



SLOVENSKI STANDARD

SIST EN 81-50:2020

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Varnostna pravila za konstruiranje in vgradnjo dvigal (liftov) - Pregledi in preskusi - 50. del: Pravila konstruiranja, izračuni, pregledi in preskusi sestavnih delov dvigal

Safety rules for the construction and installation of lifts - Examinations and tests - Part 50: Design rules, calculations, examinations and tests of lift components

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Prüfungen - Teil 50: Konstruktionsregeln, Berechnungen und Prüfungen von Aufzugskomponenten

Règles de sécurité pour la construction et l'installation des ascenseurs - Examens et essais - Partie 50 : Règles de conception, calculs, examens et essais des composants pour ascenseurs

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91.140.90 Dvigala. Tekoče stopnice Lifts. Escalators

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Safety rules for the construction and installation of lifts - Examinations and tests - Part 50: Design rules, calculations, examinations and tests of lift components

Règles de sécurité pour la construction et l'installation
des ascenseurs - Examens et essais - Partie 50 : Règles
de conception, calculs, examens et essais des
composants pour ascenseurs

Sicherheitsregeln für die Konstruktion und den Einbau
von Aufzügen - Prüfungen - Teil 50:
Konstruktionsregeln, Berechnungen und Prüfungen
von Aufzugskomponenten

This European Standard was approved by CEN on 1 December 2019.

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.

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European foreword

This document (EN 81-50:2020) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, 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of an identical text or by endorsement, at the latest by August 2020, and conflicting national standards shall be withdrawn at the latest by February 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 81-50:2014.

This document is a revision of EN 81-50:2014. Significant changes made are as follows:

- All externally referenced standards have now been dated
- A new Annex ZA has been developed in order to be aligned with the requirements of the EU Commission Standardization Request “M/549 C(2016) 5884 final”

No technical changes have been made during this revision

This standard is the culmination of the progressive development of the EN standards for lifts. Previous versions of the EN 81-1 and EN 81-2 standards incorporated into EN 81-20:2020 and EN 81-50:2020 include:

- EN 81-1:1985, Safety rules for electric lifts;
- EN 81-1:1998, Safety rules for electric lifts;
- EN 81-1:1998, Corrigendum No 1:1999;
- EN 81-1:1998/A1:2005, incorporating programmable electronic system in safety related applications for lifts;
- EN 81-1:1998/A2:2004, incorporating machine-room-less lifts;
- EN 81-1:1998+A3:2009, Incorporating unintended car movement with open doors;
- EN 81-2:1987, Safety rules for hydraulic lifts;
- EN 81-2:1998, Safety rules for hydraulic lifts;
- EN 81-2:1998, Corrigendum No 1:1999;
- EN 81-2:1998/A1:2005, incorporating programmable electronic system in safety related applications for lifts;
- EN 81-2:1998/A2:2004, incorporating machine-room-less lifts;
- EN 81-2:1998+A3:2009, incorporating unintended car movement with open doors.

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The content of this standard provides the design rules, calculations, examinations and tests for lifts component, the requirements of which are specified in other EN 81 series of standards. Therefore this standard can only be used in conjunction with the standards for specific lift types, e.g. EN 81-20 for passenger and goods passenger lifts.

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

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(s).

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

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

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Introduction

The object of this standard is to define safety rules related to lifts with a view to safeguarding persons and objects against the risk of accidents associated with the user-, maintenance- and emergency operation of lifts.

Reference should be made to the respective introductions of the standards calling for the use of this standard with regard to persons and objects to be safeguarded, assumptions, principles, etc.

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EN 81-50:2020 (E)**1 Scope**

This document specifies the design rules, calculations, examinations and tests of lift components which are referred to by other standards used for the design of passenger lifts, goods passenger lifts, goods only lifts, and other similar types of lifting appliances.

