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Title: Draft BS EN 81-30 Safety rules for the construction and installation of lifts - Lifts for the transport of goods only.
Part 30: Electric and hydraulic service lifts.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
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- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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.

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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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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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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;

- 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.

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.

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*

- 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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following 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/>

3.1

apron

smooth vertical part extending downwards from the sill of the landing or carrier entrance

3.2

authorized person

person with the permission of the natural or legal person who has the responsibility for the operation and use of the service lift, to access restricted areas (machine room and service lift well) for maintenance or inspection operations

Note 1 to entry: Authorized persons should be competent for the tasks they have been authorized for.

3.3

available carrier area

area of the carrier measured at floor level available for goods during operation of the service lift

3.4

balancing weight

mass which saves energy by balancing all or part of the mass of the carrier

3.5

buffer

resilient stop at the end of travel, and comprising a means of braking using fluids or springs (or other similar means)

3.6

carrier

part of the service lift which carries the load

3.7

competent person

person, suitably trained, qualified by knowledge and practical experience, provided with necessary instructions to safely carry out the required operations for maintaining or inspecting the service lift

Note 1 to entry: National regulations can require certification of competence.

3.8

counterweight

mass which ensures traction

3.9

direct acting service lift

hydraulic service lift where the ram or cylinder is directly attached to the carrier or its sling

3.10

down direction valve

electrically controlled valve in a hydraulic circuit for controlling the descent of the carrier

3.11

electrical anti-creep system

combination of precautions for hydraulic service lifts against the danger of creeping

3.12

electric safety chain

total of the electric safety devices connected in such a way as to stop the service lift when one of them is activated

3.13

electric service lift

service lift in which the lifting power is transmitted by means of ropes or chains to the service lift carrier from an electrically driven machine

3.14

full load pressure

static pressure exerted on the piping, jack, valve block, etc., with the carrier with the rated load being at rest at the highest landing level

3.15

guide rails

rigid components which provide guiding for the carrier, the counterweight or balancing weight

3.16

headroom

part of the well between the highest landing served by the carrier and the ceiling of the well

3.17

hydraulic service lift

service lift in which the lifting power is derived from an electrically driven pump transmitting hydraulic fluid to a jack, acting directly or indirectly on the carrier (multiple motors, pumps and/or jacks may be used)

3.18

indirect acting service lift

hydraulic service lift where the ram or cylinder is connected to the carrier or the carrier sling by suspension means (ropes, chains)

3.19

jack

combination of a cylinder and a ram forming a hydraulic actuating unit

3.20

levelling

operation which achieves the accuracy of stopping at landings

3.21

levelling accuracy

vertical distance between carrier sill and landing sill during loading or unloading of the carrier

3.22

lift machine

unit which drives and stops the service lift, including any motor, gear, brake, sheave/sprockets and drum (traction or positive drive service lift), or comprising the pump, the pump motor and control valves (hydraulic drive service lift)

3.23

limited access area

area in which only instructed users may have access

3.24

machine room

fully enclosed machinery space with ceiling, walls, floor and access door(s)/trap(s) in which machinery as a whole or in parts is placed

3.25

machinery

equipment such as: control cabinet(s) and drive system, lift machine, main switch(es) and means for emergency operations

3.26

machinery space

volume(s) inside or outside of the well where the machinery as a whole or in parts is placed, including the working areas associated with the machinery

Note 1 to entry: A machinery cabinet with its associated working area(s) is considered as a machinery space.

3.27

maintenance

all the necessary operations to ensure the safe and intended functioning of the installation and its components after the completion of the installation and throughout its life cycle

Note 1 to entry: Maintenance may include:

- a) lubrication, cleaning, etc.;
- b) checks;
- c) the operations of setting and adjustment;
- d) repair or changing of components which may occur due to wear or tear and do not affect the characteristics of the installation.

3.28

non-return valve

valve which allows flow in one direction only

3.29

one-way restrictor

valve which allows free flow in one direction and restricted flow in the other direction

3.30

overspeed governor

device which, when the service lift attains a predetermined speed, causes the service lift to stop, and if necessary, causes the safety gear to be applied

3.31**performance level****PL**

discrete level used to specify the ability of safety-related parts of control systems to perform a safety function under foreseeable conditions

3.32**pit**

part of the well situated below the lowest landing served by the carrier

3.33**positive drive service lift**

service lift which is directly driven (not reliant on friction) by drum and ropes or by sprockets and chains

3.34**pressure relief valve**

valve which limits the pressure to a pre-determined value by exhausting fluid

3.35**rated load**

load which is intended to be carried in normal operation, which may include handling devices

3.36**rated speed**

speed v , in metres per second, of the carrier for which the equipment has been built

Note 1 to entry: For hydraulic drive service lifts:

- v_m is the rated speed upwards in metres per second;
- v_d is the rated speed downwards in metres per second;
- v_s is the higher value of both rated speeds v_m and v_d in metres per second

3.37**re-levelling**

operation, after the service lift has stopped, to permit the stopping position to be corrected during loading or unloading

3.38**restrictor**

valve in which the inlet and outlet are connected through a restricted passageway

3.39**rupture valve**

valve designed to close automatically when the pressure drop across the valve, caused by the increased flow in a predetermined flow direction, exceeds a pre-set amount

3.40**safety circuit**

circuit containing contacts and/or electronic components which is regarded to fulfil demands of an electric safety device

