



SLOVENSKI STANDARD

SIST EN 13796-1:2005

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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

Sicherheitsanforderungen für Seilbahnen für den Personenverkehr - Fahrzeuge - Teil 1: Befestigungen am Seil, Laufwerke, Fangbremsen, Kabinen, Sessel, Wagen, Instandhaltungsfahrzeuge, Schleppgehänge

Prescriptions de sécurité pour les installations à câbles transportant des personnes - Véhicules - Partie 1: Attaches, chariots, freins embarqués, cabines, sièges, voitures, véhicules de maintenance, agres

Ta slovenski standard je istoveten z: EN 13796-1:2005

ICS:

45.100 U]]^{ æáãä } æ Cableway equipment

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This European Standard was approved by CEN on 17 April 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 13796-1:2005) has been prepared by Technical Committee CEN/TC 242 "Safety requirements for passenger transportation by rope", 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of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

This European Standard 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

For relationship with the EU Directive, see informative annex ZA, which is an integral part of this European Standard.

EN 13796 comprises the following parts under the general title *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
- Part 2: Slipping resistance tests for grips
- Part 3: Fatigue testing

This European Standard forms part of the standards programme approved by the CEN Technical Board on safety requirements for cableway installations designed to carry persons. This programme comprises the following standards:

- 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 – Pre-commissioning inspection, maintenance and operational inspection and checks
- 11) Safety requirements for cableway installations designed to carry persons – Recovery and evacuation

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12) Safety requirements for cableway installations designed to carry persons - Operation

13) Safety requirements for cableway installations designed to carry persons - Quality assurance

Together these form a series of standards regarding design, manufacture, construction, maintenance and operation of all cableway installations designed to carry persons.

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

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1 Scope

This European Standard specifies the safety requirements applicable to carriers for cableway installations designed to carry persons. It is applicable to the various types of installations and takes into account their environment.

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

It does not apply to installations for the transportation of goods nor to inclined lifts.

2 Normative references

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

EN 287-1, *Approval testing of welders – Fusion welding – Part 1: Steels*

EN 287-2, *Approval testing of welders – Fusion welding – Part 2: Aluminium and aluminium alloys*

EN 1709, *Safety requirements for cableway installations designed to carry persons – Pre-commissioning inspection, maintenance and 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*

ENV 1993-1, *Eurocode 3: Design of steel structures*

ENV 1999-2, *Eurocode 9: Design of aluminium structures – Part 2: Structures susceptible to fatigue*

EN 10025, *Hot-rolled products of structural steels*

EN 10045-1, *Metallic materials – Charpy impact test – Part 1: Test method*

EN 10083, *Quenched and tempered steels*

EN 10113, *Hot-rolled products in weldable fine grain structural steels*

EN 10204, *Metallic products – Types of inspection documents*

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

EN 12408, *Safety requirements for cableway installations designed to carry persons – Quality assurance*

EN 12927-1, *Safety requirements for cableway installations designed to carry persons – Ropes – Part 1: Selection criteria for ropes and their end fixings*

EN 12927-2, *Safety requirements for cableway installations designed to carry persons – Ropes – Part 2: Safety factors*

EN 12927-3, *Safety requirements for cableway installations designed to carry persons – Ropes – Part 3: Long splicing of 6-strand hauling, carrying-hauling and towing ropes*

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- EN 12927-4, *Safety requirements for passenger transportation by rope - Ropes - Part 4: End fixing*
- EN 12927-5, *Safety requirements for cableway installations designed to carry persons – Ropes – Part 5: Storage, transportation, installation and tensioning*
- EN 12927-6, *Safety requirements for cableway installations designed to carry persons – Ropes – Part 6: Discard criteria*
- EN 12927-7, *Safety requirements for cableway installations designed to carry persons – Ropes – Part 7: Calculation, repair and maintenance*
- EN 12927-8, *Safety requirements for cableway installations designed to carry persons – Ropes – Part 8: Magnetic rope testing*
- EN 12929-1, *Safety requirements for cableway installations designed to carry persons – General provisions – Part 1: Requirements for all installations*
- EN 12929-2, *Safety requirements for cableway installations designed to carry persons – General provisions – Part 2: Additional requirements for reversible bicable 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 installations other than for drive systems*
- 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 testing*
- EN ISO 898, *Mechanical properties of fasteners made of carbon steel and alloy steel*
- EN ISO 5817, *Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817:2003)*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1907:2005 and the following apply:

3.1

gravitational driving force F_T

component of the weight of the loaded carrier parallel to the tangent to its trajectory

3.2

slipping resistance force F

characterizes the resistance to slipping provided by a grip. A distinction is made between the following slipping resistance forces when they occur:

- F_{theo} calculated slipping resistance force;
- F_{lab} slipping resistance force determined experimentally in the laboratory on the rope;
- F_{eff} slipping resistance force measured on the rope on the installation

3.3

pull-off resistance force F_{aus}

characterizes the resistance provided by a fixed grip on the rope when a lifting force is exerted normal to the rope axis in a vertical plane (see Figure 1)

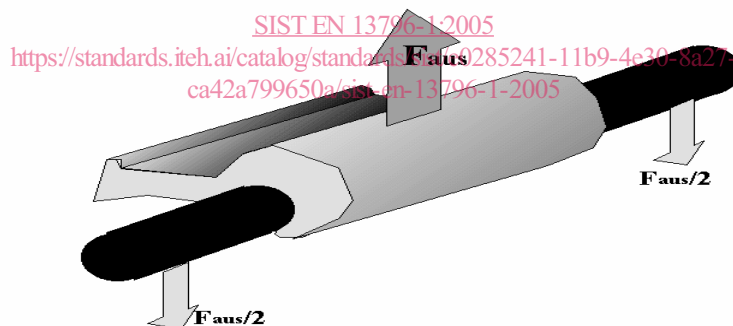


Figure 1 — Pull-off resistance force

3.4

gripping force exerted by the jaws F_{kl}

scalar sum of all the normal forces between the surface of the gripping jaws and the surface of the rope.

