

Chapter Ind 46

**TOWING AND LIFTING DEVICES FOR SKI AREAS**

- Ind 46.01 Scope (p. 2)
- Ind 46.02 Definitions (p. 2)
- Ind 46.03 Plans and specifications (p. 3)
- Ind 46.04 Tests and inspections (p. 3)
- Ind 46.05 Inspections, interval (p. 4)
- Ind 46.08 Towers, location, clearances (p. 4)
- Ind 46.09 Capacity and speed (p. 5)
- Ind 46.10 Power source (p. 5)
- Ind 46.11 Prime movers (p. 6)
- Ind 46.12 Operation and control (p. 7)
- Ind 46.13 Machine room or enclosure (p. 8)
- Ind 46.14 Moving parts (p. 8)
- Ind 46.15 Terminal and drive sheaves (p. 8)
- Ind 46.16 Hauling rope sheaves, hauling rope deflecting sheaves, counterweight sheaves and mounts (p. 8)
- Ind 46.17 Anchor connections or counterweight ropes, tower or station anchor cables or guys (p. 9)
- Ind 46.18 Counterweights and counterweight ropes (p. 9)
- Ind 46.19 Structures and foundations (p. 10)
- Ind 46.20 Loading and unloading areas (p. 10)
- Ind 46.22 Track cable saddles and mounts (p. 10)
- Ind 46.23 Hauling ropes (p. 10)
- Ind 46.24 Car (p. 11)
- Ind 46.25 Track cables (p. 12)
- Ind 46.26 Communication (p. 12)
- Ind 46.27 Evacuation (p. 12)
- Ind 46.28 Location, towers, clearances (p. 13)
- Ind 46.29 Capacity and speed (p. 14)
- Ind 46.30 Power source (p. 14)
- Ind 46.31 Prime movers (p. 15)
- Ind 46.32 Operation and control (p. 16)
- Ind 46.33 Machine room or enclosure (p. 17)
- Ind 46.34 Moving parts (p. 17)
- Ind 46.35 Terminal and drive sheaves (p. 17)
- Ind 46.36 Hauling rope sheaves, hauling rope deflecting sheaves, counterweight rope sheaves and mounts (p. 18)
- Ind 46.37 Anchor connections for counterweight ropes, tower or station anchor cables or guys (p. 18)
- Ind 46.38 Counterweights and counterweight ropes (p. 19)
- Ind 46.39 Structures and foundations (p. 19)
- Ind 46.40 Loading and unloading areas (p. 19)
- Ind 46.41 Track cable saddles and mounts (p. 19)
- Ind 46.42 Hauling ropes (p. 20)
- Ind 46.43 Carriers; chair tramways, gondola tramways and appurtenances (p. 20)
- Ind 46.44 Track cables (p. 21)
- Ind 46.45 Communication (p. 22)
- Ind 46.46 Signs (p. 22)
- Ind 46.47 Evacuation (p. 22)
- Ind 46.48 Location, towers, clearances (p. 22)
- Ind 46.49 Capacity and speed (p. 23)
- Ind 46.50 Power source (p. 24)
- Ind 46.51 Prime movers (p. 24)
- Ind 46.52 Operation and control (p. 25)
- Ind 46.53 Machine room or enclosure (p. 25)
- Ind 46.54 Moving parts (p. 26)
- Ind 46.55 Terminal and drive sheaves (p. 26)
- Ind 46.56 Hauling rope sheaves, hauling rope deflecting sheaves, counterweight rope sheaves and mounts (p. 26)
- Ind 46.57 Anchor connections for counterweight ropes, tower or station anchor cables or guys (p. 27)
- Ind 46.58 Counterweights and counterweight ropes (p. 27)
- Ind 46.59 Structures and foundations (p. 27)
- Ind 46.60 Loading and unloading areas (p. 27)
- Ind 46.61 Hauling ropes (p. 28)
- Ind 46.62 Towing outfits (p. 28)
- Ind 46.63 Communication (p. 29)
- Ind 46.64 Signs (p. 29)
- Ind 46.66 Location, clearances, path of rope (p. 29)
- Ind 46.67 Capacity and speed (p. 30)
- Ind 46.68 Power source (p. 30)
- Ind 46.69 Prime mover (p. 30)
- Ind 46.70 Operation and control (p. 31)
- Ind 46.71 Machine room or enclosure (p. 31)
- Ind 46.72 Moving parts (p. 32)
- Ind 46.73 Rope drive sheaves, idler sheaves and supports (p. 32)
- Ind 46.74 Counterweight or tensioning device rope (p. 32)
- Ind 46.75 Counterweight or tensioning device (p. 32)
- Ind 46.76 Foundations (p. 33)
- Ind 46.77 Loading and unloading areas (p. 33)
- Ind 46.775 Minimum operating personnel (p. 33)
- Ind 46.78 Hauling rope (p. 34)
- Ind 46.79 Intermediate towers and supports (p. 34)
- Ind 46.80 Signs (p. 35)
- Ind 46.81 General requirements (p. 35)
- Ind 46.82 Maintenance (p. 35)

