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Interested committees:

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Introduction

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

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

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

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Template for comments and secretariat observations

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

DRAFT INTERNATIONAL STANDARD

ISO/DIS 8100-1

ISO/TC 178

Secretariat: **AFNOR**

Voting begins on:
2023-11-27

Voting terminates on:
2024-02-19

Lifts for the transport of persons and goods —

Part 1: Safety rules for the construction and installation of passenger and goods passenger lifts

Elévateurs pour le transport de personnes et d'objets —

Partie 1: Règles de sécurité pour la construction et l'installation d'ascenseurs et d'ascenseurs de charge

ICS: 91.140.90

This document is circulated as received from the committee secretariat.

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European Foreword

This document (prEN ISO 8100-1:2023) has been prepared by Technical Committee CEN/TC 10 “Lifts, escalators and moving walks”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 81-20:2020.

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

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

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

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, Republic of North Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 178, *Lifts, escalators, passenger conveyors*

This second edition cancels and replaces the first edition (ISO 8100-1:2019), which has been technically revised.

The main changes are as follows:

- Editorial revision of the document structure according to the ISO/IEC Directives, part 2;
- Requirements for vertical sliding landing doors and car doors are added;
- Requirements for suspension means other than steel wire ropes are added;
- Requirements for automatic rescue operation are added;
- Requirements for traction lifts with increased available car area are added;
- Requirements for SIL-rated circuits (previously called PESSRAL) have been revised;
- Requirements for a working platform in the pit are added;
- Requirements to avoid the dragging of hands in doors are extended;
- Requirements for compensation means entering the refuge space in the pit are added;
- Requirements for the brake are aligned with overload limits;
- Performance and monitoring of the machine brake are revised;
- Requirements for pit access ladders are revised;

— Fire classification of electric cables is specified.

For relationship with this document and ISO 8100-20, see informative [Annex D](#), which is an integral part of this document.

A list of all parts in the ISO 8100 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

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

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

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

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

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

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

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

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

The object of this document is to define safety rules related to passenger and goods passenger lifts.

Persons to be safeguarded:

- users, including passengers, maintenance and inspection personnel;
- persons at the landings and outside of the well, or any machinery space and pulley room, who can be effected by the lift.

Property to be safeguarded:

- a) loads in car;
- b) components of the lift installation;
- c) building in which the lift is installed;

Lifts for the transport of persons and goods —

Part 1:

Safety rules for the construction and installation of passenger and goods passenger lifts

1 Scope

This document specifies the safety rules for lifts permanently installed in buildings, which are intended for the transport of passengers or passengers and goods. This document applies to:

- lifts, with traction drive, positive drive or hydraulic drive;
- lifts serving specific levels
- lifts having a closed car;
- lifts moving along guide rails inclined not more than 15° to the vertical.
- lifts installed in buildings with boundary conditions in accordance with [Annex B](#);
- the electrical equipment of the lift, including lighting and socket outlets in the well.

This document does not specify additional requirements for:

- lifts installed in buildings with requirements for seismic conditions;
- lifts installed in buildings with requirements for accessibility;
- lifts exposed to vandalism;
- lifts to be used for firefighting;
- lifts intended for the transport of goods alone where the carrier is accessible, and fitted with controls situated inside the carrier or within reach of a person inside the carrier;
- the behavior of the lift when the control system of the lift receives a recall signal(s) in the event of fire in a building.

This document is not applicable to passenger and goods passenger lifts, which are installed before the date of its publication.

2 Normative references

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

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

ISO 3008-2:2017, *Fire-resistance tests — Part 2: Lift landing door assemblies*

ISO 4344:2022, *Steel wire ropes for lifts — Minimum requirements*

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

ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

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

ISO 7010:2019, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

ISO 8100-2:2023, *Lifts for the transport of persons and goods — Part 2: Design rules, calculations, examinations and tests of lift components*

ISO 8102-1:2020, *Electrical requirements for lifts, escalators and moving walks — Part 1: Electromagnetic compatibility with regard to emission*

ISO 8102-2:2021, *Electrical requirements for lifts, escalators and moving walks — Part 2: Electromagnetic compatibility with regard to immunity*

ISO 8102-20:2022, *Electrical requirements for lifts, escalators and moving walks — Part 20: Cybersecurity*

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

ISO 12543-2:2021, *Glass in building — Laminated glass and laminated safety glass — Part 2: Laminated safety glass*

ISO 12543-3:2021, *Glass in building — Laminated glass and laminated safety glass — Part 3: Laminated glass*

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

ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails*

ISO 14122-4:2016, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders*

ISO 29584:2015, *Glass in building — Pendulum impact testing and classification of safety glass*

IEC 60204-1:2016+A1:2021, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

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 60332-1-2:2004+AMD1:2015, *Tests on electric and optical fibre cables under fire conditions — Part 1-2: Test for vertical flame propagation for a single insulated wire or cable — Procedure for 1 kW pre-mixed flame*

IEC 60332-3-24:2018, *Tests on electric and optical fibre cables under fire conditions — Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables — Category C*

IEC 60364-4-41:2005+AMD1:2017, *Low voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*

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

IEC 60417:2002, *Database — Graphical symbols for use on equipment*

IEC 60529:1989+AMD1:1999, *Degrees of protection provided by enclosures (IP Code)*

