BS EN 15700:2011

BSI Standards Publication

Safety for conveyor belts for winter sport or leisure use

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee MCE/20, Aerial ropeways.

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 58982 9

ICS 45.100; 91.140.90

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2011.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15700

October 2011

ICS 91.140.90

English Version

Safety for conveyor belts for winter sport or leisure use

Sécurité des tapis roulants pour les activités de sports d'hiver ou de loisirs

Sicherheit von Bandförderern für Wintersport- oder Freizeitaktivitäten

This European Standard was approved by CEN on 3 September 2011.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 15700:2011: E

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Foreword

This document (EN 15700:2011) has been prepared by Technical Committee CEN/TC 242 “Safety requirements for passenger transportation by cable”, the secretariat of which is held by AFNOR.

This European Standard shall be awarded the status of national standard, either by publication of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the EU Directive(s).

For the relationship with the EU Directive, see informative Annex ZA, which is an integral part of this document.

According to CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard is a type C standard as stated in EN ISO 12100:2010.

The travelators covered and the range of hazardous phenomena and situations and dangerous events covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for travelators that have been designed and built according to the provisions of this type C standard.

1 Scope

This European Standard is applicable for travelators for leisure or winter sports use.

These requirements are applicable to travelators for the transport of passengers wearing snow-sliding devices or pedestrians wearing ski boots or heavy boots who may be carrying their snow-sliding devices for winter sports activities. For other uses, users shall wear suitable (enclosed and solid) footwear for travelators.

NOTE Snow-sliding devices include seated ski equipment for handicapped people.

This European Standard has been prepared on the basis of the automatic operation of these installations with no staff permanently present at the actual installation.

It covers requirements relating to the prevention of accidents and the safety of workers.

This European Standard covers all the significant hazards, hazardous situations and hazardous events specific to travelators, for leisure or winter sports activities, when they are used in conformity with the application for which they are intended, as well as for inappropriate applications which could be reasonably foreseeable by the manufacturer (see Clause 4).

This European Standard does not apply either to moving walks as specified in EN 115 or to loading bands as specified in EN 1907.

This European Standard does not apply to travelators manufactured prior to the date of its publication as an EN.

2 Normative references

The following reference documents are indispensible for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 115-1, *Safety of escalators and moving walks — Part 1: Construction and installation*

EN 619:2002, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of unit loads*

EN 953, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 981, *Safety of machinery — System of auditory and visual danger and information signals*

EN 1037, *Safety of machinery — Prevention of unexpected start-up*

EN 1088, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1907:2005, *Safety requirements for cableway installations designed to carry persons — Terminology*

EN 1993-1-1, *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

EN 60204-11, *Safety of machinery — Electrical equipment of machines — Part 11: Requirements for HV equipment for voltages above 1 000 V a.c. or 1 500 V d.c. and not exceeding 36 kV*

EN 60947-5-1, *Low-voltage switchgear and control gear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices*

EN 61496-1, *Safety of machinery — Electro-sensitive protection equipment — Part 1: General requirements and tests*

EN 61508-1, *Functional safety of electrical/electronic/programmable electronic safety-related systems — Part 1: General requirements* (IEC 61508-1:2010)

EN ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-2:2006)*

EN ISO 13849-2, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2003)*

EN ISO 13850, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 1907:2005, EN 619:2002 and the following apply.

3.1
travelator
continuous transport installation used for leisure or winter sporting activities, comprising an electrically driven moving belt on which the passengers are transported standing up

NOTE This belt may be either continuous or modular

3.2
drum
continuous belt travelator component used to drive or return the belt

3.3
wheel
modular belt travelator component used to drive or return the belt

3.4
safety function
all the operations intended to recognize the occurrence of certain states or specific events constituting a dangerous situation. These operations initiate the processes intended to reduce the risks, in particular stopping the installation. A safety function starts by recognizing the conditions and evaluating the physical parameters on the travelator. It ends with initiating the process or with the completion of what has been initiated

3.5
electrical safety device
assemblage of components which carry out all the operations of a safety function

3.6
break circuit
circuit through which a permanent current normally flows. The desired function is initiated by interrupting the current flow

3.7
safety circuits
circuits on which the safety functions and emergency stopping devices act directly or which monitor the physical parameters relevant to safety and, if required, compare them, and which stop the travelator or prevent it from unexpectedly starting up

4 List of significant hazards

4.1 General safety principles

This clause contains all the significant hazards, hazardous situations or hazardous events that are covered by this standard and which, on the basis of a risk analysis, have been identified as being significant for this type of machinery and require action to be taken to eliminate or reduce the risk.

These actions are then described in the form of requirements in the remainder of this standard.

The hazards have been listed on the basis of EN ISO 14121-1.

Account is taken of a passenger falling so that it does not lead to a hazardous situation.

4.2 List of significant risks

4.2.1 Mechanical risks

— Injury through falling onto the travelator or from the travelator;

— injury through passengers colliding with each other;

— injury through colliding with the components of the travelator or obstacles situated within the travelator environment;

— injury through cutting or shearing;

— injury of a third party against the travelator;

— injury through pinching, crushing or entanglement;

— injury through strangling resulting from an item of clothing getting entangled;

— injury through contact with moving parts.

4.2.2 Electrical risks

— Injury through contact with live parts of the travelator;

— injury due to the electromagnetic fields;

— injury due to overvoltage (e.g. lightning strike).

4.2.3 Thermal risks

— Burns.

4.3 List of hazardous situations or danger factors

— Passengers slipping on the belt (see 5.8.2.2);

— change in speed or difference in speed between the passenger and the belt (see 5.2.3.3, 5.2.3.4, 5.2.5);

— too steep a gradient or too significant a change in gradient (see 5.2.3);

— loss of stability of the travelator (see 5.2.1, 5.8);

— sudden start or stop of the belt (see 5.4.3, 5.5.2);

— unexpected start-up of the travelator (see 5.4.3, 5.5.3.5, 5.6.1, 5.6.3);

— break of the moving belt or deterioration of the travelator (see 5.5.7, 5.8.1.4.1, 7.3.2);

— congestion at the top station (see 5.2.4.2, 5.5.3.3);

— presence of foreign bodies adjacent to the travelator (see 5.2.4.2, 5.2.4.3);

— excess clearance between the belt and the safety flap (see 5.5.4.2);

— excess clearance between the modular elements of the belt (see 5.3.1);

— access to rotating parts (see 5.3.3, 5.7.1);

— access to electrical devices (see 5.7.1, 5.7.3, 5.7.4, 5.7.5);

— excess clearance between the belt and belt covering or any other part of the travelator (see 5.3.1, 5.2.3.3, 5.2.3.4, 5.3.2.3, 5.3.3);

— drawing in of a limb between the belt and safety flap, coverings or guides (see 5.3.4, 5.3.5, 5.5.4);

— entanglement of an item of clothing between the belt and the safety flap, coverings or guides (see 5.3.2.3, 5.3.3, 5.5.4);

— excessive height of the belt above the ground or the snow (see 5.2.4.3);

— reversal of the direction of movement of the belt (see 5.4.2);

— failure of the electric circuit (see 5.5.1, 5.4.2);

— lightning strikes (see 5.7.5); the risk of a travelator passenger being struck by lightning is negligible given the operational measures taken;

— lack of signage for the attention of the travelator user; such signage is specified (see 7.2) but it is the operational measures taken that shall ensure this signage is maintained;

— operation in unsuitable climatic conditions (see 5.5.1.1, 5.7.2);

— insufficient snow removal; this risk is not covered as the operational measures shall deal with it;

— presence of ice on the travelator; this risk is not covered as the operational measures shall deal with it;

— unexpected or unintentional start-up (see 5.4.3, 5.5.3.5, 5.6.1, 5.7.4);

— non-compliance with the ergonomic principles (see 5.5.3.2);

— unexpected interruption of energy supply; the risk of a passenger falling is permissible in this case in the knowledge that the passengers are either skiers or users of winter sports equipment;

— fire on the travelator: The risk of a fire is not covered as the travelator is in the open air and evacuation of the passengers is facilitated by the small height difference between the top of the belt and the ground or snow: 0,30 m (see 5.2.4.3);

— noise is not regarded as a significant or pertinent risk for this type of machine.

5 Safety requirements and/or protective measures

5.1 General

Travelators shall conform to the safety requirements and/or safety measures of this clause.