3.41

safety gear

mechanical device for stopping in the down direction, and maintaining stationary on the guide rails, the service lift carrier, counterweight or balancing weight in case of overspeeding or breaking of the suspension

3.42

safety integrity level

SIL

discrete level (one out of a possible three) for specifying the safety-integrity requirements of the safety functions allocated to the programmable electronic safety-related system, where safety-integrity level 3 has the highest level of safety integrity and safety-integrity level 1 has the lowest

3.43

safety rope

auxiliary rope attached to the carrier, the counterweight or balancing weight for the purpose of tripping a safety gear in case of suspension failure

3.44

shut-off valve

manually operated two-way valve which can permit or prevent flow in either direction

3.45

single acting jack

jack in which displacement in one direction is by fluid action and in the other by influence of gravity

3.46

sling

metal framework carrying the carrier, counterweight or balancing weight, connected to the means of suspension

Note 1 to entry: This sling can be integral with the carrier enclosure.

3.47

special tool

tool unique to the equipment required in order to keep the equipment in a safe operating condition

3.48

traction drive service lift

service lift whose lifting ropes are driven by friction in the grooves of the driving sheave of the machine

3.49

travelling cable

flexible electric cable containing multiple cores between the carrier and a fixed point

3.50

unlocking zone

zone, extending above and below the landing level, in which the carrier floor has to be to enable the corresponding landing door to be unlocked

3.51

user

instructed person with the permission to make use of the services of a service lift installation, except for maintenance purposes

3.52 well

space in which the carrier and the counterweight or balancing weight travels. This space is bounded by the bottom of the pit, the walls or separation screens (if any) in the well and the ceiling of the well

4 Safety requirements and/or protective measures

4.1 General

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

4.1.2 All labels, notices, markings and operating instructions shall be permanently affixed, indelible, legible and readily understandable (if necessary aided by signs or symbols). They shall not be able to be torn, of durable material, placed in a visible position, and written in the language of the country where the lift is installed (or, if necessary, in several languages).

4.2 Service lift well and machinery spaces

4.2.1 General provision

4.2.1.1 Arrangement of lift equipment

If parts of different lifts are present in one machine room, each lift shall be identified with a number, letter or colour consistently used for all parts (machine, controller, overspeed governor, switches, carrier roof, pit or other places where necessary, etc.).

4.2.1.2 Exclusive use of the well

4.2.1.2.1 The well and machinery space(s) shall not be used for purposes other than lifts. They shall not contain ducts, cables or devices, etc. other than for the lift. However, these spaces may contain:

- a) heating equipment for these spaces, excluding steam heating and high-pressure water heating. However, any control and adjustment devices of the heating apparatus shall be located outside the well;
- b) fire detectors or extinguishers, with an operating temperature above 80° C, appropriate for the electrical equipment and protected against accidental impact.

When sprinkler systems are used, activation of the sprinkler shall only be possible, when the service lift is stationary at a landing and the electrical supply of the service lift and lighting circuits (if any) are automatically switched off by the fire or smoke detection system.

NOTE Such smoke, fire detection and sprinkler systems are the responsibility of the building management.

4.2.1.2.2 If the machinery space is not adjacent to the well, the hydraulic piping and the electric wiring connecting the machinery space with the service lift well shall be installed in a duct or trough, or in a section of a duct or trough, especially reserved for this purpose (see 4.9.4.3).

4.2.1.2.3 A floor shall be only required for accessible machine rooms (see 1.5).

The floor shall be able to support 2 000 N on 0,20 m x 0,20 m at any position, without permanent deformation greater than 1 mm.

4.2.1.3 Components inside the well

4.2.1.3.1 Any components requiring maintenance, adjustment or inspection shall be placed within the horizontal distance of 0,60 m from the edges of landing doors, and reachable from the working area.

Where this is not possible, inspection door(s) or trap(s) shall be provided and positioned to meet the same requirement.

4.2.1.3.2 When components are not installed according to 4.2.1.3.1, the well shall be accessible and the carrier shall be provided with devices allowing it to be immobilised near to any landing. The devices shall fulfil the requirements of 4.7.1.3 (and the carrier roof shall comply with 4.5.6.1).

4.2.1.4 Ventilation of the well and machinery spaces

The well and machinery spaces may be ventilated. The stale air from other parts of the building shall not be extracted via the well.

NOTE See E.3 for further guidance.

4.2.1.5 Lighting and socket outlet

To permit maintenance on parts installed inside the well, it shall be provided either:

- a) permanently installed lighting, with 50 lx minimum on the carrier roof at every position it may be accessed and in the pit; its switch shall be located in the machinery space; or
- b) permanently installed socket outlets for portable lighting in the pit and on the carrier roof or besides each landing door inside the well.

At least one socket outlet (see 4.10.6.2) shall be provided in the machine room.

Machinery spaces shall be provided with permanently installed electric lighting with an intensity of at least 200 lx at floor level everywhere a person needs to work. A switch shall be located near to its access controlling the supply for lighting.

NOTE For electrical supply, see 4.10.6.

4.2.1.6 Handling of equipment

Suspension point(s) with the indication of the maximum permissible working load shall be provided in the machinery spaces ceiling or on the beams, positioned to permit the hoisting of the equipment.

The maximum permissible working load shall be indicated on the lifting beam(s) or hook(s).