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

EN 81-20:2020, *Safety rules for the construction and installation of lifts – Lifts for the transport of persons and goods – Part 20: Passenger and goods passenger lifts*

EN 10025 (series), *Hot rolled products of non-alloy structural steels - Technical delivery conditions*

EN 12385-5:2002, *Steel wire ropes - Safety - Part 5: Stranded ropes for lifts*

EN 60068-2-6:2008, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)*

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

EN 60068-2-27:2009, *Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock*

EN 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

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EN 60664-1:2007, *Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests*

EN 60947-4-1:2010, *Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters*

EN 60947-5-1:2017, *Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices*

EN 61508-1:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements*

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

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

EN 61508-7:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 7: Overview of techniques and measures*

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

approved body

organization or manufacturer, operating an approved full quality assurance system to undertake testing of safety components

3.2

safety component

component provided¹⁾ to fulfil a safety function when in use

3.3

type examination certificate

document issued by an approved body carrying out a type-examination in which it certifies that the product example under consideration complies with the provisions applicable to it

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk (see Table 1).

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¹⁾ Under the Lifts Directive there is a list of items considered as safety components including safety gear, speed governor, landing door locks, etc. For the purposes of this standard other components may also be regarded as safety components where the aim is to certify their safe operation by type testing.

Table 1 — List of significant hazards

No	Hazards as listed in Annex B of EN ISO 12100:2010	Relevant clauses
1	Mechanical hazards due to:	
	Acceleration, deceleration (kinetic energy)	5.3; 5.4; 5.5; 5.7; 5.8; 5.9
	Approach of a moving element to a fixed part	5.2
1	Mechanical hazards due to: <i>(continued)</i>	
	Elastic elements	5.10; 5.11; 5.12; 5.13
	Falling objects	5.3; 5.4; 5.5; 5.9
	Gravity (stored energy)	5.3; 5.4; 5.5; 5.9
	Height from the ground	5.3; 5.4; 5.5; 5.9
	High pressure	5.13
	Moving elements	5.2; 5.3; 5.4; 5.5; 5.6; 5.7; 5.8; 5.9; 5.10; 5.11; 5.12; 5.13; 5.14; 5.15; 5.16
	Rotating elements	5.4; 5.11; 5.12
	Stability	5.10; 5.11; 5.12; 5.13; 5.14
	Strength	5.10; 5.11; 5.12; 5.13; 5.14
2	Electrical hazards	
	Arc	5.2; 5.4; 5.6; 5.7; 5.8; 5.15; 5.16
	Electrostatic phenomena	5.2; 5.4; 5.6; 5.7; 5.8; 5.15; 5.16
	Live parts	5.2; 5.4; 5.6; 5.7; 5.8; 5.15; 5.16
	Not enough distance to live parts under high voltage	5.2; 5.4; 5.6; 5.7; 5.8; 5.15; 5.16
	Overload	5.2; 5.4; 5.6; 5.7; 5.8; 5.15; 5.16
	Parts which have become live under faulty conditions	5.2; 5.4; 5.6; 5.7; 5.8; 5.15; 5.16
	Short-circuit	5.2; 5.4; 5.6; 5.7; 5.8; 5.15; 5.16
6	Hazards generated by radiation	
	Low frequency electromagnetic radiation	5.6; 5.15; 5.16
	Radio frequency electromagnetic radiation	5.6; 5.15; 5.16
9	Hazards associated with the environment in which the machine is used	5.2; 5.3; 5.4; 5.5; 5.6; 5.7; 5.8; 5.9; 5.10; 5.11; 5.12; 5.13; 5.14; 5.15; 5.16

5 Design rules, calculations, examinations and tests

5.1 General provisions for type examinations of safety components

5.1.1 Object and extent of the tests

The safety component/device is submitted to a test procedure to verify that insofar as construction and operation are concerned, it conforms to the requirements imposed by this standard. It shall be checked in particular that the mechanical, electrical and electronic components of the device are properly rated and that in the course of time the device does not lose its effectiveness, particularly through wear or aging. If the safety component is needed to satisfy particular requirements (waterproof, dust proof or explosion proof construction) supplementary examinations and/or tests under appropriate criteria shall be made.