IEC 60598-1:2020, *Luminaires — Part 1: General requirements and tests*

IEC 60617:2012, *Database — Graphical symbols for diagrams*

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

IEC 60754-2:2011+AMD1:2019, *Test on gases evolved during combustion of materials from cables — Part 2: Determination of acidity (by pH measurement) and conductivity*

IEC 60947-4-1:2018, *Low-voltage switchgear and controlgear — Part 4: Contactors and motor — starters - Section 1: Electromechanical contactors and motor-starters*

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

IEC 60947-5-5:1997+AMD1:2005, *Low-voltage switchgear and controlgear — Part 5-5: Control circuit devices and switching elements — Electrical emergency stop device with mechanical latching function*

IEC 61034-2:2005+AMD1:2013, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

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

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

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

IEC 61810-1:2015+AMD1:2019, *Electromechanical elementary relays — Part 1: General requirements*

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

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 81-58:2022, *Safety rules for the construction and installation of lifts — Examinations and tests — Part 58: Landing door fire resistance test*

EN 81-71:2022, *Safety rules for the construction and installation of lifts — Particular applications to passenger lifts and goods passenger lifts — Part 71: Vandal resistant lifts*

EN 1993-1-1:2006+A1:2014, *Eurocode 3 — Design of steel structures — Part 1-1: General rules and rules for buildings*

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

EN 12385-5:2021¹⁾, *Steel wire ropes — Safety — Stranded ropes for lifts*

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

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

EN 13411-7:2021, *Terminations for steel wire ropes — Part 7: Safety. Symmetric wedge socket*

EN 13411-8:2011, *Termination for steel wire ropes — Part 8: Safety. 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 13501-6:2018+A1:2022, *Fire classification of construction products and building elements — Part 6: Classification using data from reaction to fire tests on electric cables*

1) As impacted by EN 12385-5:2021/AC:2021

3 Terms and definitions

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

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

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

3.1

apron

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

3.2

automatic operation

operation in which start of the movement of the lift happens in response to the momentary actuation of operating devices or in response to any other automatic starting function

3.3

automatic rescue operation

device or function that operates automatically in case of failure or loss of power supply to move the lift car to a landing

3.4

balancing weight

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

3.5

buffer

mechanical device with characteristics to dissipate or store kinetic energy

3.6

car

part of the lift which carries the loads

3.7

counterweight

mass which ensures traction

3.8

direct acting lift

hydraulic lift where the ram or cylinder is directly attached to the car or the car sling

3.9

down direction valve

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

3.10

drive control system

system controlling and monitoring the running of the lift machine

3.11

electrical anti-creep system

combination of measures for hydraulic lifts against the danger of the car moving slowly away from the floor level

3.12**electric safety device**

safety contact, safety circuit or SIL-rated circuit, having the required reliability of operation

3.13**electric safety chain**

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

3.14**full load pressure**

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

3.15**goods passenger lift**

passenger lift with additional measures for the transport of goods

3.16**guide rails**

components which direct the motion

3.17**headroom**

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

3.18**hydraulic lift**

lift in which movement of the car is controlled by flow of fluid

3.19**indirect acting lift**

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

3.20**instantaneous safety gear**

safety gear in which retardation is not limited

3.21**jack**

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

3.22**levelling**

operation which achieves the stopping accuracy at a landing

3.23**levelling accuracy**

vertical distance between car sill and landing sill

3.24**lift machine**

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

3.25**machine room**

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

3.26

machinery

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

3.27

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.

3.28

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 can include:

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

3.29

mission time

maximum period of time for which a system or subsystem can be used before it must be replaced.

3.30

on-board power supply

Integrated power supply located within limits of application of this standard.

3.31

one-way restrictor

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

3.32

overspeed governor

device to detect excessive speed of the lift and to trigger the operation of devices to stop the lift

3.33

passenger

any person transported by a lift in the car

3.34

pawl device

mechanical device for stopping involuntary descent of the car, and maintaining it stationary on fixed supports

3.35

pit

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

3.36

positive drive lift

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

3.37**preliminary operation**

energizing of the lift machine as preparation to a normal run when the car is in the door zone and doors are not closed and locked

3.38**progressive safety gear**

safety gear in which retardation is limited

3.39**pulley room**

room not containing the lift machine, in which pulleys are located, and in which the overspeed governor can also be housed

3.40**rated load**

load which is intended to be carried in automatic operation, which can include handling devices

3.41**rated speed**

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

Note 1 to entry: For hydraulic drive lifts:

- v_m is the rated speed upward in metres per second;
- v_d is the rated speed downward in metres per second;
- v_s is the higher value of both rated speeds v_m and v_d in metres per second.

3.42**re-levelling**

operation to correct the car position, after the lift has stopped at a landing

3.43**residual breaking force****RBF**

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

3.44**restrictor**

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

3.45**safety circuit**

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

Note 1 to entry: Electrical components include electromechanical devices like contacts and relays. Electronic components include solid-state non-programmable electronic devices.

3.46**safety gear**

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

3.47

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 SIL-rated circuit, where safety-integrity level 3 has the highest level of safety integrity and safety-integrity level 1 has the lowest

3.48

safety rope

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

3.49

shut-off valve

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

3.50

single acting jack

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

3.51

SIL-rated circuit

circuit based on electrical (E), and/or electronic (E), and/or programmable electronic (PE) technology which is capable to fulfil demands of an electric safety device with a defined safety integrity level (SIL)

Note 1 to entry: The term is intended to cover any and all devices or systems operating on electrical principles.

