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Dvigala za prevoz oseb in blaga - 2. del: Pravila konstruiranja, izračuni, pregledi in preskusi sestavnih delov dvigal (ISO/DIS 8100-2:2023)

Lifts for the transport of persons and goods - Part 2: Design rules, calculations, examinations and tests of lift components (ISO/DIS 8100-2:2023)

Aufzüge für den Personen- und Gütertransport - Teil 2: Konstruktionsregeln, Berechnungen und Prüfungen von Aufzugskomponenten (ISO/DIS 8100-2:2023)

Elévateurs pour le transport de personnes et d'objets - Partie 2: Règles de conception, calculs, examens et essais des composants pour élévateurs (ISO/DIS 8100-2:2023)

Ta slovenski standard je istoveten z: prEN ISO 8100-2

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Lifts for the transport of persons and goods —

Part 2: Design rules, calculations, examinations and tests of lift components

*Elévateurs pour le transport de personnes et d'objets —**Partie 2: Règles de conception, calculs, examens et essais des composants pour élévateurs*

ICS: 91.140.90

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European Foreword

This document (prEN ISO 8100-2:2023) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 81-20:2020.

This document is part of the EN 81 series of standards. The structure of the EN 81 series is described in CEN/TR 81-10:2008.

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

For relationship with EU Directive(s) / Regulation(s), see informative [Annex ZA](#), which is an integral part of this document.

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, Republic of North 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.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 178, *Lifts, escalators, passenger conveyors*.

This second edition cancels and replaces the first edition (ISO 8100-2:2019), which has been technically revised.

The main changes are as follows:

- editorial revision of the document structure according to the ISO/IEC Directives, part 2;
- mechanical tests and temperature tests of safety circuits and SIL-rated circuits are updated;
- errors in the formulae for traction calculation are corrected;
- verification methods for suspension and compensation means other than steel wire ropes are added;
- discard criteria for suspension means and power transmission contact are added,
- Requirements for SIL-rated circuits (previously called PESSRAL) have been revised,

For relationship with this document and ISO 8100-20, see informative Annex G, which is an integral part of this document.

A list of all parts in the ISO 8100 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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This document is a type C standard as stated in ISO 12100:2010.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate in the drafting process of this document

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

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

The object of this document is to define safety rules related to lifts with a view to safeguarding persons and objects against the risk of accidents associated with the use, maintenance and emergency operations of lifts.

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Reference is made to the respective introductions of the standards (e.g. ISO 8100-1:2023) calling for the use of this document with regard to persons and objects to be safeguarded, assumptions, principles, etc.

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Lifts for the transport of persons and goods —

Part 2:

Design rules, calculations, examinations and tests of lift components

1 Scope

This document specifies for passenger lifts and goods passenger lifts:

- the verification of door locking devices;
- the verification of safety gears;
- the verification of overspeed governors;
- the verification of buffers;
- the verification of safety circuits and SIL-rated circuits;
- the verification of ascending car overspeed protection means;
- the verification of unintended car movement protection means;
- the verification of rupture valves and one-way restrictors;
- the verification of suspension and compensation means;
- the discard criteria for suspension means and power transmission contact;
- the calculation of guide rails;
- the calculation of rams, cylinders, rigid pipes and fittings;
- the evaluation of the traction;
- the evaluation of the safety factor on suspension means;
- the pendulum shock tests;
- fault exclusion for electric and electronic components;
- the design rules for SIL-rated circuits.

This document is not applicable to passenger lifts, goods passenger lifts or lift components, which are installed or manufactured before the date of its publication.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3108:2017, *Steel wire ropes — Test method — Determination of measured breaking force*

ISO 4344:2022, *Steel wire ropes for lifts — Minimum requirements*

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ISO 8100-1:2023, *Lifts for the transport of persons and goods — Part 1: Safety rules for the construction and installation of passenger and goods passenger lifts*

ISO 8100-33:2022, *Lifts for the transport of persons and goods — Part 33: T-type guide rails for lift cars and counterweights*

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

ISO 29584:2015, *Glass in building — Pendulum impact testing and classification of safety glass*

IEC 60068-2-6:2007, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:2009, *Environmental testing — Part 2-14: Tests — Test N: Change of temperature*

IEC 60068-2-27:2008, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock*

IEC 60112:2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems — Part 1: Principles, requirements and tests*

IEC 60893-3-1:2012, *Insulating materials — Industrial rigid laminated sheets based on thermosetting resins for electrical purposes — Part 3-1: Specifications for individual materials - Types of industrial rigid laminated sheets*

IEC 60947-4-1:2018, *Low-voltage switchgear and control gear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters*

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

IEC 61508-2:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems*

IEC 61508-3:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 3: Software requirements*

