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Zahteve za vse naprave**

Safety requirements for cableway installations designed to carry persons - General requirements - Part 1: Requirements for all installations

Sicherheitsanforderungen an Seilbahnen für den Personenverkehr - Allgemeine Bestimmungen - Teil 1: Anforderungen an alle Anlagen

Prescriptions de sécurité pour les installations à câbles transportant des personnes - Dispositions générales - Partie 1 : Prescriptions applicables à toutes les installations

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Prescriptions de sécurité pour les installations à câbles destinées au transport des personnes - Dispositions générales - Partie 1: Prescriptions applicables à toutes les installations

Sicherheitsanforderungen an Seilbahnen für den Personenverkehr - Allgemeine Bestimmungen - Teil 1: Anforderungen an alle Anlagen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 242.

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Contents

Page

1	General.....	9
1.1	Scope	9
1.2	General principles.....	9
1.3	Exceptions.....	9
2	Normative references	10
3	Terms and definitions	11
4	Safety principles	11
4.1	General safety requirements applicable to the installations and to their components	11
4.1.1	General safety principles	11
4.1.2	Possible injuries to persons.....	11
4.1.3	Hazard scenarios	11
4.2	Safety requirements applicable to installations	12
4.2.1	General.....	12
4.2.2	Protective measures.....	12
4.3	General requirements for the protection of workers	14
5	Line and line profile.....	14
5.1	Choice of line	14
5.2	Line of funicular railways.....	15
5.3	Line of aerial ropeways	16
5.4	Length of spans in aerial ropeways.....	16
5.5	Line of ski-tows.....	17
6	Limit profile	18
6.1	General.....	18
6.2	Limit profile of funicular railways	18
6.3	Limit profile of aerial ropeways.....	18
6.3.1	General.....	18
6.3.2	Lateral deviation of the ropes.....	19
6.3.3	Vertical deviation of the ropes	20
6.3.4	Transverse sway of the carriers.....	20
6.3.5	Longitudinal sway of carriers.....	21
6.3.6	Hand, foot and ski area	22
6.3.7	Guides.....	22
6.4	Limit profile of ski-tows	23
6.4.1	General.....	23
6.4.2	Width of the tow-track.....	23
6.4.3	Transverse sway of the tow-hanger.....	24
6.4.4	Longitudinal sway of the tow-hanger	24
6.4.5	Rotation of platters, T-bars or rods	24
6.4.6	Freedom of sway.....	24
6.5	Limit profile of the signal, restraint and marker ropes	24
6.6	Limit profile of ropes of on evacuation railways	24
7	Clearance profile, safety distances, track gauge	25
7.1	General.....	25
7.2	Safety distances for funicular railways	25
7.3	Safety distances for aerial ropeways	25
7.4	Track gauge for aerial ropeways.....	26
7.5	Clearance profile and safety distances for ski-tows.....	27
8	Maximum permissible height above ground	27