EXAMPLE Electrical/electronic/programmable electronic technology includes:

- (a) electromechanical devices (electrical);
- (b) solid-state non-programmable electronic devices (electronic);
- (c) electronic devices based on computer technology (programmable electronic).

3.52

special tool

tool unique to the equipment required in order to keep the equipment in a safe operating condition or for emergency operation

3.53

stopping accuracy

vertical distance between car sill and landing sill at the moment when a car is stopped by the control system at its destination floor and the doors reach their fully open position

3.54

suspension means

includes all ropes/belts/chains suspending car/counterweight/balancing weight and is engaged to car/counterweight/balancing weight side termination

3.55

traction lift

lift which is driven by friction between the driving sheave and the means of suspension

3.56

travelling cable

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

3.57

unintended car movement

non-commanded movement of the car with doors open within the door zone away from the landing, excluding movements resulting from loading/unloading operation

3.58**unlocking zone**

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

3.59**user**

person making use of the services of a lift installation which includes passengers and persons waiting at the landings

3.60**well**

space in which the car, the counterweight or the balancing weight travels. 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 Passenger and goods passenger lifts shall comply with the safety requirements and/or protective measures of the following clauses. In addition, the passenger and goods passenger lifts shall be designed according to the principles of ISO 12100:2010 for hazards relevant but not significant that are not dealt with by this document (e.g. sharp edges).

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

4.1.3 Labels, notices, markings and signs shall be permanently affixed, indelible and legible. They shall be of durable material and placed in a visible position. Text information shall be in the accepted language(s) of the country where the lift is installed.

4.2 Well, machinery spaces and pulley rooms**4.2.1 General provisions****4.2.1.1 Arrangement of lift equipment**

4.2.1.1.1 All lift components covered by this document, shall be accessible only by use of a key, except those provided for use by passengers.

All lift components covered by this document, except those provided for use by passengers, shall be located:

- in a machine room; or
- in a pulley room; or
- in a machinery cabinet; or
- in the well.

4.2.1.1.2 Where parts (lift machine, controller, overspeed governor, switches, etc.) of a lift are installed in a machine room and/or a pulley room which contains parts from other lifts, parts belonging to that lift shall be identified by consistently used number, letter or colour unique to that lift.

4.2.1.2 Lighting

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

- a) at least 50 lx, 1,00 m above the car roof within its vertical projection;
- b) at least 50 lx, 1,00 m above the pit floor, and above the pit platform (where provided) everywhere a person can stand, work and/or move between the working areas;
- c) at least 20 lx outside of the locations defined in a) and b), excluding shadows created by car or components.

To achieve this, luminaires shall be fixed throughout the well enclosure and, where necessary, additional luminaires on the car roof as a part of the well's lighting system.

The mechanical strength of luminaires shall comply with IEC 60598-1:2020, 4.13 level 1 for fixed luminaires and level 3 for portable luminaires.

The supply for this lighting shall be in conformity with [4.10.7.1](#).

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

4.2.1.2.2 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 at floor level to move between working areas. The supply for this lighting shall be in conformity with [4.10.7.1](#).

4.2.1.3 Electric equipment in the pit, in machinery spaces and in pulley rooms

4.2.1.3.1 There shall be in the pit:

- a) stopping device(s) in conformity with the requirements of [4.12.1.11](#); located:
 - 1) at any door giving access to the pit (landing door or access door);
 - within a vertical distance of minimum 0,40 m and maximum 1,20 m above the access floor;
 - within a horizontal distance of maximum 0,75 m from the door frame inner edge.

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;

 - 2) In case of no pit platform;
 - within a vertical distance of maximum 2,00 m above the pit floor;
 - 3) In the case of a pit platform;
 - within a vertical distance of maximum 2,00 m above the pit platform;
 - within a vertical distance of maximum 2,00 m above the pit floor, if there are moving parts below the pit platform.
- b) a permanently installed inspection control station according to [4.12.1.5](#), operable within 0,30 m of a refuge space;
- c) socket outlet(s) ([4.10.7.2](#)) accessible from:

- the pit; where no platform is provided; or
 - the pit platform.
- d) means to switch the well lighting ([4.2.1.2.1](#)), positioned at any door giving access to the pit (landing door or pit access door):
- within a vertical distance of minimum 0,40 m and maximum 1,20 m from the access floor;
 - within a horizontal distance of maximum 0,75 m from the door frame inner edge.

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.

4.2.1.3.2 There shall be in machinery spaces and pulley rooms:

- a) means to switch the lighting of the spaces and rooms close to each access point;
- b) a socket outlet ([4.10.7.2](#)) for each space and room.

4.2.1.3.3 There shall be in pulley rooms a stopping device, in conformity with [4.12.1.11](#), close to each access point.

4.2.1.4 Emergency release

If no means to escape are provided for person(s) trapped in the well, alarm initiation devices to the alarm system according to EN 81-28:2022 shall be installed at places where the risk of trapping exists (see [4.2.1.3.1](#), [4.2.6.4](#) and [4.4.7](#)).

4.2.1.5 Strength of walls, floors and ceilings

4.2.1.5.1 The structure of the well, machinery spaces and pulley rooms shall be able to support the loads and reaction forces imposed by the lift components during the lift operation.

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

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

4.2.1.5.3 Glass panels, plane or formed, shall be made of laminated glass according to ISO 12543-3:2021.

They and their fixings shall withstand 1 000 N horizontal static force on an area of 0,09 m² at any point, from both inside and outside the well, without permanent deformation.

