



SLOVENSKI STANDARD

oSIST prEN 17639:2021

01-maj-2021

Varnost strojev - Žičniške naprave za prevoz materiala in posebej za to določene osebe - Splošne varnostne zahteve

Safety of machinery - Cableway installations designed for the transport of material and specially designated persons - General safety requirements

Sicherheit von Maschinen - Seilbahnen für die Beförderung von Material und eigens benannten Personen - Allgemeine Sicherheitsanforderungen

Sécurité des machines - Installations à câbles destinées au transport de matériel et personnes spécialement désignées - Exigences de sécurité générale

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Ta slovenski standard je istoveten z: prEN 17639

ICS:

45.100

Oprema za žičnice

Cableway equipment

oSIST prEN 17639:2021

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 17639

February 2021

ICS 45.100

English Version

Safety of machinery - Cableway installations designed for the transport of material and specially designated persons - General safety requirements

Sécurité des machines - Installations à câbles destinées
au transport de matériel et personnes spécifiquement
désignées - Exigences de sécurité générale

Sicherheit von Maschinen - Seilbahnen für die
Beförderung von Material und eigens benannten
Personen - Allgemeine Sicherheitsanforderungen

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

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 17639:2021) has been prepared by Technical Committee CEN/TC 242 "Safety requirements for cableway installations designed to carry persons", the secretariat of which is held by AFNOR (Association Française de Normalisation — the French national organisation for standardisation).

This document has been submitted for the purposes of the CEN (Comité Européen de Normalisation — European Committee for Standardization) enquiry.

This document has been prepared as part of a standardisation mandate issued by the European Commission and the European Free Trade Association CEN and supports basic requirements of EU-Directive 2006/42/EC.

For the context of EU guidelines, see informative Annex ZA, which forms an integral part of this document.

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prEN 17639:2021 (E)**Introduction**

This document is a Type C standard, as defined in EN ISO 12100:2010.

The affected cableways and the hazards covered are defined within the scope of this document.

In preparing this standard, it was assumed that:

- a) negotiations have taken place between the operator and the manufacturer about specific conditions of use and the place of use of the cableway in terms of health and safety;
- b) only qualified individual operate, clean, check, maintain, inspect and repair cableways;
- c) the installation site allows the cableway to be operated safely;
- d) no components have specific requirements:
 - 1) have been made from material of adequate strength and durability and of appropriate quality;
 - 2) operate mechanically without any faults;
 - 3) have been measured in line with standard engineering expertise and calculation methods, including all types of malfunction and taking into account appropriate safety factors.
- e) the geological conditions have been determined and taken into account in accordance with standard engineering expertise and calculation methods.

In the event that requirements under this Type C standard differ from those specified in Type A and Type B standards, the requirements of this Type C standard will take precedence.

This document covers cableways for the transport of material and specially designated persons. These cableways are intended exclusively to open up the area in order to supply goods and dispose of waste as well as to sustain operations that are difficult to access. Supplying mountain huts and shelters is an example of operational concern/how a cableway installation of this kind can be used.

Employees and the immediate family members of the operator, as well as persons connected to the operator's actual operational activities at the site of the installation or who need to be transported in the public interest may be included in the list for carriage for in-house reasons.

NOTE Transporting a larger group of people is only permitted if cableways in accordance with Regulation (EU) 2016/424 are used.

1 Scope

This Type C standard document applies to fixed cableways operating as single-cable or bi-cable aerial ropeways operating on a single-track or dual-track for the transport

- of goods to supply goods to and dispose of waste from mountain huts and shelters and
- of specially designated persons.

This document does not apply to:

- cableways primarily designed, constructed or operated mainly for the transport of persons and subject to Regulation (EU) 2016/424;
- portable cableways;
- lifts;
- funicular railways;
- fixed and portable equipment used exclusively for leisure and pleasure purposes and not for the transport of persons;
- water ski lifts;
- agricultural and forestry installations;
- rope crane installations and crane installations;
- mining installations or other installations set up and used for industrial purposes;
- drilling equipment.

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This document deals with the significant hazards arising from the construction and operation of the aforementioned cableways and measures to eliminate or reduce these hazards, provided that these cableways are used in accordance with their intended purpose and that the remaining residual risk has been anticipated and accepted by the manufacturer. A full list of all risks considered under-EN ISO 12100:2010 is shown at Annex A.

