notified at least 48 hours in advance of pouring the concrete to permit the presence of a Passenger Tramway Technician.

Concrete used in the construction of passenger tramway shall have minimum compression strength of Class B 3,500 PSI at 28 days. Concreting shall be per the Vermont Standard Specification for Construction, Division 500, Section 501 "Structural Concrete" and Section 507 "Reinforcing Steel". ACI-318 may be used as a reference for structural concrete design.

1004.5 Protection of Electronic Components

All exposed AC wiring over 120v shall be installed in a UL-approved raceway, per NEC – 70 (2005). When a manufacturer finds that it is not possible to comply with this section, a pre-construction meeting with the Tramway staff shall be required

1004.6 When hydraulic or pneumatic tension systems are used, they must comply with the following requirements:

(1) In addition to ANSI B77.1 X.1.2.10.1, All ram connection

pins shall have a device to hold the pin in correct position without using the force of the ram. Such devices may be a cotter pin, locking plate or similar locking device.

(2) High velocity check valves will be used to prevent sudden loss of supply or system pressure to all cylinders due to hose breakage or other loss of haul rope tension. These valves shall be of internal design or be mounted contiguous to the tension cylinders.

(3) There shall be a pressure switch that will shut off the pump before the system can be over pressured. A hand pump may be used to operate the lift for evacuation if mechanical or electrical failure occurs.

(4) The lift design shall provide for retention of the carriage in the event of failure of any of any critical carriage component parts e.g. Carriage support wheels, axles or rails.

1004.7 Personnel Safety

Procedures for performing operation and maintenance functions require precautionary measures necessary to assure the safety of the personnel involved in conformance with applicable Vermont Occupational Safety and Health standards and codes. Implementation of the procedures intended for the protection of the public and operating and maintenance personnel is the responsibility of the owner, supervisor, and the individual worker.

1004.8 The installation of radio transmitters and related equipment in, on or near aerial tramways shall not be done without written authorization of the Department. Written approval from the lift manufacturer shall also be required, or if the manufacturer is no longer in business, from a qualified engineer.

1004.9 All torque wrenches used for assembly of critical components, including during new construction, must be

calibrated. The calibration certificate must be kept with, or attached to, the wrench.

All dynamometers and torque wrenches used for brake performance testing or adjustment shall be calibrated annually and the documentation shall be posted in the brake testing log.

1005 Surface lifts: J-bars, T-bars, Platter pulls and similar devices; Wire rope and Fiber rope tows

1005.1 Stop Gates

On all tows, the stop gate shall protect above and below the haul rope entering each bull wheel on the incoming side.

1005.2 Bull wheels shall be equipped with plane monitoring switches.

1006 Aerial Tramways

1006.1 Bull Wheels

Bull wheels shall be equipped with plane monitoring switches.

1006.2 Rope Evacuation

The use of line savers or other rope protection devices shall be used whenever the loaded rope contacts the haul cable. All connections such as hooks and snaps shall be load rated with a safety factor of five.

There shall be a test evacuation at least once prior to each summer and winter operation at a point designated by the Department. The Department shall be notified at least 48 hours in advance of any such required evacuation demonstration.

All rope evacuation plans shall be filed with the Department annually and shall be reviewed by the Department. All area operators shall assure that their plan meets the requirements of ANSI X.3.2.5.7.

Rope evacuation training shall be conducted at the beginning of each operating season and shall continue throughout the operating season, at intervals not to exceed 30 days. Ongoing training does not have to be hands on.

All carabineers or similar devices shall be of the double-locking type or multiple opposing single locking type.

All evacuation gear shall be available for inspection by the Department.

1007 Special provisions for chair lifts

1007.1

A. Lift attendants responsible for loading and unloading foot passengers shall stop the lift for special situations. The area is required to have written procedures outlining what should be done when confronted with special loading or unloading situations including, but not limited to, the infirm, elderly, adaptive, or more than one small child per riding adult.

B. The load and unload stations shall be equipped with a means of stopping the lift at any point along the load/unload platform when operating primarily for foot passengers.

C. It is required that a "stop line" be provided on the ramp where downhill loading occurs. The location of the stop line is to be determined taking into account the length of the ramp, the speed of the lift, and the length of the safety net (where required). The stop line shall be indicated by a permanent red line that shall not create a tripping hazard.

D All foot passengers shall be loaded or unloaded at speed not to exceed 250 feet per minute.

1007.2 Chairs

Each chair shall be equipped with a restraint bar, which shall not yield to forward pressure applied by passenger(s).

The passenger(s) must have the restraint bar fully closed except when they are embarking or disembarking the lift.

1007.3 Stop Gates

A stop gate or other device shall be provided prior to the chair entering a loading area to stop the lift in the event the restraint bar is deployed, and shall be located such that the stopped carrier does not contact waiting passengers.

1008 Wire rope

1008.1 Splices in Haul Ropes

Splicing of hauling wire ropes shall be done by a splicer approved by the department or under the supervision of a qualified person recognized by the department. The use of micro-press clips or similar devices is prohibited.

