

OHUTUSNÕUDED INIMESTE TRANSPORTIMISEKS
MÕELDUD KÕISTEPAIGALDISTELE. ÜLDNÕUDED. OSA
1: NÕUDED KÕIKIDELE PAIGALDISTELE

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 12929-1:2015 sisaldab Euroopa standardi EN 12929-1:2015 ingliskeelset teksti.	This Estonian standard EVS-EN 12929-1:2015 consists of the English text of the European standard EN 12929-1:2015.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 14.01.2015.	Date of Availability of the European standard is 14.01.2015.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 45.100

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:

Aru 10, 10317 Tallinn, Eesti; koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Aru 10, 10317 Tallinn, Estonia; homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

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

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 European Standard was approved by CEN on 25 November 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

	Page
Foreword.....	5
1 General.....	Error! Bookmark not defined.
2 Normative references	11
3 Terms and definitions	12
4 Safety principles	12
4.1 General safety requirements applicable to the installations and to their components	13
4.1.1 General safety principles	13
4.1.2 Possible injuries to persons	13
4.1.3 Hazard scenarios	13
4.2 Safety requirements applicable to installations	14
4.2.1 General.....	14
4.2.2 Protective measures.....	14
4.3 General requirements for the protection of workers	16
5 Line and line profile	16
5.1 Choice of line	16
5.2 Line of funicular railways.....	17
5.3 Line of aerial ropeways	18
5.4 Length of spans in aerial ropeways.....	18
5.5 Line of ski-tows.....	19
6 Limit profile	20
6.1 General.....	20
6.2 Limit profile of funicular railways	20
6.3 Limit profile of aerial ropeways.....	20
6.3.1 General.....	20
6.3.2 Lateral deviation of the ropes.....	21
6.3.3 Vertical deviation of the ropes	22
6.3.4 Transverse sway of the carriers.....	23
6.3.5 Longitudinal sway of carriers.....	24
6.3.6 Hand, foot and ski area	24
6.3.7 Guides.....	25
6.4 Limit profile of ski-tows	26
6.4.1 General.....	26
6.4.2 Width of the tow-track.....	26
6.4.3 Transverse sway of the tow-hanger.....	26
6.4.4 Longitudinal sway of the tow-hanger	26
6.4.5 Rotation of platters, T-bars or rods	26
6.4.6 Freedom of sway.....	26
6.5 Limit profile of the signal, restraint and marker ropes	26
6.6 Limit profile of ropes of evacuation railways	27
7 Clearance profile, safety distances, track gauge	27
7.1 General.....	27
7.2 Safety distances for funicular railways	27
7.3 Safety distances for aerial ropeways	28
7.4 Track gauge for aerial ropeways.....	29
7.5 Clearance profile and safety distances for ski-tows.....	29
8 Maximum permissible height above ground	30

8.1	General	30
8.2	Aerial ropeways with closed carriers	30
8.3	Aerial ropeways with open carriers	30
9	Operating speed and interval	30
9.1	Operating speed of funicular railways and aerial ropeways, general.....	30
9.2	Maximum operating speeds of funicular railways and aerial ropeways	31
9.3	Minimum interval and carrier pitch for uni-directional aerial ropeways.....	33
9.4	Operating speed and interval for ski-tows.....	34
10	Drive system (including brakes)	34
10.1	Drive systems for funicular railways and aerial ropeways	34
10.2	Braking systems for funicular railways and aerial ropeways.....	35
10.3	Drive system and braking systems for ski-tows.....	36
11	Passageways and work areas	36
11.1	General	36
11.2	Chairlift loading areas.....	39
11.3	Chairlift unloading areas	40
11.4	Loading and unloading areas at intermediate chairlift stations.....	42
11.5	Ski-tow loading and unloading areas	42
11.6	Ski-tow loading areas.....	42
11.7	Ski-tow unloading areas	43
11.8	Ski-tow intermediate stations	44
12	Rope tension and guides.....	44
12.1	Rope tension.....	44
12.2	Rope guidance and support - General	45
12.3	Guidance and support of the haul ropes for funicular railways.....	45
12.4	Guidance and support for bi-cable aerial ropeways.....	45
12.5	Guidance of carrying-hauling ropes in mono-cable aerial ropeways.....	46
12.6	Guidance of haul ropes in ski-tows.....	46
13	Recovery and evacuation	47
13.1	General	47
13.2	Evacuation pathway for funicular railways.....	47
13.3	Evacuation by descending by rope	47
14	Miscellaneous	47
14.1	Fire protection and fire-fighting.....	47
14.2	Protection against lightning	48
14.3	Marking of obstacles to aircraft	48
14.4	Wind measurement devices	48
14.5	Materials	48
14.6	Instructions for passengers	48
14.7	Assembly instructions	48
14.8	Operating and maintenance instructions	49
14.9	Technical documents.....	49
14.10	Lighting installations	49
14.11	Radios.....	49
15	Funicular railways with automatic operation	49
15.1	General	49
15.2	Operation monitoring.....	50
15.3	Fencing off the line.....	50
15.4	Access to the line	50
15.5	Evacuation	50
15.6	Access to carriers	50
15.7	Special safety devices on carriers.....	51
15.8	Surveillance of the line	51
Annex A	(normative) Explanatory sketch for 11.2.....	52
Annex C	(normative) Technical documents.....	54