8.1	General	27
8.2	Aerial ropeways with closed carriers	27
8.3	Aerial ropeways with open carriers	28
9	Operating speed and interval	28
9.1	Operating speed of funicular railways and aerial ropeways, general	28
9.2	Maximum operating speeds of funicular railways and aerial ropeways	29
9.3	Minimum interval and carrier pitch for uni-directional aerial ropeways	30
9.4	Operating speed and interval for ski-tows	31
10	Drive system (including brakes)	32
10.1	Drive systems for funicular railways and aerial ropeways	32
10.2	Braking systems for funicular railways and aerial ropeways	33
10.3	Drive system and braking systems for ski-tows	33
11	Passageways and work areas	34
11.1	General	34
11.2	Chairlift loading areas	36
11.3	Chairlift unloading areas	38
11.4	Loading and unloading areas at intermediate chairlift stations	40
11.5	Ski-tow loading and unloading areas	40
11.6	Ski-tow loading areas	40
11.7	Ski-tow unloading areas	41
11.8	Ski-tow intermediate stations	42
12	Rope tension and guides	42
12.1	Rope tension	42
12.2	Rope guidance and support - General	42
12.3	Guidance and support of the haul ropes for funicular railways	43
12.4	Guidance and support for bi-cable aerial ropeways	43
12.5	Guidance of carrying-hauling ropes in monocable aerial ropeways	43
12.6	Guidance of haul ropes in ski-tows	44
13	Recovery and evacuation	44
13.1	General	44
13.2	Evacuation plan	44
13.3	Evacuation pathway for funicular railways	45
13.4	Evacuation by descending by rope	45
14	Miscellaneous	45
14.1	Fire protection and fire-fighting	45
14.2	Protection against lightning	45
14.3	Marking of obstacles to aircraft	45
14.4	Wind measurement devices	45
14.5	Materials	46
14.6	Instructions for passengers	46
14.7	Assembly instructions	46
14.8	Operating and maintenance instructions	46
14.9	Technical documents	47
14.10	Lighting installations	47
14.11	Radios	47
15	Funicular railways with automatic operation	47
15.1	General	47
15.2	Operation monitoring	47
15.3	Fencing off the line	47
15.4	Access to the line	47
15.5	Evacuation	48
15.6	Access to carriers	48
15.7	Special safety devices on carriers	48
15.8	Surveillance of the line	48
Annex A (normative)	Explanatory sketch for 11.2	49

prEN 12929-1:2013 (E)

Annex B (normative) Explanatory sketch for 11.3	50
Annex C (normative) Technical documents	51
C.1 For all installations	51
C.2 For funicular railways.....	51
C.3 For aerial ropeways	51
C.4 For ski-tows.....	52
Annex D (informative) A–deviations.....	53
Annex ZA (informative) Relationship between this European Standard and the essential requirements of the EU Directive 2000/9/EC relating to cableway installations designed to carry persons	54

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Foreword

This document (prEN 12929-1:2013) has been prepared by the Technical Committee CEN/TC 242 "Safety requirements for passenger transportation by rope", the secretariat of which is held by AFNOR.

This document is currently submitted for CEN enquiry.

This document is intended to replace EN 12929-1:2004.

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 EU Directives.

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

The following main changes have been made to EN 12929-1:2004:

- In 1.1 supplementations have been made with regard to the protection of workers and the passenger circle.
- In 1.3.1 EN 12929-1 has also been included with regard to the exception to the requirements.
- In Clause 3 the terms and definitions have been removed, as the reference to EN 1907:2012 is sufficient.
- The former 4.2.2 "Safety analysis" has been removed, as the requirements listed there are established in Directive 2000/9/EC.
- In 5.2.2 the limit for the permissible transverse acceleration for funicular railways has been raised.
- In 5.2.4 detailed regulations for establishing the passing loop of funicular railways have been included.
- 6.1 has been added and establishes the basic requirements for the limit profile. The following subclauses in Clause 6 have been promoted.
- In 6.3.1 the general requirements for the limit profile have been supplemented to include aerial ropeways.
- In 6.3.2 by changing the reduction coefficient, alignment with EN 12930:2012 has been achieved and the ice curtain for the lateral deviation of the ropes has been redefined.
- In 6.3.4 the regulations with regard to the minimum values for the angle of the transverse sway of the carriers have been supplemented.
- In 6.3.5 the permissible impact speed for reversible aerial ropeways has been increased.
- In 6.3.7 the regulations with regard to the guides have been adopted from the former 7.3.2, as the guides influence the limit profile. The regulations have been supplemented and clarified.
- In 6.4.1 the regulations for the limit profile of ski-tows with regard to the combination of transverse and longitudinal sway have been established congruent to the aerial ropeways.
- In 6.4.5 the regulations with regard to the rotation of platters, T-bars or rods have been clarified.

prEN 12929-1:2013 (E)