1008.2 Annual Wire Rope Inspection

An annual wire rope inspection shall be performed by an independent wire rope inspector who has been approved by the Department. A copy of this inspection report shall be filed with the department and with the operator.

The annual wire rope inspection report shall include haul rope, counterweight rope and backstay support rope or other auxiliary ropes.

In the event of rope damage, splicing or other rope repairs, the department shall be notified and it may require an inspection after repairs.

The Department shall be given 48 hours notice of any rope splice, repair or inspection to be done. In emergency situations, the Department will respond as quickly as possible.

If MRT is required it shall be done prior to or concurrent

with the annual rope inspection. A copy of the MRT inspection shall be filed with the area, the Passenger Tramway Technician and the rope inspector. The MRT report shall be reviewed by the rope inspector prior to the annual rope inspection, and shall note all anomalies found. All anomalies are to be addressed by the rope inspector.

1009.0 Adoption of Standards Applicable to Passenger Tramways

The American National Standard for Passenger tramways – Aerial tramways and lifts, surface lifts tows and conveyors – Safety Requirements, ANSI B77.1-2011 with ANSI B.77.1a-2012 Supplement , except as amended, altered or added to in this rule, shall apply to all construction, operation, and maintenance of passenger tramways.

In addition to the standards and codes cited in ANSI B.77 as supplemented the following standards shall apply:

Vermont Standard Specifications for Construction, Division 500, Section 501, “Structural Concrete” and Section 507 “Reinforcing Steel”.

ACI-318 may be used as a reference for structural concrete design.

National Fire Protection Association: “Life Safety Code” – NFPA #101 (editions adopted by the Department of Public Safety)

Nondestructive testing as defined by American Society for Nondestructive Testing (current edition).

ANSI 1.2.4.2

Add: A conveyor relocated within the physical boundaries of a resort not need not comply with the latest edition of ANSI B77.1 under the following condition:

The slope on which the relocated tow is placed must be equal to, or less, than original design.

ANSI 1.5.1

Add “including fiber rope tows“, such that a Qualified Engineer shall be responsible for the design and installation of fiber rope tows.

Modify Sections 2.1.1.5.1; 3.1.1.5.1; 4.1.1.5.1

When aerial lifts cross one another, the following conditions shall be met:

A. Any deropement of the upper lift shall cause both lifts to stop and a deropement of the lower lift that reduces vertical clearance between the aerial lifts shall cause both aerial lifts to stop.

B. The minimum vertical clearance between the haul rope of the lower aerial lift and the top of the carrier seat of the upper aerial lift shall be 15ft under the most adverse loading condition.

Modify Sections 3.1.3.3.2 and 4.1.3.3.2, adding the following sentence to paragraph a: “The inside deropement guard shall be of sufficient design and strength to withstand the forces of deropement while at the same time allowing a grip to pass unimpeded”.

Modify Sections: 2.3.4.4, 3.3.4.4 and 4.3.4.4 to read:

“The test load shall be equivalent to the design live load plus 10 percent.”

Modify Section 5.3.2.2.b and 6.3.2.2. a:

The Vermont Passenger Tramway Board prohibits the use of television surveillance in lieu of an operator/attendant.

Modify Section 6.1.1.5.1:

Add the words “When the down coming rope, including handles, if applicable, is less than 7 feet” to vertical clearance criteria.

Modify Section 6.1.2.6.3:

Add the words: “When used for tubing operations, a rollback

device must be installed and shall act directly on the drive sheave assembly.”

Modify Sections 6.1.5 and 6.3.2.2:

Add: “No personnel shall be allowed between the stop gate and bullwheel when the lift is operating.”

The Vermont Passenger Tramway Board does not allow one operator/attendant to operate more than one lift.

Add to sections 2-4

ANSI X.1.2.1

Auxiliary engines shall be checked and started each day before transporting passengers. The aerial lift shall be operated using the APU at least 15 minutes per week.

Add to sections 2-7:

ANSI X.2.3

Failures in the tower derail detection function, including open, ground fault and crossed loop conditions or any other circuit that could impact the safe operation of the lift shall be detected in accordance with the requirements for both complex and non-complex elements (see ANSI B77.1 2011 with ANSI B.77.1a-2012 Supplement Section 1.4 Definitions) found in ANSI B77.1 2011with ANSI B.77.1a-2012 Supplement

3.2.3 – Protection Circuits

The tower detection circuit shall be functional when the lift is operated under normal conditions.

Protection devices shall be installed on the tension system and carriage system. The carriage protection device shall activate in either direction before the carriage travels more than 18 inches from its normal range of operation when fully loaded. However, in no case may the protection device be located closer than 6 inches from the maximum point of permissible travel of the tension device.

Lanyard stops shall be provided and appropriately marked in all drive and return terminals.

ANSI ANNEX A

Modify Section A.4.1.2:

Add "or 3000 Hrs whichever is greater" to the MRT requirement

ANSI ANNEX D

Modify Table D1, Line m: Add. In lieu of D 1 (m) use pictograms D17, D18 or D19

ANNEX D Modify Table D1, add a sign "Lowering bar required" with the modified arrow.

ANNEX F

Modify F.4.3: add "or Coast Guard Approved plastic tanks."