



BSI Standards Publication

Safety rules for the construction and installation of lifts — Lifts for the transport of goods only

Part 31: Accessible goods only lifts

National foreword

This British Standard is the UK implementation of EN 81-31:2024. It supersedes BS EN 81-31:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MHE/4, Lifts, hoists and escalators.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. Therefore Annex ZA/ZZ in the European text, and references to EU legislation, are still valid for this market.

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Lifts for the transport of goods only - Part 31: Accessible
goods only lifts

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des élévateurs - Élévateurs pour le transport d'objets
seulement - Partie 31 : Monte-charges accessibles

Sicherheitsregeln für die Konstruktion und den Einbau
von Aufzügen - Aufzüge für den Gütertransport - Teil
31: Betretbare Güteraufzüge

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European foreword

This document (EN 81-31:2024) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2025 and conflicting national standards shall be withdrawn at the latest by November 2026.

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

This document supersedes EN 81-31:2010.

The main changes with respect to the previous edition EN 81-31:2010 are listed below:

- Requirements have been updated, taking into account EN 81-20:2020, EN 81-50:2020 and EN 81-21:2022. Specifically: definitions; strength of the doors, screens, partitions; unintended carrier movement; refuge spaces; inspection operation; rope's retainers; balustrade; lighting.
- The scope has been amended. Specifically: excluded overlapping with EN 1570, by use of rigid guide rails only; excluded scissor lifts; removed travel limit for Type A; non-addressed energy dissipation type buffers.
- Requirements and verifications have been added for: refuge spaces; clamping devices; pawl devices; automatic power operated doors; progressive safety gears.
- Improvements have been made for: dimensions of working areas; electrical equipment; emergency electrical operation; performance levels; ropes and terminations; existing buildings; impact factors; buffer with non-linear characteristics; alarm system.
- The reported errors have been eliminated. Specifically: hydraulic formulae;
- The text has been clarified. Specifically: pulley room; extreme position of the carrier in the well; use in limited / not limited access area; ingress in / egress from the well;
- The references to other standards have been updated, according to the progress in that field. All normatively referenced standards now are dated;
- Wording has been amended. Specifically: from “uncontrolled movement” to “unintended movement”; from “manual operation” to “emergency operation”; from “safety space” to “refuge space”; from “load carrying unit” to “carrier”; from “vendor” to “manufacturer”; from “laboratory” to “examiner”;
- The informative Annex “List of significant hazards” has been added;
- The informative Annex “Building interface” has been added;
- Annex ZA has been updated with regard to the European Commission mandate M/396.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

This document is part of the EN 81 series of standards “Safety rules for the construction and installation of lifts”. This is the second edition.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

0 Introduction

0.1 General

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

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

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

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

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

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

The accessible goods only lift installation concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

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

0.2 General provision

0.2.1 The object of this document is to define safety rules related to the construction and installation of accessible goods only lifts, with a view to safeguarding persons and objects against the risk of accidents associated with the use, inspection, maintenance and emergency operation of accessible goods only lifts.¹

a) Persons to be safeguarded:

- 1) users;
- 2) maintenance and inspection personnel;
- 3) persons at the landings of the accessible goods only lift and in the machinery space(s) and pulley room(s), if any.

¹ Within CEN/TC 10 an interpretation committee has been established to answer questions about the spirit in which the experts have drafted the various clauses of this standard. All such interpretations are published within CEN/TS 81-11:2011 until incorporated by amendment into the standards concerned.

b) Property to be safeguarded:

- 1) loads in carrier;
- 2) components of the accessible goods only lift installation;
- 3) building in which the accessible goods only lift is installed.

0.2.2 A study has been made of the various possible hazards concerning accessible goods only lifts, see Annex L.

0.3 Principles used

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

It has, however, seemed necessary to establish certain requirements of good construction, either because they are peculiar to accessible goods only lifts manufacture or because in the case of accessible goods only lifts utilization the requirements may be more stringent than elsewhere.

0.3.2 As far as possible this document sets out only the requirements that materials and equipment have to meet in the interests of safe operation of accessible goods only lifts.

0.3.3 This document considers a building that has characteristics in accordance with Annex K.

0.4 Assumption

0.4.1 Relevant risks have been considered for each component that may be incorporated in a complete accessible goods only lift installation.

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

0.4.2 Components are selected and installed so that foreseeable environmental influences and special working conditions do not affect the safe operation of the accessible goods only lift.

0.4.3 Users have to be safeguarded against their own negligence and unwitting carelessness when using the accessible goods only lift in the intended way.

0.4.4 The accessible goods only lifts are not intended to transport persons inside the carrier.

0.4.5 With the exception of the items listed below, a mechanical device built according to good practice and the requirements of this document will not deteriorate to a point of creating hazard without the

possibility of detection, provided that all of the instructions given by the manufacturer have been duly applied.

The following mechanical failures are considered:

- a) breakage of the suspension;
- b) uncontrolled slipping of the ropes on the traction sheave;
- c) breakage and slackening of all linkage by auxiliary ropes, chains and belts;
- d) failure of one of the mechanical components of the machine brake which takes part in the application of the braking action on the drum or disk;
- e) failure of a component associated with the main drive elements and the traction sheave;
- f) rupture in the hydraulic system (jack excluded);
- g) small leakage in the hydraulic system (jack included).

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

0.4.7 When the speed of the carrier is linked to the electrical frequency of the mains, the speed is assumed not to exceed 115 % of the rated speed or a corresponding lower speed where specified in this document for inspection operation, re-levelling, emergency operation.

0.4.8 The location of the accessible goods only lift to be such that users using the accessible goods only lift have means available to them, to access the different landing levels served, either a staircase or a means for the transportation of persons.

1 Scope

1.1 This document specifies the safety rules for new accessible goods only lifts with traction, positive or hydraulic drive, permanently installed and only used by users (see 3.57), serving fixed and permanent landing levels, having a carrier made of a single load carrying area, designed for the transportation of goods only, moving along a fixed path by rigid guide rails and inclined not more than 15° to the vertical, with rated speed not exceeding 1 m/s.

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

1.2 For the purpose of this document, a goods only lift carrier is regarded as accessible where one of the following conditions is satisfied:

- a) floor area of the carrier is greater than 1,0 m²;
- b) depth of the carrier is greater than 1,0 m;
- c) clear height of the carrier is greater than 1,20 m.

In case the carrier is without a roof, it is considered accessible when the clear height of the landing doors is greater than 1,20 m.

1.3 Two types of accessible goods only lifts are addressed:

- a) Type A, where the intended use is bound to the maximum rated speed of 0,30 m/s;
- b) Type B, where the intended use is bound to the maximum rated speed of 1,0 m/s.

1.4 In addition to the requirements of this document, supplementary requirements are to be considered in special cases (operation subject to ATEX rules, operational in environmental conditions not addressed by this standard, seismic conditions, transporting dangerous goods, etc.).

1.5 This document does not cover:

- a) accessible goods only lifts:
 - 1) with more than one lift machine;
 - 2) where loading and unloading is automated, or the carrier floor is fitted with mobile devices (e.g. rollers) for loading and unloading purposes;
 - 3) intended to carry bulk loads (such as loose sand, gravel, etc.);
 - 4) with drive systems other than those stated in 4.8;
- b) lifting tables according to EN 1570-1 and EN 1570-2;
- c) lifting appliances, such as appliances with more than one carrier, skips, goods only lifts for construction sites, for underground applications, mine winding gear, goods only lifts on seagoing vessels and mobile offshore units, construction and maintenance appliances in wind turbines, goods only lifts specially designed and constructed for research purposes for temporary use in laboratories, goods only lifts specially designed and constructed for military or police purposes;
- d) safety during operation of transport, erection, repairs and dismantling of accessible goods only lifts;

- e) the use of translucent material for the walls of the well and machinery spaces, for the carrier with the exception of the landing doors vision panels;
- f) the use of programmable electronic systems in safety related applications for lifts (PESSRAL);
- g) hydraulic lifts where the setting of the pressure relief valve exceeds 50 MPa;
- h) any form of radiation except EMC;
- i) fire propagation;
- j) energy dissipation type buffers;
- k) the possibility of two simultaneous acts of imprudence and/or the abuse of instructions for use.
- l) ambient temperature in the well and machinery spaces lower than +5 °C and higher than +40 °C;
- m) health and safety of animals.

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

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

1.6 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.

1.7 This document is not applicable to accessible goods only lifts which were manufactured before the date of its publication as EN.