- In 6.5 and 6.6 regulations with regard to the limit profile for signal cables, restraint ropes, marker ropes and ropes on evacuation railways have been adopted from EN 12930, whereby they are aligned with ropes on aerial ropeways.
- 7.1 has been revised in terms of content and structure.
- 7.3 has been revised in terms of content and structure and includes regulations regarding the safety distances which were previously covered in 7.5. The former 7.3.2 regarding guides has been moved to 6.3.7, as the limit profile is influenced by guides.
- In 7.4 the assumptions for the verification of tracks for reversible aerial ropeways, for pulsed movement aerial ropeways and bi-cable aerial ropeways have been clarified.
- The safety distances for aerial ropeways covered in the former 7.5 has been moved to 7.3 and revised in terms of content.
- In 7.5 regulations for ski-tows have been revised in terms of content and structure.
- In 8.1 the maximum height above ground has been restricted to the height for a rope that is carrying passengers.
- In 8.2 and 8.3 the height above ground for aerial ropeways has been revised in terms of content and structure.
- In 9.2 the maximum operating speeds of cableway installations have been revised in terms of content and structure.
- In 10.1.1 the regulations for the omission of a recovery drive have been concretised.
- In 10.1.6 the regulations for the independence of the recovery drive from the main drive have been concretised.
- In 10.3.4 the permissible stopping distances for ski-tows have been modified.
- In 11.1.5 the requirements for work positions and passageways for employees has been modified.
- In 11.1.7 the distances between the carriers and the loading platform edge have been modified.
- In 11.1.9 additional requirements have been included for unloading areas for cableway installations.
- In 11.1.10 the height of the seat surface of chairlifts in the loading and unloading areas has been modified.
- In 11.2.3 the execution of the stabilisation area, the safety area and the ramp after the loading area has been modified.
- In 11.2.11 the occupation instructions in the area of the valley station of chairlifts and the reference to the relevant Standard have been modified.
- In 11.3.2 the requirements for unloading areas of chairlifts have been modified and supplemented.
- In 11.3.4 for the limits of the height above ground in the approach area the option of locking system have been taken into consideration.
- In 11.3.5 the regulations for the ramps after the unloading area of chairlifts have been clarified.

- In 11.3.6 the existing requirement for chairlifts with carriers with fixed grips was further extended to chairlifts with detachable grips.
- In 11.3.7 the regulations with regard to the emergency unloading area have been clarified.
- In 11.3.8 the passenger instructions in the area of the mountain station of chairlifts and the reference to the relevant Standard have been modified.
- In 11.6.1 the regulations for the loading area of ski-tows have been supplemented.
- In 11.6.4 the passenger instructions in the area of the valley station of ski-tows and the reference to the relevant Standard have been modified.
- 11.7.2 was reformulated as the height above ground of a ski-tow has not been defined.
- In 11.7.9 the location of the monitoring devices at the unloading area of ski-tows has been clarified.
- In 12.4.1 the exception option of omitting a monitoring of the movement between the track rope and the haul rope in the case of bi-cable uni-directional aerial ropeways has been removed, as this no longer complied with the “state of the art”.
- 12.6.2 has been reformulated as the height above ground of a ski-tow was not defined.
- In 12.6.3 the regulations for low level ski-tows with regard to twist have been supplemented.
- In 13.2 the regulations for the evacuation plan were removed and exclusive reference is made to EN 1909.
- In 13.3 a supplementary regulation has been included for the evacuation pathway for funicular railways.
- In 14.1 the hazards from fire events in the vicinity of the cableway installation have been supplemented.
- In 14.4 the requirement of a wind measurement device on funicular railways has been taken into consideration.
- In 15.4 the access to the line of funicular railways with automatic operation has been clarified.
- In 15.6 the access to the carriers of funicular railways with automatic operation has been clarified.
- In 15.7 the regulations regarding special safety devices on the carriers of funicular railways with automatic operation have been removed and exclusive reference is made to EN 13796-1.
- In Annex A the sketch and the key for explaining 11.2 has been adapted to the Standard specifications.
- In Annex B the sketch and the key for explaining 11.3 has been adapted to the Standard specifications.
- In Annex C the technical documents have been supplemented and clarified.
- In Annex D the A-deviation for Germany has been removed.