4.2.1.7 Walls, floor and ceiling of the well and machine room

4.2.1.7.1 The structure of the well and machine room shall be able to support at least the loads which may be applied by the machine, by the jacks, by the guide rails at the moment of safety gear operation, in the case of eccentric load in the carrier, by the action of the buffers or the fixed stops, by loading and unloading the carrier, etc.

4.2.1.7.2 The walls of the well shall have a mechanical strength such that when a force of 1 000 N, being evenly distributed over an area of 0,09 m² in round or square section, is applied at right angles to the wall at any point on either face they shall resist without:

- a) permanent deformation greater than 1 mm;
- b) elastic deformation greater than 15 mm.

4.2.1.7.3 The floor of the pit shall be able to support beneath each guide rail, except hanging guide rails, the force due to the mass of the guide rails plus any load due to components fixed or linked to the guide(s) and any additional reaction occurring during emergency stopping (e.g. load on traction sheave due to rebound when machine on rails), plus the reaction at the moment of operation of the safety gear.

4.2.1.7.4 For hydraulic service lifts the floor of the pit shall also be able to support beneath each jack the loads and forces imposed to it.

4.2.1.8 Surfaces of walls, floors and ceilings

4.2.1.8.1 Surfaces of walls, floors and ceilings of wells, machine rooms shall be in durable material (e.g. concrete, brick or blockwork) not favouring the creation of dust.

4.2.1.8.2 The surface of the floor where a person needs to work or to move between working areas shall be of non-slip material.

NOTE For guidance see 4.2.4.7 of EN ISO 14122-2:2016.

4.2.1.8.3 The lower part of the well shall consist of a pit, the bottom of which shall be smooth and approximately level, except for any buffer, fixed stop, jack and guide rail bases and water drainage devices.

After the building-in of guide rail fixings, buffers, any grids, etc., the pit shall be impervious to infiltration of water.

4.2.2 Access to well and to machinery spaces

Access to the machine and its associated equipment shall be possible only for competent and authorized persons.

Safe and unobstructed access door(s) or access trap(s) shall be provided to the service lift machine and its associated equipment.

The clear dimensions of openings giving access to the service lift machine and its associated equipment shall allow the possible replacement of the service lift components. This might include the dismantling of machine room enclosure panels.

In the open position the doors and traps shall not penetrate the clear spaces mentioned in 4.2.6.2.

4.2.3 Inspection doors – inspection traps – access doors – access traps

4.2.3.1 General provisions

4.2.3.1.1 Inspection doors and inspection traps to the well shall not be used except on grounds of the requirements of maintenance, adjustment or inspection.

The dimensions of the inspection doors and traps shall be adapted to their position in the well, their purpose and the visibility for the work to be undertaken.

NOTE A door about horizontal when closed is referred to as a trap.

4.2.3.1.2 Inspection doors and inspection traps shall not open towards the interior of the well.

4.2.3.1.3 Inspection doors and inspection traps shall be provided with a key-operated lock, capable of being re-closed and re-locked without a key.

If persons are likely to become trapped, they shall be capable of being opened from inside the well without a key, even when locked.

4.2.3.1.4 Operation of the service lift shall automatically depend on maintaining these inspection doors and inspection traps in the closed position. For this purpose, electric safety devices in conformity with 4.11.1.2 shall be employed.

This requirement does not apply to doors and traps giving exclusive access to the machine and its associated parts but applies to doors and traps giving access to overspeed governor, if any, installed in the well (see 4.7.2.5.1.7 b)).

4.2.3.1.5 Inspection doors and inspection traps shall be imperforate, satisfying the same requirements for mechanical strength as the landing doors.

4.2.3.1.6 Safe access to these inspection doors and inspection traps shall be provided according to 4.2.2.

4.2.3.2 Inaccessible machine rooms

4.2.3.2.1 Reachability of the service lift machine and its associated equipment shall be provided at least by inspection doors or traps. Their dimensions shall be at least 0,60 m x 0,60 m or, where the size of the machine room does not allow, the openings shall be adapted to suit the replacement of components.

4.2.3.2.2 Any components requiring maintenance, adjustment or inspection shall be placed within the horizontal distance of 0,60 m from the edges of inspection doors or traps, and reachable from the working area.

4.2.3.3 Accessible machine rooms

4.2.3.3.1 Access trap for persons shall give a clear passage at least 0,60 m x 0,60 m and shall be counterbalanced.

All access trap, when they are closed, shall be able to support 2 000 N on 0,20 m x 0,20 m at any position, without permanent deformation greater than 1 mm.

Access trap shall not open downwards, unless they are linked to retractable ladders. Hinges, if any, shall be of a type which cannot be unhooked.

When an access trap is in the open position, precautions shall be taken to prevent the fall of persons by a 1,10 m high guard rail.

4.2.3.3.2 Access doors shall have dimensions of at least 0,60 m x 0,60 m.

The sill shall not be higher than 0,40 m above the machine room and entrance access level.

4.2.3.3.3 Access doors and access traps shall be provided with a key-operated lock, capable of being re-closed and re-locked without a key. They shall be capable of being opened from inside the room without a key, even when locked.

4.2.4 Notices

4.2.4.1 The size of the notice(s) shall comply with 4.5.3.

4.2.4.2 A notice bearing the following minimum inscription:

“Service Lift Machinery - Danger

Access forbidden to unauthorised persons”

shall be fixed to the outside of door(s) or trap(s) giving access to the machinery and pulleys.