**Ind 46.01 Scope.** The requirements of this code are to insure safe design, construction, installation and operation of every single and double reversible aerial tramway, chair lift, gondola lift, T-bar lift, J-bar lift, platter lift and fiber rope tows installed in public places of employment for the safety of employees and frequenters. These requirements apply to both existing installations and those hereafter installed unless otherwise specified.

**History:** Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.02 Definitions.** (1) **TRAMWAY.** A tramway is a device used to transport passengers by any one of the following means: Single and double reversible aerial tramways, chair lifts, gondola lifts, T-bar lifts, J-bar lifts, platter lifts and fiber rope tows.

(a) *Single and double reversible aerial tramways.* A type of transportation in which passengers are carried in one or more enclosed cars and reciprocate between terminals.

(b) *Chair lifts, gondola lifts.* A type of transportation in which passengers are carried on chairs, on cars, or in gondola cabs attached to and suspended from a moving wire rope or attached to a moving wire rope and supported on a standing wire rope or other structure.

(c) *T-bar lifts, J-bar lifts, platter lifts.* A type of transportation which pulls skiers riding on skis by means of devices propelled by a main overhead traveling wire rope.

(d) *Fiber rope tow.* A type of transportation which pulls skiers riding on skis by means of a traveling fiber rope which the skier grasps by hand.

(2) **APPROVED** means approved by the department.

(3) **CAPACITY.** In computing capacity, passengers shall be based on weight of 170 pounds each.

(3a) **DEPARTMENT** means the department of industry, labor and human relations.

(4) **DIAMETER.** The term diameter in reference to sheaves means tread diameter.

(5) **ELECTRIC POWER LINE.** Electric power line shall mean a transmission line carrying voltage in excess of 480 volts.

(6) **FULL LOAD OR FULLY LOADED.** The maximum load approved by the department.

(7) **HAULING ROPE.** (a) *Wire.* A rope for propelling tramways.

(b) *Fiber.* A rope for towing skiers.

(8) **SAFETY STOP.** A device used to stop the tramway as a result of passenger contact, attendant's action, cable derailment, or movement of a terminal sheave or counterweight.