In addition, travelators shall be designed in accordance with the principles of EN ISO 12100:2010 governing the specific, but not significant, hazards not covered by this document (e.g. cutting edges).

Guards shall comply with the requirements of EN 953.

5.2 Adaptation of the travelator to the terrain

5.2.1 Installation of the travelator

The travelator shall be stable. In particular, if the feet of the travelator require support, this shall be integral with the feet.

5.2.2 Layout

The layout shall allow a passenger on the travelator to leave it safely at any point along the line in the event of a stoppage of the device.

The plan-view layout shall be a straight line.

5.2.3 Longitudinal profile

5.2.3.1 General

The longitudinal profile shall not cause a passenger to lose his balance.

5.2.3.2 Line

At no point shall the gradient of the travelator exceed 25 %.

The difference in gradient between two consecutive sections of belt, each with a constant gradient and a minimum length of 1,5 m, shall not exceed 12,5 %.

5.2.3.3 Loading

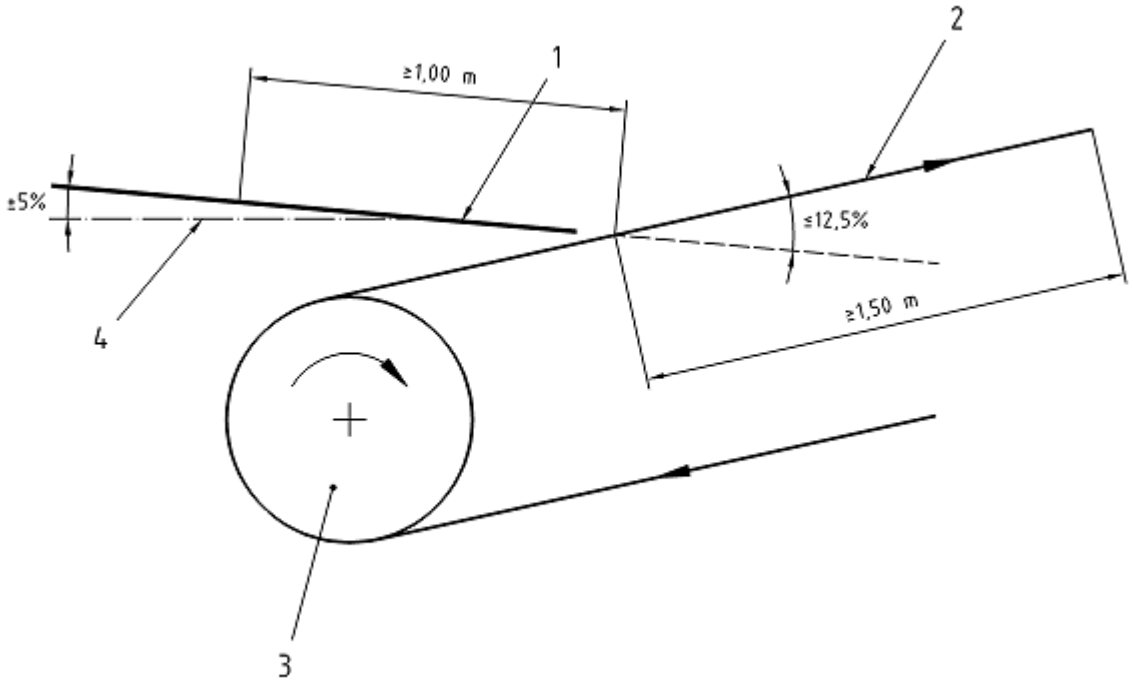
A loading plate with a constant gradient and a minimum length of 1 m shall be installed at the lower end of the travelator. Its gradient shall be between –5 % and +5 % with reference to the horizontal (see Figure 1).

There shall be a maximum height difference of 30 cm between the loading plate and the snow or the ground on either side of the loading plate.

The gradient of the loading area in front of this plate shall be such that a skier can easily stop on it.

At the start, the travelator belt shall have a uniform gradient over a minimum length of 1,5 m. This gradient shall not exceed 12,5 % when compared with the loading plate.

The clearance between the loading plate and the belt shall not exceed 6 mm during operation.



Key

1 Loading plate
2 Belt
3 Drum or wheel
4 Horizontal

Figure 1 — Loading

5.2.3.4 Unloading

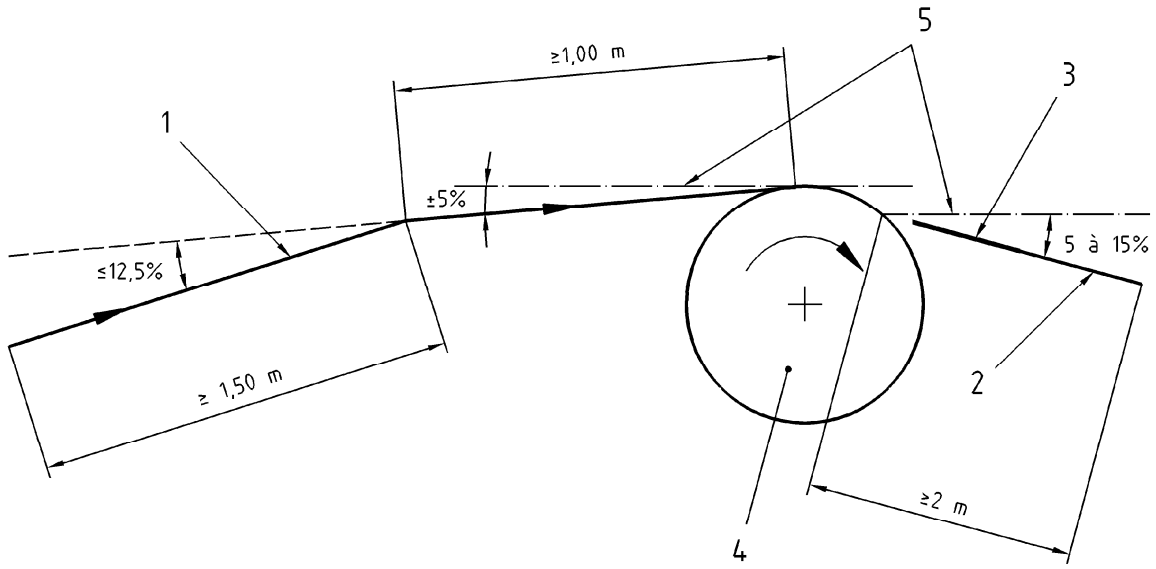
The final section of the belt shall have a uniform gradient between ±5 % relative to the horizontal over a minimum length of 1 m (see Figure 2).

The penultimate section of the belt shall have a uniform gradient of at most 12,5 % relative to the final element over a minimum length of 1,5 m.

The unloading area, beyond the upper end of the belt, shall have a counter-gradient of between 5 % and 15 %. This shall have a minimum length of 2 m. This area shall start with an unloading plate.

On either side of the unloading plate, there shall be a maximum height difference of 30 cm between the plate and the snow or the ground.

The clearance between the safety flap and the unloading plate during operation shall not exceed 6 mm during operation. This requirement applies with the safety flap in its normal position.



Key

1 Belt
2 Unloading area
3 Unloading plate
4 Drum or wheel
5 Horizontal

Figure 2 — Unloading point

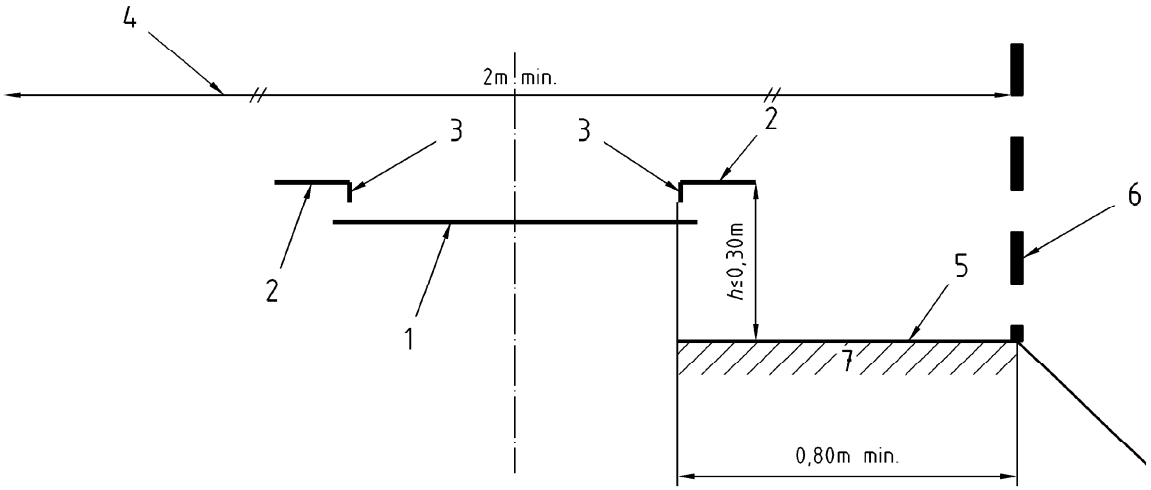
5.2.4 Cross-section

5.2.4.1 The useful width of the belt shall not be less than 0,4 m.

The belt shall be horizontal in the transverse direction.

