AMENDMENT NO. 1 MARCH 2025
TO
IS 5228 : 2017 CONTINUOUS MOVEMENT MONOCABLE ROPEWAYS WITH FIXED GRIPS — CODE OF PRACTICE

(Second Revision)

(*Foreword, fourth para*) — Insert the following after fourth para:

'The list of India Standards on ropeways given in Annex B shall also be referred along with this standard. The composition of the Committee responsible for the formulation of this standard is given in Annex C.'

(*Page* 8, *clause* **10**) — Insert the following at the end:

'11 SKI TOW

Ski Tow is a means of transport used by Skiers to glide up-hill on snow. It is often called ski lift or surface lift. Variations of purpose include basic transport, a recreational activity, or a competitive winter sport.

A ski lift or surface lift is a means of cable transport for snow sports in which skiers and snowboarders remain on the ground as they are pulled uphill by attaching to a continuous rope as they are pulled up a slope.

A ski tow that pulls skiers up a slope without lifting them off the ground.

Here, passengers grab hold of the carrier/puller attachment and are pulled along while standing on their skis or snowboards and sliding up the hill, with some variations having simple fixed handles.

The forces involved and the pulleys which the rope passes through require the rider to attach using a "nutcracker" or "tow grabber". This style has now been superseded by T-bar lifts, platter.

12 LINE OF SKI-TOWS

12.1 In the case of low-level ski toes, the tow track shall be visible from the monitoring points.

12.2 The longitudinal gradient at any point of the tow track shall not exceed the following values:

a) In the case of low-level ski-tows:

   1) Where the passengers hold directly on to the towing rope: 25 percent; and

   2) With tow-hangers: 40 percent;

b) In the case of ski-tows with a rope at high level:

   1) With tow-hangers for 2 persons: 50 percent; and

   2) With tow-hangers for 1 person: 60 percent.

In the case of high-level ski-tows equipped with tow-hangers for 2 persons, the gradient can be increased to 60 percent for a maximum length corresponding to twice the pitch between tow-hangers. Such tow-track sections shall be immediately preceded by a less steep section of at least the same length with a gradient of not more than 40 percent.

12.3 Downhill slopes on the tow-track are permissible with an average gradient measured over a length corresponding to the minimum pitch between tow-hangers, as follows:

a) With tow-hangers for 2 persons to a maximum of 3 percent; and

b) With tow-hangers for 1 person to a maximum of 5 percent.

Price Group 4

13 LIMIT PROFILE OF SKI-TOWS

13.1 Width of the Tow-Track

The width of the tow-track shall be at least:

a) With tow-hangers for 2 persons: 2.5 m; and

b) With tow-hangers for 1 person: 2.0m.

This minimum width shall be increased by 0.50 m on bridges and in cuttings.

13.2 Transverse Sway of the Tow-Hanger

If there are no guides, a transverse sway of the retracted tow-hangers of at least 0.25 rad in relation to the fixed installation parts of the installation (for example station equipment, line support structures, roller batteries, maintenance platforms, ladders, rope catchers) shall be considered as well as between the tow-hangers themselves.

This value does not apply to grips in relation to the flanges of rollers for towing ropes.

Lower values are permissible in stations and at deflection line support structures, as well as in the case of ski-tows equipped with rods, if guides are installed.

13.3 Longitudinal Sway of the Tow-Hanger

The longitudinal sway of spring-boxes shall be restricted in order to prevent spring-boxes from touching fixed parts of the installation or the rope.

13.4 Rotation of Platters, T-Bars or Rods

A rotation of a non-extended tow-hanger above the towing rope shall be taken into account with regard to equipment that does not belong to the cableway on the rope that is occupied with passengers and in the area of the return pulley. In the case of spring-boxes, additional space of 2 m shall be taken in to consideration.

13.5 Freedom of Sway

In the case of spring-box tow-hangers, the freedom of sway of retracted platters or T-bars shall be limited in relation to the spring-box.

14 CLEARANCE PROFILE AND SAFETY DISTANCES FOR SKI-TOWS

14.1 Line support structures and other stationary objects shall be at least the following distances from the center of the tow-track, upto a height of 2.0 m above the surface of the snow:

a) For ski-tows with tow-hangers for 2 persons: at least 1.50 m; and

b) For ski-tows with tow-hangers for 1 person: at least 1.25 m.

The centre of the tow-track is located in the vertical plane of the non-deflected to wing rope.