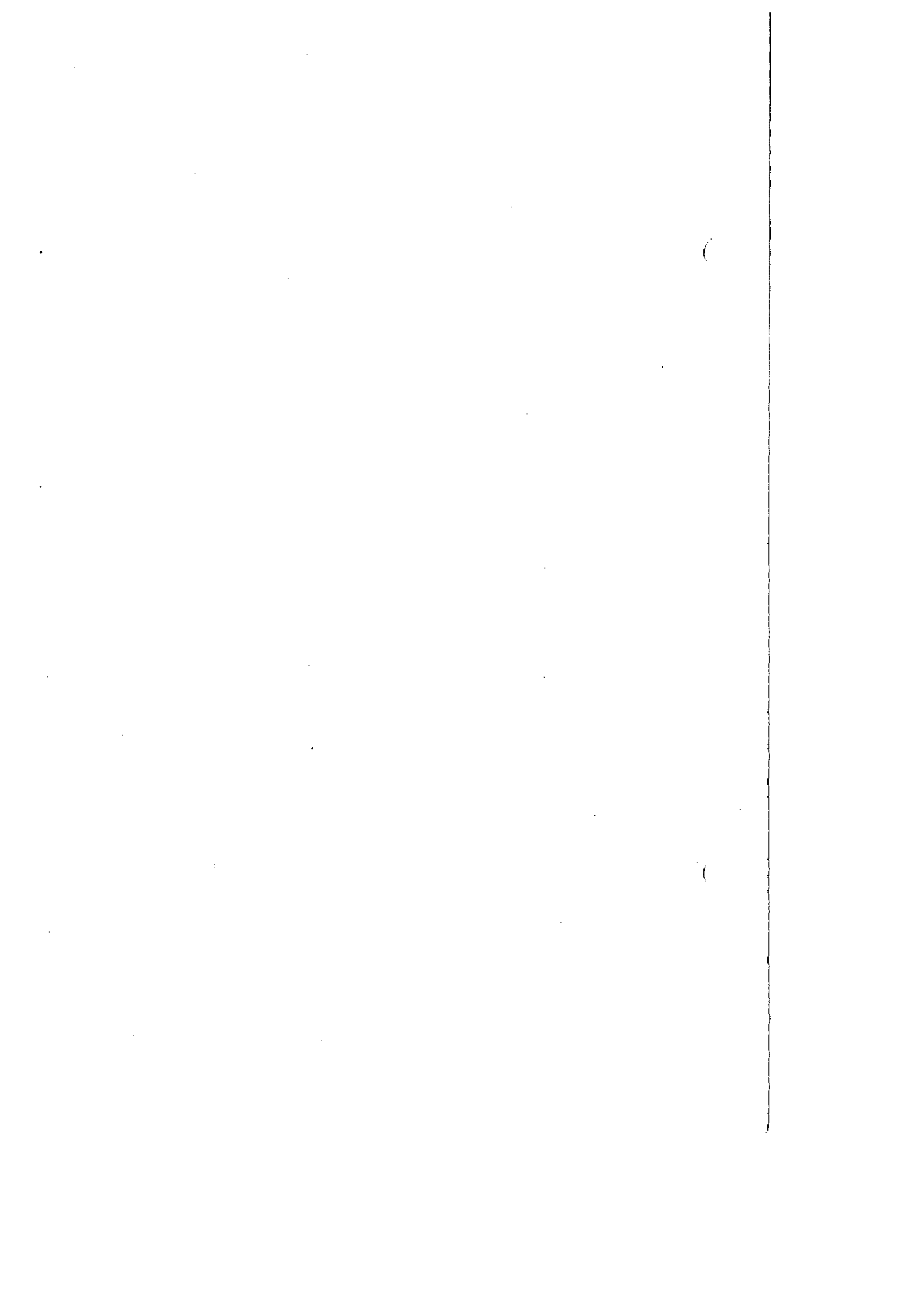
(9) **SHEAVES.** Pulleys or wheels grooved for rope.

(a) *Deflecting sheave.* A sheave which is used for the primary function of changing the course of direction of the hauling rope.

Register, October, 1982, No. 322

Towing and Lifting Devices for Ski Areas

- (b) *Drive sheave.* A sheave driving the hauling rope.
- (c) *Terminal sheave.* A drive sheave or terminal drive sheave.
- (d) *Terminal return sheave.* A sheave which reverses the direction of travel but does not transmit power to the hauling rope.



sheave or to a drive shaft so that there is no clutch, chain or belt between the brake and the main drive sheave.

**History:** Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.70 Operation and control.** (1) There shall be a safety gate or safety stop so constructed and installed that no passenger, in contact with or being pulled by the rope, can come in contact with sheaves, machinery, building or other obstruction. The safety stop shall be so designed and constructed that it can only be reset manually.

(a) The distance from the safety gate to the first sheave or other obstruction shall be not less than the distance the rope travels, plus a 30% safety factor after the safety gate has been tripped. This distance shall be determined while the tramway is operating at maximum speed with only one passenger riding on the tramway.

(b) Electrical stop circuits shall be closed metallic circuits so arranged that power failure, malfunction or actuation of a safety switch causes the tramway to stop.

(2) Bypassing of safety stop circuits is prohibited.

(a) Passenger actuated safety stops shall be so located that they cannot be bypassed by the skier.

1. Passenger or attendant-actuated safety stops shall be tested at the beginning of each day's operation by an authorized person.

(3) The tramway operator shall maintain a position to have view of the tramway or tramways, and shall have controls to stop the tramway readily available.

(4) The tramway shall be started by an authorized employee or authorized ski patrol member only.

(5) After any stop, a rope tow system may not be restarted until the cause of the stop has been determined and clearance has been obtained from all attendants for that rope tow system.

