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Title: Draft BS EN 81-42 Safety rules for the construction and installation of lifts - Special lifts for the transport of persons and goods. - Part 42: Vertical lifting appliance with enclosed carrier intended for use by persons, including persons with disability.

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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.

UK Vote

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 Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.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

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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 -
Special lifts for the transport of persons and goods - Part
42: Vertical lifting appliance with enclosed carrier
intended for use by persons, including persons with
disability

Règles de sécurité pour la construction et l'installation
des élévateurs - Élévateurs spéciaux pour le transport
des personnes et des charges - Partie 42 : Élévateurs
verticaux à habitacle clos destiné à l'usage de
personnes, y compris de personnes en situation de
handicap

Sicherheitsregeln für die Konstruktion und den Einbau
von Aufzügen - Spezialaufzüge für die Beförderung von
Personen und Gütern - Teil 42: Vertikale Hebezeuge
mit geschlossenem Lastträger für Personen und
Personen mit Behinderung

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.

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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.

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.



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European foreword

This document (prEN 81-42:2022) 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 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.

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

Introduction

0.1 General

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

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

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

0.2 General remarks

0.2.1 The object of this document is to define safety rules related to passenger lifting appliances with a view to safeguarding persons and objects against the risk of accidents associated with the normal use, maintenance and emergency operation of lifting appliances.

a) Persons to be safeguarded:

- 1) users, including passengers and competent and authorized persons, e.g. maintenance and inspection personnel (see EN 13015:2001+A1:2008);
- 2) persons in the surrounding area of the well, or any machinery spaces, who may be affected by the lifting appliance.

b) Property to be safeguarded:

- 1) loads in carrier;
- 2) components of the lifting appliance installation;
- 3) building in which the lifting appliance is installed;
- 4) the immediate surrounding area of the lifting appliance installation.

NOTE Even if EN 81-71:2018+AC:2019 and EN 81-77:2018 do not apply to lifting appliances covered by this document, they give additional requirements covering lifts resistant to acts of vandalism and lifts in seismic conditions.

0.2.2 A study has been made of the various possible hazards with lifting appliances (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.

0.2.4 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.

0.3 Principles

0.3.1 In drawing up this document the following principles have been used.

0.3.2 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, been necessary to establish certain requirements of good construction, either because they are peculiar to lifting appliance manufacture or because in the case of lifting appliance utilization the requirements may be more stringent than elsewhere.

0.3.3 This document states minimum rules for the installation of lifting appliances into buildings/constructions. Some countries can have 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 rooms, for their access doors dimensions and for protection for fire.

0.3.4 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 lifting appliances.

0.3.5 Risk analysis, terminology and technical solutions have been considered taking into account the methods of EN ISO 12100:2010, EN ISO 14798:2013 and the EN 61508:2010 series of standards.

0.3.6 In order for EN 81-42 to be a widely applicable standard the average weight of a person has been determined to be 75 kg.

0.4 Assumptions

0.4.1 In drawing up this document the following assumptions have been made:

0.4.2 Information have been exchanged between the customer and the supplier and agreement reached about:

- a) the intended use of the lifting appliance, including the type and mass of the handling devices intended to be used to load and unload the carrier, if any;
- 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) the dissipation of heat from the components/equipment of the lifting appliance which would require ventilation of the well and/or the machinery space/location of equipment;
- f) information concerning the aspects relating to noise and vibrations emitted by the equipment;
- g) operation in the event of fire alarm and exclusive use of the well and the machinery spaces (see 4.2.1.2 and 4.3.12).

0.4.3 Relevant risks have been considered for each component that may be incorporated in a complete lifting appliance installation and rules have been drawn up accordingly:

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 suitable quality;
- d) free of defects;
- e) free from harmful materials, e.g. asbestos.

0.4.4 Components are kept in good repair and working order, so that the required dimensions remain fulfilled despite wear. All lifting appliance components are considered as requiring inspection to ensure safe continued operation during their use.

The operational clearances specified in the standard should be maintained not only during the verification and tests before the lifting appliance is put into use, but also throughout the life of the lifting appliance.

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 lifting appliance.

0.4.6 By design of the elements holding a load, safe normal operation of the lifting appliance is ensured for loads ranging from 0 % to 100 % of the rated load, plus any designed overload capacity (see 4.4.1.2.1.2).

0.4.7 The requirements of this document are such that the possibility of a failure of an electric safety device or a safety component 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 lifting appliance in the intended way.

0.4.9 A user may, 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.

0.4.10 If in the course of maintenance work a safety device, normally not accessible to the users, is deliberately neutralized, safe operation of the lifting appliance 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 results in an equivalent static force of:

- a) 300 N;
- b) 1000 N where impact can occur.

0.4.12 With the exception of the items listed below which have been given special consideration, a mechanical device built according to good practice and the requirements of this document, including uncontrolled slipping of the suspension means on the traction sheave, 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:

- a) breakage of the suspension;
- b) breakage and slackening of all linkage by auxiliary ropes, chains and belts;
- c) failure of one of the mechanical components of the machine brake which take part in the application of the braking action on the drum or disk;
- 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 the safety gear not engaging, should the carrier free fall from a stationary position at the lowest landing, before the carrier strikes the buffer(s), if any, is considered acceptable.

0.4.14 Means of access are provided for the hoisting of heavy equipment (see 0.4.2 d)).

0.4.15 To ensure the safe functioning, the operating temperature range of the equipment has to take into account the conditions of the place of use of the machinery, inside the maximum range of ambient temperature between +5 °C and +40 °C. For very hot or cold environments, extra requirements may be necessary.

NOTE See HD 60364-5-51:2009, Code AA5.

0.4.16 The well is suitably ventilated, according to national building regulation, taking into consideration the heat output as specified by the manufacturer, the environmental conditions of the lifting appliance and the limits given in 0.4.15, e.g. ambient temperature, humidity, direct sunlight, air quality and air tightness of buildings due to energy saving requirements.

NOTE See 0.4.2 and A.3 for further guidance.

0.4.17 Access ways to the working areas are adequately lit (see 0.4.2).

0.4.18 Minimum passageways, corridors, fire escapes, etc. are not obstructed by the open door/trap of the lifting appliance and/or any protection means for working areas outside of the well, where fitted according to the maintenance instructions (see 0.4.2).

0.4.19 Where more than one person is working at the same time on a lifting appliance, an adequate means of communication between these persons is ensured.

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 lifting appliances are according to EN ISO 6743-4:2015.

0.4.22 In case of public access, it is assumed that the owner will carry out the following:

- a) ensure that the lifting appliance is connected to a rescue service;
- b) keep the alarm device in working conditions at all times to provide 2-way communication with a rescue service;
- c) make at least a check every 72 hours of the voice response coming from the rescue service;
- d) immediately contact the rescue service, if the device is not working.

1 Scope

1.1 This document specifies safety requirements for construction, manufacturing, installation, maintenance, inspection and dismantling of permanently installed electrically powered vertical lifting appliances affixed to a building structure intended for use by persons, including persons with disability:

- travelling vertically between predefined levels along a guided path whose inclination to the vertical does not exceed 15°;
- supported or sustained by rack and pinion, rope traction drive, noncircular elastomeric-coated suspension means (hereafter called traction belts) traction drive, rope positive drive, chains, toothed belts, screw and nut, guided chain, scissors mechanism or hydraulic jack (direct or indirect);
- with enclosed wells;
- with a rated speed not greater than 0,15 m/s;
- with the carrier completely enclosed.

1.2 This document does not cover:

- hydraulic lifting appliances where the setting of the pressure relief valve (4.8.3.5.3) exceeds 50 MPa;
- operation in severe conditions (e.g. extreme climates, strong magnetic fields);
- lightning protection;
- operation subject to special rules (e.g. potentially explosive atmospheres);
- handling of materials, the nature of which could lead to dangerous situations;
- lifting appliances whose primary function is the transportation of goods;
- lifting appliances prone to vandalism;
- earthquakes, flooding;
- firefighting and evacuation;
- noise and vibrations;
- the design of concrete, hard core, timber or other foundation or building arrangement;
- the design of anchorage bolts to the supporting structure;
- the transport of type-C wheelchairs as defined in EN 12183:2014 and/or EN 12184:2014;
- vertically sliding doors.

NOTE Noise and vibration are not considered significant nor relevant hazards.

1.3 This document deals with all significant hazards, hazardous situations or hazardous events relevant to lifting appliance, when it is used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer. They have been identified by risk assessment; see Annex I.

1.4 This document is not applicable to lifting appliances manufactured before the date of its publication.

2 Normative references

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

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

EN 81-28:2018+AC:2019, *Safety rules for the construction and installation of lifts — Lifts for the transport of persons and goods — Part 28: Remote alarm on passenger and goods passenger lifts*

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 81-58:2018, *Safety rules for the construction and installation of lifts — Examination and tests — Part 58: Landing doors fire resistance test*

EN 81-70:2021, *Safety rules for the construction and installation of lifts — Particular applications for passenger and goods passenger lift — Part 70: Accessibility to lifts for persons including persons with disability*

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

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

EN 12600:2002, *Glass in building — Pendulum test — Impact test method and classification for flat glass*

EN 13411-3:2004+A1:2008, *Terminations for steel wire ropes — Safety — Part 3: Ferrules and ferrule-securing*

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 16005:2012, *Power operated pedestrian doorsets — Safety in use — Requirements and test methods*

EN 50214:2006, *Flat polyvinyl chloride sheathed flexible cables*

EN 50274:2002, *Low-voltage switchgear and controlgear assemblies — Protection against electric shock — Protection against unintentional direct contact with hazardous live parts*

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

EN 60529:1991,¹⁾ *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60947-4-1:2010, *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters (IEC 60947-4-1:2009)*

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 60947-5-5:1997,²⁾ *Low-voltage switchgear and controlgear — Part 5-5: Control circuit devices and switching elements — Electrical emergency stop device with mechanical latching function (IEC 60947-5-5:1997)*

EN 61310-3:2008, *Safety of machinery — Indication, marking and actuation — Part 3: Requirements for the location and operation of actuators (IEC 61310-3:2007)*

EN 61800-5-2:2017, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional (IEC 61800-5-2:2016)*

EN 61810-1:2015,³⁾ *Electromechanical elementary relays — Part 1: General and safety requirements (IEC 61810-1:2015)*

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

¹⁾ As impacted by EN 60529:1991/A1:2000 and EN 60529:1991/A2:2013.