EN 12929 with the generic title “Safety requirements for cable way installations designed to carry persons - General requirements”, consists of the following parts:

- Part 1: Requirements for all installations.
- Part 2: Additional requirements for reversible bi-cable aerial ropeways without carrier truck brakes.

prEN 12929-1:2013 (E)

Part 1 of this document deals with general requirements applicable to all cableway installations designed to carry persons; Part 2 deals with the supplementary requirements applicable to reversible bi-cable aerial ropeways without carrier truck brakes.

This European Standard forms part of a series of European Standards concerning safety requirements for cableway installations designed to carry persons. This series of Standards comprises the following parts:

- 1) Safety requirements for cableway installations designed to carry persons – Terminology
- 2) Safety requirements for cableway installations designed to carry persons – General requirements
- 3) Safety requirements for cableway installations designed to carry persons – Calculations
- 4) Safety requirements for cableway installations designed to carry persons – Ropes
- 5) Safety requirements for cableway installations designed to carry persons – Tensioning devices
- 6) Safety requirements for cableway installations designed to carry persons – Drive systems and other mechanical equipment
- 7) Safety requirements for cableway installations designed to carry persons – Carriers
- 8) Safety requirements for cableway installations designed to carry persons – Electrical equipment other than for drive systems
- 9) Safety requirements for cableway installations designed to carry persons – Civil engineering works
- 10) Safety requirements for cableway installations designed to carry persons – Precommissioning inspection, maintenance and operational inspection and checks
- 11) Safety requirements for cableway installations designed to carry persons – Recovery and evacuation
- 12) Safety requirements for cableway installations designed to carry persons – Operation
- 13) Safety requirements for cableway installations designed to carry persons – Quality assurance

This series of Standards forms a complete set with regard to the design, manufacture, erection, maintenance and operation of all cableway installations for designed to carry persons.

In respect of ski-tows, the drafting of this document has been guided by the works of the International Organisation for Transportation by Rope (OITAF).

1 General

1.1 Scope

This part of EN 12929 specifies the safety requirements for the general requirements for cableway installations designed to carry persons. These requirements are applied to the various types of installations and their environment.

This document defines general technical characteristics and prescribes design principles and general safety requirements.

It does not deal with details of operation and maintenance, nor with calculations and detailed requirements for the manufacture of components.

This Part 1 does not deal with special regulations applicable to bi-cable reversible aerial ropeways without carrier truck brakes, which are the subject of Part 2.

It includes requirements relating to the prevention of accidents and the protection of workers.

It does not apply to cableway installations for transportation of goods or to lifts.

Clause 11 describes the minimum requirements to be normatively satisfied for passageways and work areas. National regulations of a building or federal/state nature or which serve to protect particular groups of people remain unaffected.

It may not always be possible for all types of cableway installation to transport all particular groups of people (e.g. persons with restricted mobility). The objective should be, however, for a cableway installation to enable the transportation of the largest possible passenger population.

1.2 General principles

1.2.1 Stringent safety requirements are of the utmost importance for the design, manufacture, erection, maintenance and operation of cableway installations.

The design, manufacture, erection, maintenance and operation of cableways shall only be entrusted to contractors and experts who have the necessary knowledge and experience and who can ensure careful execution of the installation and proper management of the operation.

All the components shall be calculated exactly, be of a good mechanical and electrical design and be manufactured from adequate, defect-free materials possessing the required characteristics.

1.2.2 All components shall be kept in working order and in good condition. Reference is made to EN 1709 and EN 12397.

1.2.3 In addition to the European Standards specific to cableway installations, the relevant European specifications shall be used for the design, manufacture, erection, maintenance and operation of cableways.