5.2.4.2 To prevent a skier from becoming stuck and then being run into by other passengers in the event that his skis are trapped across the travelator, a space free from all obstacles shall be provided above the level of the belt, except for the belt guides and covering, with a minimum width of 2 m centred on the middle of the belt (see Figure 3).

NOTE The value of 2 m is generally equivalent to the length of Alpine skis.



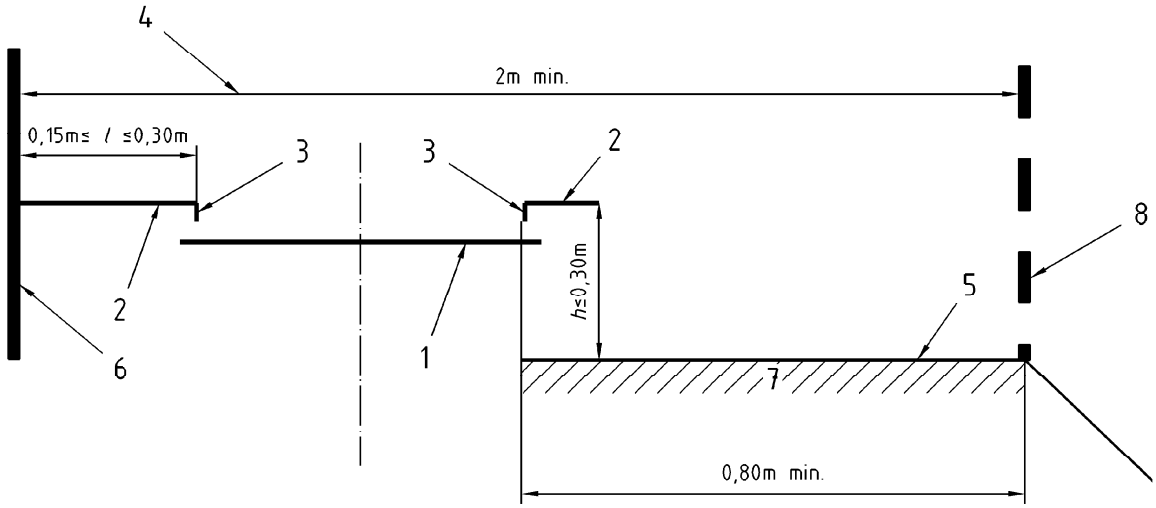
Key

1 Belt
2 Covering
3 Lateral guide for passengers
4 Width of free space in accordance with 5.2.4.2
5 Width of free space in accordance with 5.2.4.3
6 Obstacle
7 Snow or ground

Figure 3 — Free space around the travelator

At the edge of the travelator, if a continuous smooth wall is installed between 0,15 m and 0,30 m from the inside edge of the guide, the 2 m width may be off-centre (see Figure 4). In this case, the covering shall be continuous up to the smooth wall.

If a continuous smooth handrail is installed at the edge of the travelator, it shall meet the requirements of EN 115-1.



1 Belt
2 Covering
3 Lateral guide for passengers
4 Width of free space in accordance with 5.2.4.2
5 Width of free space in accordance with 5.2.4.3
6 Continuous smooth wall
7 Snow or ground
8 Obstacle

Figure 4 — Free space around the travelator adjacent to a wall

5.2.4.3 Unless a full handrail or continuous smooth wall is installed in accordance with 5.2.4.2, in order to avoid running into an obstacle when falling outside the travelator, a space free from all obstacles, excluding the belt guide or covering, shall be provided over a width of at least 0,80 m from the inside edge of the guide (see Figures 3 and 4).

In this free space, the fall height shall not exceed 0,30 m between the level of the belt and the ground or snow.

When the travelator is used for leisure activities, the ground surface within this free space shall not be injurious.

5.2.4.4 Electrical cabinets, stop button supports, loading and unloading aid devices (except for supports) and flow management devices in accordance with 5.5.3.3 may be installed within the free spaces defined in Subclauses 5.2.4.2 and 5.2.4.3 as long as they have guards or are designed to reduce the risk of injury to the passenger.

5.2.5 Belt speed

The maximum speed of the belt shall not exceed 0,7 m/s.

All installations shall be capable of running at a speed of 0,4 m/s or less in order to transport children.

5.3 Design requirements relating to the belt and its accessories

5.3.1 Belt

The meshes or connecting systems of the belts shall not have any clearance greater than 4 mm.

The belt thickness shall be greater than 2 mm in order to meet the requirements of EN ISO 13857.

5.3.2 Guides

5.3.2.1 Belt guides

The belt shall be guided laterally, along its entire length, such that the two edges of the belt, regardless of the conditions, are protected by the covering device in 5.3.3 (see Figure 5).

5.3.2.2 Passenger guides

Devices shall ensure that the skis or boots of the passengers are guided laterally at the start, en route and at the unloading point. The guides shall have a height above the belt of between 10 mm and 50 mm.

5.3.2.3 Clearances

The clearance between the top surface of the belt and the bottom of the passenger guides shall not exceed 6 mm during operation.

5.3.3 Covering

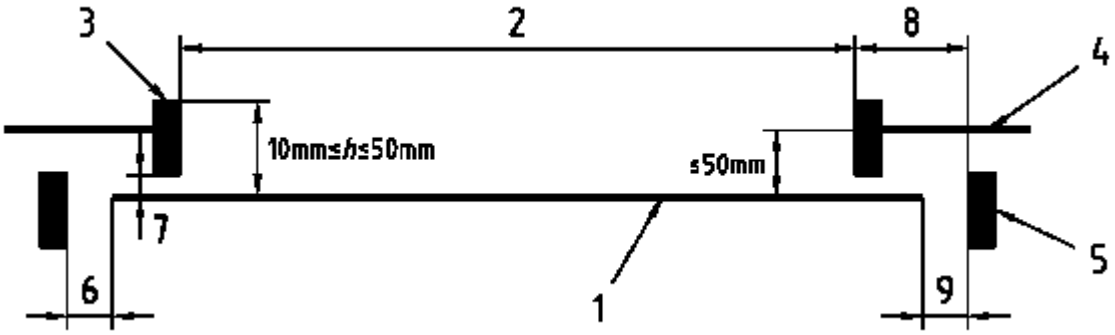
A covering device (see Figure 5) which can also be used as a guide for passenger skis or boots shall be installed on either side of the belt. In order to meet the requirements of EN ISO 13857, the width R of the covering shall comply with the following formula:

$$R \geq 20\,\text{mm} + jl$$

where

jl Total lateral clearance between the belt and its guides which shall be indicated in the manufacturer's instructions, $jl = jl_d + jl_g$

The covering device shall not be more than 50 mm higher than the belt.



Key

1 Belt
2 Useful width of belt
3 Lateral guide for passengers
4 Covering (can also be used as a ski or boot guide)
5 Lateral guide for belt
6 Lateral clearance for belt on left-hand side, jl_g
7 Clearance between top of the belt and bottom of the passenger lateral guide
8 R: Width of covering
9 Lateral clearance for belt on right-hand side, jl_d

Figure 5 — Belt and accessories

5.3.4 Elimination of risk of injury

The covering or guide devices shall be designed to reduce the risk of an item of clothing or body part becoming caught or entangled, in particular, the joints shall be arranged in the direction of travel.

5.3.5 Safety flap

At the unloading point, it shall be possible for a person trapped between the belt and the unloading devices (in particular, the safety flap, the unloading plate, the supplementary safety device mentioned in 5.5.4.2 c)) to be released rapidly by third parties or even themselves.