5.1.2 General provisions

5.1.2.1 For the purposes of this standard it is assumed that the laboratory undertakes both the testing and the certification as an approved body. An approved body may be that of a manufacturer operating an approved full quality assurance system. In certain cases the test laboratory and the body approved for the issue of type examination certificates may be separate. In these cases the administrative procedures may differ from those described in this standard.

5.1.2.2 The application for type examination shall be made by the manufacturer of the component or their authorized representative and shall be addressed to an approved test laboratory.

5.1.2.3 The despatch of samples for examination shall be made by agreement between the laboratory and the applicant.

5.1.2.4 The applicant may attend the tests.

5.1.2.5 If the laboratory entrusted with the complete examination of one of the components requiring the supply of a type examination certificate has not available appropriate means for certain tests or examinations, it may under its responsibility have these made by other laboratories with the agreement of the applicant.

5.1.2.6 The precision of the instruments shall allow, unless specified, measurements to be made within the following accuracy:

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

EN 81-50:2020 (E)**5.2 Type examination of landing and car door locking devices****5.2.1 General provisions****5.2.1.1 Field of application**

These procedures are applicable to locking devices for landing and car doors. It is understood that each component taking part in the locking of doors and in the checking of the locking forms part of the locking device.

5.2.1.2 Documents to be submitted**5.2.1.2.1 Schematic arrangement drawing with description of operation**

This drawing shall show clearly all the details relating to the operation and the safety of the locking device, including:

- a) the operation of the device in normal service showing the effective engagement of the locking elements and the point at which the electrical safety device operates;
- b) the operation of the device for mechanical checking of the locking position if this device exists;
- c) the control and operation of the emergency unlocking device;
- d) the type (AC and/or DC) and the rated voltage and rated current.

5.2.1.2.2 Assembly drawing with key

This drawing shall show all parts, which are important to the operation of the locking device, in particular those required to conform to requirements of this standard. A key shall indicate the list of principal parts, the type of materials used, and the characteristics of the fixing elements.

5.2.1.3 Test samples

One door locking device shall be submitted to the laboratory.

If the test is carried out on a prototype, it shall be repeated later on a production model.

If the test of the locking device is only possible when the device is mounted in the corresponding door the device shall be mounted on a complete door in working order. However, the door dimensions may be reduced by comparison with a production model, on condition that this does not falsify the test results.

5.2.2 Examination and tests**5.2.2.1 Examination of operation**

This examination has the aim of verifying that the mechanical and electrical components of the locking device are operating correctly with respect to safety, and in conformity with the requirements of this standard, and the standard calling for this locking device and that the device is in conformity with the particulars provided in the application.

In particular 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 from positions normally accessible to persons to operate the lift with a door open or unlocked, after one single action, not forming part of the normal operation.

5.2.2.2 Mechanical tests

5.2.2.2.1 General

These tests have the purpose of verifying the strength of the mechanical locking components and the electrical components.

The sample of the locking device in its normal operating position is controlled by the devices normally used to operate it.

The sample shall be lubricated in accordance with the requirements of the manufacturer of the locking device.

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 unfavourable 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.

5.2.2.2.2 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.

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.

5.2.2.2.3 Static test

For locking devices intended for hinged doors, a test shall be made consisting of the application over a total period of 300 s of a static force increasing progressively to a value of 3000 N.

This force shall be applied in the opening direction of the door and in a position corresponding as far as possible to that which may be applied when a user attempts to open the door. The force applied shall be 1 000 N in the case of a locking device intended for sliding doors.

5.2.2.2.4 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.

5.2.2.3 Criteria for the mechanical tests

After the endurance test (5.2.2.2.2), the static test (5.2.2.2.3) and the dynamic test (5.2.2.2.4), there shall not be any wear, deformation or breakage, which could adversely affect safety.

5.2.2.4 Electrical test

5.2.2.4.1 Endurance test of contacts

This test is included in the endurance test laid down in 5.2.2.2.2.