²⁾ As impacted by EN 60947-5-5:1997/A1:2005, EN 60947-5-5:1997/A2:2017, EN 60947-5-5:1997/A11:2013 and EN 60947-5-1:2017/AC:2020-05.

³⁾ As impacted by EN 61810-1:2015/A1:2020, EN 61810-1:2015/AC:2017-07 and EN 61810-1:2015/AC:2018-04.

EN ISO 7010:2012, *Graphical symbols — Safety colours and safety signs — Registered safety signs (ISO 7010:2011)*

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

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

HD 60364-4-41:2007, *Low-voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*

HD 60364-4-42:2011,⁴⁾ *Low voltage electrical installations — Part 4-42: Protection for safety — Protection against thermal effects*

ISO 606:2015, *Short-pitch transmission precision roller and bush chains, attachments and associated chain sprockets*

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

ISO 4190-5:2006, *Lift (Elevator) installation — Part 5: Control devices, signals and additional fittings*

ISO 4344:2004, *Steel wire ropes for lifts — Minimum requirements*

ISO 6336-2:2019, *Calculation of load capacity of spur and helical gears — Part 2: Calculation of surface durability (pitting)*

ISO 6336-3:2019, *Calculation of load capacity of spur and helical gears — Part 3: Calculation of tooth bending strength*

ISO 7000:2014, *Graphical symbols for use on equipment — Registered symbols*

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 60245-5:1994, *Rubber insulated cables — Rated voltages up to and including 450/750 V — Part 5: Lift cables*

IEC 60617:2012, *Graphical symbols for diagrams*

⁴⁾ As impacted by HD 60364-4-42:2011/A11:2021 and HD 60364-4-42:2011/A1:2015.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 81-20:2020 and EN 81-50:2020 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 design working load

rated load + overload of one person (equivalent to 75 kg)

3.2 end stop

element of the lifting appliance (i.e. the ram comes into contact with its cushioned stop) or of the well (i.e. the floor of the pit) to prevent the lifting appliance to be driven beyond the extremes of travel

3.3 full trip

trip from the bottom landing to top landing

3.4 guided chain

chain which can be either fixed or moving, and which is completely guided over its entire length such that it can transmit a load either in thrust or tension

3.5 guided chain system

lifting appliance supported, raised and lowered by means of one or more guided chain transmission units

3.6 interlocking device

interlock

mechanical, electrical or other type of device, the purpose of which is to prevent the operation of hazardous machine functions under specified conditions (generally as long as a guard is not closed)

3.7 lift machine

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

3.8 load bearing member

steel wire rope or steel wire strand inside of an elastomeric coated rope or belt

3.9 minimum breaking force

MBF

specified value in kN below which the measured breaking force is not allowed to fall in a breaking force test

3.10

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

3.11

positive drive lifting appliance

lifting appliance which is directly driven (not reliant on friction) by drum and ropes or by sprockets and chains or by toothed pulleys and toothed belts

3.12

private access

location where the users are known

3.13

public access

location where the users are unknown

3.14

residual breaking force

RBF

force the suspension member can withstand at the end of the lifetime, when discard criteria have been reached

3.15

safety nut

internally threaded component which is linked to the load carrying nut but is unloaded during normal use which is capable of carrying the load if the load carrying nut should break

3.16

screw

external threaded component which carries the load in conjunction with the load carrying nut and in certain circumstances the load imposed by the safety nut

3.17

self-sustaining system

system that, under free running conditions, ensure that the speed of the lifting appliance decreases

3.18

suspension means

includes all ropes/belts/chains suspending carrier/cwt/balancing weight and is engaged to carrier/cwt/balancing weight side termination

3.19

suspension member

one rope/ belt/ chain in the system to suspend carrier/cwt and is engaged to carrier/cwt side terminations

4 Safety requirements and/or protective/risk reduction measures

4.1 General

Machinery shall comply with the safety requirements and/or protective/risk reduction measures of this clause.

In addition, the machine shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.

Lifting appliances shall comply with Annex D, concerning accessibility and usability by persons with disability.

All labels, notices, markings and operating instructions shall be permanently affixed, visible, indelible, legible (if necessary aided by signs or symbols). They shall be of durable material, placed in a visible position, and written in the accepted language(s) of the country where the lifting appliance is installed.

4.2 Well and machinery spaces

4.2.1 General provisions

4.2.1.1 Arrangement of lifting appliance equipment

4.2.1.1.1 All lifting appliance equipment shall be located in the well or in machinery spaces.

4.2.1.1.2 If parts of different lifting appliances are present in one machinery space each part of lifting appliances shall be identified with a number, letter or colour consistently used for all parts (machine, controller, overspeed governor, switches, etc.).

4.2.1.2 Exclusive use of the well and the machinery spaces

The well and the machinery spaces shall not be used for purposes other than lifting appliances. They shall not contain ducts, cables or devices other than for the lifting appliance.

The lifting appliance well and machinery spaces may, however, contain:

- a) equipment for air-conditioning or heating of 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 suitably protected against accidental impact.

When sprinkler systems are used, activation of the sprinkler shall only be possible, when the lifting appliance is stationary at a landing and the electrical supply of the lifting appliance and lighting circuits 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.

4.2.1.3 Ventilation of the well and the machinery spaces

The well and the machinery spaces shall be provided with ventilation.

The well and the machinery spaces shall not be used to provide ventilation of rooms other than those belonging to the lifting appliance.

Ventilation shall be such that the motors and equipment, as well as electric cables, etc., are protected from dust, harmful fumes and humidity.

NOTE See A.3 for further guidance.

4.2.1.4 Lighting

4.2.1.4.1 The well shall be provided with permanently installed electric lighting, giving the following intensity of illumination, even when all doors are closed, at any position of the carrier throughout its travel in the well:

- a) at least 50 lux, 1,0 m above the carrier roof within its vertical projection, if the carrier roof is a working area, or above any working area;
- b) at least 50 lux, 1,0 m above the pit floor everywhere a person can stand, work and/or move between the working areas;
- c) at least 20 lux outside of the locations defined in a) and b), excluding shadows created by carrier or components.

To achieve this, sufficient number of lamps shall be fixed throughout the well and/or on the carrier roof as a part of the well lighting system.

Lighting elements shall be protected against mechanical damage.

The supply for this lighting shall be in conformity with 4.9.7.1.

NOTE For specific tasks additional temporary lighting is provided by hand lamp.

The light meter should be oriented towards the strongest light source when taking lux level readings.

4.2.1.4.2 Machinery spaces shall be provided with permanently installed electric lighting with an intensity of at least 200 lux at floor level of working areas and 50 lux at floor level to move between working areas. The supply for this lighting shall be in conformity with 4.9.7.1.

4.2.1.5 Electric equipment in the pit and in machinery spaces

4.2.1.5.1 An emergency stopping device in accordance with EN ISO 13850:2015 shall be available in the pit that, when operated, shall interrupt the electric safety chain.

This device shall be visible and accessible from outside the well at any door giving access to the pit.

A socket outlet (4.9.7.2) shall be in the pit.

NOTE For pits with depths exceeding 0,5 m, see also 4.2.2.4 b).

4.2.1.5.2 There shall be in machinery spaces:

- a) a switch accessible only to authorized persons and placed close to each access point, at a height between 1,0 and 1,5 m from the floor, controlling the lighting of the areas and spaces;
- b) at least one socket outlet (4.9.7.2) provided at less than 1,0 m horizontally for each working area.

4.2.1.6 Emergency release

If no means to escape are provided for person(s) trapped in the well, alarm initiation devices to the alarm system according to EN 81-28:2018+AC:2019 shall be installed at places where the risk of trapping exists (see 4.2.1.5.1, 4.2.6.4 and 4.4.1.7), operable from the refuge space(s).

If there is a risk of trapping in machinery spaces outside of the well, such risks should be discussed and solved with the building owner (see 0.4.2 d).

4.2.1.7 Handling of equipment

One or more suspension point(s) with the indication of the allowed working load, shall where necessary be provided in the machinery spaces and at the top of the well, to permit the hoisting of equipment (see 0.4.2 and 0.4.14).

4.2.1.8 Strength of walls, floors and ceilings

4.2.1.8.1 The structure of the well and machinery spaces shall be able to support the loads and reaction forces applied on them during lifting appliance operation. These loads and forces shall be defined in the documentation.

4.2.1.8.2 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.

4.2.1.8.3 Glass panels, plane or formed shall be made of laminated glass.

The glass panel and their fixings shall withstand 1 000 N static force on an area of 0,09 m² in round or square section, applied at right angles at any point, on either face, without breakage of the glass or permanent deformation on the fixings.

4.2.1.8.4 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.

4.2.1.8.5 For hydraulic lifting appliances, the floor of the pit shall be able to support beneath each jack the loads and forces imposed to it.

4.2.1.8.6 The floor of the pit shall be able to support beneath each blocking device (see 4.2.5.8), if any, or end stop (see 4.2.5.6.1) the force due to the impact of the carrier or counterweight/balancing weight.

4.2.1.9 Surfaces of walls, floors and ceilings

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

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 EN ISO 14122-2:2016, 4.2.4.7.

The floor of working areas shall be approximately level, except for buffer(s), if any; 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.

For hydraulic lifting appliances the space in which the power unit is situated and the pit shall be designed in such a way that it is impervious, so that all the fluid contained in the machinery placed in these areas is retained if it leaks out or escapes.