14.2 If the terrain presents particular hazards to any user who may fall and slide down, suitable measures shall be taken; for example: protective padding, catch-nets and catch trenches meet this requirement.

14.3 When a ski run runs immediately alongside the tow-track, the tow-track shall be marked.

14.4 The distance between the centres of the high-level tow-tracks shall be at least 3.5 m.

The distance between the centre of the tow-track of a low-level ski-tow and the centre of another tow-track shall be at least 15.0 m, provided no obstacle prevents travel from one tow-track to the other.

The centre of the tow-track is located in the vertical plane of the non-deflected towing rope.

14.5 Crossing points with ski runs at the same level shall be avoided whenever possible and are completely forbidden within 15.0 m of loading and unloading areas in the catchment area of the tow-hangers and on low-level ski-tows.

If such crossing points are installed, the safety of the users of the ski-tow and skiers on the ski run is to been sured by appropriate means, for example, signs and guiding devices.

14.6 If a tow-track passes over a bridge, the latter shall be equipped with solid railings to a height not less than 1.0 m above the snow surface on the bridge.

14.7 The tow path of rope tows and ski lifts shall be kept smooth and the clearance between the centre of the path and any obstruction shall be at least 0.9 m along the path and at least 1.2 m on the ramps. Ramps and dangerous gradients shall be protected by guardrails.

15 OPERATING SPEED AND INTERVAL FOR SKI-TOWS

15.1 The maximum permissible operating speed shall be:

a) 1 m/s for low-level ski-tows; and

b) 2 m/s for high-level ski-tows, with the provision that starter damping is provided for operating speeds in excess of 1.0 m/s.

Some sports equipment which persons are carrying may require the reduction of these operating speeds.

15.2 The interval between two consecutive tow-hangers shall not be less than the following values, provided the track characteristics and arrangement of the loading and unloading are as permit:

a) For ski-tows with tow-hangers for 2 persons: 12 s; and

b) For ski-tows with tow-hangers for 1 person: 8 s;

The corresponding distance between two consecutive tow-hangers shall in all cases be atleast 10 percent longer than the total length of a fully extended tow-hanger or 30% longer than the length of a fully extended tow rod.

16 DRIVE SYSTEM AND BRAKING SYSTEMS FOR SKI-TOWS

16.1 The drive system shall be capable of starting up the ski-tow under any operational loading condition.

16.2 Appropriately marked emergency stop buttons, accessible to all persons, shall be provided at all loading and unloading areas. All boarding and de-boarding areas should be manned by at least one attendant at all times that the ski-tow is in motion.

16.3 The drive system shall be equipped so that a suitable operating speed can be driven for inspection purposes.

16.4 The stopping distance may be a maximum of 5 m under the most unfavorable loading conditions:

After stopping, the drive sheave shall not run back.

16.6 Safe function of the drive system and braking system shall be ensured regardless of the weather conditions. These systems shall be easily accessible for maintenance purposes.

16.7 Rope tows shall be equipped with a brake capable of automatically stopping the hauling rope when a stopping device is operated or when there is a power failure before the hauling rope has travelled more than 3/4 of the distance between the safety gate and the terminal sheave of any other obstruction. Such brake is not required when the resistance of the passenger ropeway at maximum speed is sufficient to stop the apparatus within the distance required for the brake.

16.8 Rope tows shall be equipped with an anti-rollback device that prevents the reverse rotation of the hauling rope in the event of a power failure or the breakage of the driving mechanism. An anti-rollback device is not required on rope tows driven by an internal combustion engine and equipped with a manual brake or other device

that prevents the reverse rotation of the hauling rope when the clutch is disengaged.

17 SKI-TOW LOADING AREAS

17.1 Accesses and loading areas shall be arranged so as to allow the planned passenger-capacity to be achieved and to ensure that the acceleration of the passengers is as even as possible.

The loading area shall be more or less horizontal and at least 3 m in length.

17.2 For low-level ski-tows, dangerous proximity to the sheave, including the area of the down-going towing rope, shall be prevented by suitable devices (for example, by means of housing, fencing, covers combined with safety interlocks or a dividing wall between the towing rope and return rope when loading).

17.3 In the case of ski-tows with spring boxes, where access to the departure point takes place beneath the towing rope, the T-bars or platters shall remain at least 2.0 m above the surface of the snow.

In the case of self-service ski-tows, this applies to the spring boxes. The distance between the platters or T-bars of these installations and the surface of the snow in the loading area shall be 0.6 m to 0.8 m.