4.2.1.5.4 The floor of the pit shall be able to support beneath each guide rail, the force due to the mass of the guide rails plus any load due to components fixed or linked to the guide(s) and/or any additional reaction, occurring during emergency stopping (e.g. load on traction sheave due to rebound when machine on rails), plus the reaction at the moment of operation of the safety gear and any push through force exerted by the guide rails clips (see [4.7.2.3.5](#)).

4.2.1.5.5 The floor of the pit shall be able to support beneath the car buffer supports, four times the static load imposed by the mass of the fully loaded car, evenly distributed between the total number of car buffers [see [Formula \(1\)](#)]:

$$F = 4 \cdot g_n \cdot (P + Q) \quad (1)$$

where

F is the total vertical force in newtons;

g_n is the standard acceleration of free fall, [9,81 (m/s²)];

P is the mass of the empty car and components supported by the car, i.e. part of the travelling cable, compensation means (if any), etc. in kilograms;

Q is the rated load (mass) in kilograms.

4.2.1.5.6 The floor of the pit shall be able to support beneath the counterweight buffer supports, four times the static load imposed by the mass of the counterweight, evenly distributed between the total number of counterweight buffers [see [Formula \(2\)](#)]:

$$F = 4 \cdot g_n \cdot (P + q \cdot Q) \quad (2)$$

where

F is the total vertical force in newtons;

g_n is the standard acceleration of free fall, [9,81 (m/s²)];

P is the mass of the empty car and components supported by the car, i.e. part of the travelling cable, compensation means (if any), etc. in kilograms;

Q is the rated load (mass) in kilograms;

q is the balance factor indicating the amount of counterbalance of the rated load by the counterweight.

4.2.1.5.7 For hydraulic lifts, the floor of the pit shall be able to support beneath each jack the loads and forces (in newtons) imposed to it.

4.2.1.5.8 For hydraulic lifts, the total vertical force imposed on the fixed stops during operation of the pawl device can be evaluated approximately according to the following formulae:

a) Pawl devices provided with energy accumulation type buffers [see [Formula \(3\)](#)]:

$$F = \frac{3 \cdot g_n \cdot (P + Q)}{n} \quad (3)$$

b) Pawl devices provided with energy dissipation type buffers [see [Formula \(4\)](#)]:

$$F = \frac{2 \cdot g_n \cdot (P + Q)}{n} \quad (4)$$

where

- F is the total vertical force in newtons on fixed stops imposed during operation of pawl device;
- g_n is the standard acceleration of free fall, [9,81 (m/s²)];
- n is the number of pawl devices;
- P is the mass of the empty car and components supported by the car, i.e. part of the travelling cables, compensation means (if any), etc. in kilograms;
- Q is the rated load (mass) in kilograms.

4.2.2 Access to the pit

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

- a) In case a pit platform is not provided:
 - 1) where the pit depth is not exceeding 2,50 m, either:
 - an access door, or
 - a pit access ladder according to [Annex C](#);
 - 2) where the pit depth exceeds 2,50 m:
 - an access door.
- b) In case a pit platform is provided, either:
 - 1) an access door to the pit, a ladder to access the platform and an access trap door according to [4.2.3](#) and [4.2.4](#); or
 - 2) an access door to the pit platform, a ladder to access the pit and an access trap door according to [4.2.3](#) and [4.2.4](#); or
 - 3) a pit access ladder according to [Annex C](#), where the distance to the pit platform is not exceeding 2,50 m, and a ladder to access the pit and an access trap door according [4.2.3](#) and [4.2.4](#).

Any pit access door shall comply with the requirements of [4.2.3](#).

Where the vertical distance between a pit access door and the pit floor exceeds 500 mm a pit access ladder shall be provided.

If the pit access ladder is not a fixed ladder (see [Annex C](#), Type 1), automatic operation of the lift shall be prevented if the pit access ladder is not in its stored position.

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

4.2.2.2 A pit platform shall be provided when the vertical distance exceeds 2,20 m from the standing area(s) on the pit floor to:

- equipment mounted on the underside of the car which needs to be maintained with the car at its lowest possible position during pit inspection operation (see [4.12.1.5.2.1 g](#)); or
- equipment placed in the pit which needs to be maintained.

Where a platform is provided in the pit, the following shall be applied:

- a) the vertical distance from the floor of the standing area(s) on the pit platform to equipment which needs to be maintained from the pit platform shall not exceed 2,20 m;
- b) the clear vertical height between the bottom of the pit and the lowest parts of the pit platform shall be at least 1,50 m for movement or where testing and maintenance work has to be executed;
- c) refuge space(s) according [4.2.5.8.1](#) shall be available on the pit platform;
- d) clearances between the platform and the car shall comply with [4.2.5.8.2](#);
- e) the horizontal perpendicular distance between the pit platform and the walls of the well or components of the lift shall not exceed 0,30 m, unless it is provided with a balustrade in conformity with [4.4.7.4](#). It shall not be possible to pass a ball with a diameter of 0,15 m through any gap between the pit platform and the sill of a door giving direct access to the pit platform;
- f) the pit platform shall be provided with a toe board of a minimum height of 0,10 m on its outer edges;
- g) the openings in the pit platform for rails, buffers and electric cables shall be provided with at least 0,05 m high ferrules, if they are not already protected by a toe board;
- h) no load bearing component of the lift, e.g. guide rails, or hydraulic jack, shall be supported by the pit platform. There shall be a clear distance of at least 0,30 m above unprotected rotating, or vertically moving parts.
- i) the pit platform shall have a strength to support the maximum number of persons, as indicated in [4.2.5.8.1](#). However, the pit platform shall resist a minimum force of 2 000 N at any position on an area of 0,30 m × 0,30 m without permanent deformation greater than 1 mm;
- j) the maximum permissible load shall be indicated on the platform;
- k) the pit platform shall be designed as follows:
 - slip resistant;
 - plane surface;