The operation of these devices shall be single-action and possible without the use of any tools and shall enable the release of any component likely to pinch a passenger (e.g. safety flap and supplementary safety device mentioned in 5.5.4.2 c)). Their function and mode of operation shall be suitably indicated at the unloading area or on the devices. The safety flap release area shall have a minimum length of 50 cm and a width at least equal to that of the useful width of the belt.

5.3.6 Drum or wheel at the unloading station

Their diameter shall be at least 180 mm in order to meet the requirements of 5.5.4.2.

5.4 Drive and start-up of the travelator

5.4.1 General

The electrical installations shall conform to the requirements of standards EN 60204-1, EN 60204-11 and EN 60947-5-1.

5.4.2 Drive

The drive to the drum or wheel shall be by means of positive connections (flat or V-belts are not permitted).

The drive and tensioning devices shall be designed to prevent slippage of the belt on the drive drum, regardless of the loading conditions. Any uncontrolled runback of the belt shall be prevented, even under the maximum operating load.

The motor shall be protected against short-circuits and electrical overloads by automatic devices which require manual resetting.

If manual reverse drive of the belt is possible and if this operation involves any action on mechanical anti-runback devices or on a brake, these latter shall either be:

— automatically re-engaged or

— monitored by safety devices.

5.4.3 Start-up

The drive shall allow smooth starting. The acceleration shall not exceed 0,1 m/s².

It shall not be possible to start up the travelator from two control stations simultaneously. This blocking function shall have a minimum requirement class of T2 (see 5.5.1.3.1).

It shall only be possible to re-start the travelator after the staff have rectified the cause of the safety device trip, and if it can be restarted safely.

Connecting the device to the electricity supply shall not lead to the start-up of the travelator.

5.5 Operating safety requirements

5.5.1 Operating safety principles

5.5.1.1 General requirements

In the event of incorrect operation or any situation likely to present a hazard to the passengers, the travelator shall stop automatically.

The safety devices shall be compatible with operation under severe meteorological conditions: cold, snow, humidity, heat, water splashes, etc.

5.5.1.2 Definitions and principles

5.5.1.2.1 Definitions not given in Clause 3 and principles relating to operating safety shall correspond to those in EN ISO 13849-1.

5.5.1.2.2 Taking into account the hazard level and the probability of the occurrence of a hazardous situation, safety functions are classified according to 4 graduated safety requirement classes (see 5.5.1.3.1).

5.5.1.2.3 The measures to be taken regarding the software and hardware for limiting accidental or systematic failures shall be taken as a function of the corresponding requirement classes. It may be assumed that maintenance is ensured to be in compliance with these same classes.

5.5.1.3 Requirement for electrical safety devices

5.5.1.3.1 Electrical safety devices shall meet the following requirements according to the corresponding requirement class:

a) **Class T1 requirements:** Electrical devices shall as a minimum be designed, selected, manufactured and installed in conformity with the state of the art so that they are able to adequately withstand the stresses imposed by use and external influences;

b) **Class T2 requirements:** The class T1 requirements shall be met, tested components shall be used, and tested safety principles shall be adhered to. The safety functions of the electrical safety devices which comply with class T2 requirements shall be verified at specified intervals (automatic or manual tests). The occurrence of a fault may lead to the failure of the safety function in the interval between two tests;

c) **Class T3 requirements:** The class T2 requirements shall be met. The safety functions of electrical safety devices meeting class T3 requirements shall be designed so as to ensure that a single fault occurring in any of these devices will not cause a failure of the safety function. The occurrence of a second fault in the interval between two tests (automatic or manual tests) may lead to the failure of the safety function;

d) **Class T4 requirements:** The class T3 requirements shall be met. Electrical safety devices meeting class T4 requirements shall be designed so as to ensure that a single fault occurring in any of these devices will not cause a failure of the safety function and that:

    1) this single fault shall be detected, as far as possible, before or during the next safety function operation or when the travelator has been transferred to a safe state; or

    2) if this is impossible, a second fault shall not cause the failure of the safety function and shall cause the transfer of the travelator to a safe state. When automatic or manual tests with a high error detection rate are carried out at intervals according to 5.5.1.3.7 c) allowing the first fault to be determined before the appearance of the second fault, the second fault need not be taken into consideration.

NOTE A high fault detection rate may mean that 99 % of all the faults that are to be considered shall be detected.

5.5.1.3.2 If the electrical safety device is such that:

a) the behaviour of each component is not adequately defined in the event of a failure; or if

b) the behaviour of the set of components under fault conditions cannot be fully determined; or if

c) no reliable data exist for the components or the set of components with regard to the failure rate obtained from experience,

it shall meet the following requirements in addition to the requirements of the classes specified in 5.5.1.3.1:

d)

    1) The structure of the safety device, the association of the subassemblies and the cabling of the components shall be traceable with no ambiguity, and shall meet the basic safety objectives of the corresponding requirement class; or

    2) Tested safety components, including any resident software, corresponding to the respective requirement class and meeting the requirements according to the conformance certification issued by the notified body shall be used;

e) if application software is used, this shall demonstrably meet the objectives of the corresponding requirement class.

NOTE Justification of the safety level required on the basis of EN ISO 13849-1, referring to the relevant publications on this subject, e.g. EN 61508.

5.5.1.3.3 A fault shall be understood to mean the initial fault and all those that could result from it. The initial fault and all subsequent faults shall be regarded as a single fault.

5.5.1.3.4 The simultaneous appearance of two accidental faults, independent of each other, in a single safety function need not be taken into account.

5.5.1.3.5 Fault exclusions are only acceptable if justified according to EN ISO 13849-1 and EN ISO 13849-2.

5.5.1.3.6 The safety circuits shall be break circuits or shall put the travelator into a safe status in the event of a breakdown, short-circuit, variation in impedance or earthing fault.

5.5.1.3.7 The following is applicable to the tests for electrical safety devices:

a) all faults that may affect the operation of the safety devices shall be detected, complying with the fault detection rate required for the relevant requirement class. The tests may be carried out automatically or manually or using a combination of these two methods;

b) if the tests are carried out before the travelator is started (before the daily entry into service or before each start), the start may only take place if no fault has appeared during the tests. If they are carried out during operation and a fault is detected, the travelator shall be stopped.

NOTE 1 If this relates to a test that is initialized and carried out manually, it may also be included in the set of instructions for use, as it is not always possible to prevent a start-up.

c) The frequency of tests depends not only on the specified requirement class, but also on the fault tolerance period, failure data and the (material) design of the electrical safety devices.

NOTE 2 Justification of the performance level required on the basis of EN ISO 13849-1, referring to the relevant publications on this subject, e.g. EN 61508.

5.5.1.4 In accordance with the requirements of EN 60240, electrical installations shall be manufactured, installed and their maintenance assured such that:

a) they do not affect the safe use of other electrical installations in compliance with their requirements in a hazardous or unacceptable way;

b) their safe use in compliance with their requirements is not compromised in a hazardous or unacceptable way by other electrical installations.

5.5.1.5 Electrical devices which do not form part of the safety system shall comply at least with class T1 requirements.

5.5.2 Travelator stops

5.5.2.1 Service stop

The service stop shall have a requirement class of at least T2.

The service stop shall be smooth whilst maintaining a deceleration rate of between 0,12 m/s² and 0,24 m/s². Following the stop, the belt shall remain immobile under the most unfavourable load conditions.

It shall be possible to interrupt a service stop with an emergency stop at any time.

5.5.2.2 Emergency stop

The emergency stop shall comply with the requirements of EN ISO 13850 and have a requirement class of at least T3.

Unless it is ensured that a passenger or third party cannot cross the belt re-entry point, the belt shall stop within a maximum distance of 20 cm from the moment a safety function is triggered. Following this emergency stop, the belt shall remain stationary under the most unfavourable load conditions.

In the event of an emergency stop effected by means of a speed controller:

a) if the inertia stopping distance exceeds 20 cm, the deceleration of the controller shall be regulated so as to ensure a stopping distance not exceeding 20 cm;

b) if the inertia stopping distance is less than 20 cm, this deceleration shall be regulated so as not to counter the inertia stop;

c) a double cut off of traction shall be installed, which shall operate at the latest after a delay initiated at the same time as the emergency stop request. This delay, whose regulation shall correspond to the theoretical deceleration time of the regulator, shall be managed with a requirement class of at least T3.

