



SLOVENSKI STANDARD
oSIST prEN 81-30:2022

01-september-2022

Varnostna pravila za konstruiranje in vgradnjo dvigal (liftov) - Dvigala za prevoz blaga - 30. del: Električna in hidravlična mala tovorna dvigala

Safety rules for the construction and installation of lifts - Lifts for the transport of goods only - Part 30: Electric and hydraulic service lifts

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Aufzüge für den Transport von Gütern - Teil 30: Elektrisch und hydraulisch betriebene Kleingüteraufzüge

Règles de sécurité pour la construction et l'installation des ascenseurs - Partie 30 : Monte-charge électriques et hydrauliques

Ta slovenski standard je istoveten z: prEN 81-30

ICS:

91.140.90 Dvigala. Tekoče stopnice Lifts. Escalators

oSIST prEN 81-30:2022

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 81-30

July 2022

ICS 91.140.90

Will supersede EN 81-3:2000+A1:2008

English Version

Safety rules for the construction and installation of lifts - Lifts for the transport of goods only - Part 30: Electric and hydraulic service lifts

Règles de sécurité pour la construction et l'installation
des ascenseurs - Partie 30 : Monte-charge électriques
et hydrauliques

Sicherheitsregeln für die Konstruktion und den Einbau
von Aufzügen - Aufzüge für den Transport von Gütern -
Teil 30: Elektrisch und hydraulisch betriebene
Kleingüteraufzüge

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 10.

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.

This draft European Standard was established by CEN 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, 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, Türkiye and United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

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

Contents

	Page
European foreword.....	5
Introduction	6
1 Scope	10
2 Normative references.....	11
3 Terms and definitions	14
4 Safety requirements and/or protective measures	19
4.1 General.....	19
4.2 Service lift well and machinery spaces.....	19
4.2.1 General provision.....	19
4.2.2 Access to well and to machinery spaces.....	21
4.2.3 Inspection doors – inspection traps – access doors – access traps	21
4.2.4 Notices.....	23
4.2.5 Well	23
4.2.6 Machinery spaces.....	26
4.3 Carrier entrance	28
4.3.1 General provisions.....	28
4.3.2 Height and width of entrances	28
4.4 Landing and carrier doors	28
4.4.1 General provisions.....	28
4.4.2 Sills, guides, door suspension	28
4.4.3 Strength of doors and their frames.....	29
4.4.4 Protection in relation to door operation.....	29
4.4.5 Local lighting and 'carrier here' signal lights	30
4.4.6 Locked and closed landing door check.....	31
4.4.7 Locking and emergency unlocking	31
4.4.8 Sliding doors with multiple, mechanically linked panels.....	34
4.5 Carrier, counterweight and balancing weight.....	34
4.5.1 Height of carrier	34
4.5.2 Available carrier area and rated load.....	34
4.5.3 Rated load and manufacturer's name.....	34
4.5.4 Walls, floor and roof of the carrier	35
4.5.5 Apron and automatic bridging sills	35
4.5.6 Carrier roof.....	36
4.5.7 Counterweight and balancing weight	36
4.6 Suspension and related protection means	37
4.6.1 General.....	37
4.6.2 Suspension.....	37
4.6.3 Sheave, pulley, drum and rope diameter ratios, rope/chain terminations.....	37
4.6.4 Rope traction	38
4.6.5 Winding up of ropes for positive drive service lifts.....	38
4.6.6 Distribution of load between the ropes or the chains	39
4.6.7 Protection for sheaves, pulleys and sprockets.....	39
4.7 Precautions against free fall, excessive speed, creeping of the carrier	41
4.7.1 General provision.....	41
4.7.2 Safety gear	42