In the case of trap(s), a permanently visible notice shall indicate to those using the trap:

“Danger of falling - Re-close the trap”

4.2.4.3 For service lifts where the well is regarded as accessible (see 1.5), outside the well, near the access door(s) and trap(s), there shall be a notice stating:

“Service Lift Well - Danger

Access forbidden to unauthorised persons”

4.2.4.4 On the carrier roof of service lifts a notice(s) shall be provided as follows:

- a) where the well is regarded as inaccessible but with dimensions of inspection doors exceeding 0,30 m x 0,40 m:

“Access Forbidden”.

and / or the safety sign as shown in Figure 1.



Figure 1 — Access forbidden

- b) where the well is regarded as accessible (see 1.4):

“Before entering the carrier roof actuate the mechanical and electrical stopping device”.

4.2.4.5 For service lifts where the well is regarded as inaccessible a notice shall be provided near the inspection doors and traps stating:

“Do not enter the service lift well”

4.2.5 Well

4.2.5.1 General provisions

4.2.5.1.1 The well may contain one or more service lift carriers.

4.2.5.1.2 The counterweight or the balancing weight of a service lift shall be in the same well as the carrier.

4.2.5.1.3 For hydraulic service lifts jack(s) shall be in the same well as the carrier. They may extend into the ground or other space.

4.2.5.2 Well enclosure

A service lift well shall be separated from the surroundings by imperforate walls, floor and ceiling.

The only permissible openings are:

- a) openings for landing doors;
- b) openings for inspection doors to the well and inspection traps;
- c) vent openings for escape of gases and smoke in the event of fire;
- d) ventilation openings;
- e) necessary openings for the functioning of the service lift between the well and the machine room;
- f) openings in partition between service lifts or between service lift(s) and lift(s) according to 4.2.5.5;
- g) for accessible machine rooms (see 1.5), perforations in the ceiling separating the well from a machine room.

4.2.5.3 Clearances between carrier and wall facing the carrier entrance

4.2.5.3.1 The operational clearances specified in the standard shall be maintained not only during the verification and tests before the service lift is put into service, but also throughout the life of the service lift.

4.2.5.3.2 The clearance between the carrier and landing door or frame with fully opened landing door shall not exceed 35 mm.

4.2.5.4 Protection of any spaces located below the well

If accessible spaces do exist below the service lift well within the area of the carrier, the counterweight or the balancing weight, requirements 4.7.1.1, 4.7.1.2 and 4.8.3.2 apply.

4.2.5.5 Protection in the well

4.2.5.5.1 In the lower part of a well accessible to maintenance personnel the travelling area of the counterweight or balancing weight shall be guarded by either:

- a) a rigid screen extending from the lowest point of the counterweight or balancing weight in its lowest position to a minimum height of 2,0 m from the pit floor.

The width of the screen shall be at least equal to that of the counterweight or balancing weight. If the gap between the counterweight/balancing weight guide rails and the well wall exceeds 0,30 m then this area shall also be guarded in accordance with above.

The screen may have slot(s) with the minimum width necessary for the purpose of visual inspection.

If this screen is perforate, 4.2.4.1 of EN ISO 13857:2019 applies.

The screen shall have sufficient rigidity to ensure that when a force of 300 N being evenly distributed over an area of 5 cm² in round or square section is applied at right angles at any point of the screen, it shall not deflect to cause the counterweight or balancing weight to collide with it;

- b) or a means in accordance with 4.2.5.7.2.1, limiting the travel of the counterweight or balancing weight at least 1,80 m height, or the maximum allowed by the travel high, above the pit floor.

4.2.5.5.2 Where the well contains more than one lifts and/or service lifts there shall be a partition between the moving parts of different service lifts, and between service lifts and lifts.

If this partition is perforate, 4.2.4.1 of EN ISO 13857:2019 applies.

The partition shall have sufficient rigidity to ensure that when a force of 300 N being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles at any point of the partition, it shall not deflect to cause the moving parts to collide with it.

4.2.5.5.3 The partition referred in 4.2.5.5.2 shall extend at least from the lowest point of travel of the carrier, the counterweight or balancing weight to a height of 2,50 m above the floor of the lowest landing.

The width shall be as to prevent access from one pit to another, having gaps not wider than 0,30 m.

4.2.5.5.4 The partition referred in 4.2.5.5.2 shall extend through the full height of the well if the horizontal distance between the edge of the carrier roof and a moving part (carrier, counterweight or balancing weight) of an adjacent lift/service lift is less than 0,50 m.

The width of this partition shall be at least equal to that of the moving part, or part of this, which is to be guarded, plus 0,10 m on each side.