4.2.2 Access to well and to machinery spaces

4.2.2.1 The well, the machinery spaces and the associated working areas shall be accessible. Provisions shall be made to allow access to spaces other than the carrier interior only to authorized persons.

4.2.2.2 The access way adjacent to any door/trap giving access to the well or to machinery spaces shall be lit by a permanently installed electric lighting with an intensity of at least 50 lux.

4.2.2.3 If any access to the lifting appliance for maintenance and rescue purposes is not through public areas or under the control of the building owner/management, then access of authorized persons to the premises and relevant instructions shall be provided.

The manufacturer or their authorized representative shall make the owner aware of the consequences of the decision regarding access, fire, entrapment and also problems of security associated with lifting appliances serving directly into private premises (see 0.4.2).

4.2.2.4 A means to enter the pit shall be provided consisting of:

- a) a landing door, where the pit depth is not exceeding 0,50 m;
- b) where a pit depth exceeds 0,50 m, EN 81-20:2020, 5.2.2.4, 5.2.1.5.1 a), 5.2.1.5.1 c) and 5.2.1.5.1 d) apply;
- c) 4.2.6.4.4.1 c) applies.

4.2.2.5 An access for persons to machinery spaces shall be provided. For preference, this should be effected entirely by way of stairs. If it is not possible to install stairs, ladders satisfying the following requirements shall be used:

- a) the access to the machinery spaces shall not be situated more than 4 m above the level accessible by stairs;
- b) for access by ladder over 3 m in height fall protection shall be provided;
- c) ladders shall be fastened to the access permanently or at least by rope or chain in such a way that they cannot be removed;
- d) ladders exceeding 1,50 m in height shall, when in position for access, form an angle between 65° and 75° to the horizontal and shall not be liable to slip or turn over;
- e) the clear width of the ladder shall be at least 0,35 m, the depth of the steps shall not be less than 25 mm and in the case of vertical ladders the distance between the steps and the wall behind the ladder shall not be less than 0,15 m. The steps shall be designed for a load not less than 1 500 N;
- f) adjacent to the top end of the ladder there shall be at least one hand hold within reach;
- g) around a ladder, within a horizontal distance of 1,50 m, the risk of falling by more than the height of the ladder shall be prevented.

4.2.3 Access and emergency doors – Access trap doors – Inspection doors

4.2.3.1 When the distance between consecutive landing door sills exceeds 11 m, there shall be intermediate emergency doors.

NOTE “Consecutive” means two adjacent floors, with landing doors, regardless of open through or open adjacent configurations.

4.2.3.2 Access and emergency doors, access trap doors and inspection doors shall have the following dimensions:

- a) access doors to machinery spaces and access doors to the well shall have a minimum height of 2,0 m and a minimum width of 0,60 m. In case of existing building, due to the building constraints, the clear height of the entrance of access doors shall be the maximum allowed by the building constraints, however not less than 1,80 m, and the width shall be not less than 0,50 m;
- b) access trap doors for persons to machinery spaces shall give a clear passage of at least 0,80 m × 0,80 m, and shall be counterbalanced;
- c) emergency doors shall have a minimum height of 1,80 m and a minimum width of 0,50 m;
- d) inspection doors (i.e. access/inspection panels) shall have sufficient dimensions to carry out the required work through the door.

4.2.3.3 Access and emergency doors and inspection doors shall:

- a) not open towards the inside of the well or machinery spaces;
- b) be provided with a key-operated lock, capable of being reclosed and relocked without a key;
- c) be capable of being opened from inside the well, machinery spaces without a key, even when locked;
- d) be provided with an electric safety device in conformity with 4.10.2, checking the closed position;
- e) be imperforate, and are expected to comply with the regulations relevant to the fire protection for the building concerned;
- f) 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 at any point from outside the well, it shall resist without elastic deformation greater than 15 mm.

4.2.3.4 Access trap doors, when they are closed, shall be able to support 2 000 N on an area of 0,20 m × 0,20 m at any position.

Trap doors shall not open downwards. Hinges, if any, shall be of a type which cannot be unhooked.

Trap doors used only for access of material may be locked from the inside only.

When a trap door is in the open position, precautions shall be taken to prevent the fall of persons (e.g. a guardrail) and prevent the trapdoor from closing such as to cause a crushing hazard (e.g. by counterbalance).

4.2.4 Notices

4.2.4.1 A notice bearing the following minimum inscription:

**“Machinery space – Danger
Access forbidden to unauthorized persons”**

shall be fixed to the outside of access doors or trap doors giving access to machinery spaces.

In the case of trap doors, a permanently visible notice shall indicate to those using the trap-door:

“Danger of falling – Reclose the trap-door”

4.2.4.2 Outside of the well, near the access doors and emergency doors, if any and looking different from a landing door, there shall be a notice stating:

**“Lifting appliance well – Danger
Access forbidden to unauthorized persons”**

4.2.5 Well

4.2.5.1 General provisions

4.2.5.1.1 The well shall contain only one carrier.

4.2.5.1.2 The counterweight or the balancing weight, if any, of a carrier shall be in the same well as the carrier.

The carrier and its associated components shall be at a horizontal distance of at least 30 mm from the counterweight or balancing weight (if any) and its associated components.

4.2.5.1.3 For hydraulic lifting appliances, jacks shall be in the same well as the carrier. They may extend into the ground or other spaces.

4.2.5.2 Well enclosure

4.2.5.2.1 A lifting appliance shall be separated from the surroundings by walls, floor and ceiling.

4.2.5.2.2 The well shall be totally enclosed by imperforate walls, floor and ceiling

The only permissible openings are:

- a) openings for landing doors;
- b) openings for access and emergency doors to the well and inspection doors;
- 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 lifting appliance between the well and the machinery spaces.

4.2.5.2.3 If the carrier roof is accessible for maintenance and inspection works, any horizontal projection from a wall into the well or horizontal beam greater than 0,15 m width, including separator beams, shall be protected from a person standing there, unless access is prevented by a carrier top balustrade in accordance with 4.4.1.7.6.

Protection shall be such as:

- a) the projection, where greater than 0,15 m, shall be chamfered to at least 45° to the horizontal, or

- b) a deflector forming an inclined surface of minimum 45° to the horizontal, capable of resisting a force of 300 N applied at right angles to the deflector at any point, distributed evenly over a surface of 5 cm^2 in round or square section, such that it shall resist without:

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

4.2.5.3 Construction of the walls of the well and landing doors facing a carrier entrance

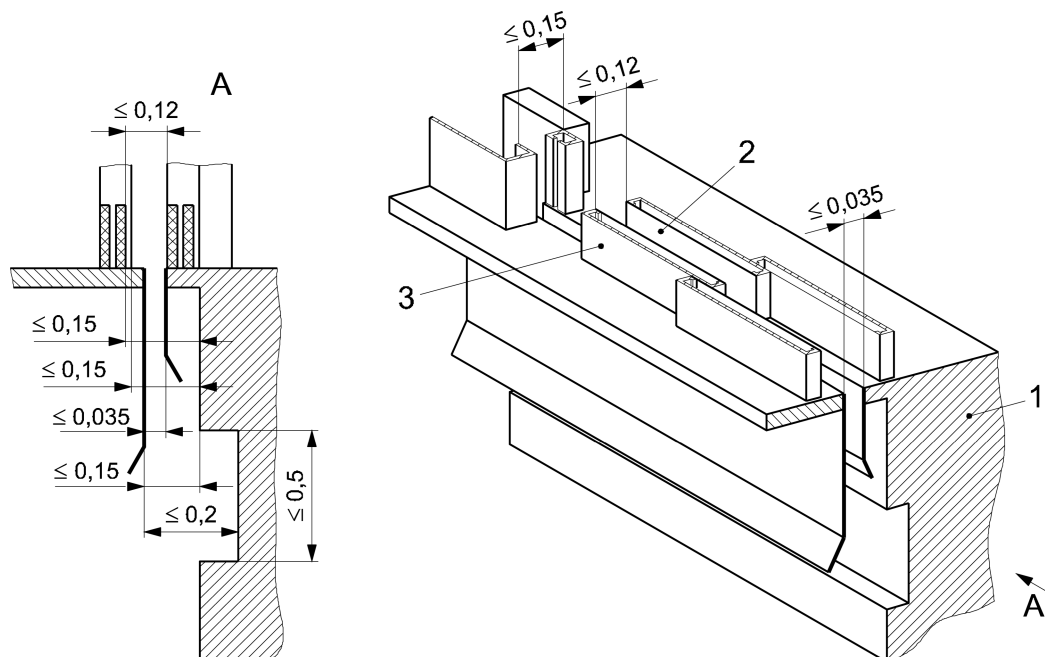
4.2.5.3.1 The horizontal distance between the inner surface of the well and the carrier sill, door frame of the carrier or closing edge of carrier sliding doors shall not exceed 0,15 m, over the full height of the well (See Figure 1).

The distance given above:

- a) may be extended to 0,20 m over a height not exceeding 0,50 m. There shall not be more than one of such recesses in between two consecutive landing doors;
- b) is not limited if the carrier is provided with a mechanically locked door in accordance with 4.3.9.2, which can only be opened in the unlocking zone of a landing door.

The operation of the lifting appliance shall automatically depend on the locking of the corresponding carrier door except in the cases covered in 4.11.1.2 and 4.11.1.5. This locking shall be proved by an electric safety device in conformity with 4.10.2.

Dimensions in metres



Key

- 1 lifting appliance well wall
- 2 landing door leading panel
- 3 carrier door leading panel

Figure 1 — Clearances between carrier and wall facing the carrier entrance

4.2.5.3.2 Below each landing door sill the wall of the well shall comply with the following requirements:

- a) it shall form a vertical surface which is directly connected to the landing door sill, whose height is at least half the unlocking zone plus 50 mm and whose width is at least the clear opening of the carrier access plus 25 mm on both sides;
- b) this surface shall be continuous and be composed of smooth and hard elements, such as metal sheets, and when a force of 300 N is applied at a right angle to the wall at any point, being evenly distributed over an area of 5 cm² in round or square section, it shall resist without:
 - 1) permanent deformation;
 - 2) elastic deformation greater than 15 mm;
- c) any projections shall not exceed 5 mm. Projections exceeding 2 mm shall be chamfered at least 75° to the horizontal;
- d) furthermore, it shall be either:
 - 1) connected to the lintel of the next door; or
 - 2) extended downwards using a hard smooth chamfer whose angle to the horizontal plane shall be at least 60°. The projection to this chamfer on the horizontal plane shall not be less than 20 mm.