4.7.3	Rupture valve.....	46
4.7.4	Restrictor, also one-way restrictor	46
4.8	Guide rails, buffers	47
4.8.1	General provisions concerning guide rails	47
4.8.2	Guiding of the carrier, counterweight or balancing weight	48
4.8.3	Buffers and fixed stops for carrier and counterweight.....	48
4.9	Lift machine and associated equipment.....	48
4.9.1	General provision	48
4.9.2	Protection of machinery.....	49
4.9.3	Lift machines for traction and positive service lifts.....	49
4.9.4	Lift machine, jack and other hydraulic equipment for hydraulic service lifts	52
4.10	Electric installations and appliances.....	60
4.10.1	General provisions	60
4.10.2	Contactors, contactor relays, components of safety circuits	61
4.10.3	Protection of electrical equipment	62
4.10.4	Main switches.....	62
4.10.5	Electric wiring.....	63
4.10.6	Lighting and socket outlets	65
4.10.7	Electrical identification	65
4.11	Protection against electric faults; failure analysis; controls; priorities	65
4.11.1	Failure analysis and electric safety devices	65
4.11.2	Controls - Final limit switches - Priorities.....	70
5	Verification of the safety requirements and/or protective measures - Tests	74
5.1	Technical compliance documentation	74
5.2	Verification of design	74
5.3	Verification tests before putting into use	78
5.3.1	General	78
5.3.2	Tests and verifications.....	78
6	Information for use	82
6.1	General	82
6.2	Instruction handbook	82
6.2.1	General	82
6.2.2	Information.....	82
6.2.3	Instructions for erection and dismantling	84
6.2.4	Instructions for tests before putting into use.....	84
6.2.5	Instruction for normal use	84
6.2.6	Breakdown procedures.....	85
6.2.7	Maintenance	85
6.2.8	Verifications and tests	86
6.3	Logbook.....	87
Annex A (normative) List of the electric safety devices.....		88
Annex B (informative) Technical compliance documentation.....		90
B.1	General	90
B.2	Technical details and plans.....	90
B.3	Electric schematic diagrams and hydraulic circuit diagrams	91
Annex C (informative) Periodical verifications and tests, verifications and tests after an important modification or after an accident.....		92
C.1	Periodical verifications and tests	92

prEN 81-30:2022 (E)

C.2	Verifications and tests after important modifications or after accidents	92
Annex D (informative) Construction of walls of service lift wells and landing doors facing a carrier entrance.....		94
Annex E (informative) Building interfaces		95
E.1	General provisions.....	95
E.2	Support of Guide Rails	95
E.3	Ventilation of well and machinery spaces.....	95
E.3.1	General.....	95
E.3.2	Ventilation of the well and machinery spaces	95
Annex F (normative) Electronic components - Failure exclusion.....		97
Annex G (normative) Calculations of rams, cylinders, rigid pipes and fittings		103
G.1	Calculation against over pressure.....	103
G.1.1	General.....	103
G.1.2	Calculation of wall thickness of rams, cylinders, rigid pipes and fittings.....	103
G.1.3	Calculation of the base thickness of cylinders (examples)	103
G.2	Calculations of the jacks against buckling.....	104
G.2.1	General.....	104
G.2.2	Single acting jacks	105
G.2.3	Telescopic jacks without external guidance, calculation of ram	106
G.2.4	Telescopic jacks with external guidance	107
Annex H (informative) Information to the owner/user of a service lift.....		109
H.1	General.....	109
H.2	Means of access to machine room entrance of the service lift.....	109
H.3	Maintenance work carried out from a step of a ladder	109
Annex I (informative) List of significant hazards		110
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered		113
Bibliography.....		118

European foreword

This document (prEN 81-30:2022) 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 is part of the EN 81 series of standards “Safety rules for the construction and installation of lifts”. A list of all parts in a series can be found on the CEN website.

This document will supersede EN 81-3:2000+A1:2008.

In comparison with the previous edition, the following technical modifications have been made:

- All Essential Health and Safety Requirements from the Directive 2006/42/EC have been incorporated. Specifically added: EMC reference; verification of design; handbooks requirements for erection/test/breakdown;
- Requirements have been updated, taking into account EN 81-20:2020 and EN 81-50:2020. Specifically: carrier material flammability; machinery stopping; rope's retainers; strength of the doors and of the well, screens, partitions; definitions; data plates;
- Improvements in safety due to changes in proven technology have been reflected. Specifically: performance levels; doors locking; electrical equipment;
- Changes in the state of the art have been incorporated. Specifically: ropes and terminations; lighting; balancing weights; existing buildings; emergency electrical operation; fluid characteristics;
- Reported errors have been eliminated. Specifically: hydraulic formulae;
- The text has been clarified. Specifically: accessible/inaccessible well;
- References to other standards (according to the progress in that field) have been improved. All references now include a date;
- Informative Annex “List of significant hazards” has been added;
- Informative Annex “Building interface” has been added;
- Annex ZA replaces the previous Annex ZA and Annex ZB. The new informative Annex ZA (on the relationship with EU Directive 2006/42/EC) is now an integral part of this document.

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.