4.2.5.6 Guided travel of carrier, counterweight and balancing weight

4.2.5.6.1 In the case of traction drive service lifts:

- a) when the counterweight rests on its fixed stop(s) or its fully compressed buffer(s), the carrier guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m;
- b) when the carrier rests on its fixed stop(s) or its fully compressed buffer(s), the counterweight guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.6.2 In the case of positive drive service lifts:

- a) the guided travel of the carrier upwards from the top landing floor until it strikes the ceiling of the well shall be at least 0,10 m;
- b) when the carrier rests on its fixed stop(s) or its fully compressed buffer(s) the guide rails length of the balancing weight shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.6.3 In the case of hydraulic service lifts:

- a) when the ram is in its ultimate position, achieved through the means of ram stroke limitation according to 4.9.4.2.3, the carrier guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m;
- b) when the carrier rests on its fixed stop(s) or its fully compressed buffer(s) the guide rails length of the balancing weight, if any, shall be such as would accommodate a further guided travel of at least 0,10 m;

- c) when the carrier is at the highest position of its travel, the guide rails length of the balancing weight, if any, shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.7 Refuge spaces

4.2.5.7.1 Headroom

Any device as required in 4.2.1.3.2 shall allow to ensure in the headroom a free vertical distance of 1,80 m above the carrier roof.

4.2.5.7.2 Pit

4.2.5.7.2.1 When the well is accessible (see 1.5), it shall be possible by movable means to guarantee a free vertical distance of minimum 1,80 m, or the maximum allowed by the travel high, between the bottom of the pit and the lowest parts of the carrier, when the carrier rests on this means.

Any device provided for this purpose shall be permanently attached inside the well to ensure its availability. It shall be possible to activate the device before entering the pit.

4.2.5.7.2.2 When the well is accessible (see 1.5), there shall be in the pit a stopping device visible and accessible on opening the door(s) giving access to the pit and from the pit floor, in conformity with the requirements of 4.11.2.2.

4.2.5.7.2.3 When the well is regarded as inaccessible, the bottom of the pit shall be able to be cleaned from the outside.

4.2.5.7.2.4 When the well is regarded as inaccessible a notice on the landing door(s) of the bottom landing shall be provided stating:

“Do not enter the service lift pit”

4.2.5.7.2.5 In case of accessible well, a means to enter the pit shall be provided consisting of either:

- a) a landing door or an access door;
- b) or an access door where the pit depth exceeds 2,50 m.

Steps, ladder or hand hold(s) shall be provided to allow a safe descent into the pit; for pit depth exceeding 1,0 m a pit ladder is required. A portable ladder may be used.

Any pit access door other than landing door shall comply with the requirements of 4.4.3.3.

Where there are two landing doors at the same level giving access to the pit, then one shall be determined as the pit access door, having the access equipment.

If there is no access door to the accessible pit, other than the landing door, the door lock shall be reachable within a height of 1,80 m from the pit floor, or a permanently installed device shall allow a person in the pit to unlock the door.

4.2.6 Machinery spaces

4.2.6.1 Notices and instructions

4.2.6.1.1 Notice(s) shall be provided to permit identification of the main switch(es) and the light switch(es).

If, after release of a main switch, some parts remain live (interconnection between service lifts, lighting ...) notice(s) shall indicate this.

4.2.6.1.2 There shall be visible and legible detailed instructions to be followed in the event of service lift breakdown, particularly concerning the use of the device for manual movement, and the unlocking key for landing doors.

4.2.6.2 Dimensions

4.2.6.2.1 In front of control panels and cabinets there shall be a clear horizontal area having:

- a) depth, measured from the external surface of the panels, at least 0,70 m;
- b) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel.

4.2.6.2.2 There shall be a clear space of at least the height of the door, and horizontal area of:

- a) 0,50 m x 0,60 m in front of the component in need of inspection or maintenance, or emergency manual operation (see 4.9.3.3), or
- b) 0,70 m x 0,60 m in front of the sill of the inspection door allowing in all cases the door to be fully opened.

4.2.6.2.3 In case of accessible machinery space there shall be a clear vertical distance of at least 0,30 m above unprotected rotating parts of the machine.

4.2.6.2.4 The clear height shall be not less than 2,10 m for working areas and not less than 1,80 m for movement.

This clear height for movement or working is taken to the underside of the lowest striking point and measured from the floor of the access area or the floor of the working area(s) respectively.

The access ways to the clear spaces mentioned in 4.2.6.2.1 shall have a width of at least:

- a) 0,50 m; or
- b) 0,40 m where there are no moving parts or hot surfaces.

4.2.6.2.5 In case of existing buildings, when the clear height at working areas is less than 2,10 m, warnings using yellow and black stripes according to ISO 3864-1:2011, Figure 17 or a warning sign shall be placed and shock dampening materials shall be provided under the ceiling above those areas.

The clear height, measured up to the lower surface of shock dampening materials on the ceiling, shall not be less than 1,80 m for working areas.

4.2.6.3 Other openings

The dimension of holes in the slab and machine room floor shall be reduced to a minimum for their purpose.

With the aim of removing the danger of objects falling through openings situated above the well, including those for electric cables, ferrules shall be used, which project at least 50 mm above the slab or finished floor.

4.3 Carrier entrance

4.3.1 General provisions

In the cases where the goods intended to be transported could come into contact with the wall(s) of the well during travel, means limiting the movement, e.g. retainers, barriers, roller blinds, carrier doors, etc. shall be provided at carrier entrances.

Moveable means shall have an electric safety device in conformity with 4.11.1.2 proving the closed position.

Particular attention shall be given to carriers constructed with openings on opposite or adjacent sides to prevent goods from projecting outside the carrier (see examples in Annex D).

4.3.2 Height and width of entrances

The clear carrier entrance shall not be smaller than the clear entrance of the landing doors, on all sides.

4.4 Landing and carrier doors

4.4.1 General provisions

4.4.1.1 The carrier door(s), if any, shall be:

- a) imperforate, or
- b) of mesh, or
- c) perforated panel form.