4.2.3 Access, emergency, trap and inspection doors

4.2.3.1 When the distance between consecutive landing door sills exceeds 11 m, one of the following conditions shall be fulfilled. There shall be:

- a) intermediate emergency doors; or
- b) adjacent cars each fitted with an emergency door, provision for which is made in [4.4.6.2](#).

NOTE "Consecutive" is understood as meaning two adjacent floors, with landing doors, regardless of open through or open adjacent configurations.

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

- a) access doors to machine rooms and access doors to the well shall have a minimum height of 2,00 m and a minimum width of 0,60 m;
- b) access doors to pulley rooms shall have a minimum height of 1,40 m and a minimum width of 0,60 m;
- c) access trap doors for persons to machine and pulley rooms shall give a clear passage of at least 0,80 m × 0,80 m, and shall be counterbalanced;

- d) emergency doors shall have a minimum height of 1,80 m and a minimum width of 0,50 m;
- e) inspection doors shall have a maximum height of 0,50 m and a maximum width of 0,50 m;
- f) access trap doors on the pit platform shall give a clear passage of at least 0,50 m × 0,70 m.

4.2.3.3 Access, emergency and inspection doors shall:

- a) not open towards the inside of the well or machine or pulley room;
- b) be provided with a key-operated lock, capable of being closed without the use of a key and automatically locked when closed;
- c) be openable from inside the well, machine or pulley room without a key, even when locked;
- d) be provided with an electric safety device in conformity with [4.11.2](#), checking the closed position;

An electric safety device is not required in the case of:

- 1) access door(s) to machine and pulley rooms; and
- 2) access door(s) to the pit ([4.2.2.1](#)), if the pit door(s) does not give access to a hazardous zone. This is regarded to be the case if the free vertical distance between the lowest parts of car, counterweight or balancing weight including guide shoes, apron, etc. during automatic operation and the bottom of the pit or the pit platform is at least 2,00 m.

The presence of travelling cables, compensation means and their equipment, tensioning pulleys for the overspeed governor and similar installations is not regarded as being hazardous.

- e) be imperforate and comply with the regulations relevant to the fire protection for the building concerned;
- f) have a mechanical strength such that when a force of 1 000 N, being evenly distributed over an area of 0,09 m² in round or square section, is applied at right angles at any point from outside the well, it shall resist without elastic deformation greater than 15 mm.

4.2.3.4 Access trap doors shall comply with the following:

- a) 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;
- b) trap doors shall not open downward. Hinges, if any, shall be of a type which cannot be unhooked;
- c) trap doors used only for access of material shall be unlocked from the inside only;
- d) when a trap door is in the open position, precautions shall be taken to prevent the fall of persons (e.g. a guardrail) and prevent the trap door from closing such as to cause a crushing hazard (e.g. by counterbalance).

4.2.4 Notices

4.2.4.1 A notice bearing the following minimum inscription:

“Lift Machinery — Danger Access forbidden to unauthorized persons”

shall be fixed to the outside of doors or trap doors (excluding landing doors and doors of emergency and test panels) giving access to machine and pulley rooms.

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

“Danger of falling — Reclose the trap door”

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

"Lift well — Danger Access forbidden to unauthorized persons"

4.2.5 Well

4.2.5.1 General provisions

4.2.5.1.1 The well may contain one or more lift cars.

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

4.2.5.1.3 For hydraulic lifts jacks shall be in the same well as the car. They may extend into the ground or other spaces.

4.2.5.2 Well enclosure

4.2.5.2.1 General

4.2.5.2.1.1 The well shall be according [4.2.5.2.2](#) or [4.2.5.2.3](#).

4.2.5.2.1.2 Any horizontal projection from the wall into the well or any horizontal beam - including separator beams - greater than 0,15 m in width and 0,25 m in length, shall be protected from a person standing there, unless access is prevented by a car top balustrade in accordance with [4.4.7.4](#).

Protection shall be:

- a) the projection is chamfered to at least 45° to the horizontal where the projection is greater than 0,15 m; or
- b) a deflector forming an inclined surface of minimum 45° to the horizontal, capable of resisting a force of 300 N applied at right angles to the deflector at any point, distributed evenly over a surface of 5 cm² in round or square section, such that it shall resist:
 - without permanent deformation greater than 1 mm;
 - without elastic deformation greater than 15 mm.

4.2.5.2.2 Totally enclosed well

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

The only permissible openings are:

- a) openings for landing doors;
- b) openings for access and emergency doors to the well and inspection doors;
- c) vent openings for escape of gases and smoke in the event of fire;
- d) ventilation apertures;
- e) necessary openings for the functioning of the lift between the well and the machine or pulley rooms.