4.2.5.4 Protection of any spaces located below the well

If accessible spaces do exist below the well, the base of the pit shall be designed for an imposed load of at least 5 000 N/m², and the counterweight or the balancing weight shall be equipped with safety gear.

4.2.5.5 Protection in the well

The travelling area of the counterweight or the balancing weight shall be guarded by means of a screen, which comply with the following:

- a) if this screen is perforate, EN ISO 13857:2008, 4.2.4.1 applies;
- b) this screen shall extend from the lowest point of the counterweight resting on its end stops or balancing weight in its lowest position to a minimum height of 2,0 m from the pit floor;
- c) in no case shall it be more than 0,30 m from the pit floor to the lowest part of the screen;
- d) the width shall be at least equal to that of the counterweight or balancing weight;
- e) 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 a), b) and c);
- f) 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.

4.2.5.6 Guided travel of carrier, counterweight and balancing weight

4.2.5.6.1 General

The extreme positions of carrier, counterweight and balancing weight are defined in Table 1.

Table 1 — Extreme positions of carrier, counterweight and balancing weight

Position	Traction drives	Positive drives	Hydraulic drives
Highest position of carrier	When the counterweight is on either its lower end stop or on the fully compressed buffer, if any	When the carrier is either on the mechanical upper end stop or on fully compressed buffer, if any	When the ram is in its ultimate position achieved through the means of ram stroke limitation
Lowest position of carrier	When the carrier is either on its lower end stop or on the fully compressed buffer, if any	When the carrier is either on its lower end stop or on the fully compressed buffer, if any	When the carrier is either on its lower end stop or on the fully compressed buffer, if any
Highest position of counterweight/balancing weight	When the carrier is either on its lower end stop or on the fully compressed buffer, if any	When the carrier is either on its lower end stop or on the fully compressed buffer, if any	When the carrier is either on its lower end stop or on the fully compressed buffer, if any
Lowest position of counterweight/balancing weight	When the counterweight is either on its lower end stop or on the fully compressed buffer, if any	When the carrier is either on the mechanical upper end stop or on fully compressed buffer, if any	When the ram is in its ultimate position achieved through the means of ram stroke limitation
NOTE In case of buffers with non-linear characteristics, the term “fully compressed” means a compression of 90 % of the installed buffer height without considering fixation elements of the buffer which might limit the compression to a lower value.			

4.2.5.6.2 Traction lifting appliances

4.2.5.6.2.1 When the counterweight is at its lowest position, the following two conditions shall be satisfied at the same time:

- the carrier guide rail lengths shall be such as would accommodate a further guided travel, of at least 0,05 m;
- the free vertical distance between the lowest parts of the roof of the well and the highest pieces of equipment fixed on the carrier, shall be at least 0,05 m.

4.2.5.6.2.2 When the carrier is at its lowest position, the following two conditions shall be satisfied at the same time:

- a) the counterweight guide rail lengths shall be such as would accommodate a further guided travel, of at least 0,05 m;
- b) the free vertical distance between the lowest parts of the ceiling of the well and the counterweight, shall be at least 0,05 m.

4.2.5.6.3 Positive drive lifting appliances

4.2.5.6.3.1 The guided travel of the carrier upwards from the top floor until it strikes the upper end stops shall be at least 0,05 m. The carrier shall be guided to the limit of its end stop stroke.

4.2.5.6.3.2 When the balancing weight, if any, is at its highest position, its guide rails lengths shall be such as would accommodate a further guided travel of at least 0,05 m.

4.2.5.6.4 Hydraulic lifting appliances

4.2.5.6.4.1 When the carrier is at its highest position, its guide rails lengths shall be such as would accommodate a further guided travel of at least 0,05 m.

4.2.5.6.4.2 When the balancing weight, if any, is at its highest position, its guide rails lengths shall be such as would accommodate a further guided travel of at least 0,05 m.

4.2.5.6.4.3 When the balancing weight, if any, is at its lowest position, its guide rails lengths shall be such as would accommodate a further guided travel of at least 0,05 m.

4.2.5.7 Refuge spaces on carrier roof and clearances in headroom

When the carrier is at its highest position, at least one clear area where a refuge space can be accommodated shall be provided on the carrier roof, selected from Table 2, type 1, 2 or 4.

For type 4 refuge space, the maximum horizontal distance of the components to be inspected from the edges of the opening in the ceiling shall be 0,6 m.

A sign on the carrier roof readable from the landings giving access to the carrier roof shall indicate if the carrier roof is walkable (if not, see 6.2.1.4.5) and the allowed number of persons and the type of posture (Table 2) considered for the refuge space(s) accommodation.

Where a counterweight is used a sign shall be placed on or near the counterweight screen (see 4.2.5.5) stating the maximum allowed clearances between the counterweight and the counterweight end stops when the carrier is at its upmost landing level in order to maintain the carrier headroom dimensions.

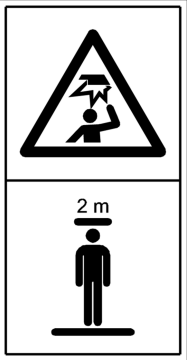
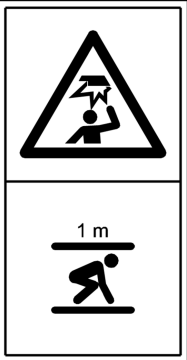
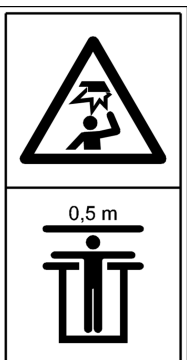
The refuge spaces, as per Table 2, may be achieved by a mechanical blocking device. If any, the blocking device shall be able to stop the lifting appliance travelling upwards at rated speed with empty carrier.

The blocking device shall be provided with an electric safety device(s) in conformity with 4.10.2 that:

- a) in its active position disables the carrier and landing controls and enables any inspection control station in the carrier / on the carrier roof;
- b) in its inactive position enables the return to normal operation.

The function shall be marked with its intended purpose and position.

Table 2 — Dimensions of refuge spaces in the pit and headroom

N°	Posture	Picture	Horizontal dimension in plant [m × m]	Height of the space [m]	Zone	
					Pit	Headroom
1	Erected		0,4 × 0,5	2	Applicable	Applicable
2	Crouched		0,5 × 0,7	1	Applicable	Applicable
3	Lied down		0,7 × 1	0,5	Applicable	Not Applicable
4	Erected		0,4 × 0,5	0,5	Not Applicable	Applicable
Black		Body of the triangular sign and for pictograms and quotes				

Yellow	Ground of the triangular sign
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4.2.5.8 Refuge spaces and clearances in the pit

When the carrier is to be maintained or inspected from underneath the carrier, the following applies:

- a) at least one clear area where a refuge space can be accommodated shall be provided on the pit floor, selected from Table 2;
- b) a sign in the pit readable from the entrance(s) shall indicate the allowed number of persons and the type of posture (Table 2) considered for the refuge space(s) accommodation.

The refuge spaces, as per Table 2, may be achieved by a mechanical blocking device, see 4.2.6.4.4.1. If any, the blocking device shall be able to stop the lifting appliance travelling downwards at rated speed with design working load.

4.2.6 Machinery spaces

4.2.6.1 General provisions

The spaces and the associated working areas for maintenance/inspection work and emergency operation shall be suitably protected against environmental influences. See 0.3.3, 0.4.2 and 0.4.5.

4.2.6.2 Notices and instructions

4.2.6.2.1 Notices shall be provided to permit identification of the main switch(es) and the light switch(es).

4.2.6.2.2 If, after release of a main switch, some parts remain live (lighting, etc.) notice(s) placed in proximity to the main switch shall indicate this.

4.2.6.2.3 In the machine room (4.2.6.3), the machinery cabinet (4.2.6.5.2) or at the emergency and tests panel(s) (4.2.6.6), there shall be detailed instructions (see 6.3.1.1 g) and m)) to be followed in the event of lifting appliance breakdown, particularly concerning the use of the device for rescue operations and the emergency unlocking key for landing doors.

4.2.6.3 Machinery in a machine room

4.2.6.3.1 Traction sheave in the well

The traction sheave may be installed in the well, provided that:

- a) the verifications and the tests and the maintenance operations are able to be carried out from the machine room;
- b) the openings between the machine room and the well are as small as possible.

4.2.6.3.2 Dimensions

4.2.6.3.2.1 The dimensions of machine rooms shall be sufficient to permit working on equipment.

There shall be provided at least a clear height of 2,10 m at working areas, and:

- a) a clear horizontal area in front of the control panels and cabinets of:
 - 1) depth, measured from the external surface of the enclosures, at least 0,70 m;

- 2) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel;
- b) a clear horizontal area of at least 0,50 m × 0,60 m for maintenance and inspection of moving parts at points where this is necessary and, if need be, manual emergency operation (4.8.2.3.1).

4.2.6.3.2.2 The clear height for movement shall not be less than 1,80 m.

The access ways to the clear spaces mentioned in 4.2.6.3.2.1 shall have a width of at least 0,50 m. This value may be reduced to 0,40 m where there are no moving parts or hot surfaces, as defined in 4.9.1.1.6.

This clear height for movement is taken to the underside of the lowest striking point and measured from the floor of the access area.

4.2.6.3.2.3 There shall be a clear vertical distance of at least 0,30 m above unprotected rotating parts of the machine.

4.2.6.3.2.4 When the machine room floor comprises a number of levels differing by more than 0,50 m, fixed ladders according to 4.2.2.5 or stairways and guardrails shall be provided.