The dimensions of the mesh or perforations shall be chosen with consideration to the loads to be transported.

4.4.1.2 The carrier door(s), if any, when closed shall completely cover the carrier entrances, apart from the necessary clearances.

4.4.1.3 The openings in the well giving normal access to the service lift carrier shall be provided with imperforate landing doors.

When the landing doors are closed, the clearance between panels, or between panels and uprights, lintels or sills, shall not exceed 6 mm. This value, due to wear, shall not exceed 10 mm. These clearances are measured at the back of recesses, if any.

4.4.2 Sills, guides, door suspension

4.4.2.1 Sills

Every landing and carrier entrance shall incorporate a sill of sufficient strength to withstand the passage of loads being introduced into the carrier.

NOTE A slight counter slope provided in front of each landing sill helps to avoid water from washing, sprinkling, etc. draining into the well.

4.4.2.2 Guides

4.4.2.2.1 Landing and carrier doors shall be designed to prevent, during normal operation, derailment, mechanical jamming, or displacement at the extremities of their travel.

4.4.2.2.2 Horizontally sliding landing and carrier doors shall be guided top and bottom.

4.4.2.2.3 Vertically sliding landing and carrier doors shall be guided at both sides.

They shall not leave their guiding even when the suspension elements break.

4.4.2.3 Suspension of vertically sliding doors

4.4.2.3.1 Panels of vertically sliding landing and carrier doors shall be fixed at least to two independent suspension elements.

4.4.2.3.2 Suspension ropes, chains, belts and their terminations shall be designed with a safety factor of at least 8.

4.4.2.3.3 The pitch diameter of suspension rope pulleys shall be at least 20 times the rope diameter.

4.4.2.3.4 Suspension ropes and chains shall be guarded against leaving the pulley grooves or sprockets.

4.4.2.3.5 Panels shall be balanced.

4.4.3 Strength of doors and their frames

4.4.3.1 Doors and their frames shall be constructed in such a way that they will not become deformed in the course of time.

It is recommended that they are made of metal.

4.4.3.2 Landing doors shall comply with the regulations relevant to the fire protection for the building concerned. EN 81-58:2003 describes a method of the fire test.

4.4.3.3 Complete landing doors, with their locks, shall have a mechanical strength such that in the locked position:

- a) when a force of 300 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles to the panel/frame at any point on either face they shall resist without:
 - 1) permanent deformation greater than 1 mm;
 - 2) elastic deformation greater than 15 mm;
- b) after such a test the safety function of the door shall not be affected;
- c) where service lifts are not installed in a limited access area, when a static force of 1 000 N, being evenly distributed over an area of 100 cm² in round or square section, is applied at right angles at any point of the panel/frame from the landing side, they shall resist without permanent deformation greater than 5 mm affecting functionality and safety (see 4.4.1.3 and 4.4.7.2).

4.4.3.4 Under the application of a manual force (without a tool) of 150 N in the direction of the opening of the leading door panel(s) of landing sliding doors at the most unfavourable point, the clearances stated in 4.4.1.3 shall not exceed 15 mm.

In any case, the requirements of EN ISO 13857:2019 apply for the minimum distance to moving parts.

4.4.4 Protection in relation to door operation

4.4.4.1 The doors and their surrounds shall be designed in such a way as to minimise risk of damage or injury due to drawing in of a part of the person, clothing or other object.

Where handles are fitted on manually operated doors, the minimum distance in the direction of movement of the doors between the handle and any other part shall not be less than:

- a) 50 mm, or
- b) 30 mm for handles which cannot be grasped.

4.4.4.2 Power operated doors shall be designed to reduce to a minimum the harmful consequences of a person being struck by a door panel.

In the case of coupled carrier and landing doors, operated simultaneously, the requirements 4.4.4.3 and 4.4.4.4 are valid for the joint door mechanism.

4.4.4.3 Automatically power operated sliding doors (vertical or horizontal) shall fulfil the following requirements:

- a) where the service lift is installed in a limited access area, the effort needed to prevent the door closing shall not exceed 80 N. After exceeding the door closing time of maximum 3 s, the sliding door shall open automatically;
- b) if the effort needed to prevent the door closing exceeds 80 N with a maximum of 150 N a protective device shall automatically initiate re-opening of the door in the event of a person or goods being struck, or about to be struck, by the door during the closing movement. Such a device may be neutralized where the closing of the doors is manually initiated at the entrance with the open door. The effect of the device may be neutralized during the last 50 mm of travel of each leading door panel;
- c) the effort needed to prevent the door closing shall not exceed 150 N;
- d) to avoid the risk of shearing during operation, the landing face of power operated sliding doors shall not have recesses or projections exceeding 3 mm. Edges of these shall be chamfered in the opening direction of movement. Exception to these requirements is made for the access to the unlocking triangle defined in 4.4.7.3;
- e) if the carrier door is closed before the landing door, the requirements a), b), c) and d) apply also to the carrier door.

4.4.4.4 When using other types of doors, e.g. hinged doors, with power operation, where there is a risk when opening or closing of striking persons, precautions similar to those laid down for power operated sliding doors shall be taken.

4.4.5 Local lighting and 'carrier here' signal lights

4.4.5.1 Local lighting

The natural or artificial lighting shall be at least 50 lx at the sill of the landing doors.