If the design incorporates a longer stopping distance which does not constitute a hazard, in particular where a passenger or third party cannot cross the belt re-entry point, the stopping distance may be longer. In this case, the deceleration shall be at least 0,5 m/s².

5.5.2.3 Brake

If a brake is fitted, it shall meet the following requirements:

a) the braking force shall be generated by the expansion of pre-compressed springs and shall be applied mechanically;

b) the brake shall be kept open by means of a pneumatic, hydraulic or electrical break circuit;

c) the contact pressure resulting from the braking force shall be distributed as uniformly as possible over the surface of each lining;

d) if braking is required in both running directions, its action shall be the same for each running direction.

Band brakes are prohibited.

5.5.3 Safety devices and functions

5.5.3.1 Service stop button

In addition to the service stop button on the main control panel, other service stop/start units accessible only to personnel may be provided.

The associated function shall initiate a service stop and have a requirement class of at least T2.

Re-starting after a service stop shall only be possible from the operating position which initiated the stopping of the travelator.

5.5.3.2 Emergency stop button

Emergency stop push-buttons shall meet the requirements of EN ISO 13850.

Manual reset emergency stop push-buttons shall be installed so that they are easily and quickly accessible to passengers at the loading and unloading points in order to enable the travelator to be stopped in the event of a hazard.

An emergency stop button shall also be installed on the front face of the electrical cabinet. If the cabinet is suitably located, this emergency stop button may be the one provided for use by the passengers.

At the loading and unloading points, these stop buttons shall be installed at a height suitable for passengers and shall include appropriate signage.

The associated function shall initiate an emergency stop with a requirement class of at least T3.

5.5.3.3 Flow management device at the unloading point

This device is intended to monitor the proper dispersal of the passengers following unloading. It shall stop the travelator automatically if a passenger remains stationary at the end of the travelator for more than 3 s.

For travelators with a velocity of not more than 0,4 m/s, the 3 s value may be increased to 5 s.

This device shall detect a spherical object 10 cm in diameter positioned at a maximum distance of 10 cm in front of the nose of the safety flap (distance measured horizontally).

If optical detection devices are used, they shall not be affected by changes in lighting or sunlight and shall comply with the requirements of the relevant standards.

The associated function shall initiate at least a service stop and shall have a requirement class of at least T2.

5.5.3.4 Detection device beyond the safety flap

This device, intended to monitor any possible fall of a passenger immediately beyond the safety flap, shall stop the travelator automatically if a passenger remains stationary for more than 3 s.

For travelators with a velocity of not more than 0,4 m/s, the 3 s value may be increased to 5 s.

This device shall detect a spherical object 10 cm in diameter situated a maximum distance of 20 cm after the nose of the safety flap (distance measured horizontally).

If optical detection devices are used, they shall not be affected by changes in lighting or sunlight and shall comply with EN 61496-1 and EN 61496-7/A1.

The associated function shall initiate at least a service stop and shall have a requirement class of at least T2.

5.5.3.5 Common requirements for the devices covered in 5.5.3.3 and 5.5.3.4

After having been brought to a stop by these devices, the belt may be re-started from a stop/start unit different from the one at the unloading point. This shall only be possible if the operator has a full view of the travelator and, in particular, is able to see a 10 cm sphere positioned directly above the safety flap.

Under exceptional operating circumstances (climatic conditions, for example), the devices specified in 5.5.3.3 and 5.5.3.4 may be taken out of service temporarily by means of a lockable selector switch as long as a member of staff is permanently stationed at the unloading point to monitor the travelator. This removal from service shall be cancelled automatically following an emergency stop of the travelator.

The removal from service of these safety functions shall be indicated visually in a clearly identifiable and unambiguous manner by personnel in accordance with EN 981.

5.5.4 Monitoring of the belt re-entry angle at the unloading point

5.5.4.1 Objectives

In view of the hazard presented by the re-entry angle at the end of the belt, a device shall be installed of minimum width equal to the useful width of the belt, enabling:

— an emergency stop of the belt to be initiated as soon as there is a risk of an item of clothing or a passenger's limb being drawn in between the belt and the exit components (unloading plate or safety flap);

— the prevention of any injury, particularly in the case where a child might have his arm drawn in by the belt, this being stopped before the elbow becomes trapped;

— the prevention of any injury to a passenger in cases where an item of clothing might become drawn in by the belt.

5.5.4.2 Technical requirements when a safety flap is used

To meet the primary objective of preventing any injuries, the belt shall stop in less than 20 cm and the safety flap shall open to a width of 60 mm.

To meet the second objective of preventing any injuries, the force to open the flap shall be set at a maximum of 50 N.

This device shall meet the following requirements:

a) With regard to the nose of the safety flap (see Figure 6);

   1) in order to reduce the risk of unintentional opening of the flap, this shall be located at least 50 mm below a line extending from the top of the belt;

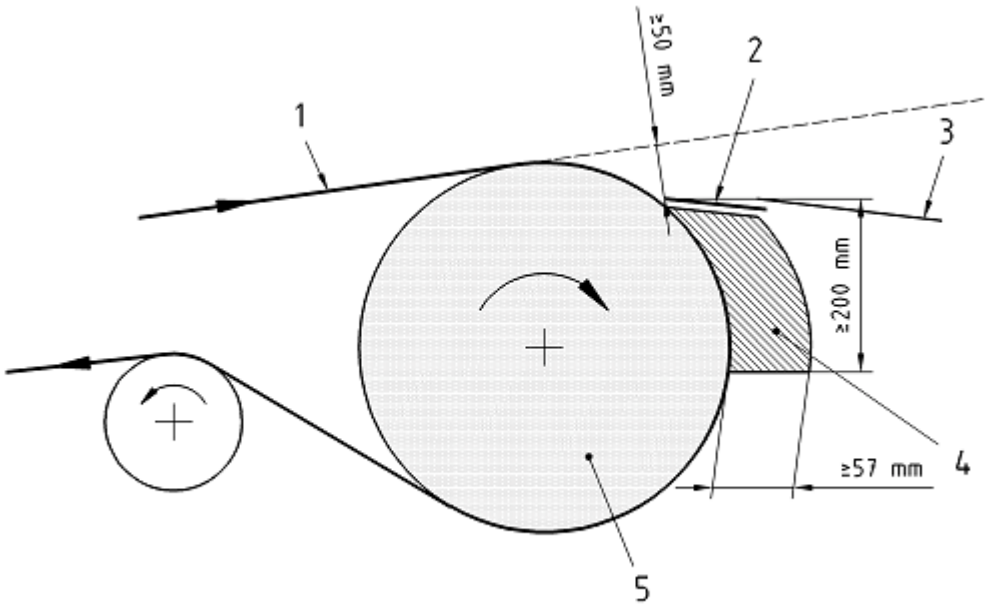
   2) when an emergency stop is initiated: The opening between the safety flap and the belt on its drive unit shall not allow the passage of a sphere of diameter greater than 20 mm;

   3) when the flap is completely open: This opening shall allow the passage of a sphere of diameter at least 57 mm, but not greater than 62 mm (see Figure 8);

b) The force necessary to open the safety flap shall not exceed 50 N (see Figure 7);

c) Under the safety flap, to a depth of at least 200 mm, it shall be possible at least for a 57 mm diameter sphere to pass in contact with the belt (see Figure 6).