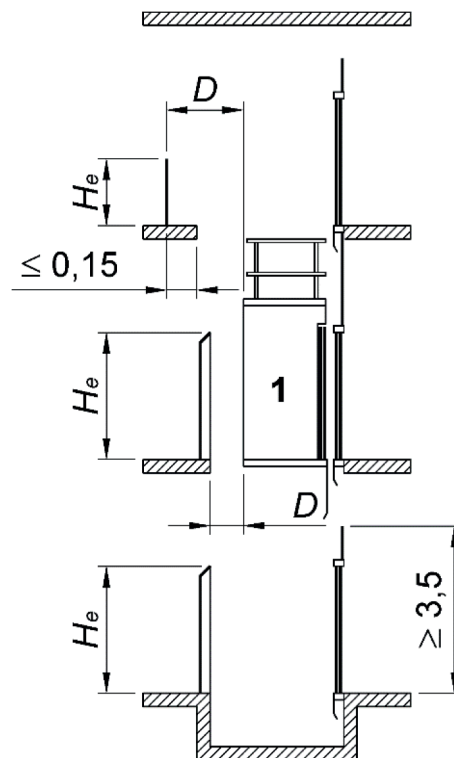
4.2.5.2.3 Partially enclosed well

Where the well is required to be partially enclosed, e.g. observation lifts in connection with galleries or atriums, tower buildings, etc., the following apply (see [Figure 1](#) and [Figure 2](#)):

- a) the height of the enclosure at places normally accessible to persons shall be:
 - 1) minimum 3,50 m at a landing door side;
 - 2) minimum 2,50 m at other sides and with a minimum horizontal distance of 0,50 m to moving parts of the lift.

If the distance to moving parts exceeds 0,50 m, the value of 2,50 m can be reduced progressively to a minimum height of 1,10 m in a distance of 2,00 m;
- b) the enclosure shall be imperforate;
- c) the enclosure shall be located within 0,15 m maximum of the edges of floors, stairs or platforms (see [Figure 1](#)) or be protected in accordance with [4.2.5.2.1.2](#);
- d) provisions shall be taken to prevent the interference with the operation of the lift by other equipment [see [6.2.3 d](#));

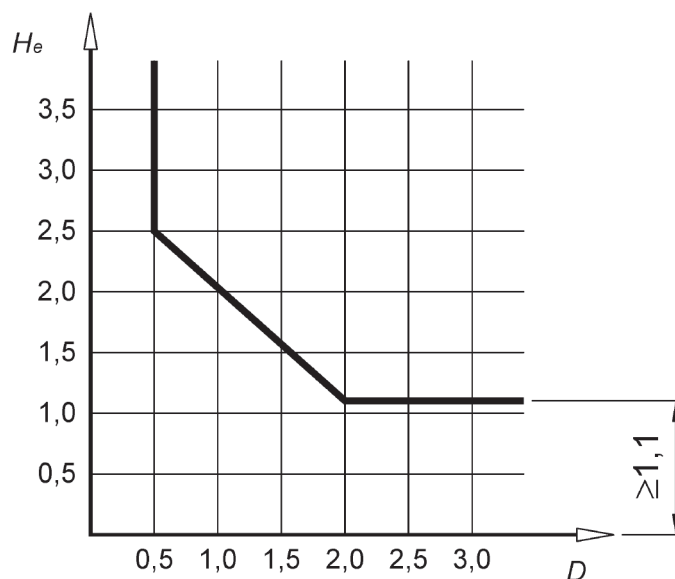
Dimensions in metres



Key

- 1 car
 D distance to moving parts of the lift (see [Figure 2](#))
 H_e height of the enclosure

Figure 1 — Partially enclosed well

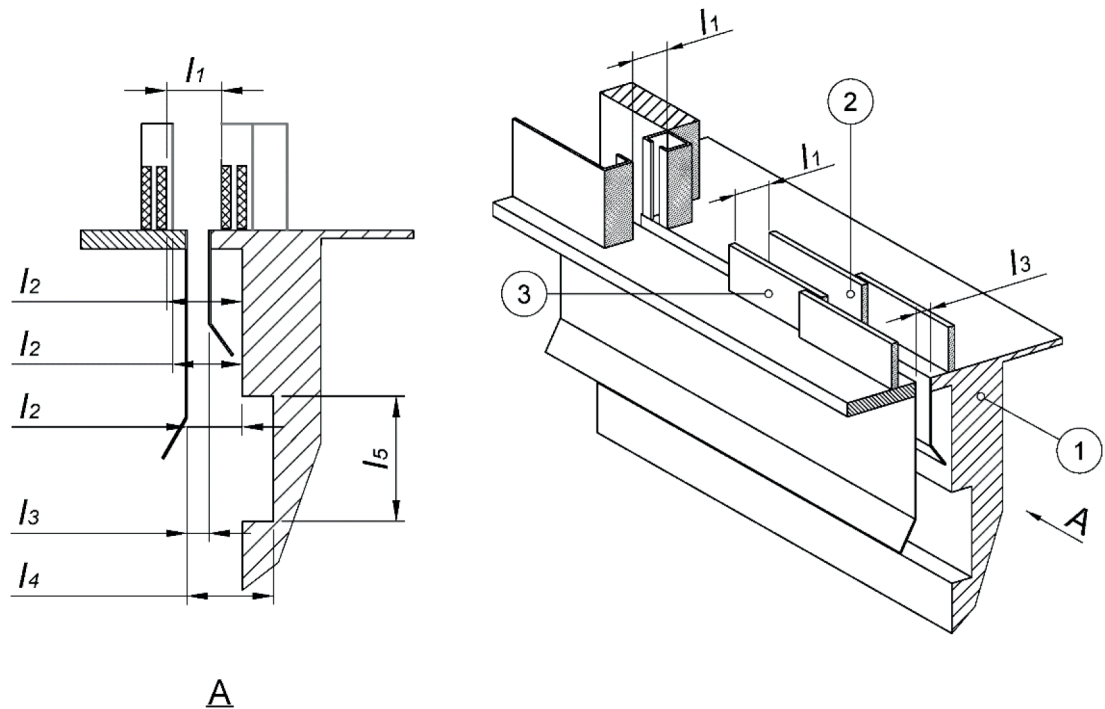
**Key** H_e height of the enclosure D distance to moving parts of the lift**Figure 2 — Partially enclosed well — Distances****4.2.5.3 Clearances related to the walls of the well and landing doors facing a car entrance**