2 Normative references

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

EN 81-28:2022, *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 1005-3:2002+A1:2008, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

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 10305-3:2023, *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 12015:2020, *Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Emission*

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

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

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

EN 13015:2001+A1:2008, *Maintenance for lifts and escalators — Rules for maintenance instructions*

EN 13411-3:2022, *Terminations for steel wire ropes — Safety — Part 3: Ferrules and ferrule-securing*

EN 13411-5:2003+A1:2008, *Terminations for steel wire ropes — Safety — Part 5: U-bolt wire rope grips*

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

EN 13411-7:2021, *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 13501-1:2018, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 50214:2006,² *Flat polyvinyl chloride sheathed flexible cables*

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

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

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

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

EN 60529:1991,³ *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

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

EN 60947-5-1:2017,⁴ *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:2016)*

² As impacted by EN 50214:2006/Corrigendum Dec. 2007.

³ As impacted by EN 60529:1991/A2:2013.

⁴ As impacted by EN 60947-5-1:2017/AC:2020-05.

EN 60947-5-5:1997,⁵ *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 61810-1:2015,⁶ *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)*

EN ISO 6743-4:2015, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems) (ISO 6743-4:2015)*

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

EN ISO 13849-1:2023, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2023)*

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

EN IEC 60947-4-1:2019,⁷ *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters (IEC 60947-4-1:2018)*

HD 60364-6:2016, *Low-voltage electrical installations — Part 6: Verification (IEC 60364-6:2016)*

HD 60364-4-42:2011,⁸ *Low voltage electrical installations — Part 4-42: Protection for safety — Protection against thermal effects (IEC 60364-4-42:2010, modified)*

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*

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

IEC 60617:2024, *Graphical symbols for diagrams*

⁵ As impacted by EN 60947-5-5:1997/A2:2017.

⁶ As impacted by EN 61810-1:2015/A1:2020.

⁷ As impacted by EN IEC 60947-4-1:2019/AC:2020-05 and EN IEC 60947-4-1:2019/AC:2021-04.

⁸ As impacted by HD 60364-4-42:2011/A11:2021.

3 Terms and definitions

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

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

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

3.1

accessible goods only lift

permanently installed lifting appliance intended for the transport of goods only, serving fixed and permanent landing levels, comprising a carrier accessible for loading and unloading, running along a fixed travel, inclined not more than 15° to the vertical, for use only by users (see 3.57)

3.2

apron

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

3.3

available carrier area

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

3.4

balancing weight

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

3.5

buffer

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

3.6

carrier

part of the accessible goods only lift which carries the load

3.7

clamping device

mechanical device which when activated stops the carrier in downward motion and maintains it stationary at any point of the travel to limit the extent of creeping

3.8

counterweight

mass which ensures traction

3.9

direct acting accessible goods only lift

hydraulic accessible goods only lift where the ram or cylinder is directly attached to the carrier or its sling

3.10

down direction valve

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

3.11**electric safety chain**

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

3.12**emergency operation**

operation to move the carrier to rescue trapped people or to resume the use after a failure or breakdown arises

3.13**full load pressure**

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

3.14**guide rails**

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

3.15**headroom**

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

3.16**hydraulic accessible goods only lift**

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

3.17**indirect acting accessible goods only lift**

hydraulic accessible goods only lift where the ram or cylinder is connected to the carrier or its sling by suspension means

3.18**instantaneous safety gear**

safety gear in which the full gripping action on the guide rails is almost immediate

3.19**jack**

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

3.20**lift machine**

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

3.21**limited access area**

area in which only users may have access

Note 1 to entry: Such areas exist in factories, warehouses, military establishments, theatres, etc.

3.22

machine room

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

Note 1 to entry: A door about horizontal when closed is referred to as a trapdoor.

3.23

machinery

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

3.24

machinery space

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

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

3.25

maintenance

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

Note 1 to entry: Maintenance may include:

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

3.26

movable stop

mechanical device that under normal operation allows the free movement of the lift between normal terminal stops

Note 1 to entry: where a person enters on the carrier roof or in the pit, the device limits the travel of the carrier to ensure refuge space in the headroom or in the pit.

3.27

non-return valve

valve which allows flow in one direction only

3.28

one-way restrictor

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

3.29

overspeed governor

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

3.30**pit**

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

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

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

3.32**positive drive accessible goods only lift**

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

3.33**pressure relief valve**

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

3.34**pre-triggered stopping system**

system including the triggering device, the stopping gear and a mechanical linkage in between

Note 1 to entry: Under normal operation of the lift, the system allows the free movement of the lift between normal terminal stops. Where a person enters on the carrier roof or in the pit the system ensures refuge spaces in the headroom or in the pit.

3.35**progressive safety gear**

safety gear in which retardation is effected by a braking action on the guide rails and for which special provisions are made so as to limit the forces on the carrier, counterweight or balancing weight to a permissible value

3.36**pulley room**

room not containing the machine, in which pulleys are located, and in which the overspeed governor and the electrical equipment may also be housed

3.37**rated load**

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

3.38**rated speed**

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

Note 1 to entry: For hydraulic drive accessible goods only lifts is:

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

3.39

re-levelling

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

3.40

restrictor

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

3.41

rupture valve

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

3.42

safety circuit

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

3.43

safety component

component provided to fulfil a safety function when in use

Note 1 to entry: Under the Machinery Directive there is a list of items considered as safety components including safety gear, speed governor, landing door locks, etc. For the purposes of this document, other components may also be regarded as safety components where the aim is to prove their safe operation by testing; they may be called "safety devices" in general.

3.44

safety gear

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

3.45

safety integrity level

SIL

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

3.46

shut-off valve

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

3.47

single acting jack

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

3.48

sling

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

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

3.49**special tool**

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

3.50**stopping gear**

mechanical device for stopping and maintaining stationary the carrier in the case of movement of the carrier above and/or below a predetermined position in the well, to protect person(s) on the carrier roof and/or in the pit

3.51**test report**

document stating that the product example under consideration complies with the provisions applicable to it

Note 1 to entry: It may be issued by the product's manufacturer, upon relevant test.

3.52**traction drive accessible goods only lift**

accessible goods only lift whose lifting ropes are driven by friction in the grooves of the driving sheave of the machine

3.53**travelling cable**

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

3.54**triggering device**

device for operating a stopping gear by a mechanical linkage when the lift carrier passes a predetermined position in the well

Note 1 to entry: This device is activated when an access to the lift well is opened by means of a key.

3.55**unintended carrier movement**

non-commanded movement of the carrier with the landing door not locked, from those positions where it needs to be accessed, including access for maintenance purposes, either to the carrier floor or to the roof, excluding movements resulting from loading/unloading operation

3.56**unlocking zone**

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

3.57**user**

instructed person with the permission to make use of the services of an accessible goods only lift installation, except for maintenance purposes

3.58**well**

space in which the carrier and the counterweight or balancing weight travels

Note 1 to entry: This space is usually bounded by the bottom of the pit, the walls and the ceiling of the well.

4 Safety requirements and/or protective measures

4.1 General

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

4.1.2 When the weight, size and/or shape of components prevent them from being moved by hand, they shall be 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.

4.2 Well

4.2.1 General provision

The well may contain one or more accessible goods only lifts.

The counterweight or the balancing weight of an accessible goods only lift shall be in the same well as the carrier.

For hydraulic accessible goods only lifts jacks shall be in the same well as the carrier. They may extend into the ground or other spaces.

4.2.2 Well enclosure

4.2.2.1 The well shall be totally enclosed by walls, floor and ceiling.

4.2.2.2 Where the type A accessible goods only lift is located in a limited access area and the well is not required to contribute against the spread of fire, the well enclosure may be perforated and:

- a) it shall comply with EN ISO 13857:2019, 4.2.4.2;
- b) it shall not be possible to interfere with the operation of the lift by reaching lift equipment within the well;
- c) a protective imperforate screen shall be provided around the landing door locking devices in order to prevent any manipulation of the locking devices by means of a rigid rod 0,30 m long.

4.2.2.3 The well shall be totally enclosed by imperforate walls, floor and ceiling in the following cases:

- a) type B accessible goods only lifts;
- b) type A accessible goods only lifts not placed in a limited access area;
- c) in sections of the building where the well is required to contribute against the spread of fire.

4.2.2.4 The only permissible openings in imperforate enclosures are:

- a) openings for landing doors;

- b) openings for inspection doors and inspection trapdoors;
- 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 accessible goods only lift between the well and the machine or pulley rooms;
- f) openings in partition between lifts (passenger, goods passenger, service, goods only, etc.) according to 4.2.6.

EN ISO 13857:2019, Table 4, applies against contact with danger zones and moving parts reachable through the openings and perforations referred in c), d) and e).

4.2.3 Access doors – access trapdoors

4.2.3.1 When provided, access doors and access trapdoors for persons to enter the well or machinery spaces shall give a clear passage at least 0,60 m × 0,60 m.