The requirements under this document do not apply to equipment and systems manufactured or placed on the market before the date that this document is published.

In the event that there are changes to the existing cableways, these changes must be assessed in terms of their impact on safety in accordance with EN ISO 12100:2010. If this assessment shows that the intended changes do not constitute a significant change pursuant to the Machinery Directive, the requirements under this document must in all cases be fulfilled by the assemblies/components concerned.

In the following sections, for reasons of simplification, the term cableway is used on its own to cover the types of equipment covered by this standard.

This document does not cover:

- hazards caused by noise;
- hazards caused by vibration;
- hazards caused by explosion;

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— hazards caused by electromagnetic influences (EMC).

NOTE Directive 2014/30/EU regarding electromagnetic compatibility may be used for machinery or components in accordance with this standard. This standard is not intended as a means of proving compliance with the basic health and safety requirements of the aforementioned directive or the aforementioned hazards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of them are requirements of this document. In the case of dated references, only the related issue applies. For undated references, the last issue of the referenced document (including any changes) applies.

EN 795:2012, *Personal fall protection equipment — anchor devices*

prEN 1090-1:2018,¹ *Execution of steel structures and aluminium structures — Part 1: Assessment and verification of constancy of performance of steel components and aluminium components for structural use*

EN 1090-2:2018,² *Execution of steel structures and aluminium structures — Part 2: Technical requirements for the execution of steel structures*

EN 1907:2017, *Safety requirements for cableway installations designed to carry persons — Terminology*

prEN 10025-1:2011,³ *Hot-rolled products of structural steels — Part 1: General technical delivery conditions*

EN 10025-2:2019, *Hot-rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10025-3:2019, *Hot-rolled products of structural steels — Part 3: Technical delivery conditions for normalised/normalised rolled welded fine grain structural steels*

EN 10025-4:2019, *Hot-rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

EN 10025-5:2019, *Hot-rolled products of structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

EN 10025-6:2019, *Hot-rolled products of structural steels — Part 6: Technical delivery conditions for flat products of high yield strength alloy special steels in quenched and tempered conditions*

EN 12385-2:2002+A1:2008, *Steel wire ropes — Safety — Part 2: Definitions, designation and classification*

EN 12385-4:2002+A1:2008, *Steel wire ropes — Safety — Part 4: Stranded ropes for general lifting*

EN 12385-8:2002, *Steel wire ropes — Safety — Part 8: Stranded hauling and carrying-hauling ropes for cableway installations designed to carry persons*

¹ Under revision

² Under revision

³ Under revision

EN 12385-9:2002, *Steel wire ropes — Safety — Part 9: Locked track ropes for cableway installations designed to carry persons*

EN 12927:2019, *Safety requirements for cableway installations designed to carry persons — Ropes*

EN 12929-1:2015, *Safety requirements for cableway installations designed to carry persons — General requirements — Part 1: Requirements for all installations*

EN 12929-2:2015, *Safety requirements for cableway installations designed to carry persons — General requirements — Part 2: Additional requirements for reversible bi-cable aerial ropeways without track rope brakes*

EN 12930:2015, *Safety requirements for cableway installations designed to carry persons — Calculations*

EN 13107:2015, *Safety requirements for cableway installations designed to carry persons — Civil engineering works*

EN 13223:2015, *Safety requirements for cableway installations designed to carry persons — Drive systems and other mechanical equipment*

EN 13243:2015, *Safety requirements for cableway installations designed to carry persons — Electrical equipment other than for drive systems*

prEN 13411-4:2019,⁴ *Terminations for steel wire ropes — Safety — Part 4: Metal and resin socketing*

EN 13411-6:2004+A1:2008, *Terminations for steel wire ropes — Safety — Part 6: Asymmetric wedge socket*

EN 13796-1:2017, *Safety requirements for cableway installations designed to carry persons — Carriers — Part 1: Grips, carrier trucks, on-board brakes, cabins, chairs, carriers, maintenance carriers, tow-hangers*

EN 17064:2018, *Safety requirements for cableway installations designed to carry persons — Prevention and fight against fire*

EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2016, modified)*

EN 60947-5-1:2017, *Low-voltage switchgear and control gear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:2016)*

FprEN IEC 62061:2020,⁵ *Safety of machinery — Functional safety of electrical, electronic and programmable electronic control systems (IEC 62061:202X)*

EN 62305:2015 (all parts),⁶ *Protection against lightning*

EN ISO 8528-13:2016, *Reciprocating internal combustion engine driven alternating current generating sets — Part 13: Safety (ISO 8528-13:2016, corrected version 2016-10-15)*

⁴ Under revision

⁵ Under revision

⁶ Under revision

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

EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2012)*

EN ISO 13850:2015, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2015)*

EN ISO 13854:2019,⁷ *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body (ISO 13854:2017)*

EN ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones from being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 14118:2018, *Safety of machinery — Prevention of unexpected start-up (ISO 14118:2017)*

EN ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design, construction and application of fixed and movable guards (ISO 14120:2015)*

EN ISO 14122:2016 (all parts), *Safety of machinery — Permanent means of access to machinery*

3 Terms and definitions

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For the purposes of this document, the terminology subject to EN 1907:2017 and the following terms apply.

ISO and IEC provide terminological databases for use in standardization available from the following websites:

— ISO Online Browsing Platform: available from <https://www.iso.org/obp>

— IEC Electropedia: available from <http://www.electropedia.org/>

3.1

Workstation

area provided by the manufacturer on which persons work or operate equipment during normal operation (maintenance is excluded)

3.2

Specially designated person

authorised individual who is trained and/or instructed by the operator or manufacturer, and who is authorised by the owner to operate and/or use a cableway in accordance with the user agreement

3.3

Operations log

documentation that records all checks and maintenance carried out, and exceptional events that have occurred

⁷ EN ISO 13854 (2019) is the successor to the withdrawn EN 349.

3.4**Durability**

fulfilment of the requirements for load bearing safety and suitability for use within the scope of intended use and the foreseeable impact, without unforeseen expenditure for maintenance and repair

3.5**Limit profile**

space required by the ropes, the carriers, where applicable the space required to allow for easy reach and for the transported goods

3.6**Ready for operation**

condition of the system in which the functional and safety-related requirements for starting normal operation are met

3.7**Out of service**

when the cableway installation is at a standstill with carriers located in the stations

3.8**In operation**

cableway installation operating and moving

3.9**Operational wind speed**

lateral ram pressure caused by wind on which the cableway is designed to operate and up to which the cableway may operate normally

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4 List of significant hazards**4.1 General**

Section 4 covers all significant hazards, hazardous situations and circumstances that have been identified as relevant to the field of application specified in the scope of application as a result of a risk assessment and which require provisions to eliminate or reduce the risk. A full list of all hazards under EN ISO 12100:2010 is shown in Annex A. The clarifying remarks form the basis for the safety measures under Section 5.

On the basis of the description of intended use for the cableway in a specification (user agreement, see 6.4) the conditions to be accepted for the cableway to operate must be defined. Before this standard is applied, a risk assessment must be carried out for the respective cableway, its intended use and location to ensure that all hazards have been recorded.

Cableways must be designed, dimensioned and constructed in such a way that they can be operated safely taking into account the type of cableway, the characteristics of the terrain and the surrounding area, the atmospheric and meteorological conditions, structures and obstacles on the ground that may be located in the vicinity and in mid air and the natural hazards (such as avalanches, rockfall).

Assembly and maintenance must be able to be carried out safely.

There may be exceptions to the requirements under this standard. These exceptions must be justified by means of a risk assessment in accordance with EN ISO 12100:2010 and at least an equivalent level of safety must be achieved.

prEN 17639:2021 (E)**4.2 Mechanical hazards****4.2.1 Crushing and shearing**

Crushing and shearing can occur where components move towards each other or move close to each other.

4.2.2 Getting caught, dragged in and trapped

Hazards caused by individuals, body parts or clothing getting caught, dragged in and trapped arise near rotating ropes, reels, rope sheaves, rope pulleys, shafts and couplings, chains and sprockets or other revolving or rotating components.