IEC 61558-1:2017, *Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests*

IEC 61709:2017, *Electric components - Reliability - Reference conditions for failure rates and stress models for conversion*

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

EN 12385-1:2002+A1:2008, *Steel wire ropes – Safety — Part 1: General requirements*

EN 12385-5:2021, *Steel wire ropes - Safety — Part 5: Stranded ropes for lifts*

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

EN 13411-7:2021, *Terminations for steel wire ropes — Part 7: Safety. Symmetric wedge socket*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8100-1:2023 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

4 Design rules, calculations, verifications and tests

4.1 General

Passenger and goods passenger lifts shall comply with the safety requirements and/or protective measures of the following clauses. In addition, the passenger and goods passenger lifts shall be designed according to the principles of ISO 12100:2010 for hazards relevant but not significant that are not dealt with by this document (e.g. sharp edges).

The precision of the instruments shall allow measurements to be made within the following accuracy:

- a) ± 1 % for masses, forces, distances, speeds;
- b) ± 2 % for accelerations, retardations;
- c) ± 5 % for voltages, currents;
- d) ± 5 °C for temperatures;
- e) recording equipment shall be capable of detecting signals, which vary in time of 0,01 s;
- f) $\pm 2,5$ % for flow rate;
- g) ± 1 % for pressure, P , below 200 kPa;
- h) ± 5 % for pressure, P , above 200 kPa.

4.2 Verification of landing and car door locking devices

4.2.1 Verifications and tests

4.2.1.1 Verification of operation

It shall be verified that:

- a) there is at least 7 mm engagement of the locking elements before the electric safety device operates;
- b) it is not possible to operate the lift from positions normally accessible to persons with a door open or unlocked, after one single action not forming part of the normal operation.

4.2.1.2 Mechanical tests

4.2.1.2.1 General

When there are several possible means of control and positions of operation, the endurance test shall be made in the arrangement which is regarded as the most stressed condition from the point of view of the forces on the components.

The number of complete cycles of operation and the travel of the locking components shall be registered by mechanical or electrical counters.

4.2.1.2.2 Endurance test

The locking device shall be submitted to 1 000 000 (± 1 %) complete cycles; one cycle comprises one forward and return movement over the full travel possible in both directions.

The driving of the device shall be smooth, without shocks, and at a rate of 60 (± 10 %) cycles per minute.

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During the endurance test, the electrical contact of the lock shall close a resistive circuit under the rated voltage and at a current value double that of the rated current.

If the locking device is provided with a mechanical checking device for the locking pin or the position of the locking element, this device shall be submitted to an endurance test of 100 000 (± 1 %) cycles.

The driving of the device shall be smooth, without shocks, and at a rate of 60 (± 10 %) cycles per minute.

4.2.1.2.3 Static test

The test shall be made consisting of the application of a force, increasing gradually to the value laid down in the standard calling for the use of this standard (e.g. ISO 8100-1:2023, 4.3.9.1.6) between 30 s to 60 s. The force shall be applied for a period of 300 s.

4.2.1.2.4 Dynamic test

The locking device, in the locked position, shall be submitted to a shock test in the opening direction of the door.

The shock shall correspond to the impact of a rigid mass of 4 kg falling in free fall from a height of 0,50 m.

4.2.1.3 Criteria for the mechanical tests

After the endurance test ([4.2.1.2.2](#)), the static test ([4.2.1.2.3](#)) and the dynamic test ([4.2.1.2.4](#)), there shall not be any wear, deformation or breakage, which could affect safety.

4.2.1.4 Electrical test

4.2.1.4.1 Endurance test of contacts

This test is included in the endurance test laid down in [4.2.1.2.2](#).

4.2.1.4.2 Test of ability to break circuit

4.2.1.4.2.1 This test shall be carried out after the endurance test. It shall check that the ability to break a live circuit is sufficient. This test shall be made in accordance with the procedure in IEC 60947-4-1 and IEC 60947-5-1. The values of current and rated voltage serving as a basis for the tests shall be those specified for the device.

If nothing is specified, the rated values shall be as follows:

- a) alternating current: 230 V, 2 A;
- b) direct current: 200 V, 2 A.

The capacity to break circuit shall be examined for both A.C. and D.C. conditions.

The tests shall be carried out with the locking device in all working positions.

The sample tested shall be provided with covers and electric wiring as used in normal service.

4.2.1.4.2.2 A.C. locking devices shall open and close an electric circuit under a voltage equal to 110 % of the rated voltage 50 times, at normal speed and at intervals of 5 s to 10 s. The contact shall remain closed for at least 0,5 s.

The circuit shall comprise a choke and a resistance in series. Its power factor shall be $0,7 \pm 0,05$ and the test current shall be 11 times the rated current indicated by the manufacturer of the device.