4.2.3.2 Access trapdoors shall be counterbalanced and, when they are closed, they shall be able to support 2 000 N on an area of 0,20 m × 0,20 m at any position, without permanent deformation greater than 1 mm.

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

4.2.3.4 A guard rail high at least 1,10 m shall prevent the fall of persons through the open access trapdoor.

4.2.3.5 The access/inspection doors/trapdoors fixing system shall remain attached to the panel or to the frame, when the door/trapdoor is opened.

4.2.4 Shapes and clearances of the walls of well and landing doors facing carrier entrance(s)

4.2.4.1 The horizontal distance between the sill of the carrier and the sill of the landing doors shall not exceed 35 mm.

4.2.4.2 Where the carrier entrance(s) is (are) not provided with means as specified in 4.5.1.2.3, the following applies:

- a) landing doors shall have a resistance in accordance with 4.4.3.2;
- b) doors shall have a distance to the carrier sill in accordance with 4.2.4.1, and
- c) the surface facing the carrier entrance(s) plus 25 mm on both sides for a height of at least the unlocking zone extending below the landing door shall be:
 - 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.

4.2.4.3 When manual re-levelling with door not closed and locked is provided according to 4.10.2.2, below each landing doorsill the wall of the lift well shall be covered by a guard complying 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 10 mm and whose width is at least the clear opening of the carrier entrance plus 25 mm on both sides;
- b) this surface shall be continuous and be composed of smooth and hard elements, such as metal sheets or equivalent. It shall be capable of withstanding a force of 300 N applied at a right angle to the surface at any point, being evenly distributed over an area of 5 cm² in round or square section; it shall resist without:
 - 1) permanent deformation greater than 1 mm;
 - 2) elastic deformation greater than 10 mm;
- c) any projections shall not exceed 5 mm. Projections exceeding 2 mm shall be chamfered at least 75° to the horizontal.

4.2.5 Protection of any spaces located below the well

If accessible spaces do exist below the well, the carrier shall be equipped with safety gear (or a rupture valve or a restrictor/one-way restrictor on the jack of a direct acting hydraulic drive), and the counterweight/balancing weight shall be equipped with safety gear.

4.2.6 Protection in the well

4.2.6.1 In the lower part of an accessible well the travelling area of the counterweight or balancing weight shall be guarded by either:

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

The width of the screen shall be at least equal to that of the counterweight/balancing weight. If the gap between the counterweight/balancing weight guide rails and the well wall exceeds 0,30 m then this area shall also be guarded in accordance with above. If this screen is perforate, EN ISO 13857:2019, 4.2.4.1 applies. The screen shall have 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 the screen;

- b) or a means in accordance with 4.2.7.4.1 a) 2), assuring a clearance from the pit floor of the counterweight or balancing weight of:
 - 1) at least 1,80 m, or
 - 2) the maximum allowed by the travel height.

4.2.6.2 Where the well contains more than one lift there shall be a partition between the moving parts of different lifts.

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

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

4.2.6.3 The partition referred in 4.2.6.2 shall extend through the full height of the well.

The width of the partition shall be at least equal to that of the moving part, and prevent access from one side of the well to another, having gaps not wider than 0,30 m.

4.2.7 Headroom and pit

4.2.7.1 Extreme positions of carrier, counterweight and balancing weight

The extreme positions of carrier, counterweight and balancing weight according to Table 1 shall be considered for requirements on guided travel according to 4.2.7.2, and refuge spaces and clearances according to 4.2.7.3 and 4.2.11.4.

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

Position	Traction drives	Positive drives	Hydraulic drives
Highest position of carrier	Counterweight on fixed stop(s) or fully compressed buffer(s) $+0,035 * v^2$ ^a	Carrier on upper fixed stop(s) or fully compressed upper buffer(s)	Ram in its ultimate position achieved through the means of ram stroke limitation $+0,035 * v_m^2$
Lowest position of carrier	Carrier on fixed stop(s) or fully compressed buffer(s)	Carrier on lower fixed stop(s) or fully compressed lower buffer(s)	Carrier on fixed stop(s) or fully compressed buffer(s)
Highest position of counterweight/balancing weight	Carrier on fixed stop(s) or fully compressed buffer(s) $+0,035 * v^2$	Carrier on lower fixed stop(s) or fully compressed lower buffer(s) $+0,035 * v^2$	Carrier on fixed stop(s) or fully compressed buffer(s) $+0,035 * v_d^2$
Lowest position of counterweight/balancing weight	Counterweight on fixed stop(s) or fully compressed buffer(s)	Carrier on upper fixed stop(s) or fully compressed upper buffer(s)	Ram in its ultimate position achieved through the means of ram stroke limitation $+0,035 * v_m^2$
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.			
^a $0,035 * v^2$ represents half the gravity stopping distance corresponding to 115 % of the rated speed: $1/2 * (1,15 * v)^2 / (2 * g n) = 0,0337 * v^2$, rounded to $0,035 * v^2$; in the case of direct acting hydraulic lifts, the value need not be taken into account.			

4.2.7.2 Guided travel of carrier, counterweight and balancing weight

The following apply:

- In the case of traction drive, when carrier or counterweight is at its highest position, their guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m.
- In the case of positive drive:

- 1) for type A and type B with a speed of not more than 0,30 m/s, the guided travel of the carrier upwards from the top floor until it strikes the upper fixed stop(s) or buffer(s) shall be at least 0,20 m;
 - 2) for type B with a speed of more than 0,30 m/s the guided travel of the carrier upwards from the top floor until it strikes the upper buffer(s) shall be at least 0,50 m;
 - 3) the carrier shall be guided to the end of its buffer stroke;
 - 4) when the balancing weight, if any, is at its highest position its guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m.
- c) In the case of hydraulic drive:
- 1) when the carrier is at its highest position its guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m;
 - 2) when the balancing weight, if any, is at its highest position its guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m;
 - 3) when the balancing weight, if any, is at its lowest position its guide rails length shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.7.3 Refuge spaces on carrier roof and clearances in headroom when the carrier is at its highest position

4.2.7.3.1 Where carrier is not provided with a roof:

- a) the free vertical distance between the lowest parts of the ceiling of the well and:
- 1) the highest pieces of equipment fixed on the carrier enclosure, except for those covered in 2) below, shall be at least 0,30 m;
 - 2) the highest part of the guide shoes or rollers, of the rope terminations and of the header or parts of vertically sliding doors, if any, and of an upward travelling part of the driving gear assembly (ram head, etc.) shall be at least 0,10 m;
- b) the free vertical distance between the carrier floor and the lowest parts of the ceiling of the well shall be at least equal to the clear height of the tallest landing door plus 0,10 m. In no case shall it be less than 1,80 m.

4.2.7.3.2 For carriers with a roof (see 4.5.1.6):

- a) where no inspection control station is provided on the carrier roof, a stopping device according to 4.10.2.4 shall be provided on the carrier roof and requirements of 4.2.7.3.1 a) apply with the exception that the minimum clearance given in 4.2.7.3.1 a) 1) is reduced to 0,10 m;
- b) where an inspection control station is provided on the carrier roof, in addition to the requirements of 4.2.7.3.1 a), clearances and refuge spaces shall be provided and:
- 1) the free vertical distance between the level of the highest area on the carrier roof whose dimensions comply with 4.5.1.6.1 b) and the level of the lowest part of the ceiling of the well (including beams and components located under the ceiling) situated in the projection of the carrier shall be at least 1,0 m;

- 2) there shall be above the carrier space to accommodate a rectangular block not less than $0,5\text{ m} \times 0,7\text{ m}$, height $1,0\text{ m}$. A reduction is allowed on one side at the lower edge where the block touches the carrier roof; a reduction of $0,10\text{ m}$ wide by $0,30\text{ m}$ high may be included in order to accommodate parts fixed on the carrier roof (see Figure 1).

Dimensions in metres

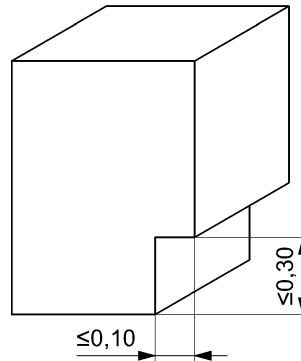


Figure 1 — Maximum dimensions of a reduction in the refuge space

- 3) the clear distance between the lowest parts of the ceiling of the well (including beams and components located under the ceiling) and the highest part of the balustrade, if any, shall be at least:
- i) $0,30\text{ m}$ within a horizontal distance of $0,40\text{ m}$ within the projection of the carrier and $0,10\text{ m}$ on the outside of the balustrade;
 - ii) $0,50\text{ m}$ in any inclined distance beyond $0,40\text{ m}$ within the projection of the carrier.
- c) the requirement b) above can be either:
- 1) obtained by means of well dimensions, when the carrier is at its highest positions as per Table 1, or
 - 2) achieved with the application of the requirements listed in J.2.