C.1	For all installations	54
C.2	For funicular railways.....	54
C.3	For aerial ropeways	54
C.4	For ski-tows.....	55
Annex D	(informative) A–deviations.....	56
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	57
Bibliography	59

Tables

Table 1 – List of hazardous situations

Table ZA.1 - Relationship between this European Standard and the essential requirements of the EU Directive 2000/9/EC relating to cableway installations designed to carry persons

Figures

Figure A.1 – Explanatory sketch for 11.2

Figure B.1 – Explanatory sketch for 11.3

Foreword

This document (EN 12929-1:2015) has been prepared by Technical Committee CEN/TC 242 "Safety requirements for cableway systems for passenger transportation", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2015, and conflicting national standards shall be withdrawn at the latest by July 2015.

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.

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

This document replaces 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 Directive 2000/9/EC.

For the relationship with EU Directive 2000/9/EC, 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 Clause 1 (formerly Subclause 1.1) supplementations have been made with regard to the protection of workers and the passenger circle.
- In 4.2.1 (formerly Subclause 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 is sufficient.
- The former Subclause 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 12930:2014 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 tow-hangers have been clarified.
- 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.
- In 7.5 regulations for ski-tows have been revised in terms of content and structure.
- In 8.1.1 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 10.2.4 the residual risk of a standstill caused by the on-board brakes has been taken into consideration.
- In 10.3.2, the requirement for the arrangement of the emergency stop buttons which are accessible to all persons when entering and exiting ski-tows has been restricted.
- In 10.3.4 the permissible stopping distances for ski-tows have been modified.
- The previous point 10.3.5, which established the design of the brakes for ski-tows, has been deleted.
- In 11.1.5 the requirements for work positions and passageways for operating personnel 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 the unloading areas of chairlifts.

- 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 safety 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” and a time span specified in which no switch-off shall take place.
- 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 13.1 the regulations for the evacuation plan were removed and exclusive reference is made to EN 1909.
- In 13.2 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 14.2 the requirement for inspecting the rope has been supplemented with established or assumed lightning, as EN 12929-2 no longer specifies this regulation.
- 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.
- Annex ZA has been updated.

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.*

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:

- EN 1907 – *Terminology*
- EN 12929 – *General requirements*
- EN 12930 – *Calculations*
- EN 12927 (all parts) – *Ropes*
- EN 1908 – *Tensioning devices*
- EN 13223 – *Drive systems and other mechanical equipment*
- EN 13796 (all parts) – *Carriers*
- EN 13243 – *Electrical equipment other than for drive systems*
- EN 13107 – *Civil engineering works*
- EN 1709 – *Precommissioning inspection, maintenance and operational inspection and checks*
- EN 1909 – *Recovery and evacuation*
- EN 12397 – *Operation*
- EN 12408 – *Quality assurance*

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

This document is a preview generated by EVS

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

This document is a preview generated by EVS

1 Scope

This European Standard specifies the general regulations for safety requirements for cableway installations designed to carry persons. Supplementary safety requirements for reversible bi-cable aerial ropeways without carrier truck brakes are established in EN 12929-2.

This Part of the EN 12929 defines general technical characteristics and prescribes design principles and general safety requirements.

This Part of the EN 12929 does not deal with details of operation and maintenance, calculations and detailed requirements for the manufacture of components.

This Part of the EN 12929 includes requirements relating to the prevention of accidents and the protection of workers irrespective of the application of national regulations.

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.

This standard does not apply to cableway installations for the transportation of goods or to lifts.

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

EN 12927 (all parts), *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 (all parts), *Safety requirements for cableway installations designed to carry persons — Carriers*

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)*

3 Terms and definitions

For the purposes of this document, the terms and definitions in accordance with EN 1907 apply.

4 Safety requirements applicable to cableway installations

4.1 General principles

4.1.1 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.

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

4.1.3 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.

4.1.4 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.

4.2 Exceptions

4.2.1 Exceptions to the requirements of Standards EN 1709, EN 1908, EN 1909, EN 12385-8, EN 12385-9, EN 12397, EN 12927 (all parts), EN 12929-1, EN 12929-2, EN 12930, EN 13107, EN 13223, EN 13243, EN 13796 (all parts) are permissible, particularly in the case of innovation. These exceptions shall be justified by a safety analysis and offer at least an equivalent level of safety.

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