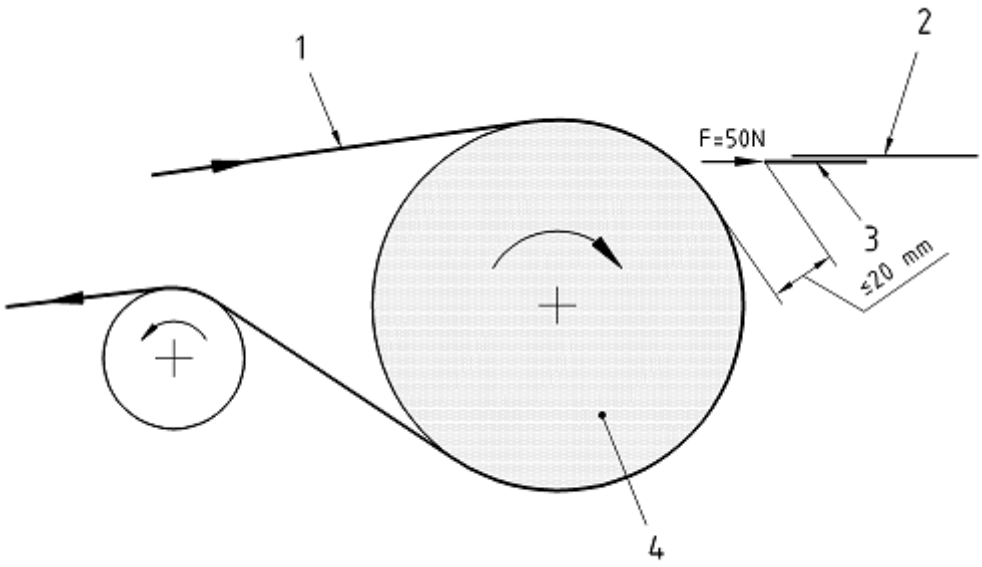
   Within this passage, any additional safety devices shall part under a maximum force of gravity of 20 N and clear a free space beyond the upper belt in excess of 57 mm.



Key

1 Belt
2 Safety flap
3 Unloading plate
4 Free space
5 Drum or wheel

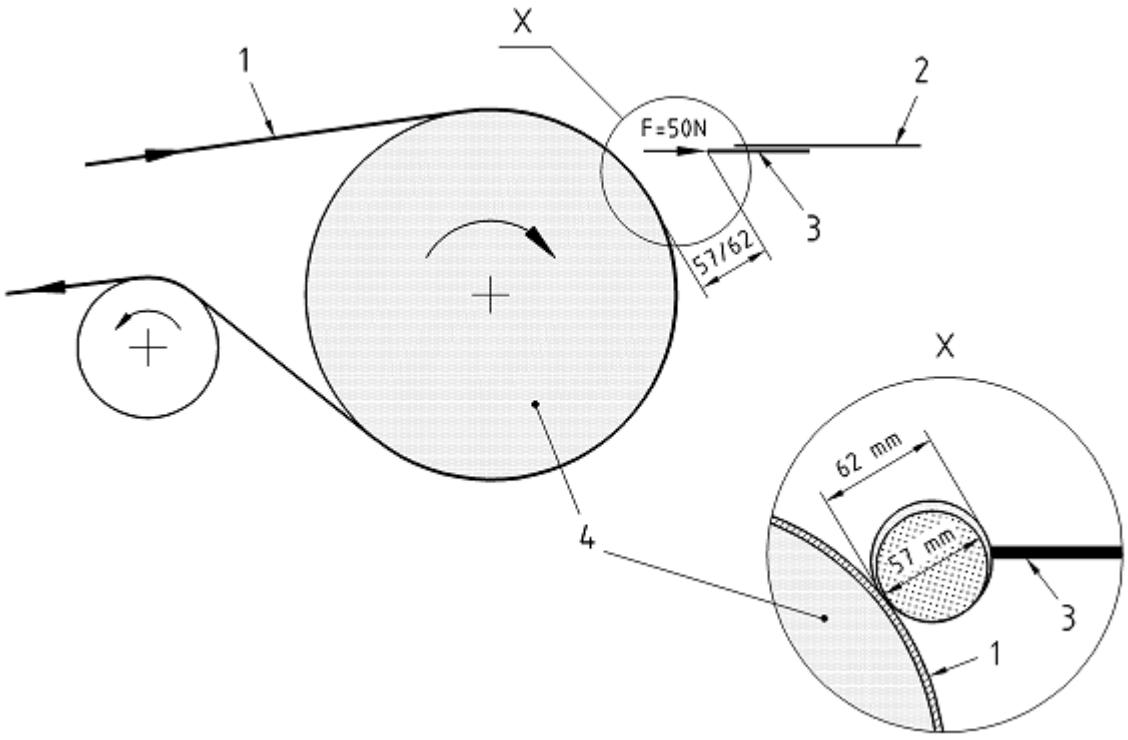
Figure 6 — Unloading point — Safety flap device — Functional dimensions



Key

1 Belt
2 Unloading plate
3 Safety flap
4 Drum or wheel

Figure 7 — Unloading point — Safety flap device — Triggering



Key

1 Belt
2 Unloading plate
3 Safety flap
4 Drum or wheel

Figure 8 — Unloading point — Safety flap device — Maximum opening

5.5.4.3 Device for checking the "open" position of the safety flap

The function for checking the "open" position of the safety flap beyond 20 mm and any supplementary safety devices (indicated in 5.5.4.2 c)) shall initiate an emergency stop and have a requirement class of at least T3.

5.5.5 Necessary conditions for automatic re-starting after a stop

a) All of the safety devices in 5.5.3.3 and 5.5.3.4 associated with the automatic re-start of the belt shall comply with requirement class T3 and meet the following requirements:

   Automatic re-start may take place 5 s after the cause of the triggering has been removed. However, re-start shall not be possible if the triggering lasts more than 15 s after the belt has been stopped.

b) An automatic re-start of the belt after the safety flap has been opened is permitted as long as the following requirements are met:

   1) the flap shall be returned to its resting position less than 5 s after it has been opened, and

2) an additional object detector shall be installed. It shall be operational as soon as the flap is opened and prevent the re-start of the belt whilst it remains blocked. The detector shall be installed not more than 20 cm beyond the nose of the flap and at a point no higher than 10 cm above the unloading zone. If this detector remains blocked for longer than 3 s, automatic re-start shall be impossible;

3) the function associated with this automatic re-start of the belt shall meet the requirements of class T3.

The detector may be the one specified in 5.5.3.4 as long as it meets the requirements of class T3 and prevents the automatic re-start of the belt after blocking of 3 s.

5.5.6 Device for checking the correct position of the emergency flap

A control device shall immobilize the belt if the safety flap is not in the specified resting position.

The associated function shall initiate an emergency stop and shall have a requirement class of at least T3.

5.5.7 Device for checking for belt rupture

A control device shall stop the drive if the belt breaks, in particular in the area of its drive device.

The associated function shall initiate an emergency stop and shall have a requirement class of at least T3.

5.5.8 Device for checking the correct position of the non-return device

If the anti-runback system can be de-activated in accordance with 5.4.2 without an automatic reset, a position checking device shall be installed.

The associated function shall initiate a service stop and shall have a requirement class of at least T2.

5.5.9 Device for checking the correct position of the brakes

If a brake is used to hold the belt in a stationary position and this brake can be de-activated in accordance with 5.4.2 without an automatic reset, a position checking device shall be installed.

The position checking device shall prevent a start-up of the belt if the brake is de-activated.

The associated function shall prevent a start-up of the belt and shall have a requirement class of at least T3.

5.5.10 Travelator on which passengers or third parties may not cross the belt re-entry point at the unloading point

5.5.10.1 General

The following Clauses are not mandatory: 5.2.3.4, 5.3.5, 5.3.6, 5.5.3.3, 5.5.3.4, 5.5.4, 5.5.6.

5.5.10.2 Speed

The maximum belt speed shall not exceed 0,55 m/s.

5.5.10.3 Location of the unloading area

The unloading area shall be located at a sufficient distance from the belt end re-entry point in order to meet the following objectives and to prevent the passengers from being able to be drawn into another hazard area.

5.5.10.4 Unloading area profile

The profile of the travelator and its lateral exit shall allow passengers to change direction.

5.5.10.5 Handrails

A handrail shall be installed to help passengers to exit.

5.5.10.6 Overrun safety device

A safety device shall be installed after the unloading area to stop the belt before a passenger is able to reach the belt end re-entry point.

The associated function shall initiate an emergency stop and have requirement class T3 with no possible automatic re-start.

5.5.10.7 Protection of the belt end re-entry point

Beyond this stopping point, the belt and the belt end re-entry angle shall be made inaccessible by appropriate guards or safety devices.

5.5.10.8 Emergency stop buttons

An emergency stop button shall be placed at the disposal of the passengers close to each unloading point.

5.6 Control elements

5.6.1 Controls

The main control panel shall be located at the operator's position at the unloading point in order to monitor all types of travel.

Its location shall permit personnel to obtain a full view of the travelator and, in particular, be capable of seeing a 10 cm sphere placed directly above the safety flap.

This control panel shall at least consist of:

— the reset button;

— the start and stop devices;

— any speed regulators;

— any controls for removing from service the flow management device and the fall detection device beyond the safety flap and their indicators;

— any fault indicators.