Introduction

0.1 General

This document is a type C standard as stated in EN 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 provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

0.2 General notes

0.2.1 The object of this document is to define safety rules related to service lifts with a view to safeguarding persons and objects against the risk of accidents associated with the normal use and maintenance operation of service lifts¹⁾.

a) Persons to be safeguarded:

- 1) users;
- 2) maintenance and inspection personnel;
- 3) persons in the immediate surrounding area the service lift well and the machinery space(s).

¹⁾ Within CEN/TC 10 an interpretation committee has been established to answer questions about the spirit in which the experts have drafted the various clauses of this standard. All such interpretations are published within CEN/TS 81-11 until incorporated by amendment into the standards concerned.

- b) Property to be safeguarded:
- 1) loads in the carrier;
 - 2) components of the service lift installation;
 - 3) building in which the service lift is installed;
 - 4) the immediate surrounding area of the service lift installation.

0.2.2 A study has been made of the various possible hazards with service lifts; see Annex I.

0.2.3 When the weight, size and/or shape of components prevent them from being moved by hand, they are either:

- a) fitted with attachments for lifting gear, or
- b) designed so that they can be fitted with such attachments (e.g. by means of threaded holes), or
- c) shaped in such a way that standard lifting gear can be attached.

0.3 Principles

0.3.1 This document does not repeat all the general technical rules applicable to every electrical, mechanical, or building construction including the protection of building elements against fire.

It has, however, seemed necessary to establish certain requirements of good construction, either because they are peculiar to service lift manufacture or because in the case of service lift utilization the requirements can be more stringent than elsewhere.

0.3.2 This document addresses the Essential Health and Safety Requirements of the Annex I of Machinery Directive 2006/42/EC, and additionally states minimum rules for the installation of service lifts into buildings/constructions. In some countries there can be regulations for the construction of buildings, etc. which cannot be ignored.

Typical clauses affected by this are those defining minimum values for the height of the machine room, for their access doors dimensions and for protection from fire.

0.3.3 As far as possible the standard sets out only the requirements that materials and equipment have to meet in the interests of safe operation of service lifts.

0.4 Assumptions

0.4.1 Relevant risks have been considered of each component that may be incorporated in a complete service lift installation.

Rules have been drawn up accordingly.

0.4.2 Negotiations have been made between the customer and the manufacturer, or the manufacturer's authorized representative, and agreement reached about:

- a) the intended use of the service lift;
- b) environmental conditions such as temperature, humidity, exposure to sun or wind, snow, corrosive atmosphere;

prEN 81-30:2022 (E)

- c) civil engineering problems (for example, building regulations);
- d) other aspects related to the place of installation, e.g. presence of unsupervised children;
- e) the type and mass of any handling devices intended to be used.

See also Annex H (information about access and maintenance with ladders).

0.4.3 Components are:

- a) designed in accordance with usual engineering practice and calculation codes, taking into account all failure modes;
- b) of sound mechanical and electrical construction;
- c) made of materials with adequate strength and of sound quality;
- d) free of defects;
- e) free from harmful materials, e.g. asbestos.

0.4.4 Components, and where applicable well and machine room, are kept in good repair and working order, so that the required dimensions remain fulfilled despite wear. All service lift components are considered as requiring inspection to ensure safe continued operation during their use.

NOTE Components not requiring maintenance (e.g. maintenance free, sealed for life) are still required to be available for inspection.

0.4.5 Components are selected and installed so that foreseeable environmental influences and special working conditions do not affect the safe operation of the service lift.

<https://standards.iteh.ai/catalog/standards/sist/d03c55e7-b5b5-4f32-8b3d->

0.4.6 By design of the load bearing elements, a safe normal operation of the service lift is ensured for loads ranging from 0 % to 100 % of the rated load.

The overload of 25 % to be considered for test purpose as per 5.3.2.

0.4.7 The requirements of this document are such that the possibility of a failure of an electric safety device complying with all the requirements of this document needs not to be taken into consideration.

0.4.8 Users have to be safeguarded against their own negligence and unwitting carelessness when **using** the service lift in the intended way.

A user can, in certain cases, make one imprudent act. The possibility of two simultaneous acts of imprudence and/or the abuse of instructions for use is not considered.

0.4.9 Persons are not transported inside the well.

0.4.10 If in the course of maintenance work a safety device, normally not accessible to the users, is deliberately neutralized, safe operation of the service lift is no longer ensured, but compensatory measures will be taken to ensure users safety in conformity with maintenance instructions.