4.2.6.3.2.5 When the floor of the machine rooms has any recesses with a depth of more than 0,05 m and a width between 0,05 m and 0,50 m wide, or any ducts, they shall be covered. This applies only to areas where a person may work or move between different working areas.

Recesses with a width of more than 0,50 m shall be considered as different levels, see 4.2.6.3.2.4.

4.2.6.3.3 Other openings

The dimension of holes in the slab and 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.

4.2.6.4 Machinery inside the well

4.2.6.4.1 General provision

In the case of manually operated mechanical blocking device (4.2.6.4.4.1), a clear notice(s) giving all the necessary instructions for operation shall be affixed at an appropriate place(s) in the well.

4.2.6.4.2 Dimensions of working areas inside the well

4.2.6.4.2.1. The dimensions of working areas at the machinery shall be sufficient to permit working on equipment.

It shall be possible to put the carrier in a position to obtain at least a clear height of 2,10 m at working areas, if available considering the travel height, and:

- a) a clear horizontal area in front of the control panels and cabinets. This area is defined as follows:
 - 1) depth, measured from the external surface of the enclosures, at least 0,70 m;
 - 2) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel;
- b) a clear horizontal area of at least 0,50 m × 0,60 m for maintenance and inspection of parts at points where this is necessary.

4.2.6.4.2.2 There shall be a clear vertical distance of at least 0,30 m above unprotected rotating parts of the machine.

4.2.6.4.3 Working areas in the carrier or on the carrier roof

4.2.6.4.3.1 Where work on the machinery is to be carried out from inside the carrier or from the carrier roof and if any kind of uncontrolled or unexpected carrier movement resulting from the work can be dangerous to persons, the following applies:

- a) any dangerous movement of the carrier shall be prevented by a mechanical blocking device;
- b) all movement of the carrier shall be prevented by means of an electric safety device in conformity with 4.10.2 when the mechanical blocking device is in its active position. The inactive position shall be controlled by an electric switch;
- c) when this mechanical blocking device is in its active position and cannot be disengaged due to forces exerted on it by the lifting appliance, it shall be possible to leave the well:
 - 1) via the landing door by a clear opening of at least 0,50 m × 0,70 m above the carrier door header / door drive, or
 - 2) via the carrier by access through a trap door in the carrier roof according to 4.4.1.6. Steps, ladder or hand hold(s) shall be provided to allow a safe descent into the carrier, or
 - 3) via an emergency door as 4.2.3.2 c).

Instructions regarding the escape procedure shall be given in the lifting appliance documentation.

4.2.6.4.3.2 The emergency operation and dynamic tests shall be carried out from outside of the well in accordance with 4.2.6.6.

4.2.6.4.3.3 If inspection door(s) or access/inspection panel(s) are located in the wall(s) of the carrier, they shall:

- a) comply with 4.2.3.2 d);
- b) in the case of inspection doors with a width of more than 0,30 m and the gap to the wall of the well is more than 0,30 m be provided with a barrier to avoid falling into the well;
- c) not open towards the outside of the carrier;
- d) be secured by means requiring the use of a tool or key for their release. Its fixing systems shall remain attached to the carrier or to the inspection doors or access/inspection panel when it is removed;
- e) be provided with an electric safety device in conformity with 4.10.2, checking the locked position;
- f) satisfy the same requirements as the walls of the carrier (4.4.1.3 and 4.4.1.4).

4.2.6.4.3.4 Where it is necessary to move the carrier from inside with an open inspection door or panel the following applies:

- a) an inspection control station according to 4.11.1.3 shall be available near the inspection door or panel;

- b) this inspection control station shall be accessible only to authorized persons by placing it behind the inspection door or panel and so arranged that it is not possible to use it to drive the carrier when standing on the carrier roof.

4.2.6.4.4 Working areas in the pit

4.2.6.4.4.1 When work on the lifting appliance has to be performed from underneath the carrier, the following applies:

- a) If a clear distance in accordance with Table 2 is not available under the carrier when at its lowest position, a manually positioned mechanical blocking device shall be provided to enable the carrier to be held in a position to create a free distance between the floor of the working area and the lowest parts of the carrier in accordance with Table 2. The device shall be able to stop the carrier travelling downwards at rated speed with design working load.
- b) The blocking device shall be activated before entering the pit and shall be provided with an electric safety device in conformity with 4.10.2 that detects the active positioning of the mechanical blocking device and which disables the carrier and landing controls and enables any inspection control station in the pit. The device shall be marked with its intended purpose and position.
- c) The opening of any door providing access to the pit shall be by use of a key, see 4.3.9.3.1, and prevent normal operation of the lifting appliance; visible and/or audible information shall be available if the blocking device is not in its active position. The return of the lifting appliance to normal operation shall only be made by operation of a reset device placed outside of the well and accessible to authorized persons only.
- d) Where it is necessary to move the carrier from the pit, an inspection control station according to 4.11.1.3.1.1 c) shall be available for use.
- e) The walkable floor of the pit shall be able to support at any position the mass of 2 persons, each counting for 1 000 N without permanent deformation.

4.2.6.4.4.2 When the carrier is in the position according to 4.2.6.4.4.1 a), it shall be possible to leave the pit either:

- a) through a vertical gap from the landing door level to the lowest edge of the carrier apron of at least 0,50 m, or;
- b) through an access door to the pit.

4.2.6.4.4.3 The emergency operation and dynamic tests shall be carried out from outside of the well in accordance with 4.2.6.6.

4.2.6.4.5 Working areas outside of the well

When the machinery is in the well and any work has to be performed from outside of the well, access to this equipment shall only be possible by an access/ trap door in conformity with 4.2.3.2.

4.2.6.5 Machinery outside of the well

4.2.6.5.1 If any part of machinery is located outside of the well e.g. control panel, drive machine, it shall be located inside a cabinet.

4.2.6.5.2 The machinery cabinet shall consist of imperforate walls, floor, roof and door(s).

The door(s) shall:

- a) not open towards the inside of the cabinet;
- b) be provided with a key-operated lock;
- c) be capable of being re-closed and re-locked without a key.

The only permissible openings are:

- d) necessary openings for the functioning of the lifting appliance between the well and the machinery cabinet;
- e) vent openings for escape of gases and smoke in the event of fire. These openings when accessible to non-authorized persons shall comply with the following requirements:
 - 1) protection according to EN ISO 13857:2008, Table 5, against contact with danger zones;
 - 2) IP2XD according to EN 60529:1991;
- f) ventilation openings.

4.2.6.5.3 The dimensions of working areas shall be sufficient to permit working on equipment.

There shall be provided at least a clear height of 2,10 m at working areas, and:

- a) a clear horizontal working area of at least 0,50 m × 0,60 m for maintenance and inspection of parts at points where this is necessary;
- b) a clear horizontal area in front of the control panels and cabinets, defined as follows:
 - 1) depth, measured from the external surface of the enclosures, at least 0,70 m;
 - 2) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel.

4.2.6.5.4 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 an adequate warning sign shall be appropriately 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.

4.2.6.6 Devices for emergency and test operations

4.2.6.6.1 In the case of 4.2.6.4.3 and 4.2.6.4.4 the necessary devices for emergency and test operations shall be provided on a panel(s) suitable for carrying out from outside of the well all emergency operations and dynamic tests of the lifting appliance such as tests of traction, safety gear, end stops, ascending carrier overspeed protection means, unintended carrier movement protection, rupture valve, cushioned stop and pressure. The panel(s) shall be accessible to authorized persons only.

If the emergency and test devices are not protected inside a machinery cabinet, they shall be enclosed with a suitable cover, which:

- a) does not open towards the inside of the well;
- b) is provided with a key-operated lock, capable of being reclosed and relocked without a key.

4.2.6.6.2 The panel(s) shall provide the following:

- a) emergency operation devices according to 4.8.2.2.2.7 and 4.8.2.3 or 4.8.3.9, together with an intercom system in conformity with 4.11.3.4;
- b) control equipment which enables dynamic tests to be carried out;
- c) direct observation of the lift machine or a display device(s), which give indication of:
 - 1) the direction of movements of the carrier;
 - 2) the reaching of an unlocking zone;
 - 3) the speed of the carrier for lifting appliances where there are not devices to limit the speed during the emergency operations.

4.2.6.6.3 The devices on the panel(s) shall be lit by a permanently installed electric lighting with an intensity of at least 200 lux measured at the device.

A switch placed on or close to the panel shall control lighting of the panel(s).

The electrical supply for this lighting shall be in conformity with 4.9.7.1.

4.2.6.6.4 There shall be working areas according to 4.2.6.3.2.1 in front of emergency and test panels.

4.3 Landing doors and carrier doors

4.3.1 General provisions

4.3.1.1 The openings in the well giving normal access to the carrier shall be provided with landing doors and the access to the carrier shall be through a carrier door.

4.3.1.2 The doors shall be imperforate.

4.3.1.3 The landing and carrier doors when closed shall, apart from the necessary clearances, completely close the landing and carrier entrances.

4.3.1.4 When closed, the clearance between door panels, or between panels and uprights, lintels or sills, shall not exceed 6 mm. This value, due to wear, shall not exceed 10 mm, with the exception of doors made from glass (see 4.3.6.2.2 i) 3)). These clearances are measured at the back of recesses, if any.

4.3.1.5 In the case of hinged carrier doors, they shall strike stops to prevent them swinging outside the carrier.

4.3.2 Height and width of entrances

4.3.2.1 Height

Landing doors and carrier doors shall be such that a minimum clear height of the entrance is 2,0 m.

In case of existing building, due to the building constraints, the clear height of the entrance of a landing door shall be the maximum allowed by the building constraints, however not less than 1,80 m.