**History:** Cr. Register, March, 1967, No. 135, eff. 4-1-67; cr. (6), Register, October, 1982, No. 322, eff. 11-1-82.

**Ind 46.71 Machine room or enclosure.** (1) Driving units shall be enclosed or located in a manner that will prevent employes and frequenters from accidentally coming in contact with the machinery.

(a) When an internal combustion engine is used as a prime mover, the machine room shall be ventilated to prevent any products of combustion or fuel fumes from contaminating the atmosphere in the enclosure. Engine exhaust pipes shall not pass within 2 inches of any wooden member or other flammable material.

(b) Openings over 10 inches square shall be provided with suitable doors with locks to prevent entrance and operation by unauthorized persons.

1. The machine room or enclosure shall be sign posted to the effect that unauthorized persons are not permitted therein.

Register, October, 1982, No. 322  
Towing and Lifting Devices for Ski Areas

## Ind 46

(c) Machine rooms shall be provided with uniform artificial illumination of an intensity of not less than 5 foot candles at the floor.

(d) Approved fire extinguishers shall be installed in all machine rooms.

(e) An exit shall be near enough to permit anyone to leave rapidly in the case of an emergency.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.72 Moving parts.** All moving parts shall be guarded in accordance with the requirements of the Wis. Adm. Code, chapter Ind 1, Safety.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.73 Rope drive sheaves, idler sheaves and supports.** (1) Sheaves and supports shall be of a design, type and sufficient strength to withstand stresses imposed by full load operation.

(a) Grooved sheaves shall be installed to hold the uphill rope not more than 3 feet above the snow at the loading area so arranged to prevent the rope from being pulled out of the groove by skiers.

(b) There shall be no intermediate sheaves on the uphill rope between the loading and unloading areas.

(c) Terminal sheaves shall be grooved and arranged to retain the rope in the groove.

1. Terminal sheaves shall be installed to prevent their falling to the ground in the event of rope breakage.

(d) Return rope sheaves shall be mounted high enough on the intermediate towers to hold the rope at least 7 feet above the snow level.

1. Return rope sheave mountings shall be of sufficient strength to prevent failure under full load.

(e) The vertical component of the rope tension shall be sufficient to hold the rope in the sheave groove, or an approved device shall be provided to retain the rope in the groove.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.74 Counterweight or tensioning device rope.** (1) Connection between the counterweight or tensioning device sheave and the securing point shall be made with rope with a factor of safety of not less than 6.

(a) Wire rope shall be coated with lubricant or some other approved coating to prevent rusting unless manufactured of corrosion-resistant material.

(b) Splices in counterweight ropes are prohibited.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.75 Counterweight or tensioning device.** (1) The counterweight or tensioning device shall be of sufficient type and size to prevent slippage of the hauling rope on the drive sheave under full load.

Register, October, 1982, No. 322  
Towing and Lifting Devices for Ski Areas

(a) Counterweight or tensioning device sheaves shall be grooved and arranged to retain the rope in the groove.

(b) Counterweights shall be so suspended to permit free vertical movement.

(c) Counterweights or tensioning devices shall be so constructed and maintained as to have free movement at all times.

(d) Counterweights or tensioning devices shall be guarded to prevent accidental contact with or passage under the counterweights.

(e) Counterweights or tensioning devices shall have sufficient travel to provide for all normal operating changes in loading and temperatures.

**History:** Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.76 Foundations.** Foundations or anchors used to restrain the driving mechanism and the terminal sheave shall be of sufficient size and type to prevent movement under full load.

**History:** Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.77 Loading and unloading areas.** (1) Loading areas shall be level, free of obstructions and fenced to guide skiers for loading.

(2) Unloading areas shall be of sufficient length, width and grade to provide the skier clearances to move away from the tramway line.

(3) A ladder or other suitable means of elevation for facilitating release of skiers entangled in the tramway rope shall be available and visible at all times in the immediate vicinity of the safety-stop at the unloading area.

(4) Illumination at loading and unloading areas and the entire ski-path, when the tramway is in operation, shall be of an intensity of not less than 5 foot candles at the surface.

**History:** Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.775 Minimum operating personnel.** (1) (a) Except as provided in subs. (2) and (3), each rope tow system shall have at least one attendant present at each:

1. Loading area; and
2. Unloading area.

(b) 1. The duties of the attendants at the loading and unloading areas shall include observing for any potentially dangerous operational or mechanical developments within their view.