For self-service, the passengers shall have an adequate view of the approaching tow-hangers. Self-service shall be clearly marked, as far as possible with standardized symbols.

17.4 At least the following information shall be provided in the field of vision of the passengers:

a) It is forbidden to leave the tow-track while ascending;

b) In the case of a fall, leave the tow-track immediately;

c) It is forbidden to get on or off except at stations; and

d) Hold ski poles in one hand.

18 SKI-TOW UNLOADING AREAS

18.1 Unloading areas shall be arranged so that these can be vacated quickly and permit trouble-free retraction and stabilization of the tow-hangers.

18.2 In the case of high-level ski-tows with spring boxes, the height of the towing cable above the unloading area shall be such that retracted platters or T-bars remain at least 2.5 m above the surface of the snow. This distance applies to the spring-box if passengers cannot be endangered by the platters, for example at operating speeds not exceeding 1.0 m/s with light platters, and if the descending line cannot be crossed by passengers after they have dismounted.

For ski-tows with rods the minimum vertical distance of the towing rope above the surface of the snow shall be not less than the length of a retracted tow-hanger. If passengers can cross the downhill line after dismounting, the rod shall remain at least 2.5 m above the surface of the snow at the crossing point.

18.3 The unloading area shall be arranged horizontally or with a slight slope in the direction of the exit:

a) For ski-tows with spring-boxes, immediately after a line support structure;

b) For ski-tows with telescopic rods, so that the passengers release their tow-hangers immediately after the grip passes the last line support structure; and

c) For ski-tows with rods, the gradient of the towing rope at the start of the unloading area shall be 1:20.

18.4 For ski-tows equipped with spring-boxes, the distance between the start of the unloading area and the next rope guide shall not be less than the distance travelled by the towing rope in 16 s at the maximum operational speed. For spring-boxes less than 2.5 m long, this may be reduced to11 s, and for rods, to 6s.

18.5 A reduction in the distances specified in above may take place if secure passage of the tow-hangers around the sheave is ensured by suitable measures (for example, guides controlling the bar or platter until it is completely retracted).

18.6 Safety devices shall be placed after the unloading area, which shall stop the ski-tow if:

a) A passenger fails to release their tow-hanger, or;

b) The tow-hanger does not retract, resulting in a hazard.

After the unloading area, the terrain shall be free from all unnatural obstacles for the length of the stopping distance after triggering the safety device.

18.7 For ski-tows equipped with telescopic rods, dismounting beneath the sheave may take place if the design of the arrival station permits it.

The gradient of the tow-track downhill from the unloading area shall not be greater than 20 percent for a minimum length of 8 m.

This gradient may be increased up to 40 percent over a minimum length of 15 m where a tow-hanger uncoupling device is provided at the unloading area.

18.8 Unloading under the sheave shall be avoided in ski-tows with spring-boxes; in exceptional cases, it may be permissible if the operating speed, length of tow-hanger and height of the towing rope permit a hazard-free passage around the sheave and retraction.

18.9 In low-level ski-tows, in the absence of other construction-related measures, a monitoring device shall be installed after the unloading area in order to prevent dangerous proximity to station equipment. Passengers shall not lose contact with the ground in the area of the monitoring device or beyond it for the stopping distance after the device has been triggered.

In view of the particular danger of this situation, an independent duplicate monitoring device shall be provided. These monitoring devices shall not independently reset.

The following distances for the monitoring devices shall be observed:

a) To the hazard zone: at least the stopping distance;

b) To the surface of the snow: at least 30 cm;

c) To the rope without T-bar: maximum 20 cm; and

d) To the rope with T-bar: maximum 60 cm.

18.10 At least the following information shall be provided in the field of vision of the passengers:

a) Warning of the approach to the unloading area;

b) Release the tow-hanger; and

c) Leave the unloading area immediately.

19 GUIDANCE OF HAUL ROPES IN SKI-TOWS

19.1 In the case of ski-tows with spring-boxes, the haul rope shall be located at such a height that the retracted T-bars or platters travel at least 2.5 m above the surface of the snow.

The angle between the extended towing cord and the vertical shall not be less than 0.30 rad in the most unfavorable case, to prevent passengers from being lifted off the tow-track.

19.2 In the case of ski-tows with rods, the vertical distance of the haul rope to the tow-track shall at no point of the tow-track be greater than the length of a tow-hanger with its platter extended under a load of 200 N.