Hazards caused by getting trapped and caught are caused in particular by protruding sharp edges, teeth, screws, lubricating nipples and other protruding parts or rough surfaces on revolving or rotating components.

It must be noted that on installations where the direction of travel can be reversed, there are points of entry on each reel, rope sheave, rope pulley or bottleneck.

4.2.3 Stability

Loss of stability can occur due to:

- overloading;
- operation and maintenance being carried out in an improper manner;
- third party external influences;
- any kind of natural forces;
- inadequate design;
- insufficient materials;
- inadequate assembly.

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4.2.4 Hazards caused by individual components malfunctioning

If mechanical components break (such as screws, drive shaft, ropes and their mounts, supports). this can pose a hazard to system parts or people.

If pressurised hydraulic lines burst, this can endanger system parts or people.

4.2.5 Hazards caused by slips, trips and falls

Hazards in the form of slips, trips and falls can occur (for example, due to incorrectly designed access points, ladders and platforms).

4.2.6 Cableway-specific hazards

The following cableway-specific hazards may occur:

- haul-/carrying-hauling ropes in the incorrect position;
- track rope derailing;
- haul rope tearing;
- haul rope derailing;

- rope clamping force dropping below permitted values;
- rope clamping force increasing above permitted values;
- haul rope miswrap;
- contact with ropes other than the track rope;
- support system for the haul rope loop malfunctioning;
- impact of aircraft;
- damage to the haul rope due to atmospheric influences (such as lightning, corrosion);
- carrier attachment to the haul rope malfunctioning;
- in-feed monitoring system malfunctioning;
- loss of traction capacity on the drive pulley;
- carrier derailing when stationary in extreme situations; obstacle on the road;
- obstacle in the station area;
- movement of the carrier during a recovery operation;
- haul rope twisting;
- difficulty eliminating haul rope miswrap.

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4.3 Hazards caused by electrical equipment

Hazards caused by electrical system components can occur due to:

- direct contact with live parts of electrical equipment (active parts);
- indirect contact with electrically active parts as a result of damage to insulation, grounding or wrapping;
- power supply shutting down erroneously;
- electrical safety functions malfunctioning;
- electrical or electronic components malfunctioning;
- reduction in voltage or power failure;
- short circuit, earth fault or interruption occurring;
- electrostatic processes;
- malfunction due to power surges;
- predictable external influences, in particular environmental conditions (such as dirt or moisture getting into electrical systems, impact of lightning).

prEN 17639:2021 (E)**4.4 Thermal hazards**

Hazards may occur due to:

- heat being generated as a result of faulty components moving;
- heat being generated as a result of relative movement (e. g. slippage) between components;
- heat generated by drive components;
- fire.

4.5 Hazards caused by transported goods

Hazards can occur due to loads not being secured properly, overloading, the intended load area being exceeded, loads being ejected or falling as well as the transported material being flammable.

4.6 Hazards caused by not observing ergonomic principles

Failure to observe ergonomic principles may result in people not adopting the correct posture when working on cableways (such as in the driver's compartment), experiencing excessive physical exertion or mental overexertion or underexertion.

4.7 Hazards caused by failure of the power supply

Hazards (such as unwanted movements or changes in movement on cableways) can occur due to:

- failure of the power supply; (standards.iteh.ai)
- control system failing/malfunctioning.

4.8 Combination of hazards

Hazards can occur through combinations of individual hazards.

5 Safety requirements and/or protective measures**5.1 General**

Cableways must be assessed in terms of relevant hazards in accordance with EN ISO 12100. Cableways must also comply with the safety requirements and protective measures under this standard.

For the purposes of Type B standards EN ISO 13857:2019 and EN ISO 13854:2019, the manufacturer must carry out a specific risk assessment in accordance with EN ISO 12100:2010 so that the manufacturer is able to select suitable design guidelines under the aforementioned standards with which an appropriate level of safety can be achieved.

NOTE This specific risk assessment forms part of the general risk assessment, which relates to the hazards not covered by this standard.

The necessary protective measures must be defined in order to prevent hazards that cannot be avoided by means of design and structural measures. Organisational measures are therefore often required to achieve an adequate level of safety. The interaction between technical and organisational measures must be taken into account in the construction of cableways and dealt with in the operating instructions. Information must be provided about the residual risks.