4.4.5.2 'Carrier here' indication

In the case of landing doors with manual opening, the user needs to know, before opening the door, whether the carrier is there or not. The signal used shall remain all the time that the carrier remains there.

4.4.6 Locked and closed landing door check

4.4.6.1 Protection against the risk of falling

It shall not be possible in normal operation to open a landing door (or any of the panels in the case of a multi-panel door) unless the carrier has stopped, or is on the point of stopping, in the unlocking zone of that door.

The unlocking zone shall not extend more than 0,10 m above and below the landing level.

4.4.6.2 Protection against shearing

4.4.6.2.1 It shall not be possible in normal operation to start the service lift nor keep it in motion if a landing door, or any of the panels in the case of a multi-panel door, is open.

4.4.6.2.2 Operation movement of the carrier with doors open is permitted in the unlocking zone (see 4.4.6.1) to permit levelling, re-levelling or electrical anti-creeping at the corresponding floor level, provided the requirements of 4.11.2.1.4 and 4.11.2.1.6 are met.

4.4.7 Locking and emergency unlocking

4.4.7.1 General

Each landing door shall be provided with a locking device satisfying the requirement of 4.4.6.1. This device shall be protected against deliberate misuse.

4.4.7.2 Locking

4.4.7.2.1 For service lifts with:

- a) rated speed $\leq 0,63$ m/s, and
- b) door height $\leq 1,20$ m, and
- c) height of the door sill $\geq 0,70$ m above the landing floor level,

the locking need not be controlled electrically. It is then not necessary for the landing door locking to precede the movement of the carrier.

However, when the carrier leaves the unlocking zone, the locking element shall automatically close and, in addition to the normal locking position, there shall be at least a second locking position where the door closing electrical control device (see 4.4.7.4) remains inactive.

If any of the above conditions are not met the lock shall comply with the requirements listed on 4.4.7.2.2.

4.4.7.2.2 If the requirement of 4.4.7.2.1 a) plus b) plus c) are not met the following apply:

- a) it shall not be possible in normal operation to open a landing door (or any of the panels in the case of a multi-panel door) unless the carrier has stopped, or is on the point of stopping, in the unlocking zone of that door;
- b) each landing door shall be provided with a locking device satisfying the conditions of a). This device shall be protected against deliberate misuse. The effective locking of the landing door in the closed position shall precede the movement of the carrier. The locking shall be provided by an electric safety device in conformity with 4.11.1.2;
- c) the electric safety device shall not be activated unless the locking elements are engaged by at least 7 mm (see Figure 2);

- d) the element of the electric safety device proving the locked condition of the door panel(s) shall be positively operated without any intermediate mechanism by the locking element;
- e) the locking elements and their fixings shall be resistant to shock and be made of durable material that maintains the strength property over their intended lifetime under the environmental conditions. 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;
- f) the lock shall resist, without permanent deformation to a minimum force at the level of the lock and in the direction of opening of the door of:
 - 1) 1 000 N in the case of sliding doors;
 - 2) 3 000 N on the locking pin, in the case of hinged doors;
- g) in the case where the lock contacts are in a box, the fixing screws for the cover shall be of the captive type, so that they remain in the holes in the cover or box when opening the cover;
- h) on locking devices a data plate shall be fixed indicating:
 - 1) the name of the manufacturer of the locking device;
 - 2) the type of locking device;
- i) where service lifts are not installed in a limited access area:
 - 1) it shall not be possible, from positions normally accessible to persons, to operate the service lift with a landing door open or unlocked, after one single action not forming part of the normal operating sequence;
 - 2) the means used to prove the position of a locking element shall have positive operation.

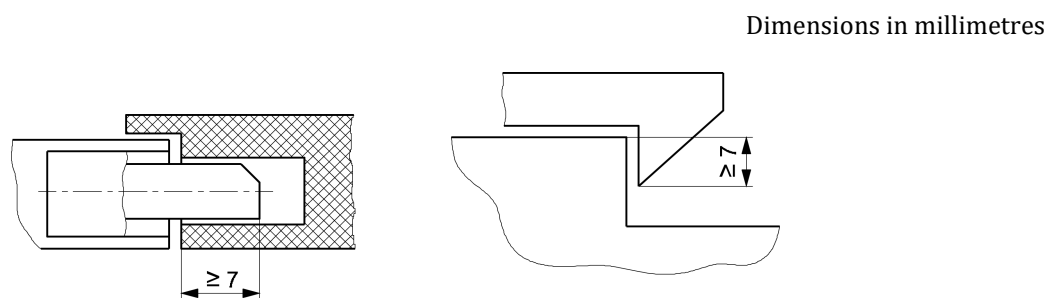


Figure 2 — Examples of locking elements

4.4.7.2.3 For hinged doors, locking shall be effected as near as possible to the vertical closing edge(s) of the doors and maintained even in the case of panels sagging.

4.4.7.2.4 For sliding doors, locking shall be effected as near as possible to the closing edge of the leading panel. For vertical sliding centre opening doors, the lock shall be located on the upper panel.

4.4.7.2.5 The engagement of the locking elements shall be achieved in such a way that a force of 300 N in the opening direction of the door does not diminish the effectiveness of locking.

4.4.7.2.6 The locking action shall be effected and maintained by the action of gravity, permanent magnets, or springs. The springs shall act by compression, be guided and of such dimensions that at the moment of unlocking the coils are not compressed solid.