4.2.7.4 Refuge spaces and clearances in the pit

4.2.7.4.1 Pit clearances and/or refuge spaces shall be provided either:

- a) at least according to the following requirements:
- 1) there shall be a vertical clearance of at least $0,01\text{ m}$ between the lowest parts of the moving equipment and the highest parts of the pit or the equipment installed in it when the fully loaded carrier is at its lowest positions as per Table 1; and,
 - 2) for maintenance purposes, mechanical means, having the active position electrically checked with a safety contact according to 4.10.1.2.2, shall be provided to physically limit the travel of the carrier behaving as fixed stops under the carrier, to ensure a clearance of minimum $1,80\text{ m}$ height, or the maximum allowed by the travel height, between the floor of the pit and the lowest part of the carrier or its supporting structure. In case of rated speed higher than $0,30\text{ m/s}$ the mechanical means shall be fitted with buffers which comply with the requirements of 4.7.4.3.

This means may be the same as the one used to prevent the carrier from leaving the landing (see 4.6.2.2.3). This means shall be operable before entering the pit, and:

- i) if the effort required to position the mechanical means exceeds 200 N or the lower effort applicable according to EN 1005-3:2002+A1:2008, its actuation shall be powered;
 - ii) the mechanical means shall resist without permanent deformation greater than 1 mm to the hit of the carrier with rated load and rated speed, and the carrier floor shall not incline more than 5° from its normal position;
- b) or when the carrier is at its lowest positions as per Table 1, the following five conditions shall be satisfied at the same time and obtained by means of well dimensions:
- 1) there shall be in the pit space to accommodate a rectangular block not less than 0,50 m × 0,70 m × 1,0 m resting on one of its faces;
 - 2) the free vertical distance between the bottom of the pit and the lowest parts of the carrier shall be at least 0,50 m. This distance may be reduced to a minimum of 0,10 m within a horizontal distance of 0,15 m between:
 - i) clamping device blocks, pawl devices, apron or parts of the vertical sliding doors and the adjacent wall(s);
 - ii) the lowest parts of the carrier and the guide rails;
 - 3) the free vertical distance between the highest parts fixed in the pit, for instance jack supports, pipes and other fittings, and the lowest parts of the carrier, except for items detailed in 2) i) and 2) ii) above, shall be at least 0,30 m;
 - 4) the free vertical distance between the bottom of the pit or the top of equipment installed there and the lowest parts of the downward travelling ram-head assembly of an inverted jack shall be at least 0,50 m.
- However, if it is impossible to gain involuntary access under the ram head assembly (for example by providing screens in accordance with 4.2.6.1), this vertical distance may be reduced from 0,50 m to 0,10 m minimum;
- 5) the free vertical distance between the bottom of the pit and the lowest guiding yoke of a telescopic jack below the carrier of a direct acting lift shall be at least 0,50 m.
- c) or the requirements listed in J.3 apply.

4.2.7.4.2 In case of type B accessible goods only lifts having rated speed greater than 0,30 m/s pit clearances and refuge spaces shall be provided according to 4.2.7.4.1 b) or c).

4.2.8 Exclusive use of the well, machine and pulley rooms

The well, machine and pulley rooms shall not be used for purposes other than lifts. They shall not contain ducts, cables or devices, other than for the accessible goods only lift. The well, machine and pulley rooms may, however, contain machines for other lifts.

4.2.9 Lighting of the well and machinery spaces

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

- a) permanently installed lighting, with 50 lx minimum through the full length of the well and in the pit; or
- b) portable lighting powered by permanently installed socket outlets in the pit and on the carrier roof or beside each landing door inside the well.

In case of an inspection control station on a carrier roof, only a) applies.

At least one socket outlet (see 4.9.5.5.2) shall be provided in the machine room.

Machinery spaces and pulley rooms shall be provided with permanently installed electric lighting, with an intensity of at least 200 lx at floor level everywhere a person needs to work and 50 lx in the walking areas.

4.2.10 Alarm device

If there is a risk for persons working in the well being trapped and no means are provided to escape, either through the carrier, or through the well, or no means of communication within the user's premises are present, alarm devices shall be installed at places where this risk exists.

The alarm devices shall fulfil at least the following requirements:

- a) the power for this device shall be provided from an electric charging supply which is capable of feeding the device for at least 1 h in case of interruption of the normal power supply;
- b) this device shall either:
 - 1) at least cause the operation of an audible and visible alarm in an area close to the accessible goods only lift well and/or in an area close to potential rescuers. The sound level shall be a minimum of 60 dB(A); or
 - 2) if it cannot be ensured that someone will react to the audible and visible alarm, a remote alarm system in accordance with EN 81-28:2022 shall be installed ensuring a two-way voice communication allowing permanent contact with a rescue service.
- c) the device activating the alarm shall be recognizable and accessible, visible even in case of power supply failure.

Where more than one person is working at the same time for maintenance/inspection on an accessible goods only lift, if a direct acoustic communication between working areas is not possible, an intercom system, or similar device, shall be installed.

4.2.11 Equipment in the pit

There shall be in the pit:

- a) a stopping device(s), accessible on opening the door(s) giving access to the pit, and from the pit floor, in conformity with the requirements of 4.10.2.4;
- b) a socket outlet (see 4.9.5.5.2);
- c) means to switch the lift well lighting (see 4.9.5.6.2), accessible on opening the access door to the pit.

An inspection control station box in conformity with 4.10.2.3 may be installed in the pit.

4.3 Machinery spaces

4.3.1 General provisions

4.3.1.1 Machinery and pulleys shall be located in machinery spaces.

These spaces and the associated working areas shall be accessible only for maintenance and emergency operation.

These spaces and the associated working areas shall be protected against environmental influences intended by the manufacturer to be taken into consideration and provisions shall be made for areas for maintenance/inspection work.

4.3.1.2 Machinery spaces shall be:

- a) rooms, comprising solid walls, ceiling, floor and door and/or trapdoor;
- b) cabinets, consisting of imperforate walls, floor, roof and door(s);
- c) part of the lift well.

NOTE Machinery rooms and pulley rooms are a subset of machinery spaces.

4.3.1.3 The only permissible openings in the machinery spaces imperforate enclosures are:

- a) ventilation openings;
- b) necessary openings for the functioning of the lift between the well and the machinery cabinet, if any;
- c) vent openings for escape of gases and smoke in the event of fire.

4.3.1.4 The openings called in 4.3.1.3 when accessible shall comply with the following requirements:

- a) protection according to EN ISO 13857:2019, 4.2.4.2 against contact with danger zones, and
- b) degree of protection of at least IP 2XD according to EN 60529:1991 against contact with electrical equipment.

4.3.1.5 The dimension of holes in the slab of machine and pulley rooms floor shall be in accordance with Table 4 of EN ISO 13857:2019.

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

4.3.1.6 When traction sheaves, pulleys and sprockets are installed in the well above the lowest landing level:

- a) protection means shall be fitted according to 4.5.3, Table 2;
- b) in case of carrier without a roof or of Type B, retaining devices shall be fitted to prevent pulleys/sprockets from falling in the event of a mechanical failure. The devices shall be able to support the weight of the pulley/sprocket and the suspended loads;
- c) verifications and tests and maintenance operations shall be carried out from the carrier roof/floor or from outside of the well;

- d) if traction sheaves, pulleys/sprockets are placed in the vertical projection of the carrier, then clearances in the headroom shall be according to 4.2.11.3.

4.3.1.7 Where machinery is to be maintained or inspected from the carrier floor or from the carrier roof and if any kind of uncontrolled or unexpected carrier movement resulting from maintenance/inspection can be dangerous to persons, the following applies:

- a) any dangerous movement of the carrier shall be prevented by a mechanical device be capable to take at least a static load equal to the mass of the empty carrier plus 200 kg;
- b) all movement of the carrier shall be prevented by means of an electric safety device in conformity with 4.10.1.2 when the mechanical blocking device is in its active position. The inactive position shall be controlled by an electric switch.
- c) when this mechanical device is in its active position and cannot be disengaged due to forces exerted on it, 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 floor / roof / door header / door drive; or
 - 2) via the carrier by access through a hatch in the carrier roof according to 4.5.1.2.2. Steps, ladder or hand hold(s) shall be provided to allow descent into the carrier; or
 - 3) via an access door as per 4.2.3.

Instructions regarding the escape procedure shall be given in the lift documentation.