4.2.5.3.1 The horizontal distance between the inner surface of the well and the sill, door frame of the car and closing edge of car sliding doors shall not exceed 0,12 m, over the full height of the well (See [Figure 3](#)).

The distance given above:

- a) shall not exceed 0,20 m over a height not exceeding 0,50 m. There shall not be more than one of such recesses in between two consecutive landing doors;
- b) shall not exceed 0,20 m throughout the travel on goods passenger lifts in which the landing doors are vertically sliding;
- c) is not limited if the car is provided with a mechanically locked door in accordance with [4.3.9.2](#), which can only be opened in the unlocking zone of a landing door.

The operation of the lift shall automatically depend on the locking of the corresponding car door except in the cases covered in [4.12.1.4](#) and [4.12.1.8](#). This locking shall be checked by an electric safety device in conformity with [4.11.2](#).



Key

- 1 lift well wall
- 2 landing door leading panel
- 3 car door leading panel
- l_1 distance $\leq 0,10$ m [4.3.4.2]
- l_2 distance $\leq 0,12$ m [4.2.5.3.1]
- l_3 distance ≤ 35 mm [4.3.4.1]
- l_4 distance $\leq 0,20$ m [4.2.5.3.1 a)]
- l_5 distance $\leq 0,50$ m [4.2.5.3.1 a)]

Figure 3 — Clearances between car and wall facing the car entrance

4.2.5.3.2 Below each landing door sill the surface facing the car apron shall comply with the following requirements:

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

- 2) extended downwards using a hard smooth chamfer whose angle to the horizontal plane shall be at least 60°. The projection to this chamfer on the horizontal plane shall not be less than 20 mm.

4.2.5.4 Protection of any spaces located below the well

If accessible spaces do exist below the well the counterweight or the balancing weight shall be equipped with safety gear.

4.2.5.5 Protection in the well

4.2.5.5.1 The travelling area of the counterweight or the balancing weight shall be guarded by a screen(s):

- where the vertical distance of the lowest point of the counterweight resting on its fully compressed buffer(s) or of the balancing weight in its lowest position, is less than 2,00 m from the pit floor;
- where a pit platform is provided, and the vertical distance of the lowest point of the counterweight resting on its fully compressed buffer(s) or of the balancing weight in its lowest position, is less than 2,00 m from the pit platform and the horizontal distance between the pit platform edges and the counterweight or the balancing weight is less than 0,50 m.

The screen shall comply with the following:

- a) if this screen is perforate, ISO 13857:2019, 4.2.4.1 shall be respected;
- b) this screen shall extend from the lowest point of the counterweight resting on its fully compressed buffer(s) or balancing weight in its lowest position to a minimum height of 2,00 m from the pit floor or platform where provided;
- c) in no case shall the lowest part of the screen be more than:
 - 0,30 m from the pit floor;
 - 0,10 m from the pit platform where provided;For buffers travelling with the counterweight, see [4.8.1.1](#).
- d) the width shall be at least equal to that of the counterweight or balancing weight;
- e) if the gap between the counterweight/balancing weight guide rails and the well wall exceeds 0,30 m then this area shall also be guarded in accordance with b) and c);
- f) the screen may have slot(s) to permit free passage of compensation means or for the purpose of visual inspection;
- g) the screen shall not deflect to cause the counterweight or balancing weight to collide with it 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;

4.2.5.5.2 Where the well contains several lifts there shall be a partition between the moving parts of different lifts. This partition shall comply with the following:

- a) If this partition is perforate, ISO 13857:2019, 4.2.4.1 shall be respected;
- b) The partition shall not deflect to cause the moving parts to collide with it 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.

- c) This partition shall extend from within 0,30 m from the pit floor or pit platform if provided to a height of 2,50 m
- above the pit platform if provided; or
 - above the floor of the door giving access to the pit.

The width shall prevent access from one pit to another, with the maximum free distance of 0,15 m to the adjacent wall.

Where the conditions of 4.2.3.3 d)2) are met, such a partition screen below the lowest point of the travel of the car is not required.

- d) The partition shall extend through the full height of the well where the horizontal distance between the inner edge of any balustrade and a moving part (car, counterweight or balancing weight) of an adjacent lift is less than 0,50 m.

This partition shall be at least the width of the moving part and extend a further 0,10 m on each side throughout the height of the well.

4.2.5.5.3 The car and its associated components shall be at a distance of at least 50 mm from the counterweight or balancing weight (if there is one) and its associated components.