19.3 For Low-Level Ski-Tows:

a) The haul rope shall run at such a height that its distance above the tow track is more or less constant and so that only reasonable lifting up or pushing down on the rope is necessary to suit passengers;

Licensed copy: Roma Roy, ISO EXCHANGE - INDIA, Version correct as of 23/05/2018

b) The ascending rope shall not run over line support structures;

c) The length shall not exceed 300 m; and

d) Measures shall be taken to minimize the twist.

19.4 At points of horizontal deviation (curves), the guides for the haul rope shall be located in the plane formed by the rope at either end of the curve (the plane containing the resultant rope tension). Before and after each deviation, rollers or sheaves in a vertical plane shall be provided.

For small deviation angles and for self-adjusting sheaves or rollers, rollers before and after the deviation of the rope are not required.

Steps shall be taken to ensure that in the event of derailment at deflection devices the haul rope is caught either by the deflection device itself or by suitable rope catchers.

The guidance of the haul rope on the line support structures and, in the stations shall comply with the provisions of safety requirements (*see* **10**).

19 The hauling rope of a rope hand held tow shall:

a) be free from protruding fibres;

b) be maintained under tension by a hand-operated chain hoist, a winch equipped with holding dogs, a self-locking winch or a free-moving counterweight;

c) be between 0.5 m and 1.0 m above snow surface at the loading and unloading stations;

d) when held by a user between the loading station and the safety gate at 0.6 m above snow surface, exert an upward or downward force not greater than 150 N;

e) be supported only by terminal sheaves on the up-going rope;

f) on the up-going side of a fibre rope tow, be kept away from the down-coming rope by at least 2 m at the loading and unloading stations and by at least 1 m from any obstruction between these 2 points;

g) in the case of wire rope tows equipped with towing outfits on the down-coming side, have a horizontal distance, between the up-going rope and down-coming rope, greater than twice the projecting part of any towing outfit fastened to the hauling rope; such distance shall not be less than 1 m for a rope tow that is up to 180 m and 1.5 m for a rope tow over 180 m. Where loading occurs on both sides of the up-going rope, the horizontal distance shall be at least 2 m. When no towing outfits are on the down-coming rope, such distance shall be at least 0.6 m.

The guidance of the haul rope on the line support structures and, in the stations shall comply with the provisions of safety requirements (*see* **10**).

20 The user of a fibre rope tow shall grip the hauling rope directly.

21 Towing outfits for ski lifts that do not extend or retract normally shall be removed or marked.'

(*Page* 9, *Annex* A) — Insert the following after Annex A.

'**ANNEX B**

(*Foreword*)

INDIAN STANDARDS ON ROPEWAYS

The standards listed below shall also be referred for the construction, operation and maintenance of any type of ropeways. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 5229 : 2017	Continuous movement monocable ropeways with automatic grip — Code of practice (*second revision*)
IS 5230 : 2017	To and fro jig back movement bi-cable ropeways — Code of practice (*second revision*)
IS 7649 : 1975	Glossary of terms used in connection with aerial ropeways and cableways
IS 9228 : 2019	Chairs for chairlifts — Specification (*first revision*)
IS 9706 : 2019	Material handling ropeways — Code of practice (*second revision*)
IS 16620 : 2017	Jig back movement monocable ropeways with fixed grips — Code of practice
IS 16623 : 2017	Pulsated movement monocable ropeways with fixed grips — Code of practice
IS 17232 : 2019	Continuous movement bicable tricable ropeways with detachable grip — Code of practice
IS 17233 : 2019	Acceptance and certification criteria for design and construction of all types of ropeways intended for transportation of passengers
IS 17234 : 2019	Operation and maintenance of all types of ropeways intended for transportation of passengers — Code of practice
IS 17235 : 2019	Magnetic rope testing MRT — Specification
IS 17236 : 2019	Prevention and safety against fire in ropeways — Code of practice
IS 17237 : 2019	Code of practice for design and construction of civil engineering works for ropeways — General requirements
IS 17238 : 2019	Safety requirements for ropeways installations designed to carry persons quality control
IS 17239 : 2019	Safety requirements for drives used for ropeway installation for passenger transportation
IS 17240 : 2019	Corrosion protection of iron and steel sections used in passenger ropeways — Code of practice
IS 17405 : 2020	Calculation for design of ropeway installation intended for transportation of passengers — Code of practice
IS 17406 : 2020	Transportation storage installation and tensioning of wire ropes for passenger ropeway — Code of practice’

(*Page* 10, *Annex* B) — Substitute ‘Annex C’ *for* ‘Annex B’.

(MED 06)

Publication, BIS, New Delhi