4.3.1.8 Where machinery is to be maintained or inspected from the pit and if any kind of uncontrolled or unexpected carrier movement resulting from maintenance/inspection can be dangerous to persons, the following applies:

- a) a permanently installed device shall be provided as per 4.2.7.4.1 a) 2);
- b) it shall be possible to leave the pit either:
 - 1) through a vertical clearance from the landing door level to the lowest edge of the carrier of at least 0,50 m, or
 - 2) through an access door to the pit.

4.3.1.9 The necessary devices for emergency operation and for dynamic tests shall be arranged so that they can be carried out from outside of the well.

4.3.2 Access

4.3.2.1 General

Unobstructed access door(s) or access trapdoor(s) shall be provided to the lift machine and its associated equipment.

Their dimensions shall be at least 0,60 m × 0,60 m or, where the size of the machine room does not allow, other openings can be adapted to suit the replacement of components. This might include the dismantling of machine room enclosure panels.

4.3.2.2 Accessible machinery spaces

A machinery space is regarded as accessible if:

- a) the openings giving access have a minimum size of 0,60 m × 0,60 m, and
- b) the height of the machinery space is at least 2,10 m for working areas and 1,90 m for movement.

Where maintenance is intended to be carried out from inside of the machinery spaces, the sill of the access door shall not be higher than 0,40 m above the access level. The access doors and access trapdoors shall be provided with a key-operated lock, capable of being re-closed and re-locked without a key. They shall be capable of being opened from inside the space without a key, even when locked.

4.3.2.3 Non-accessible machinery spaces

Where maintenance is intended to be carried out without entering the well, machine room or other machinery spaces, any components requiring maintenance, adjustment or inspection shall be placed within the horizontal distance of 0,60 m from the edges of inspection doors or trapdoors, and reachable from the working area.

When there is the risk of falling into the well, machine room or other machinery spaces, the level of the lower edge of the inspection doors shall be placed at least at 1,10 m above the level of the working area.

Provisions shall be taken where the maximum forces to be exerted during maintenance operation exceed the values given in EN 1005-3:2002+A1:2008.

4.3.2.4 Access to the pit

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

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

For pit depth exceeding 0,50 m a pit ladder shall be provided.

Any pit access door other than landing door shall comply with the requirements of 4.2.3.

For ladders, see Annex H.

If there is a risk that the ladder in its deployed position colliding with moving elements of the lift, the ladder shall be provided with an electric safety device(s) in accordance with 4.10.1.2 to prevent the lift from operating if the ladder is not in its stored position.

If the ladder is stored on the pit floor, all pit refuge spaces shall be maintained when the ladder is in its stored position.

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

4.3.2.4.2 If there is no access door to the pit other than the landing door, the door lock shall be reachable within a height of 1,8 m and a maximum horizontal distance of 0,8 m from the pit ladder, or a permanently installed device shall allow a person in the pit to unlock the door.

4.4 Landing doors

4.4.1 Openings

The openings in the well giving normal access to the carrier shall be provided with landing doors. The doors, including their frame, shall be imperforate.

The landing doors shall comply with the regulations relevant to the fire protection for the building concerned.

NOTE EN 81-58:2022 describes a method of the fire-resistant test for doors.

4.4.2 Height, width, sills of entrances at landings

4.4.2.1 Height

The clear height of the entrances at landings and carrier shall be minimum 1,20 m.

When the clear height is less than 2,00 m, loading and unloading of the carrier shall be carried out without the user entering the carrier, by use of containers, castors or pallets.

4.4.2.2 Width

The clear width of the entrances at landings shall not extend more than 50 mm beyond the clear carrier entrance on both sides.

4.4.2.3 Sills

Every entrance at landings shall incorporate a sill to withstand the passage of loads being introduced into the carrier.

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

4.4.2.4 Guides for landing doors

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

Where the guides may become ineffective due to wear, corrosion or fire, emergency guidance shall be provided to maintain the landing doors in their position.

4.4.2.4.2 Horizontally sliding landing doors shall be guided top and bottom.

4.4.2.4.3 Vertically sliding landing doors shall be guided at both sides.

4.4.2.5 “Carrier here” indication

In the case of landing doors with manual opening shall be installed, either:

- a) 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; or
- b) one or more transparent vision panels conforming to the following five conditions at the same time:
 - 1) mechanical strength as specified in 4.4.3.2;

- 2) laminated glass of minimum thickness of 3/3/0,38 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;
- 5) the carrier shall be continuously electrically illuminated (see 4.5.1.9).

4.4.3 Doors

4.4.3.1 General

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

4.4.3.2 Mechanical strength

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

- a) when a force of 300 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at a right angle to the panel/frame at any point on either face they shall resist without:
 - 1) permanent deformation greater than 1 mm;
 - 2) elastic deformation greater than 15 mm.
- b) where accessible goods only lifts are installed in a not limited access-area, when a static force of 1 000 N, being evenly distributed over an area of 100 cm² in round or square section, is applied at right angles at any point of the panel/frame from the landing side, they shall resist without permanent deformation greater than 5 mm affecting functionality and safety (see 4.4.3.2.2 and 4.4.5);
- c) after test a) and b) the safety function of the door shall not be affected.

4.4.3.2.2 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. These clearances are measured at the back of recesses, if present.

Under the application of a manual force (without a tool) of 150 N in the direction of the opening of the leading door panel(s) of horizontally sliding doors and folding doors, at the most unfavourable point, the clearances defined above shall not exceed:

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

4.4.3.2.3 Landing doors shall not be made of glass with the exception of vision panel (see 4.4.2.5 b)).

4.4.3.2.4 In addition for landing doors and side frames wider than 150 mm, when an impact energy equivalent to a falling height of 800 mm of the soft pendulum shock device (with a test as per EN 81-50:2020, 5.14 performed by the door manufacturer) is striking the panels or side frames in the middle of the panel or frame width, at height of 1 m ± 0,10 m, from the landing side, the following shall be satisfied:

- a) they may have permanent deformation;

- b) 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;
- c) after the pendulum test the doors do not need to be able to operate;
- d) the glass vision panel as per 4.4.2.5 b) may have breaking or damaging. It shall not detach from the door.

Additional panels to the side of the door frame used to enclose the well shall be considered as side frames.

4.4.3.3 Suspension of vertically sliding doors

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

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

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

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

4.4.3.3.5 Panels shall be balanced.

4.4.3.4 Protection in relation to door operation

4.4.3.4.1 General

The doors and their surrounds shall be designed to prevent jamming of a part of the person, clothing or other object.

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

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

Where manually operated doors are used, the maximum forces to be exerted shall not exceed the values given in EN 1005-3:2002+A1:2008.

4.4.3.4.2 Power operated doors

4.4.3.4.2.1 General

To avoid the risk of shearing during operation, the landing face of power operated sliding doors shall not have recesses or projections exceeding 3 mm. Edges of these shall be chamfered in the opening direction of movement. Exception to these requirements is made for the access to the unlocking triangle defined in 4.4.5.15.

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

4.4.3.4.2.2 Non-automatic power operated doors

The movement of non-automatic power operated doors shall depend on:

- a) a hold to run control device located at the landing such as to allow supervision of the door movement by the user;
- b) a stopping device in conformity with 4.10.2.4 adjacent to the hold to run control device.

The maximum speed of the closing edge of the door shall be limited to 0,30 m/s.

4.4.3.4.2.3 Automatic power operated doors

The automatic movement for the closing of power operated doors shall depend upon the operation started by the user from a landing position allowing supervision of the door movement. At the same position, a stopping device in conformity with 4.10.2.4 shall be installed.

The following applies:

- a) Automatic power operation shall not be used for vertically sliding doors;
- b) In case of horizontally sliding / folding doors:
 - 1) 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.
 - 2) The average closing speed of a sliding door is calculated over its whole travel, less:
 - i) 25 mm at each end of the travel in the case of centrally closing doors;
 - ii) 50 mm at each end of the travel in the case of side closing doors;
 - 3) The effort needed to prevent the door closing shall not exceed 150 N excluding the first third of the travel of the door;
 - 4) The prevention of door closing movement shall initiate a re-opening of the door;

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

- 5) 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 door frame are at a distance of 100 mm;
- c) In case of hinged doors, the following applies:
 - 1) The force required to prevent a stopped door from opening or closing any further – measured at the main closing edge in the direction of travel – shall not exceed 67 N at any point in the opening or closing cycle;
 - 2) The kinetic energy of a door in motion shall not exceed 1,69 J;
 - 3) In the event of any interruption of mains power or failure of the drive, it shall be possible to open the door with a manual force not exceeding 67 N to release the lock and 90 N to open the door, when the force is applied to the main closing edge in the direction of the travel;

- 4) A static closing force not exceeding 150 N is allowed when the gap between the main closing edge and the counterclosing edge is not larger than 8 mm.