It is assumed that maintenance personnel are instructed and work according to the instructions.

0.4.11 Horizontal forces and energies to consider are indicated in the applicable clauses of the standard. Typically, where not otherwise specified in this document, the energy exerted by a person, resulting in an equivalent static force is:

- a) 300 N;
- b) 1 000 N where impact can occur.

0.4.12 With the exception of the items listed below, a mechanical device built according to good practice and the requirements of this document will not deteriorate to a point of creating hazard without the possibility of detection, provided that all of the instructions given by the manufacturer have been duly applied.

The following mechanical failures are considered:

- a) breakage of the suspension;
- b) uncontrolled slipping of the ropes on the traction sheave;
- c) breakage and slackening of all linkage by auxiliary ropes, chains and belts;
- d) failure of a component associated with the main drive elements and the traction sheave;
- e) rupture in the hydraulic system (jack excluded);
- f) small leakage in the hydraulic system (jack included).

0.4.13 The possibility of devices providing protection against free fall or descent with excessive speed not setting, should the carrier free fall from a stationary position at the lowest landing, before the carrier strikes the buffer(s) or fixed stop(s) is considered acceptable.

0.4.14 When the speed of the carrier is linked to the electrical frequency of the mains the speed is assumed not to exceed 115 % of the rated speed.

0.4.15 From the scope, service lifts carriers are regarded as inaccessible for users who have purpose to work inside for loading/unloading goods.

0.4.16 Means of access are provided for the hoisting of heavy equipment (see 0.4.2 and 4.2.1.6).

0.4.17 This document does not address the health and safety of animals.

0.4.18 To ensure the correct functioning of the equipment in the well and machinery space(s), the ambient temperature in these spaces is assumed to be maintained between +5 °C and +40 °C.

To achieve this, the well and machinery space(s) may be ventilated, taking into consideration the national building regulations.

0.4.19 Access ways to the working areas are adequately lit.

0.4.20 The fixing system of guards, used specifically to provide protection against mechanical, electrical or any other hazards by means of a physical barrier, which have to be removed during regular maintenance and inspection, remains attached to the guard or to the equipment, when the guard is removed.

0.4.21 The fluids used for the operation of hydraulic lifts are according to EN ISO 6743-4:2015.

prEN 81-30:2022 (E)**1 Scope**

1.1 This document specifies the safety rules for the construction and installation of permanently installed new service lifts, with traction, positive, or hydraulic drive, serving defined landing levels, having a carrier the interior of which is regarded as inaccessible to persons on account of its dimensions and means of construction, suspended by ropes or chains or jack and moving between rigid guide rails inclined not more than 15° to the vertical.

This document covers service lifts with rated load not exceeding 300 kg and not intended to transport persons.

1.2 In addition to the requirements of this document, supplementary requirements have to be considered in special cases (potentially explosive atmosphere, extreme climate conditions, seismic conditions, transporting dangerous goods, etc.).

1.3 This document does not cover:

- a) service lifts with drives other than those stated in 1.1;
 - b) services lifts having carrier with dimensions that exceed:
 - 1) for floor area, 1,0 m²;
 - 2) for depth, 1,0 m;
 - 3) for height, 1,20 m. The height is not limited if the carrier comprises several permanent compartments, each of which satisfies the above dimensions.
- NOTE Lifting equipment intended exclusively for the transportation of goods but having a carrier with dimensions exceeding any one of the figures above is not entered in the category 'service lifts';
- c) important modifications (see Annex C) to a service lift installed before this document is brought into application;
 - d) lifting appliances, such as paternosters, mines lifts, theatrical lifts, appliances with automatic caging, skips and hoists for building and public works sites, ships hoists, platforms for exploration or drilling at sea, construction and maintenance appliances;
 - e) safety during operations of transport, erection, repairs and dismantling of service lifts;
 - f) use of glass for the walls of the well, for the carrier and for the landing doors including the vision panels;
 - g) hydraulic service lifts where the setting of the pressure relief valve exceeds 50 MPa;
 - h) any form of radiation except EMC (see 4.10.1.1.3).

However, this document can usefully be taken as a basis.

Noise and vibrations are not dealt with in this document as they are not considered a significant nor relevant hazard for the actual type of the service lift.

Fire propagation is not dealt with in this document.

1.4 The well is regarded as accessible to maintenance personnel if the opening giving access have dimensions of at least 0,40 m x 0,50 m, and:

- a) the horizontal depth of the well is greater than 1 m, or
- b) the area of the well is greater than 1 m², or
- c) the maintenance is intended to be carried out from the carrier roof or pit regardless the well dimensions.