In the event of the permanent magnet or spring no longer fulfilling its function, gravity shall not cause unlocking.

If the locking element is maintained in position by the action of a permanent magnet, it shall not be possible to neutralize its effect by simple means (e.g. heat or shock).

4.4.7.2.7 The locking device shall be protected against the risk of an accumulation of dust, which could hinder its proper functioning.

4.4.7.2.8 Working parts needing inspection shall be visible directly or through a vision panel.

4.4.7.3 Emergency unlocking

Each of the landing doors shall be capable of being manually unlocked from the outside with the aid of a key, which fits the unlocking triangle as defined in Figure 3.

Keys shall be accompanied by a written instruction detailing the essential precautions to be taken in order to avoid accidents, which could result from an unlocking which was not followed by effective re-locking.

This key shall be available on the site of the service lift installation and accessible only to authorized persons.

The unlocking key shall have a label attached drawing attention to the danger which is involved in using this key and the need to make sure that the door is locked after it has been closed.

After an emergency unlocking, the locking device shall not be able to remain in the unlocked position with the landing door closed.

In the case of landing doors driven by the carrier door, if the landing door becomes open for whatever reason when the carrier is outside the unlocking zone, a device (either weight or springs) shall ensure closing and locking of the landing door.

Dimensions in millimetres

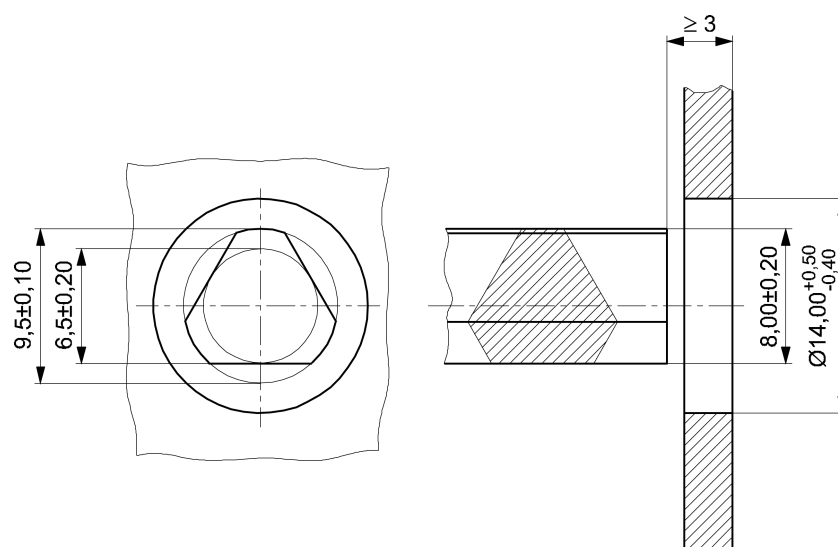


Figure 3 — Unlocking triangle

4.4.7.4 Electrical device for proving the landing door closed

4.4.7.4.1 Each landing door shall be provided with an electrical safety device in conformity with 4.11.1.2 for proving the closed position, so that the conditions imposed by 4.4.6.2 are satisfied.

4.4.7.4.2 In the case of sliding landing doors, coupled with carrier doors, this device may be in common with the device for proving the locked condition, provided that it is dependent upon the effective closing of the landing door.

4.4.7.4.3 In the case of hinged landing doors, this device shall be placed adjacent to the closing edge of the door or on the mechanical device proving the closed condition of the door.

4.4.8 Sliding doors with multiple, mechanically linked panels

4.4.8.1 If a sliding door comprises several directly mechanically linked panels, it is permitted:

- a) to place the device required in 4.4.7.4.1 or 4.4.7.4.2, on a single panel, and
- b) to lock only one panel, provided that this single locking prevents the opening of the other panel(s) by hooking the panels in the closed position in case of telescopic doors.

A back fold of the sheet of each panel of a telescopic door and hooking the fast panel to the slow panel when the door is in the closed position, or hooks on the hanger plate realizing the same linkage, are considered as a direct mechanical linkage, and therefore does not require device as required in 4.4.7.4.1 or 4.4.7.4.2 on all panels. The linkage shall be ensured even in case of rupture of guiding means. Compliance with the strength requirements of 4.4.7.2.2 f) and 4.4.7.2.5 shall be verified with the minimum possible design overlapping of the hooking elements of the panels.

NOTE The hanger plate is not considered as part of the guiding means.

4.4.8.2 If a horizontally or vertically sliding door comprises several indirectly, mechanically linked panels (e.g. by rope, belt or chain), it is permitted to lock only one panel provided that this single locking prevents the opening of other panels, and that these are not fitted with a handle.

An electric safety device in conformity with 4.11.1.2 shall prove the closed position of the other panel(s), not locked by the locking device. In case of vertically sliding doors, this electric safety device may be placed at the locked panel only if the breakage of the indirect linkage causes the opening of the electric safety device.

4.5 Carrier, counterweight and balancing weight

4.5.1 Height of carrier

See 1.3 b).

4.5.2 Available carrier area and rated load

See 1.1 and 1.3 b).

4.5.3 Rated load and manufacturer's name

- a) Inside the carrier, visible from the landing loading area, shall be displayed:
 - 1) business name and full address of the manufacturer (or the manufacturer's authorized representative);
 - 2) designation of series or type;