4.4.4 Locked and closed landing door check

4.4.4.1 Protection against the risk of falling

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

The unlocking zone shall not extend more than 0,20 m above and below the landing level.

Operation with landing doors open is permitted in the unlocking zone to permit re-levelling at the corresponding floor level provided the requirements of 4.10.2.2 are met.

4.4.4.2 Protection against shearing

With the exception of 4.10.2.2, it shall not be possible to start the accessible goods only lift nor keep it in motion if a landing door or any of the panels in the case of a multi-panel door is open (see 4.4.6).

4.4.5 Locking and emergency unlocking

4.4.5.1 Each of the landing doors shall be provided with a locking device, satisfying the conditions of 4.4.4.1. This device shall be not accessible to the users.

With the exception of 4.10.2.2, the effective locking of the landing door in the closed position shall precede the movement of the carrier.

4.4.5.2 For hinged doors, locking shall be effected at the vertical closing edge or at maximum 250 mm from the vertical closing edge(s) of the doors, and maintained even in the case of panels sagging.

For vertical sliding centrally opening doors, the lock shall be located on the upper panel.

4.4.5.3 If a horizontally or vertically sliding door comprises several directly mechanically linked panels, it is permitted:

- a) to place the device required in 4.4.5.1 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 defined in 4.4.6.1 or 4.4.6.3 on all panels. The linkage shall be ensured even in case of rupture of guiding means. Compliance with the strength requirements of E.2.3.1 shall be verified with the minimum possible design overlapping of the hooking elements of the panels.

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

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

An electric safety device in conformity with 4.10.1.2 shall prove the closed position of the other panel(s), not locked by the locking device. In case of vertically sliding doors, this electric safety device may be

placed only at the locked panel if the breakage of the indirect linkage causes the opening of the electric safety device.

4.4.5.5 The electric safety device required in 4.4.5.11 shall not be activated unless the locking elements are engaged by at least 7 mm; see Figure 2.

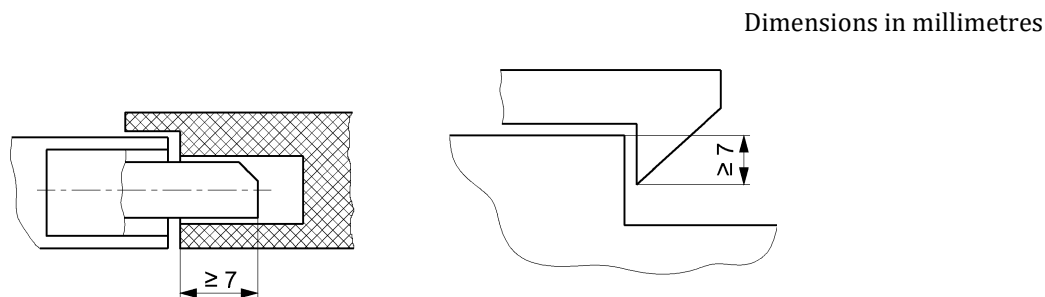


Figure 2 — Examples of locking elements

4.4.5.6 The locking elements and their fixings shall be made of material that maintains the strength property over their intended lifetime under the environmental conditions. The locking device, in the locked position, shall resist in the opening direction of the door to the impact of a rigid mass of 4 kg falling in free fall from a height of 0,50 m.

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

4.4.5.8 The locking device shall resist without permanent deformation or breakage a minimum force in the direction of opening of the door of:

- a) 1 000 N at a height of 1,50 ($\pm 0,1$) m from the sill level, in the case of sliding doors;
- b) 3 000 N on the locking pin, in the case of hinged doors;
- c) the force when the locking force limiter according to 4.4.5.12 releases the flap in the case of flap type locking device.

4.4.5.9 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 failure of the permanent magnet or spring, 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 heat or shock.

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

4.4.5.11 The locking element shall be fitted with an electric safety device in conformity with 4.10.1.2. The elements of the electric safety device proving the locked condition of the landing doors shall be positively operated without any intermediate mechanism by the locking element.

From positions normally accessible to persons, it shall not be possible to operate the lift with a landing door open or unlocked (apart re-levelling as per 4.10.2.2), after one single action not forming part of the normal operating sequence.

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

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.

4.4.5.12 Flap type locking devices shall comply with the following:

- a) flap type locking devices shall only be used on hinged doors;
- b) the flap(s) shall cover the door leave(s) with the door closed over their entire width at least 15 mm in the vertical direction, and at least 10 mm more than the height of the lower door gap (see 4.4.3.2.2);
- c) in every position of the open door, the flap shall be secured against falling into the closed position by a horizontal overlap of at least 15 mm with the top of the door leaf. Stops on the floor limiting the door panel movement are not sufficient to prevent the flap from falling into the closed position;
- d) it shall be prevented that the locking device is engaged when the landing door is not fully in the closed position;
- e) all components of the flap type locking device shall be connected positively, except the locking force limiter;
- f) to prevent operation of the lift with a locking device deformed by excessive opening force, a locking force limiter shall be provided to prevent deformation of the flap. This device shall withstand a force of at least 3 500 N acting on the closing edge of the panel at a height of $300 \text{ mm} \pm 100 \text{ mm}$ above the sill level. The activation of the force limiter shall be detected by an electric safety device in conformity with 4.10.1.2. This device shall be in common with the contacts of the landing doors (see 4.6.4) or the landing door locks (see 4.4.5). The return to normal operation shall only be possible by manual resetting.

4.4.5.13 The locking device is regarded as a safety component. E.2 applies to test the locking device.

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

- a) the name of the manufacturer of the locking device;
- b) the type of locking device.

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

This key shall be available at the installation site in the space where the main switch is located. The unlocking key shall have a label attached drawing attention to the danger which may be involved in using this key and the need to make sure that the landing door is locked after it has been closed.

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

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

Dimensions in millimetres

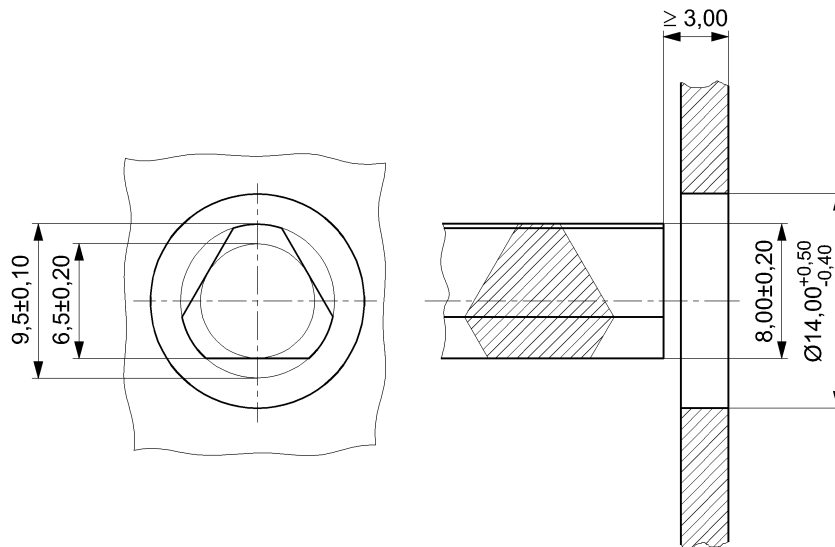


Figure 3 — Unlocking triangle

4.4.6 Electric safety device for proving the landing doors closed

4.4.6.1 Each landing door shall be provided with an electric safety device in conformity with 4.10.1.2 for proving the closed position, so that the conditions imposed by 4.4.4.2 are satisfied.

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

4.4.6.3 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.

4.5 Carrier, counterweight and balancing weight

4.5.1 Carrier

4.5.1.1 Walls, floor and roof of the carrier

4.5.1.1.1 The carrier structure may range from a floor with protection means in accordance with 4.5.1.2.1 up to a fully enclosed carrier.

4.5.1.1.2 The rated load shall be linked to the weight of the goods to be transported.

To prevent an overloading of the carrier by goods, the relation between the rated load and available area of the carrier shall not be less than 200 kg/m².

Where the rated load exceeds 1 000 kg, a load control device (see 4.10.2.6) shall be provided.

The floor of the carrier shall be capable of supporting the local load caused by the weight of the goods to be transported and the weight of the persons and/or handling equipment when loading or unloading according to the intended use.

4.5.1.1.3 The assembly of the carrier comprising components such as the sling, guide shoes, walls, guarding, floor and roof shall have mechanical strength to resist the forces which are applied in normal operation and in safety devices operation or impact of the carrier on its stops, buffered or not.