The controls of the main box shall not be capable of being operated by passengers.

If other control panels are provided in addition to the main box, it shall be impossible for them to be active simultaneously. Selection of the active control panel shall be made from the main control panel.

5.6.2 Secondary control panel

Other control panels may be installed away from the operating position at the unloading point if their location permits the personnel to have a full view of the installation and, in particular, be capable of seeing a 10 cm sphere placed immediately above the safety flap. Operational procedures shall take into account the use of this control panel.

It shall not be possible for passengers to operate the controls of this panel.

5.6.3 Resetting

Except during automatic resetting phases, after any emergency stop, the fault shall be rectified in order to allow manual resetting of the travelator control unit in the active control panel. Only after this action may the start command be activated.

5.6.4 Alarm

An audible alarm signal in accordance with EN 981 and EN ISO 7731 shall be triggered following any stop requiring manual resetting. This shall be audible to personnel who, in accordance with the requirements of 1.1 of this standard, are not directly present at the travelator and no matter where they are working. The same shall apply for operators of the secondary control panel. The alarm shall continue throughout the resetting period.

The travelator controller shall have available qualified personnel who are able to respond to an alarm signal and take the required measures.

5.7 Protection of property and people

5.7.1 Safety of personnel and passengers

Access by unauthorized persons to the mechanical and electrical devices shall be prevented. Personnel and passengers shall not be put at risk by broken parts.

Personnel access and movements shall be managed so as to avoid any risk of falling, impacts or the entanglement of a limb or an item of clothing by the moving components. All moving parts except for the carrying surface of the belt shall be made inaccessible in accordance with EN ISO 13857 and EN 953.

Along the travelator, as a derogation from EN ISO 13857, the grilles or cowlings may be replaced by a flexible tarpaulin-type cover (600 g/m² at least) fixed to the ground. This possibility is not acceptable at the drive and return stations.

These guards shall only be removed or dismantled by means of tools or keys for maintenance purposes.

5.7.2 Protection of the installations

The machinery and the mechanical and electrical components shall be located so that they are sheltered from the weather or designed to be weather-resistant and, in addition, they shall be arranged and equipped so that monitoring and maintenance may be carried out easily and reliably.

5.7.3 Main switch

A main switch shall be located close to the drive unit or on the operator's console at the drive station. It shall disconnect the active power conductors to the motor, to the brake release device and to the control circuit.

5.7.4 Locking the installation

During maintenance operations, when not in service and with the travelator at standstill, the main switch shall be capable of being secured in the “open” position in accordance with EN 1037.

5.7.5 Protection against electrical currents and atmospheric electrical discharges

All metallic parts of the travelator shall be electrically interconnected and directly and permanently earthed.

The earthing, equipotential bonding and atmospheric electrical discharge protective devices shall conform to EN 60204-1.

5.8 Calculations and justifications

5.8.1 Calculations

5.8.1.1 General requirements

The safety of all of the design requirements, the stability and safety relating to tilting and tipping resistance shall be justified by means of calculation or testing, whilst acknowledging the recognized rules of the art.

The travelator shall be dimensioned for the most unfavourable load which may occur during normal operation.

5.8.1.2 Calculation note

The following components shall be justified with regard to strength in a calculation note:

— drive and kinematic chain with justification of the brake and anti-runback devices if necessary;

  in the case where the motor is used to stop the belt, these arrangements shall be calculated accordingly;

— strength of the belt and its connecting components (see 5.8.1.4.1);

— strength of the load-bearing structures (see 5.8.1.4.2).

5.8.1.3 Loads

The various components shall be calculated while taking into account, in particular:

— the dead weights of the components, friction, belt tension, starting and braking forces of the belt;

— the gradient of the travelator;

— the load of the passengers on the belt with a minimum, uniformly distributed value of 1 400 N/m², this value taking into account the impact forces.

NOTE This value takes into account the possibility of 2 rows of skiers, wearing skis, where the useful width of the belt exceeds 90 cm, and the skis having a mean length of 1,5 m.

5.8.1.4 Strength of certain components

5.8.1.4.1 Belt

The belt shall have a safety coefficient relative to its breaking strength in tension of at least 3,5. The manufacturer shall be able to justify the breaking strength of the belt, if necessary by testing.

The connections of the carrier belt shall not reduce the safety coefficient of the belt in tension.

5.8.1.4.2 Load-bearing structures

All of the components of the load-bearing structure of the belt shall be justified with a safety coefficient of 3,5 with respect to the yield strength of the material.

Account shall be taken of the most unfavourable installation conditions possible and the adjustments of the feet of the travelator within the limits defined by the manufacturer and the possibility of frequent dismantling and re-assembly of the travelator.

5.8.2 Justification of materials

5.8.2.1 Steels

The materials shall be selected on the basis of the relevant standards based on the operating temperatures and stresses. Account shall be taken of the risk of brittle fracture. EN 1993-1-1 shall be applied in this regard.

5.8.2.2 Belt materials

The material used for the belt shall have adequate adhesion to prevent, as far as possible, any slipping of a pedestrian or skier under the maximum gradient and operating conditions permissible for the travelator.

This adhesion shall be verified under usage conditions as close as possible to actual conditions, and particularly in the following combinations:

a) gradient of belt: 25 % or lower limit value specified by the manufacturer;

b) with:

   1) skier, wearing skis 1,5 m long (80 kg in total);

   2) pedestrian weighing 75 kg and wearing ski boots or heavy boots; For other uses, the participant shall wear suitable (enclosed, solid) footwear;

c) under the following conditions:

   1) dry belt;

   2) wet belt.

6 Verification of the safety requirements and/or protective measures

6.1 General

In order to show that the marketed travelator meets the requirements of this standard, the manufacturer shall gather together appropriate descriptions, calculations and test results in a technical file.

6.2 Verifications during the design/construction phase

The technical file shall in particular include:

— the calculations and circuit diagrams, including proof of conformance of the travelator design and dimensions with the specified capacities and mode of operation;

— the other documents required (e.g. plans, lists of parts, material specifications, test results);

— instructions for use including the instructions required for the assembly, dismantling and transportation of the travelator and its components.

6.3 Verifications at the installation site

The compliance of the implementation of the travelator with regard to safety requirements shall be verified on the basis of the design and construction phase documents.

Verifications to be specifically carried out:

— verification of conformity with safety distances with respect to the travelator external components and the protective equipment with respect to the safety requirements, in particular for components which move relative to each other;

— verification of the proper operation of the electrical safety devices;

— verification of the proper operation of the emergency stop devices, alarms, fault indicators.

Specifically, the verification shall cover compliance with the safety requirements and/or measures in Clauses 5 and 7 of this standard as indicated in Table 1 below.

Table 1 covers the following verification methods:

a) visual examination, intended solely to confirm the presence of a component on the travelator, the system or a component (e.g. a guard, a visual warning device, a marking, a control panel, etc.) and compliance of the existing documents and diagrams with the requirements of this standard;

b) measurements: Their results shall establish the specified measurable parameters (e.g. geometric dimensions, safety distances, electrical circuit insulation resistance) and their compliance with the requirements of this standard;

c) tests:

   1) un-loaded operating test: The test results shall indicate that the travelator, including the electrical safety devices, operates as specified throughout a normal cycle or normal parts of a cycle, and that all of the functions meet the requirements of this standard and the technical documentation;

2) tests under load: Tests which go beyond the normal operational tests and which are intended to establish that requirements that can only be assessed under load conditions are met, e.g. mechanical strength and or stability, and which establish that the electrical safety devices and their controls are suitable and that the result of their triggering meets the requirements of this standard;

3) specific verifications/measurements: The results of verifications, tests or specific measurements (e.g. of the electrical system) shall establish that the parameters indicated meet the requirements of this standard (e.g. compliance with the electrical standards).