When the height is less than 2,0 m, warnings, using yellow and black stripes according to ISO 3864-1:2011, Figure 17 or an adequate warning sign shall be appropriately placed in the carrier and at the landing and:

- a) the edges of the door lintel shall be provided with an inclined surface of not more than 30° inclination to the horizontal up to the height of 2,0 m; or
- b) the edges shall be covered with shock dampening material;
- c) the landing door mechanism shall not be accessible from inside the carrier.

4.3.2.2 Width

The clear entrance of the landing doors shall not extend more than 50 mm in width beyond the clear carrier entrance on both sides.

4.3.3 Sills, guides, door suspension

4.3.3.1 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 will help to avoid water from washing, sprinklers, etc., draining into the well.

4.3.3.2 Guides

4.3.3.2.1 Landing and carrier doors shall be designed to prevent, during normal operation, derailment, mechanical jamming, or displacement.

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

4.3.4 Horizontal door clearances

4.3.4.1 The horizontal distance between the sill of the carrier and sill of the landing doors shall not exceed 35 mm (see Figure 1).

4.3.4.2 The horizontal distance giving access to the well between the leading edges of the carrier door and the landing doors during the whole of their normal operation shall not exceed 0,12 m (see Figure 1).

NOTE Where additional building doors are added in front of the landing door the rescue of trapped persons in the space between is in charge to the building management (see also 4.2.2.1 and 4.2.2.3).

4.3.4.3 In the case of the combination of:

- a hinged landing door and a folding carrier door (see Figure 2);
- a hinged landing door and a horizontal sliding carrier door (see Figure 3);
- horizontal sliding carrier and landing doors, which are not mechanically coupled (see Figure 4);

it shall not be possible to place a ball with a diameter of 0,12 m according to Figure 2, Figure 3 or Figure 4 respectively in any gap between the closed doors.

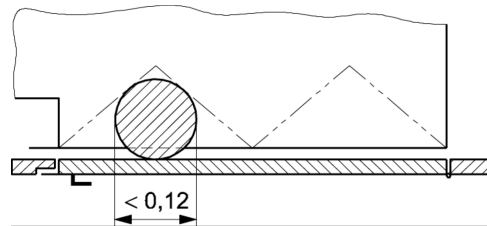


Figure 2 — Hinged landing door and folding carrier door

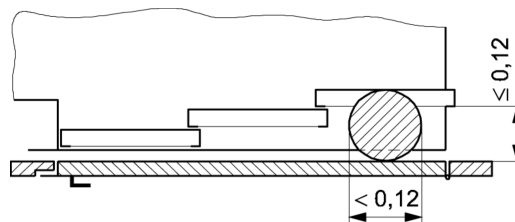


Figure 3 — Hinged landing door and horizontal sliding carrier door

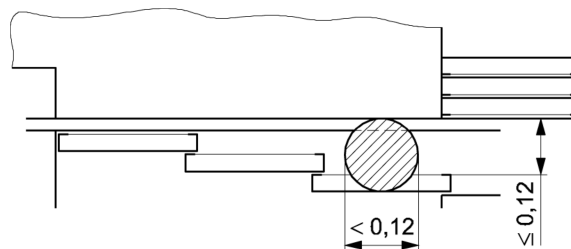


Figure 4 — Horizontal sliding carrier and landing doors, not mechanically coupled

NOTE Figure 4 is also applicable for situation “carrier door closed and landing door open”.

4.3.5 Strength of landings and carrier doors

4.3.5.1 General

Components shall be made of material that maintains the strength property over their intended lifetime under the environmental conditions.

4.3.5.2 Behaviour under fire conditions

Landing doors are expected to comply with the regulations relevant to the fire protection for the building concerned. EN 81-58:2018 shall be applied for the testing of such doors.

4.3.5.3 Mechanical strength

4.3.5.3.1 Complete landing doors, with their locks, and carrier doors shall have a mechanical strength such that in the locked position of landing doors and closed position of carrier doors:

- a) when a static 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.

After such a test the safety function of the door shall not be affected.

- b) 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 or frame, with width larger than 100 mm from the landing side for landing doors or from the inside of the carrier for carrier doors they shall resist without permanent deformation affecting requirements of 4.3.1.4 and 4.3.9.1.

For glass doors see 4.3.6.2.2 i) 3).

For a) and b), the probe surface used to apply the test forces may be of soft material to avoid damage to the door coating.

4.3.5.3.2 Horizontal sliding doors and folding doors shall be provided with devices for retaining the door panel(s) in position should the guiding element fixed to the door panel fail. All door panels with these devices installed in their complete door assembly with these devices shall withstand a pendulum shock test as specified in 4.3.5.3.4 a) at striking points according to Table 3 and Figure 5 under the worst possible failure condition of the normal guiding elements.

Retainer should be understood as a mechanical means preventing the door panels from leaving their guides which may be either an additional component or part of the panel/hanger.

The test shall be performed with the door panel in the normal operational position. The means simulating the normal guiding elements keeping this position shall not give any horizontal support during the test.

4.3.5.3.3 Under the application of a manual force of 150 N in the direction of the opening of the leading landing door panel(s) of horizontally sliding doors and folding doors, at the most unfavourable point, the clearances defined in 4.3.1 may exceed 6 mm, but they shall not exceed:

- a) 30 mm for side opening doors;
- b) 45 mm in total for centre opening doors.

4.3.5.3.4 In addition for:

- landing doors with glass panels;
- carrier doors with glass panels, and;
- side frames wider than 150 mm on landing doors;

the following shall be fulfilled (see Figure 5):

NOTE Where additional panels to the side of the door frame are used to enclose the well they are considered as side frames.

- a) when an impact energy equivalent to a falling height of 800 mm of the soft pendulum shock device (EN 81-50:2020, 5.14) is striking the glass panels or side frames in the middle of the panel or frame width, at striking points according to Table 3, from the landing side or from the inside of the carrier, the following shall be satisfied:
 - 1) they may have permanent deformation;
 - 2) there shall be no loss of integrity of the door assembly. The door assembly shall remain in place with no gaps greater than 0,12 m into the well;

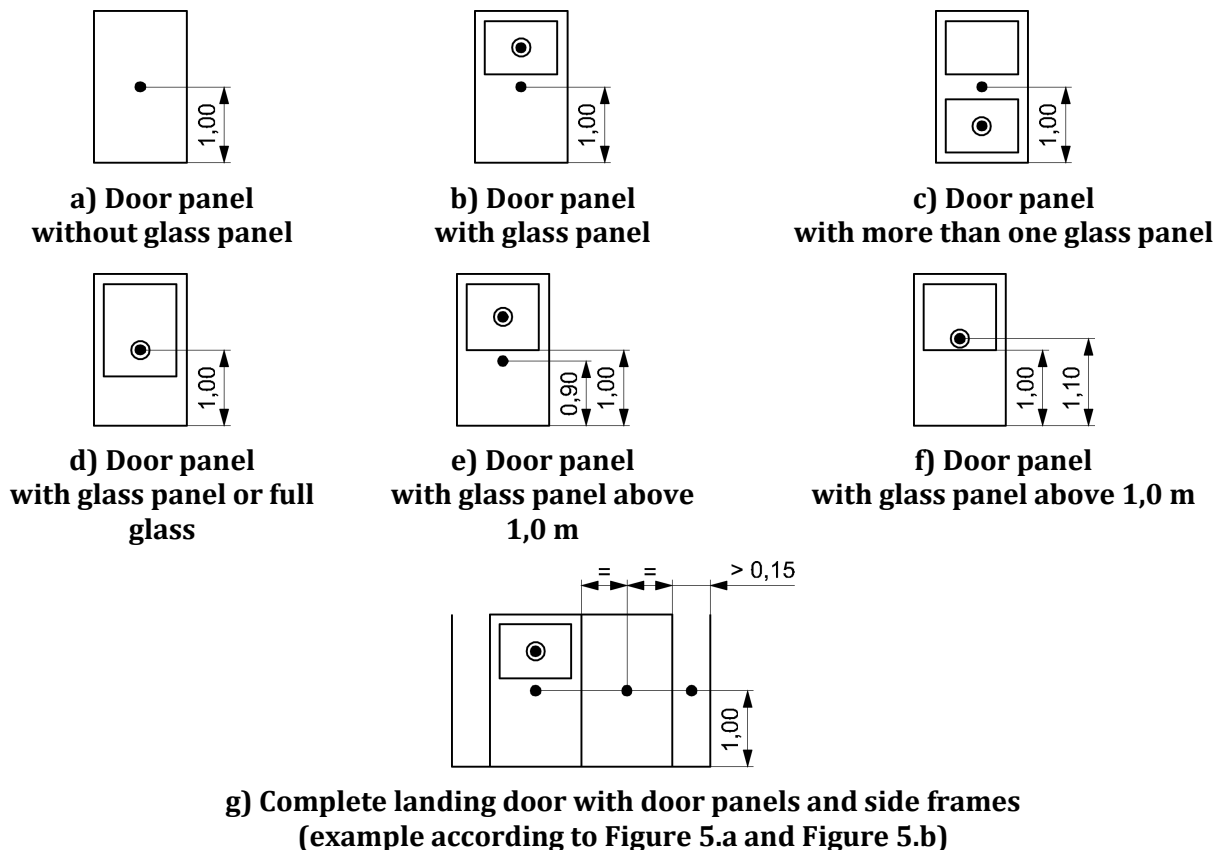
- 3) after the pendulum test the doors do not need to be able to operate;
- 4) for glass elements, there shall be no cracks;
- b) when an impact energy equivalent to a falling height of 500 mm of the hard pendulum shock device (EN 81-50:2020, 5.14) is striking a glass panel bigger than stated in 4.3.7.1 a), or a glass panel in frames in the middle of the glass panels width at striking points according to Table 3, from the landing side or from the inside of the carrier, the following shall be satisfied:
- 1) no cracks;
- 2) no damage on the surface of the glass except chips of 2 mm maximum in diameter.

In the case of multiple glass panels, the weakest configuration of the panels shall be taken into account.