1.2.4 This document takes into account, in certain cases, the careless behaviour of passengers. In all cases, use of the cableway in accordance with its intended use is assumed and not misuse of the installation.

1.3 Exceptions

1.3.1 Exceptions to the requirements of Standards EN 1709, EN 1908, EN 1909, EN 12385-8, EN 12385-9, EN 12397, EN 12927, EN 12929-1, EN 12929-2, EN 12930, EN 13107, EN 13223, EN 13243, EN 13796-1, EN 13796-2 and EN 13796-3 are permissible, particularly in the case of innovation, if they are justified by a safety analysis and offer at least an equivalent level of safety.

prEN 12929-1:2013 (E)

1.3.2 Exceptions to this Standard are also permissible in the case of replacement of components in existing installations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1709, *Safety requirements for cableway installations designed to carry persons — Precommissioning inspection, maintenance, operational inspection and checks*

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

EN 1908, *Safety requirements for cableway installations designed to carry persons — Tensioning devices*

EN 1909, *Safety requirements for cableway installations designed to carry persons — Recovery and evacuation*

EN 12397, *Safety requirements for cableway installations designed to carry persons — Operation*

EN 12408, *Safety requirements for cableway installations designed to carry persons — Quality control*

EN 12927, *Safety requirements for cableway installations designed to carry persons — Ropes*

EN 12929-2, *Safety requirements for cableway installations designed to carry persons — General requirements — Part 2: Additional requirements for reversible bi-cable aerial ropeways without carrier truck brakes*

EN 12930, *Safety requirements for cableway installations designed to carry persons — Calculations*

EN 13107, *Safety requirements for cableway installations designed to carry persons — Civil engineering works*

EN 13223, *Safety requirements for cableway installations designed to carry persons — Drive systems and other mechanical equipment*

EN 13243, *Safety requirements for cableway installations designed to carry persons — Electrical equipment other than for drive systems*

EN 13796-1, *Safety requirements for cableway installations designed to carry persons — Carriers — Part 1: Grips, carrier trucks, on-board brakes, cabins, chairs, carriages, maintenance carriers, tow-hangers*

EN 13796-2, *Safety requirements for cableway installations designed to carry persons — Carriers — Part 2: Slipping resistance tests for grips*

EN 13796-3, *Safety requirements for cableway installations designed to carry persons — Carriers — Part 3: Fatigue tests*

EN 12385-8, *Steel wire ropes — Safety — Part 8: Stranded hauling and carrying-hauling ropes for cableway installations designed to carry persons*

EN 12385-9, *Steel wire ropes — Safety — Part 9: Locked coil carrying ropes for cableway installations designed to carry persons*

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

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

ISO 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1907:2005 apply.

4 Safety principles

4.1 General safety requirements applicable to the installations and to their components

This Clause sets out general safety requirements for cableway installations designed to carry persons, their components and their subsystems.

4.1.1 General safety principles

All cableway installations designed to carry persons shall be designed, manufactured and operated by applying the following principles in the order indicated:

- a) avoid or at least limit the risks by appropriate design or construction measures;
- b) take the necessary protective measures with respect to remaining risks which cannot be avoided by design and construction measures;
- c) define and make known the precautions to be taken to reduce those risks which it has not been possible to avoid completely by the previous preventative and protective measures.

In the case of installations and components complying with EN 1709, EN 1908, EN 1909, EN 12397, EN 12927, EN 12929 (Parts 1 and 2), EN 12930, EN 13107, EN 13223, EN 13243 and EN 13796 (Parts 1 to 3), it can be assumed that these safety principles are observed.

4.1.2 Possible injuries to persons

The hazards to be taken into account are those which can in particular result in the following injuries to persons:

- a) injuries caused by falls (including those caused by carriers falling);
- b) bruising, crushing or injury by trapping of persons (other than falls);
- c) impairments to health resulting from extended exposure of persons to adverse weather conditions;
- d) other dangers to health, for example electrocution, burns, inhalation of poisonous gases, etc.