2. Each attendant shall have controls to stop the rope tow system readily available and shall maintain an operating position no more than 10 feet from these controls.

3. The tow system shall be stopped whenever a required attendant is more than 10 feet from the controls to stop the rope tow system.

(2) A rope tow system may have only one attendant present at either the loading area or unloading area, if:

Register, October, 1982, No. 322  
Towing and Lifting Devices for Ski Areas

## Ind 46

(a) The rope tow system is less than 800 feet in length, measured from the loading area to the safety gate; and

(b) The attendant is positioned so to have an unobstructed view of the entire length of the system, either physically or through television surveillance; and

(c) That attendant has controls to stop the rope tow system readily available and maintains an operating position no more than 10 feet from these controls; and

(d) The tow system will be stopped whenever the required attendant is more than 10 feet from the controls to stop the rope tow system.

(3) One attendant may serve more than one loading area or unloading area, if:

(a) The attendant is positioned so that all loading areas or unloading areas under their responsibility are within a 90 degree cone of vision; and

(b) The attendant has controls to stop all rope tow systems readily available and maintains an operating position no more than 10 feet from these controls; and

(c) The stopping controls are clearly marked to indicate the corresponding rope tow system; and

(d) All tow systems under the attendant's responsibility will be stopped whenever the required attendant is more than 10 feet from the controls to stop the rope tow systems.

History: Cr. Register, October, 1982, No. 322, eff. 11-1-82.

**Ind 46.78 Hauling rope.** (1) Hauling rope shall be a type manufactured for ski-tow use.

(a) Splices shall be of the transmission or long type.

(2) The use of towing outfits or rope grippers attached to a skier or his equipment is prohibited.

(3) Sheave adjustment or other approved means shall be provided to regulate rotation of the up-going rope of a fiber rope tow, limiting spiraling to no more than one complete revolution in 200 feet of travel and not to exceed 3 revolutions in the total uphill length of any tow. This spiraling measurement shall be taken with no one using the rope tow system.

History: Cr. Register, March, 1987, No. 135, eff. 4-1-87; cr. (3), Register, October, 1982, No. 322, eff. 11-1-82.

**Ind 46.79 Intermediate towers and supports.** (1) Return rope sheave supports shall be of sufficient strength to prevent failure under full load.

(a) Guy wires or braces shall be located to provide the minimum clearances as required by s. Ind 46.66 (1) (a), (b), and (c).

(b) Guy wires or braces shall be fenced.

(c) There shall be no projections lower than 7 feet above the surface of the tow path on towers and supports.

Register, October, 1982, No. 322  
Towing and Lifting Devices for Ski Areas



(2) Foundations for intermediate towers shall be constructed, located and of sufficient strength to support the stresses imposed under full load operation.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.80 Signs.** (1) Signs shall be provided as outlined in the following subsection:

(a) "Towing outfits or rope grippers attached to a skier or his equipment are prohibited."

"Beware"—"Dangerous"—"Loose clothing—Long Hair."

"Stay in Ski-Track."

1. These shall be placed at loading areas.

(b) "Safety Gate."

1. This shall be placed at the safety gate.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67.

**Ind 46.81 General requirements.** (1) NEW AND EXISTING INSTALLATIONS. (a) Voltage through any passenger activated safety stop shall not exceed 120 volts.

(2) CONSTRUCTION AND LOCATION OF SIGNS. Required signs shall be of substantial construction, firmly and appropriately mounted or positioned. They shall be provided in such numbers and at such locations as to be clearly visible under normal operating conditions to all persons to whom their respective legends may relate. Design, lettering and background coloring shall be such to provide easy legibility.

(3) ACCIDENTS. Provision shall be made to render first aid in the event persons are injured in the tramway. This shall include provision for transporting an injured person off the tramway or slope.

(a) Accidents resulting in personal injury on a tramway shall be reported to the department within 10 days from date of accident.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67; am. (3) (a), Register, July, 1978, No. 271, eff. 8-1-78.

**Ind 46.82 Maintenance.** (1) Tramways shall be kept in safe operating condition, properly lubricated and clean, including counterweight areas and pits, machine rooms or areas.

(a) Permanent records must be kept of all inspections and major repairs made. These records shall be made available to the department upon request.

History: Cr. Register, March, 1967, No. 135, eff. 4-1-67; am. (1) (a), Register, July, 1978, No. 271, eff. 8-1-78.