Table 3 — Striking points

Pendulum shock test	Soft pendulum		Hard pendulum	
Dropping height	800 mm	800 mm	500 mm	500 mm
Striking point height	1,0 m ± 0,10 m	Centre of glass	1,0 m ± 0,10 m	Centre of glass
Door without glass panel (Figure 5 a)	X			
Door with small glass panel (Figure 5 b)	X	X		X
Door with more than one glass panel (Figure 5 c) Tests on whichever glass panel represent the worst case	X	X		X
Door with big glass panel or full glass (Figure 5 d)	X (Impact on glass)		X (Impact on glass)	
Door with glass panel starting or ending at about 1 m height (Figure 5 e)	X	X		X
Door with glass panel starting or ending at about 1 m height (Figure 5 f)	X (Impact on glass)		X (Impact on glass)	
Side frames > 150 mm (Figure 5 g)	X			
Door with vision panel (4.3.7)	X	X		

Dimensions in metres



NOTE 1 Figures 5 e) and 5 f) are alternative solutions.

The worst case shall be tested. If it is not possible to determine the worst case, both or all variants shall be tested.

NOTE 2 For striking points defined by 1 m, the tolerance is $\pm 0,10$ m.

Key

- striking point for soft pendulum shock test
- striking point for hard pendulum shock test

Figure 5 — Door panels – Pendulum shock tests – Striking points

4.3.5.3.5 Doors/frames with glass shall use laminated glass.

4.3.5.3.6 The fixing of the glass in doors/frames shall ensure that the glass cannot slip out of the fixings, even when sinking.

4.3.5.3.7 The glass panels shall have markings giving the following information:

- a) name of the supplier or trade mark;
- b) type of glass;
- c) thickness (e.g. 8/8/0,76 mm).

4.3.6 Protection in relation to door operation

4.3.6.1 General

The doors shall be designed and positioned in such a way as to minimize risk of damage or injury due to jamming of a part of the person, clothing or other object.

To avoid the risk of shearing during operation, the face of automatic power operated sliding doors, from the landing and from inside the carrier 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 also made for the access to the unlocking triangle defined in 4.3.9.3.

4.3.6.2 Power operated doors

4.3.6.2.1 General

In the case of a combination of hinged landing door manually or power operated and power operated carrier door, the carrier door shall move only when the landing door is closed and shall fully reopen if the landing door is opened.

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

4.3.6.2.2 Horizontally sliding doors – Automatic power operated doors

The following applies:

- a) the kinetic energy of the landing and/or carrier door and the mechanical elements which are rigidly connected to it, calculated or measured at the average closing speed shall not exceed 10 J.

The average closing speed of a sliding door is calculated over its whole travel, less:

- 1) 25 mm at each end of the travel in the case of centrally closing doors;
 - 2) 50 mm at each end of the travel in the case of side closing doors;
- b) a protective device shall automatically initiate re-opening of the door(s) in the event of a person crossing the entrance during the closing movement. The protective device may be rendered inoperative in the last 20 mm of door closing gap. The protective device of the carrier door and the landing doors may be common.
 - 1) the protective device shall cover the opening over the distance between at least 25 mm and 1 600 mm above the carrier door sill;
 - 2) the protective device shall be capable of detecting obstacles minimum of 50 mm diameter;
 - 3) to counteract persistent obstructions when closing the door, the protective device may be deactivated after a predetermined time;
 - 4) in case of failure, or deactivation of the protective device, the kinetic energy of the doors shall be limited to 4 J, if the lifting appliance is kept in operation, and an acoustic signal shall operate at any time the door(s) is (are) closing.
 - c) the effort needed to prevent the door closing shall not exceed 150 N excluding the first third of the travel of the door;
 - d) the prevention of door closing movement shall initiate a re-opening of the door;

Re-opening does not imply that the door shall open fully, but some reopening shall occur to allow an obstacle to be removed.

- e) the effort needed to prevent a folding door from opening shall not exceed 150 N. This measurement shall be made with the door collapsed such that the adjacent outer edges of the folded panels or equivalent, e.g. door frame, are at a distance of 100 mm;
- f) if a folding carrier door is going into a recess the distance between any outer edge of the door fold in the open position and the recess shall be at least 25 mm;
- g) if labyrinths or chicanes are used on the front edges of leading door panels, or on the combination of leading door edge and fixed jamb, recesses and protrusions shall not exceed 25 mm.

In the case of glass doors, the thickness of the front edge of the leading panel(s) shall not be less than 20 mm. The edges of the glass shall be ground in order not to cause injury;

- h) doors made from glass, with the exception of vision panels to 4.3.7.1 a), shall be provided with means to limit the opening force to 150 N. When the maximum opening force is exceeded the door panels shall be stopped and the power to the door motor shall be switched off;
- i) to avoid dragging of children hands, automatic power operated horizontally sliding doors made of glass of dimensions greater than stated in 4.3.7 shall be provided with means to minimize the risk, by:
 - 1) making the glass opaque on the side exposed to the user by the use of either frosted glass or the application of frosted material to a height of minimum 1,10 m, or
 - 2) sensing the presence of fingers at least up to 1,60 m above sill and stopping the door movement in opening direction, or
 - 3) limiting the gap between door panels and frame to maximum 4 mm at least up to a minimum of 1,60 m above sill. This value due to wear shall not exceed 5 mm.

Recesses (framed glass, etc.) shall not exceed 1 mm and shall be included in the 4 mm gap. The maximum radius on the outer edge of the frame adjacent to the door panel shall not be more than 4 mm.

4.3.6.2.3 Other types of doors

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, the operation shall comply with EN 16005:2012, 4.6.4.1.

4.3.6.3 Reversal of closing movement

If carrier doors are automatic power operated a control button inside the carrier shall allow to reopen the doors when the carrier is at the landing. This control button shall re-open also the related power operated landing doors, if any.

NOTE This is normally referred to as a "Door Re-open Button".

4.3.7 Local landing lighting and “Carrier here” indication

4.3.7.1 In the case of landing doors with manual opening, the user needs to know whether the carrier is there or not.

To this effect, there shall be installed one of the following solutions:

- a) one or more transparent vision panels conforming to the following four conditions at the same time:
 - 1) mechanical strength as specified in 4.3.5.3 breaking or damaging the glass during the door pendulum shock test per 4.3.5.3.4 a) is not considered as test failure. The glass panel shall not detach from the door;
 - 2) laminated glass of minimum thickness of 3/3/0,76 mm and marked with:
 - i) name of the supplier and trade mark;
 - ii) thickness (e.g. 3/3/0,76 mm);
 - 3) minimum glazed area per landing door of 0,015 m² with a minimum of 0,01 m² per vision panel;
 - 4) width of at least 60 mm, and at most 150 mm. The lower edge of vision panels which are wider than 80 mm shall be at least 1 m above floor level,
- b) an illuminated “carrier here” signal which shall light up when the carrier is about to stop or has stopped at the particular landing. This signal may be switched off when the carrier is parked and the doors are closed, but shall light again when the call button of the landing where the carrier is parked is activated.

4.3.7.2 The carrier door shall be fitted with a vision panel(s) if the landing door has a vision panel(s) as in 4.3.7.1 a), unless the carrier door is automatic and remains in the open position when the carrier is stationary at the level of a landing.

When a vision panel(s) is fitted it shall satisfy the requirements of 4.3.7.1 a) and be positioned in the carrier door such that it is in visual alignment with the landing door vision panel(s) when the carrier is at the level of the landing.

4.3.7.3 The natural or artificial lighting of the landings in the vicinity of landing doors has to be at least 50 lux at floor level, such that a user can see ahead when they are opening the landing door to enter the lifting appliances, even if the carrier light has failed.

4.3.8 Locking and closed landing door check

4.3.8.1 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 0,20 m above and below the landing level.

4.3.8.2 It shall not be possible to make the carrier start or continue in motion with a landing door open.

4.3.8.3 It shall not be possible to make the carrier start or continue in motion with a landing door unlocked when the carrier is more than 50 mm from the sill level of that door. This may be achieved by means of an electric safety contact bridging the locking contact within the unlocking zone.

4.3.9 Locking and emergency unlocking of landing and carrier doors

4.3.9.1 Landing door locking devices

4.3.9.1.1 Each landing door shall be provided with a locking device satisfying the conditions of 4.3.8.1. This device shall be protected against deliberate misuse.

With the exception of 4.3.8.3, 4.11.1.2 and 4.11.1.5 the effective locking of the landing door in the closed position shall precede the movement of the carrier. The locking shall be proved by an electric safety device in conformity with 4.10.2.

4.3.9.1.2 The locking devices shall be designed and situated to be inaccessible from the outside and the inside of the well when in normal use and shall be protected against deliberate misuse.

4.3.9.1.3 The electric safety device shall not be activated unless the locking elements are engaged by at least 7 mm (see Figure 6).

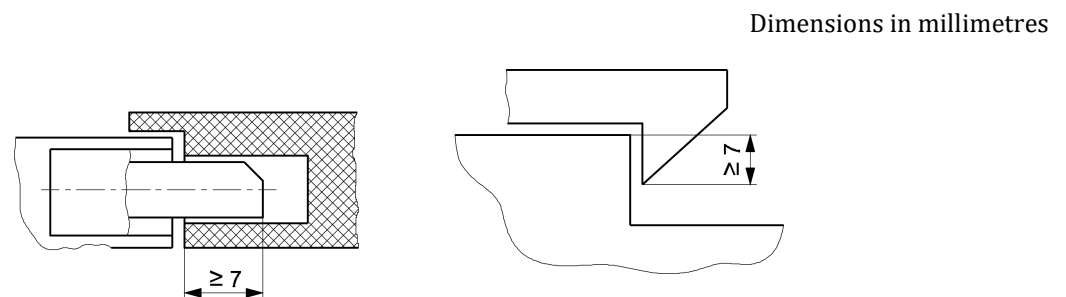


Figure 6 — Examples of locking elements

4.3.9.1.4 The connection between one of the contact elements which opens the circuit and the device which mechanically locks shall be positive and failsafe, but adjustable if necessary.