In addition, design calculations for the carrier shall take into account not only the load carried but also the weight of handling devices, which may enter the carrier.

4.5.1.2 Enclosure

4.5.1.2.1 Means shall be provided to prevent the risk of persons falling off the carrier during loading and unloading. The means at the carrier edges shall be either:

- a) guarding; the guarding shall consist of a handrail at 1,10 m height, a toe guard of 0,15 m height and an intermediate bar at half the height of the guarding.

Each guarding shall have at least a mechanical strength such that when a force of 1 000 N is applied on the handrail in the most unfavourable position, it shall resist without:

- 1) permanent deformation greater than 1 mm;
 - 2) elastic deformation greater than 15 mm.
- b) carrier wall, with a mechanical strength at least according to 4.4.3.2.1 (see also 4.5.1.1.3).
 - c) well enclosure, provided that the distance between the outer edge of the carrier floor and the surface of the wall does not exceed 35 mm. This surface shall be continuous and be composed of smooth and hard elements, such as metal sheets, hard facings or materials equivalent with regard to friction.

The carrier wall and well enclosures shall be of limited flammability, according to EN 13501-1:2018, class C.

4.5.1.2.2 For type B accessible goods only lifts the carrier shall be completely enclosed by walls, floor and roof, the only permissible openings being as follows:

- a) entrances for the normal access of users;
- b) hatch in carrier roof (to be used as escape way as per 4.3.1.7 c 2));
- c) ventilation openings.

The walls may be perforated with openings in conformity with EN ISO 13857:2019, 4.2.4.2.

4.5.1.2.3 Where the goods intended to be transported could move during travel, devices, e.g. carrier walls, ceiling, retainers, barriers, roller blinds, carrier doors, shall be provided to prevent the goods from falling outside of the carrier. These means shall be part of the carrier and designed for the goods to be transported. Moveable means shall have an electric safety device in conformity with 4.10.1.2 proving the closed position.

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

4.5.1.2.4 The clear height of the entrances to the carrier and its interior clear height shall be minimum 1,20 m.

When the clear height is less than 2,00 m, loading and unloading of the carrier shall be carried out without the user entering the carrier, by use of containers, castors or pallets (see 4.4.2.1).

Where the carrier is not fitted with a roof, 4.2.7.3.1 b) applies.

4.5.1.3 Doors at carrier entrances

4.5.1.3.1 General

With the exception of the unlocking zone as specified in 4.4.4.1, it shall not be possible in normal operation to start the accessible goods only lift nor keep it in motion if a carrier door, where fitted (or any of the panels in the case of a multi-panel door), is open.

Each carrier door shall be provided with an electric safety device in conformity with 4.10.1.2, for proving the closed position.

Where vertically opening doors are used, any unexpected movement of them shall be prevented as per 4.4.3.3.5.

Where manually operated doors are used, the maximum forces to be exerted shall not exceed the values given in EN 1005-3:2002+A1:2008.

Power operated entrance doors and their surrounds shall be designed to prevent jamming of a part of the person, clothing or other objects.

In case of non-automatic power operated entrance doors, 4.4.3.4.2.2 applies.

In case of automatic power operated entrance doors, 4.4.3.4.2.3 applies.

The devices mentioned in 4.4.3.4.2 may be the same for carrier and landings, if landing and carrier doors are operated simultaneously.

The horizontal distance between the carrier door and the landing doors or the access distance between the doors during the whole of their normal operation shall not exceed 0,12 m.

In the case of the combination of a hinged landing door and a folding carrier door it shall not be possible to place a ball with a diameter of 0,15 m in any gap between the closed doors.

4.5.1.3.2 Doors

4.5.1.3.2.1 The carrier door(s), where provided, shall be fitted with a vision panel(s) complying with 4.4.2.5 b) when the landing doors have a vision panel(s) for the purpose of “carrier here” indication.

The vision panel(s) shall be positioned in the carrier door(s) such that it is in visual alignment with the landing door vision panel(s) when the carrier is at the level of the landing.

The carrier door(s) may be perforated. The dimensions of the mesh or perforations shall be chosen with consideration to the loads to be transported.

4.5.1.3.2.2 For sliding door with several directly, mechanically linked panels it is permitted to place the device required to prove the closed position (see 4.5.1.3) either:

- a) on a single panel (the leading panel in the case of telescopic doors), or
- b) on the door-driving element if the mechanical connection between this element and the panels is direct.

Where the mechanical link is indirectly made by rope, belt or chain, one or more electric safety device(s), depending on design, in conformity with 4.10.1.2 shall prove the closed position of every panel, also in case the indirectly mechanical link breaks.

NOTE Scissor gate (lattice gate), roller shutter are considered to be a single panel.

4.5.1.4 Apron

4.5.1.4.1 In case of a lift equipped with re-levelling operation with open doors, each carrier entrance shall be fitted with an apron at the sill and a guard at the roof which extend to the full width of the clear landing entrance which it faces.

The height of the vertical section shall be at least equal to that of the effective unlocking zone. This vertical section shall be extended outwards by a chamfer whose angle with the horizontal plane shall be at least 60°. The projection of this chamfer of the horizontal plane shall be not less than 20 mm.

4.5.1.4.2 When a force of 100 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles from the landing side to the apron/guard at any point along the outwards edge of the vertical section, the apron/guard shall resist without:

- a) permanent deformation greater than 1 mm;
- b) elastic deformation greater than 35 mm.

4.5.1.5 Hatch

If there is a hatch in the carrier roof, it shall conform to 4.5.1.6.1 a) and also to the following. It shall:

- a) measure at least 0,40 m × 0,50 m;
- b) be opened from outside of the carrier without a key and from inside of the carrier with a key suited to the triangle defined in 4.4.5.15;
- c) not open towards the inside of the carrier;
- d) not project, in the open position, beyond the edge of the carrier;
- e) be provided with a means for manual locking. This manual locking shall be proved by means of an electric safety device in conformity with 4.10.1.2 and shall cause the lift to stop if the locking ceases to be effective.

Restoring the accessible goods only lift to use shall only be possible after deliberate relocking.

4.5.1.6 Carrier roof

4.5.1.6.1 The carrier roof shall:

- a) be able to support at any position 2 000 N on an area of 0,30 m × 0,30 m, without permanent deformation greater than 1 mm;
- b) have at one point a clear area for standing of at least 0,12 m², in which the lesser dimension is at least 0,25 m;
- c) be provided with a balustrade (see 4.5.1.6.2) where the free distance in a horizontal plane, beyond and perpendicular to its outer edge exceeds 0,30 m. The free distances shall be measured to the wall of the well, allowing a larger distance in recesses the width or height of which is less than 0,30 m;
- d) the surface of the carrier roof where a person needs to work or to move between working areas shall be non-slip;

NOTE For guidance about non-slip, see 4.2.4.7 of EN ISO 14122-2:2016.

- e) where an inspection control station is provided on the carrier roof, the carrier roof shall be equipped with a toe guard a minimum of 0,10 m high positioned either:
 - 1) on the outer edge of the carrier roof; or
 - 2) between the outer edge and the position of the balustrade, where a balustrade is provided.

4.5.1.6.2 The balustrade shall fulfil the following requirements:

- a) considering the free distance in a horizontal plane beyond the inner edge of the handrail of the balustrade and the well wall, its height shall be at least:
 - 1) 0,70 m where the free distance is up to 0,50 m;
 - 2) 1,10 m where the free distance exceeds 0,50 m.
- b) it shall consist of a handrail, a toe guard of 0,10 m height and an intermediate bar at half the height of the balustrade;
- c) the balustrade at the access side(s) shall provide access to the carrier roof;
- d) the balustrade shall be located at a maximum distance of 0,15 m from the parallel edge of the carrier roof behind the balustrade;
- e) when a force of 1 000 N is applied horizontally at right angles to any point at the top of the balustrade it shall resist without elastic deformation greater than 50 mm;
- f) where an inspection control station is provided on the carrier roof the horizontal distance between the outer edge of the handrail and any part in the well (counterweight or balancing weight, switches, rails, brackets, etc.) shall be at least 0,10 m;
- g) the distance between the lateral ends of the balustrade and well wall shall not exceed 0,30 m.

4.5.1.7 Pulleys and/or sprockets

Pulleys and/or sprockets fixed to the carrier shall have protection according to 4.5.3.