1.5 The machinery space is regarded as accessible to maintenance personnel if:

- a) the openings giving access have dimensions of at least 0,60 m x 0,60 m, and
- b) the height of the moving area is at least 1,80 m.

1.6 This document covers the safety requirements for service lifts with rated speeds up to 1 m/s.

1.7 This document is not applicable to service lifts which are installed before the date of its publication as EN.

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 81-50:2020, *Safety rules for the construction and installation of lifts - Examinations and tests - Part 50: Design rules, calculations, examinations and tests of lift components*

EN 10305-1:2016, *Steel tubes for precision applications - Technical delivery conditions - Part 1: Seamless cold drawn tubes*

EN 10305-2:2016, *Steel tubes for precision applications - Technical delivery conditions - Part 2: Welded cold drawn tubes*

EN 10305-3:2016, *Steel tubes for precision applications - Technical delivery conditions - Part 3: Welded cold sized tubes*

EN 10305-4:2016, *Steel tubes for precision applications - Technical delivery conditions - Part 4: Seamless cold drawn tubes for hydraulic and pneumatic power systems*

EN 10305-6:2016, *Steel tubes for precision applications - Technical delivery conditions - Part 6: Welded cold drawn tubes for hydraulic and pneumatic power systems*

EN 12015:2014, *Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Emission*

EN 12016:2013, *Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Immunity*

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

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

prEN 81-30:2022 (E)

- EN 13015:2001+A1:2008, *Maintenance for lifts and escalators - Rules for maintenance instructions*
- EN 13411-2:2001+A1:2008, *Terminations for steel wire ropes - Safety - Part 2: Splicing of eyes for wire rope slings*
- EN 13411-3:2004+A1:2008, *Terminations for steel wire ropes - Safety - Part 3: Ferrules and ferrule-securing*
- EN 13411-4:2011, *Terminations for steel wire ropes - Safety - Part 4: Metal and resin socketing*
- EN 13411-5:2003+A1:2008, *Terminations for steel wire ropes - Safety - Part 5: U-bolt wire rope grips*
- EN 13411-6:2004+A1:2008, *Terminations for steel wire ropes - Safety - Part 6: Asymmetric wedge socket*
- EN 13411-7:2006+A1:2008, *Terminations for steel wire ropes - Safety - Part 7: Symmetric wedge socket*
- EN 13411-8:2011, *Terminations for steel wire ropes - Safety - Part 8: Swage terminals and swaging*
- EN 13501-1:2007+A1:2009, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*
- EN 50214:2006, *Flat polyvinyl chloride sheathed flexible cables*
- EN 60068-2-6:2008, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)*
- EN 60068-2-27:2009, *Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock*
- EN 60204-1:2018, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2016)*
- EN 60204-32:2008, *Safety of machinery - Electrical equipment of machines - Part 32: Requirements for hoisting machines (IEC 60204-32:2008)*
- EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)*
- EN 60529:1991/A1:2000, *Degrees of protection provided by enclosures (IP Code)*
- EN 60529:1991/A2:2013, *Degrees of protection provided by enclosures (IP Code)*
- EN 60664-1:2007, *Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests (IEC 60664-1:2007)*
- EN 60947-5-1:2017, *Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices (IEC 60947-5-1:2016)*
- EN 60947-5-5:1997, *Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function*
- EN 60947-5-5:1997/A1:2005, *Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function*
- EN 60947-5-5:1997/A2:2017, *Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function*

EN 60947-5-5:1997/A11:2013, *Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function*

EN 61800-5-2:2017, *Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional*

EN 61810-1:2015, *Electromechanical elementary relays - Part 1: General and safety requirements*

EN 61810-1:2015/A1:2020, *Electromechanical elementary relays - Part 1: General and safety requirements*

EN 61810-3:2015, *Electromechanical elementary relays - Part 3: Relays with forcibly guided (mechanically linked) contacts*

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

EN IEC 60947-4-1:2019, *Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters (IEC 60947 4 1:2018)*

ISO 1219-1:2012, *Fluid power systems and components - Graphical symbols and circuit diagrams - Part 1: Graphical symbols for conventional use and data-processing applications*

ISO 3864-1:2011, *Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings*

IEC 60227-6:2001, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 6: Lift cables and cables for flexible connections*

IEC 60617:2012, *Graphical symbols for diagrams*