3.5
funicular railway or aerial ropeway vehicle compartment
passenger compartment, or part of a passenger compartment, in which the walls or other boundary devices are able to withstand the forces H_{X1} and H_{Y1} defined in 6.2 imparted by the passengers

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4 Symbols and abbreviations

A_{ref}	Reference area for force due to wind	(m ²)
A_x	Force due to impact into buffer	(N)
d	Rope diameter (nominal)	(m)
F	Slipping resistance force	(N)
F_{aus}	Pull-off resistance force	(N)
F_{eff}	Slipping resistance force measured on the rope on the installation	(N)
F_{kl}	Gripping force imparted by the jaws	(N)
F_{lab}	Slipping resistance force determined experimentally in the laboratory	(N)
F_{theo}	Calculated slipping resistance force	(N)
F_F	Force due to the springs of a fixed or detachable grip	(N)
F_N	Action caused by the gradient of the ropes	(N)
F_S	Force due to the support of a haulage rope	(N)
F_T	Gravitational driving force	(N)
F_W	Wind action	(N)
F_Y	Force transverse to the track	(N)
G	Self-weight of the carrier with all its accessories	(N)
H_X	Force due to longitudinal impact	(N or N/m)
H_Y	Force due to transverse impact	(N or N/m)
M_Y	Damping moment	(N.m)
M_Z	Torsional moment about the vertical axis	(N.m)
N	Number of cycles	(-)
O	Force to open and close a detachable grip	(N)
Q	Useful load	(N)
Q_F	Force due to the action of the on-board brake	(N)
R	Reaction force on a carrier when entering the station	(N)
S	Force due to start-up	(N)
U	Reaction force when passing round a sheave	(N)

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5 General requirements

5.1 Application of the standard

The requirements of this European Standard apply to all cableways for passenger transport along with those of EN 1709, EN 1908, EN 1909, EN 12397, EN 12408, EN 12927-1, EN 12927-2, EN 12927-3, EN 13927-4, EN 12927-5, EN 12927-6, EN 12927-7, EN 12927-8, EN 12929-1, EN 12929-2, EN 12930, EN 13107, EN 13223, EN 13243, EN 13796-2, EN13796-3.

5.2 Safety principles

5.2.1 General

The safety principles set out in EN 12929-1 apply. In addition, the following hazard scenarios and safety requirements relative to the scope of this European Standard shall be taken into account.

5.2.2 Hazard scenarios

The following events may lead to hazardous situations that may be avoided or limited by the safety requirements of this European Standard:

- a) overloading of the carrier;
- b) exceeding the limits of use permitted by the manufacturer;
- c) damage caused by ageing, corrosion, wear, fatigue or deformation;
- d) hooking up and impact (carrier with carrier, carrier with people, carriers with ropes, stations, line structures and external objects);
- e) derailment and deropement when carrier passes;
- f) derailment or instability of the carrier;
- g) failure of the haulage rope or carrying hauling rope where a grip is attached;
- h) failure of the attachment or detachment of a grip;
- i) inadequate resistance to slipping and pull-off of a rope grip;
- j) faulty door operation (unexpected opening, slamming shut);
- k) inadequate protection against passengers and any element falling out of the carrier;
- l) inadequate positioning and difficult access for the maintenance and evacuation personnel;
- m) fire.

5.2.3 Safety measures

The safety measures to be taken to eliminate the hazard scenarios listed in 5.2.2 are the following:

- a) checking of the load or limiting the area available to each passenger and systematically informing the passengers of the maximum authorized load;
- b) establishment of an operating manual defining the limits of use;

- c) requirements relating to design and manufacture, to the selection of materials, production checks, type approval tests, pre-commissioning tests and checks during operation;
- d) compliance with space envelopes, monitoring of the maximum permissible wind speed in operation, damping devices on the outside of the carriers,
- e) design to allow unrestricted passage of the grips past the rope-catchers;
- f) requirements relating to the guiding and stability of the carriers;
- g) adequate design of the grip to limit the risks of fatigue failure of the haulage rope or carrying hauling rope;
- h) monitoring the attachment and detachment of the carriers, catching a carrier not properly attached to the rope,
- i) monitoring during operation of the gripping force, or of a value representative of this force, of detachable grips
- j) design of fixed grips to facilitate their systematic displacement without upsetting the adjustment of the spring force;
- k) periodic checks during operation;
- l) limiting the effect of an impermissible reduction in the gripping force of the grip;
- m) monitoring the closing and locking of the doors prior to departure of the carrier; monitoring of the position and speed of the carriers prior to unlocking and opening of the doors, limiting the closing force of the doors, fitting the edges of the doors with soft material;
- n) use of an efficient safety bar on chairlifts, minimum height of backrests and sides, selection of non-slip materials;
- o) use of handholds and anchorage points for PPE against falls from a height;
- p) use of positions and access allowing personnel to carry out maintenance and evacuation operations;
- q) selection of suitable materials to limit the risks of fire.

6 Basic requirements

6.1 Technical documents

The following technical documents shall be supplied:

6.1.1 List of safety components

A list of all the safety components deemed necessary through a safety analysis shall be drawn up.

6.1.2 Drawings and parts lists

6.1.2.1 General arrangement drawings of the carriers with indications of the main dimensions.

6.1.2.2 Detail drawings with lists of parts and indications of the materials in accordance with 6.4 for:

— all the safety components