4.5.1.8 Equipment on top of the carrier

Where the carrier roof is intended to be used as a working platform for maintenance and service operations, the following shall be provided:

- a) stopping device(s) in conformity with 4.10.2.4;
- b) socket outlet in conformity with 4.9.5.5 at the working area;
- c) an inspection control station box in conformity with 4.10.2.3 (inspection operation) if the maintenance operations are intended to be carried out with movement of the carrier;
- d) a balustrade when requested by 4.5.1.6.1 c). Equipment requiring maintenance, adjustment or inspection shall be positioned less or equal than 0,60 m in horizontal distance from the inside of the balustrade;
- e) an emergency light with an automatically rechargeable emergency supply, which is capable of ensuring a lighting intensity of at least 5 lx for 1 h in the centre of the carrier roof, 1 m above the roof.

This lighting shall turn on automatically upon failure of the normal lighting supply.

Provisions of 4.5.1.8 c) above shall always apply to type B accessible goods only lifts.

4.5.1.9 Lighting

When the landing door is open the carrier shall be continuously illuminated with a light intensity of at least 100 lx at 1 m above the floor in the centre of the carrier floor.

Where vision panels are provided (see 4.4.2.5 b)), there shall be in the carrier at least two individual light sources connected in parallel.

4.5.2 Counterweight and balancing weight

4.5.2.1 If the counterweight or the balancing weight incorporates filler weights, to prevent their displacement it shall be used either:

- a) a frame in which the fillers are secured; or
- b) if the fillers are made of metal, a minimum of two tie-rods on which the fillers are secured.

4.5.2.2 Pulleys and/or sprockets fixed to the counterweight or to the balancing weight shall have protection according to 4.5.3.

4.5.3 Protection for traction sheaves, pulleys and sprockets

4.5.3.1 For traction sheaves, pulleys and sprockets, provisions shall be made according to Table 2 to avoid:

- a) bodily injury where components are within reach;
- b) the ropes/chains leaving the pulleys/sprockets, if slack;
- c) the introduction of objects between ropes/chains and pulleys/sprockets.

Where overhung pulleys or sprockets are used, devices according to Table 2 shall be provided.

Depending on the intended environmental conditions attention shall be paid to avoid the accumulation of dust and debris in the guards.

Table 2 — Protection for traction sheaves, pulleys and sprockets

Location of sheaves, pulleys and sprockets			Risk according to 4.5.3.1		
			a)	b)	c)
Carrier	On the roof		X	X	X
	Under the floor			X	X
On the counterweight / balancing weight				X	X
In the machinery spaces			X ^a	X	X ^b
In the pulley rooms			X ^a	X	X ^b
Lift well	Headroom	Above carrier	X	X	
		Beside carrier	X	X	
	Between pit and headroom			X	X ^b
	Pit		X	X	X
Jack	Extending upwards		X ^a	X	
	Extending downwards			X	X ^b
	With mechanical synchronizing means		X	X	X
X Risk shall be taken into account.					
^a Protection shall be nip guards as a minimum, preventing involuntary access to areas where ropes/chains enter or leave the sheaves, pulleys or sprockets (See Figure 4).					
^b Required only if the ropes/chains are entering the traction sheave or the pulley/sprocket horizontally or at any angle above the horizontal up to a maximum of 90°.					

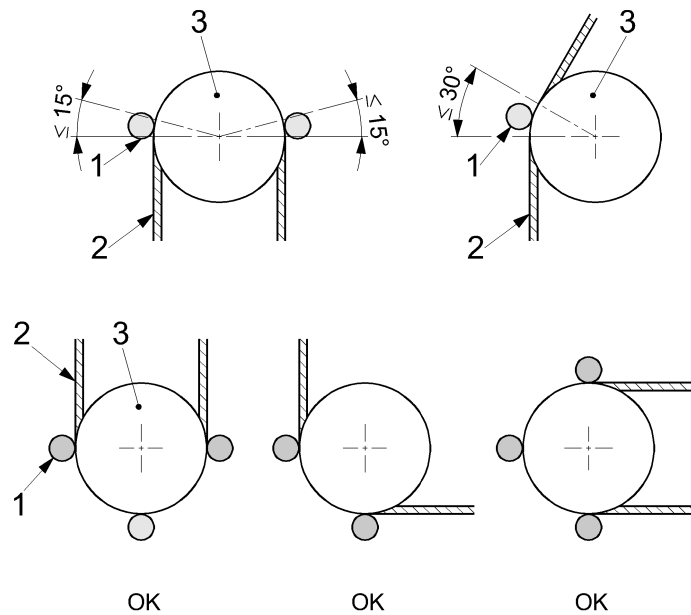
4.5.3.2 The devices used shall be constructed so that they do not hinder verification and maintenance operation. If they are perforated the gaps shall comply with EN ISO 13857:2019, 4.2.4.1.

The dismantling shall be necessary only in the following cases:

- a) replacement of a rope/chain;
- b) replacement of a pulley/sprocket;
- c) re-cutting of the grooves.

The devices for preventing the ropes/belts/chains from leaving the grooves of sheaves or pulleys or sprockets shall include one retainer at maximum 15° near the points where the ropes/belts/chains enter and leave the pulleys/sprockets and at least one intermediate retainer if more than 60° of the angle of wrap is arranged below the horizontal axis of the pulley and the total angle of wrap is more than 120° (see Figure 4).

Where the angle of wrap is equal to or less than 30° only one retainer is required, positioned centrally between the entry and exit point of the rope/belt/chain onto the sheave/pulley/sprocket.

**Key**

- 1 retainer
- 2 rope, belt, chain
- 3 sheave, pulley, sprocket

Figure 4 — Examples of arrangements of rope retainers**4.5.4 Protection of machinery**

Effective protection shall be provided for accessible rotating parts, in particular:

- a) keys and screws in the shafts;
- b) tapes, chains, belts;
- c) gears, sprockets and pulleys;
- d) projecting motor shafts.

Exception is made for traction sheaves with protections according to 4.5.3.1, hand winding wheels, machine brake drums and any similar smooth, round parts. Such parts shall be yellow in colour, at least in part.

4.6 Suspension, unintended carrier movement and excessive speed protection**4.6.1 Suspension means****4.6.1.1 General**

4.6.1.1.1 Carriers, counterweights or balancing weights shall be suspended from steel wire ropes, or steel chains with parallel links (Galle type) or roller chains.

4.6.1.1.2 The ratio between the minimum breaking load of one suspension rope/chain and the maximum force in this rope/chain, when the carrier is stationary at the lowest landing with its rated load, shall be not less than:

- a) 8 in the case of chains;
- b) 8 in the case of ropes on Type A accessible goods only lifts;
- c) 10 in the case of ropes, where an inspection control station is provided on the carrier roof or for type B accessible goods only lifts.

4.6.1.1.3 The tensile strength of the wires and the other characteristics (construction, extension, ovality, flexibility, tests etc.) of the ropes shall be at least as specified in EN 12385-4:2002+A1:2008 or EN 12385-5:2021.

4.6.1.1.4 The minimum number of ropes or chains shall be two.

NOTE Where reeving is used, the number to take into account is that of the ropes or chains and not the falls.

4.6.1.1.5 Ropes or chains shall be independent.

4.6.1.2 Sheave, pulley, drum and rope diameter ratios, rope/chain terminations

4.6.1.2.1 The ratio between the pitch diameter of sheaves, pulleys or drums and the nominal diameter of the suspension ropes shall be at least 25, regardless of the number of strands.

4.6.1.2.2 The ends of the ropes shall be fixed to the carrier, counterweight or balancing weight, or suspension points of the dead parts of reeved ropes by means of:

- a) self-tightening wedge type sockets according to EN 13411-6:2004+A1:2008 or EN 13411-7:2021, or
- b) heart shaped thimbles with at least three rope grips according to EN 13411-5:2003+A1:2008 matching the rope size, or
- c) ferrule secured eyes according to EN 13411-3:2022, or
- d) swage terminals according to EN 13411-8:2011.

4.6.1.2.3 The junction between the rope and the rope termination, according to 4.6.1.2.2, shall be able to resist at least 80 % of the minimum breaking load of the rope.

Rope terminations according to EN 13411-3:2022, EN 13411-6:2004+A1:2008, EN 13411-7:2021, and EN 13411-8:2011 achieve at least 80 % of the minimum breaking load of the rope.

4.6.1.2.4 The ends of each chain shall be fixed to the carrier, counterweight or balancing weight, or suspension points of the dead parts of reeved chains by terminations matching the chain size. The fixation shall be safeguarded by its construction or additional means against unintended detachment.

4.6.1.2.5 The junction between the chain and the chain termination shall be able to resist at least 80 % of the minimum breaking load of the chain.

4.6.1.3 Winding up of ropes for positive drive lifts

The following applies:

- a) the drum, which may be used in the conditions laid down in 4.8.2.1 b) shall be helically grooved and the grooves shall match the size of the ropes used;