4.3.9.1.5 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.

4.3.9.1.6 Locks on landing doors shall be located at, or close to, the closing edge of the door and shall continue to lock effectively should the door sag.

4.3.9.1.7 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.

NOTE Shock requirements are found in EN 81-50:2020, 5.2.

4.3.9.1.8 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.

4.3.9.1.9 The lock shall resist, without permanent deformation or breakage which could adversely affect safety during the test laid down in EN 81-50:2020, 5.2, a minimum force at the level of the lock and in the direction of opening of the door of:

- a) 1 000 N in the case of sliding doors;
- b) 3 000 N on the locking pin, in the case of hinged doors.

4.3.9.1.10 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).

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

4.3.9.1.12 Working parts needed inspection shall be visible directly or through a transparent cover.

4.3.9.1.13 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.

4.3.9.1.14 The locking device is regarded as a safety component and shall be tested according to the requirements in EN 81-50:2020, 5.2.1, 5.2.2, 5.2.3.

4.3.9.1.15 On locking devices a data plate shall be fixed indicating:

- a) the name of the manufacturer of the locking device;
- b) the type examination certificate number, if any;
- c) the type of locking device.

4.3.9.2 Carrier door locking devices

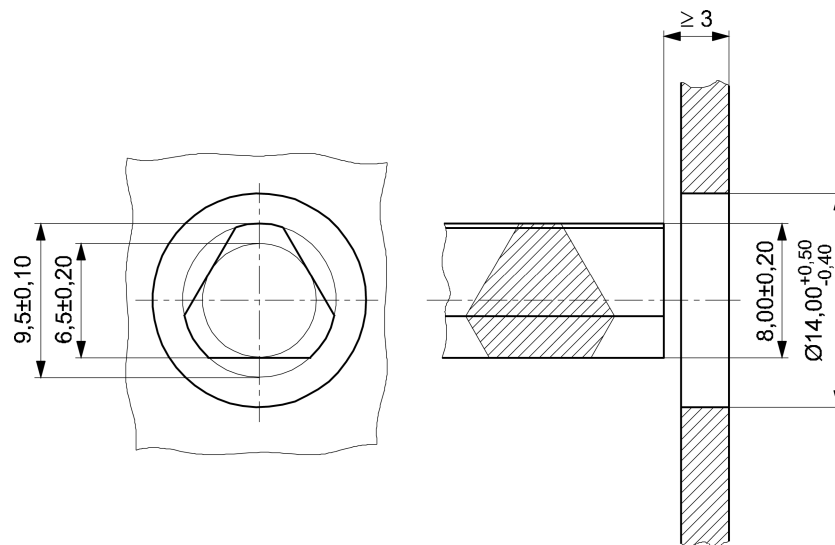
If the carrier door needs to be locked (see 4.2.5.3.1 b)), the locking device shall be designed to meet the requirements given in 4.3.9.1.

This device shall be protected against deliberate misuse.

4.3.9.3 Emergency unlocking

4.3.9.3.1 Each of the extreme (the lowest and the highest) landing doors shall be capable of being unlocked from the outside with the aid of an emergency unlocking key, which fits the unlocking triangle as defined in Figure 7. Any intermediate landing doors shall not be unlockable with the emergency unlocking key.

Dimensions in millimetres

**Figure 7 — Unlocking triangle**

4.3.9.3.2 The position of unlocking triangle shall be either on the door panel or frame. When in a vertical plane, on the door panel or frame, the position of the unlocking triangle shall not exceed 2,0 m in height above the landing.

If the unlocking triangle is on the frame and the key hole downwards in the horizontal plane the maximum height of the unlocking triangle hole from the landing floor shall be 2,70 m. The length of the emergency unlocking key shall be at least equal to the height of the door minus 2,0 m.

The emergency unlocking key shall be available on the site of the lifting appliance installation, close to the main switch.

The emergency 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.

Where the emergency unlocking key is of a length greater than 0,20 m it is regarded as a special tool.

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

4.3.9.3.4 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.

4.3.9.3.5 If there is no access door to the pit, other than the landing door, the door lock shall be reachable within a height of 1,80 m and a maximum horizontal distance of 0,80 m from the pit ladder, if any, according to 4.2.2.4, or a permanently installed device shall allow a person in the pit to unlock the door.

4.3.9.4 Electric safety device for proving the landing door closed

4.3.9.4.1 Each landing door shall be provided with an electric safety device in conformity with 4.10.2 for proving the closed position, so that the conditions imposed by 4.3.8.2 are satisfied.

4.3.9.4.2 In the case of horizontally 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.

4.3.9.4.3 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.

4.3.10 Requirements common to devices for proving the locked condition and the closed condition of the landing door

4.3.10.1 It shall not be possible, from positions normally accessible to persons, to operate the lifting appliance with a landing door open or unlocked, after one single action not forming part of the normal operating sequence.

4.3.10.2 The means used to prove the position of a locking element shall have positive operation.

4.3.11 Sliding landing doors with multiple, mechanically linked panels

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

- a) to place the device required in 4.3.9.4.1, or 4.3.9.4.2 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 4.3.9.4.1 or 4.3.9.4.2 on all panels. The linkage shall be ensured even in case of rupture of guiding means. Simultaneous rupture of upper and lower guiding means needs not to be taken into consideration. Compliance with the strength requirements of 4.3.11.3 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.

4.3.11.2 If a 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 the other panel(s), and that these are not fitted with a handle.

The closed position of the other panel(s), not locked by the locking device, shall be proved by an electric safety device in conformity with 4.10.2.

4.3.11.3 The devices providing direct mechanical linkage between panels according to 4.3.11.1 or indirect mechanical linkage according to 4.3.11.2 are considered as forming part of the locking device.

They shall be capable of resisting the force of 1 000 N as per 4.3.9.1.9 a) even if the force of 300 N mentioned in 4.3.5.3.1 is acting simultaneously.

4.3.12 Closing of automatically operated landing doors

In the case of lifting appliance landing doors participating in the fire protection of the building, they shall be closed in normal operation, after the necessary period of time (see D.2.3.2), which may be defined according to the traffic using the lifting appliance, in the absence of a command for the movement of the carrier.

NOTE For the behaviour of lifting appliances in the event of a fire, requirements are found in EN 81-73:2016.

4.3.13 Electric safety device for proving the carrier doors closed

4.3.13.1 With the exception of 4.11.1.2 and 4.11.1.5, it shall not be possible to start the lifting appliance nor keep it in motion if a carrier door (or any of the panels in the case of a multi panel door) is open.

4.3.13.2 Each carrier door shall be provided with an electric safety device in conformity with 4.10.2, for proving the closed position so that the conditions imposed by 4.3.13.1 are satisfied.

4.3.14 Sliding or folding carrier doors with multiple, mechanically linked panels

4.3.14.1 If a sliding or folding carrier door comprises several directly mechanically linked panels, it is permitted:

- a) to place the device required in 4.3.13.2 either:
 - 1) on a single panel (the leading panel in the case of telescopic doors), or
 - 2) on the door driving element if the mechanical connection between this element and the panel is direct, and
- b) in the case and conditions laid down in 4.2.5.3.1 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 or folding 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 4.3.13.2 on all panels. The linkage shall be ensured even in case of rupture of guiding means. Compliance with the strength requirements of 4.3.11.3 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.

4.3.14.2 If a sliding door comprises several indirectly mechanically linked panels (e.g. by rope, belt or chain), it is permitted to place the device (4.3.13.2) on a single panel, provided that:

- a) this is not the driven panel, and
- b) the driven panel is directly mechanically linked to the door driving element.

4.3.15 Opening the carrier door

4.3.15.1 If the carrier is stationary in the unlocking zone (4.3.8.1), it shall be possible with a force not greater than 300 N, to open the mechanically coupled carrier and landing door by hand from:

- a) any landing door which can be unlocked with the emergency unlocking key (see 4.3.9.3.1), or being unlocked by the carrier door;
- b) within the carrier;

when the door operator does not apply closing force.

4.3.15.2 In order to restrict the opening of the carrier door by persons inside the carrier, the carrier door shall be equipped by a locking device, when the lifting appliance has more than two stops.

4.3.15.3 It shall be possible, at least where the carrier is stopped within the distance defined in 4.6.5.5, once the corresponding landing door has been opened, to open the carrier door from the landing without tools, other than the emergency unlocking key or tools being permanently available on site. This also applies to carrier doors fitted with locking devices as 4.3.9.2.

4.3.15.4 In the case of lifting appliances covered by 4.2.5.3.1 b), the opening of the carrier door from inside the carrier shall be possible only when the carrier is in the unlocking zone.

4.4 Carrier, counterweight and balancing weight

4.4.1 Carrier

4.4.1.1 Height of carrier

The interior clear height of the carrier shall be:

- a) at least 2,0 m;
- b) in case of existing building, due to the building constraints:
 - 1) the maximum allowed by the building constraints, however not less than 1,80 m;
 - 2) not less than the height of the landing doors;
 - 3) a seat inside the carrier as per D.2.6 shall be provided.

4.4.1.2 Available carrier area, rated load, number of passengers

4.4.1.2.1 General case

4.4.1.2.1.1 To prevent overloading of the carrier by persons, the available area of the carrier shall be limited.

Carrier dimensions shall be measured between the structural carrier walls, and shall produce an area not exceeding 2,0 m². Decorative finishes on each wall that reduce the carrier dimensions shall not exceed 15 mm in thickness. There shall be no additional features attached to the carrier walls below a height of 800 mm which may restrict the accommodation and turning of passengers using wheelchairs or passengers with other walking aids.

The rated load shall be calculated at not less than 250 kg/m² of the loading area calculated as above.

The maximum permissible rated load shall be 500 kg.

Mechanical strength of the carrier shall be such that foreseeable misuse of too many persons is taken into consideration. Therefore, the carrier shall be designed to support the static load as determined in Table 4, or design working load, whichever is highest, plus an additional load of 25 % i.e. giving a static test coefficient of 1,25.