Table 1

Subclause of EN 15700	Hazardous phenomena, requirements and/or safety measures	Test [a]	Measure-ment [b]	Visual inspection [c]
5.1	Guards		x	x
5.2				
5.2.1	Stability of the travelator			x
5.2.2	Layout			x
5.2.3	Longitudinal profile			x
5.2.3.2	Gradient of travelator belt		x	
5.2.3.3	Loading plate		x	x
	Gradients of plate and belt		x	
	Gradient of loading area			x
	Clearance between loading plate and belt		x	
	Vertical distance between loading plate and snow or ground		x	
5.2.3.4	Gradient of final belt component		x	
	Gradient of penultimate belt component		x	
	Counter-gradient		x	
	Vertical distance between unloading plate and snow or ground		x	
	Clearance between safety flap and unloading plate		x	
5.2.4.1	Useful width of belt		x	
5.2.4.2	Free space above belt level		x	x
	Covering in the case of installation of a continuous smooth wall			x
5.2.4.3	Free space in the absence of a solid handrail or a continuous smooth wall		x	x

Subclause of EN 15700	Hazardous phenomena, requirements and/or safety measures	Test [a]	Measure-ment [b]	Visual inspection [c]
	Height of fall between belt and ground or snow		x	
5.2.4.4	Presence and protection of devices in the free spaces			x
5.2.5	Belt speed	x	x	
5.3				
5.3.1	Belt mesh		x	
	Belt thickness		x	
5.3.2.1	Belt guides			x
5.3.2.2	Passenger guides		x	x
5.3.2.3	Clearance between belt and passenger guides		x	
5.3.3	Covering width		x	x
	Limit height of covering devices		x	
5.3.4	Elimination of risk of injury at joints			x
5.3.5	Width of release area		x	x
	Functionality	x		
5.4				
5.4.2	Drum or wheel drive device			x
	Motor protection			x
	If manual reversing is possible, test of associated devices	x		
5.4.3				
5.4.3	Maximum acceleration		x	
	Re-starting of the travelator	x		
	Connection of power	x		
5.5				

Subclause of EN 15700	Hazardous phenomena, requirements and/or safety measures	Test [a]	Measure-ment [b]	Visual inspection [c]
5.5.1.3.6	Safety circuits	x		
5.5.1.3.7	Tests for electrical safety devices	x		
5.5.2				
5.5.2.1				
	Measurement of deceleration	x	x	
	Possibility of emergency stop	x		
5.5.2.2	Emergency stop conditions	x	x	
5.5.2.3	Brake	x		x
5.5.3				
5.5.3.1	Service stop button(s)	x		x
5.5.3.2	Emergency stop button(s)	x		x
	Locations of emergency stop buttons			x
5.5.3.3	Flow management device at the unloading point	x	x	x
5.5.3.4	Fall detector beyond the safety flap	x	x	x
5.5.3.5	Belt re-start conditions after a stop via these devices	x		
	Deactivation of the functions during exceptional operation	x		
	Indication of the deactivation of the functions			x
5.5.4				
5.5.4.1	Minimum width of the device		x	
	Triggering of the emergency stop	x		
5.5.4.2				
5.5.4.2	Belt stopping distance		x	
	Position of the nose of the safety flap		x	

Subclause of EN 15700	Hazardous phenomena, requirements and/or safety measures	Test [a]	Measure-ment [b]	Visual inspection [c]
	Opening of the flap at the moment of the stop triggering	x	x	
	Opening width relative to the belt when the flap is completely open	x	x	
	Flap opening force		x	
	Free space below the flap	x	x	x
5.5.5				
5.5.5	Automatic re-start conditions after a stop	x	x	x
5.5.6	Device for checking the correct position of the emergency flap	x		
5.5.7	Device for checking for belt rupture	x		x
5.5.8	Device for checking the correct position of the non-return device	x		x
5.5.9	Device for checking the correct position of the brakes	x		x
5.5.10.6	Overrun safety device	x		x
5.6				
5.6.1	Location of the main control panel			x
	Contents of the main control panel			x
5.6.2	Secondary control box			x
	Conditions of use			x
5.6.3	Resetting after any emergency stop	x		
5.6.4	Audible alarm before manual re-start	x		
5.7				
5.7.1	Non-contact of personnel and passengers with broken parts			x

Subclause of EN 15700	Hazardous phenomena, requirements and/or safety measures	Test [a]	Measure-ment [b]	Visual inspection [c]
	Arrangements for personnel access and circulation			x
	Inaccessible moving parts			x
	Protective devices fixed to the ground			x
5.7.3	Main switch	x		x
	Location			x
5.7.4	Installation interlocking requirements			x
5.7.5	Protection against electrical currents and atmospheric electrical discharges			x
	Measurement of earthing resistance		x	
7.2	Signage			x
7.3.1	Assembly instructions			x
7.3.2	Instructions for use and installation instructions			x
7.4	Marking of the travelator			x

[a] The result of this test is intended to indicate that the travelator, including the electrical safety devices, operates as specified.

[b] The result of the measurements shall indicate that the specified measurable parameters have been complied with.

[c] The result of the visual examination is intended solely to indicate that something is present (e.g. a marking, control panel, instruction manual), that the marking and the contents of the documents submitted to the owner meet the requirements.

7 User information

7.1 General

All information shall be clear, easy to understand and drafted in a language comprehensible to the persons tasked with the use of the travelators.

The user information shall meet the requirements of Clause 6 of EN ISO 12100:2010.

7.2 Signage

Suitable signage (Annex B) shall inform the passengers of the behaviour required:

— to access the travelator at the start;

— during their travel during normal operation and in the event of an extended stop;

— to disembark from the travelator at the unloading point (including travelators on which passengers or third parties cannot cross the belt re-entry point at the unloading point in accordance with Clause 5.5.10).

7.3 Accompanying documents (Instructions)

7.3.1 General

These documents shall be submitted at the latest when the travelator is placed on the market.

7.3.2 Assembly instructions

The assembly instructions shall include in particular:

— the installation conditions for the travelator: If the ground presents a risk of slipping or transverse sloping of the travelator, this shall be treated and arranged accordingly;

— the ground shall be compatible with the load values transmitted by the travelator supports;

— the mechanical assembly;

— the electrical diagrams;

— the electrical connections and the earthing;

— the electrical and mechanical test procedures, adjustments and operational tests to be carried out.

7.3.3 Instructions for use and maintenance

The instructions for use and maintenance shall include in particular:

— the operating instructions;

— the nature and frequency of monitoring and checking operations, including any non-destructive tests, to be carried out over and above those set out in this standard;

— the location of all lubrication points, the lubrication frequency and the quality of the products to be used;

— the periodic replacement of parts;

— all adjustments and clearances to be observed during the maintenance of the moving parts of the travelator;

— the belt checking frequency to detect any deterioration, and repair instructions;

— the fixing of the guards and their interlocking checking devices in accordance with EN 953 and EN 1088 ;

— the instructions for use shall also indicate the following : The emissions-weighted accoustic pressure level A at the operating position is < 70dB.

7.4 Marking

A legible and permanent marking including at least the following information shall be affixed to the travelator:

— the type or serial number, the complete name and address of the manufacturer, and if appropriate, its agent; the name of the machine;

— the CE mark;

— the serial number, if appropriate;

— the year of manufacture, corresponding to the year of completion of manufacture.

Annex A
(normative)

Safety function requirement classes

RC (Requirement class) EN 15700	SIL (Safety integrity level) EN 61508	PL (Performance level) EN ISO 13849-1	Brief description
TI	0	a	Controls conforming to the state of the art
T2	1	b/c	Components and principles conforming to safety/test regulations
T3	2	d	Redundancy with partial detection of fault where allowed by the state of the art
T4	3	e	Auto-control

Annex B
(informative)

Signs

Figure B.1 — Approach one by one

Figure B.2 — Do not lie down

Figure B.3 — Do not sit down

Figure B.4 — Direction arrow

Figure B.5 — Direction arrow

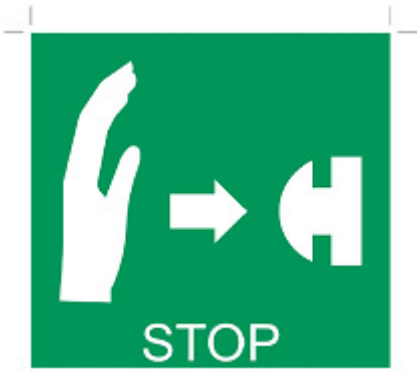


Figure B.6 — Emergency stop button

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Machinery Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to the Essential Requirements of the New Approach Machines Directive 2006/42/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the applicable Essential Requirements of that Directive and associated EFTA regulations.

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] EN ISO 14121-1, *Safety of machinery – Risk assessment – Part 1: Principles (ISO 14121-1:2007)*

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