4.1.3 Hazard scenarios

The following events can give rise to hazardous situations which are avoided or reduced by the safety requirements of this document:

- a) failure (rupture, malfunction or non-functioning) of a component of an installation;
- b) breakdown of correct interaction between the components in an installation or between the components and their environment;

prEN 12929-1:2013 (E)

- c) incorrect behaviour of persons (passengers, personnel or third parties);
- d) foreseeable external events (for example caused by avalanches, landslides, rock falls, lightning, piste grooming machines, aircraft).

The following events in particular shall be considered:

- failure of or defects in the supporting structures of the civil engineering structures;
- defective condition of loading and unloading areas;
- failure of tensioning systems and rope end fixings;
- failure of rope support and guide elements;
- failure of carrier components;
- failure of or defects in drive systems and brakes;
- failure of or defects in control and monitoring systems, safety and signalling installations;
- incorrect behaviour of persons, personnel or third parties who are being transported.

Chain reactions which can happen as a result of an event shall be taken into account. On the other hand, the simultaneous occurrence of two independent hazardous situations may be ignored.

4.2 Safety requirements applicable to installations**4.2.1 General**

This document sets out general measures to reduce the hazards listed in 4.1 and to prevent the hazardous situations.

4.2.2 Protective measures

In particular, monitoring devices are required as protective measures to detect and correct the hazardous situations listed below. Table 1 below indicates the Standards which deal with each of these hazardous situations.

Table 1 – List of hazardous situations

Type of installation	Hazardous situation	Standards
all installations except ski-tows	inadmissible variation in the nominal tension of the moving ropes (except for tensioning by counterweights)	EN 1908 EN 13243
	arrival at the end positions of the tensioning devices	EN 1908 EN 13223
	inadmissible exceeding of speed	EN 13223
	inadvertent runback	EN 13223
	abrupt change in the drive torque beyond the limit values for the installation	EN 13223 EN 13243
	failure of doors of closed carriers to lock before leaving the station	EN 13223 EN 13243
	inadvertent start-up	EN 13243
funicular railways and bi-cable aerial ropeways	incorrect position of the haul rope relative to its supports or to the track rope (for example crossing of the haul rope and track rope, derailment)	EN 12929-1 EN 13223 EN 13243
	inadmissible reduction in the haul rope tension (except for bi-cable uni-directional aerial ropeways)	EN 12929-1 EN 13223 EN 13243
funicular railways	inadmissible speeding and/or inadvertent runback of carriers	EN 13223
Mono-cable aerial ropeways	derailment of the towing rope on line support structures and at rollers in the station having a similar function to line rollers	EN 12929-1 EN 13223 EN 13243
funicular railways, reversible aerial ropeways and pulsed movement aerial ropeways	failure to slow down on approach to stations or at other points of the line	EN 13223
	overrunning of end points at the end of the line	EN 13223 EN 13243
cableway installations with detachable carriers	failure of grips to attach to or detach from the rope	EN 13796-1 EN 13223
	inadmissible deviation in the carrier pitch	EN 13796-1 EN 13223
	incorrect progression of carriers in the station	EN 13796-1 EN 13223
chairlifts	overrunning of unloading area by occupied carriers (with the exception of intermediate stations)	EN 12929-1 EN 13223
ski-tows	inadmissible variation in the nominal tension in the towing rope (except for tensioning by counterweights)	EN 1908 EN 13223
	inadvertent start-up	EN 13243
	overrunning of reception area by a skier	EN 13223
	abrupt temporary change in the drive torque beyond any limit value characteristic of normal operating conditions	EN 13223 EN 13243
	incomplete retraction of a tow-hanger	EN 13223
	derailment of the towing rope on line support structures and at rollers in the station having a similar function to line rollers	EN 12929-1 EN 13223 EN 13243