4.2.5.6 Guided travel of car, counterweight and balancing weight

4.2.5.6.1 Extreme position of car, counterweight and balancing weight

4.2.5.6.1.1 The extreme positions of car, counterweight and balancing weight according to Table 1 shall be considered for requirements on guided travel according to 4.2.5.6, and refuge spaces and clearances according to 4.2.5.7 and 4.2.5.8.

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

Position	Traction drives	Positive drives	Hydraulic drives
Highest position of car	Counterweight on fully compressed buffer $+0,035v^2$ ^(a)	Car on fully compressed upper buffer	Ram in its ultimate position achieved through the means of ram stroke limitation $+0,035v_m^2$
Lowest position of car	Car on fully compressed buffer	Car on fully compressed lower buffer	Car on fully compressed buffer
Highest position of counterweight/balancing weight	Car on fully compressed buffer $+0,035v^2$	Car on fully compressed lower buffer $+0,035v^2$	Car on fully compressed buffer $+0,035v_d^2$
Lowest position of counterweight/balancing weight	Counterweight on fully compressed buffer	Car on fully compressed upper buffer	Ram in its ultimate position achieved through the means of ram stroke limitation $+0,035v_m^2$
^(a) $0,035v^2$ represents half the gravity stopping distance corresponding to 115 % of the rated speed: $\frac{1}{2} \cdot \frac{(1,15 \cdot v)^2}{2 \cdot g_n} = 0,0337v^2$, rounded to $0,035v^2$.			

4.2.5.6.1.2 When for traction lifts the slowdown of the lift machine is monitored, in accordance with 4.12.1.3, the value of $0,035v^2$, in Table 1 shall be calculated with the speed at which the car or counterweight comes into contact with the buffer (see 4.8.2.2.1 b)).

4.2.5.6.1.3 For traction lifts which are fitted with compensation means having a tensioning pulley equipped with an anti-rebound device (braking or lock-down device), the value of $0,035v^2$ in Table 1

shall be replaced by a value for the movement of the car related to the possible travel of that pulley plus $1/500$ of the travel of the car, with a minimum of 0,20 m to take account of the elasticity of the ropes.

4.2.5.6.1.4 In the case of direct acting hydraulic lifts, the value of $0,035v^2$ mentioned in [Table 1](#) need not be taken into account.

4.2.5.6.2 In the case of traction lifts

When the car or counterweight is at its highest position according to [4.2.5.6.1](#), its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.6.3 In the case of positive drive lifts

4.2.5.6.3.1 The guided travel of the car upwards from the top floor until it strikes the upper buffers shall be at least 0,50 m. The car shall be guided to the limit of its buffer stroke.

4.2.5.6.3.2 When the balancing weight, if there is one, is at its highest position according to [4.2.5.6.1](#), its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,30 m.

4.2.5.6.4 In the case of hydraulic lifts

4.2.5.6.4.1 When the car is at its highest position according to [4.2.5.6.1](#), its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.6.4.2 When the balancing weight, if there is one, is at its highest position according to [4.2.5.6.1](#), its guide rail lengths shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.6.4.3 With the balancing weight, if there is one, at its lowest position according to [4.2.5.6.1](#), its guided length shall be such as would accommodate a further guided travel of at least 0,10 m.

4.2.5.7 Refuge spaces on car roof and clearances in headroom

4.2.5.7.1 When the car is at its highest position according to [4.2.5.6.1](#), at least one clear area on the car roof shall provide a refuge space selected from [Table 2](#).

For type 2 refuge spaces, the reduction to accommodate parts fixed on the car roof shall not exceed 0,10 m wide by 0,30 m high (see [Figure 4](#)).

If more than one person is necessary on the car roof for carrying out inspection and maintenance work, an additional refuge space shall be provided for each additional person.

In the case of more than one refuge space, they shall be of the same type and not interfering with each other.

Dimensions in metres

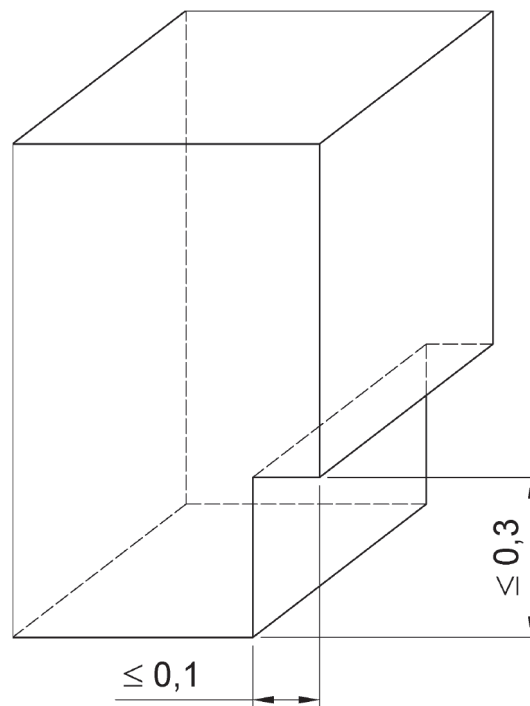


Figure 4 — Maximum dimensions of a reduction in the refuge space

A sign on the car roof readable from the landings giving access to the car roof shall clearly indicate the allowed number of persons and the type of posture ([Table 2](#)) considered for the refuge space(s) accommodation.

Where a counterweight is used a sign shall be placed on or near the counterweight screen (see [4.2.5.5.1](#)) stating the maximum allowed clearances between the counterweight and the counterweight buffer when the car is at its upmost landing level in order to maintain the car headroom dimensions.

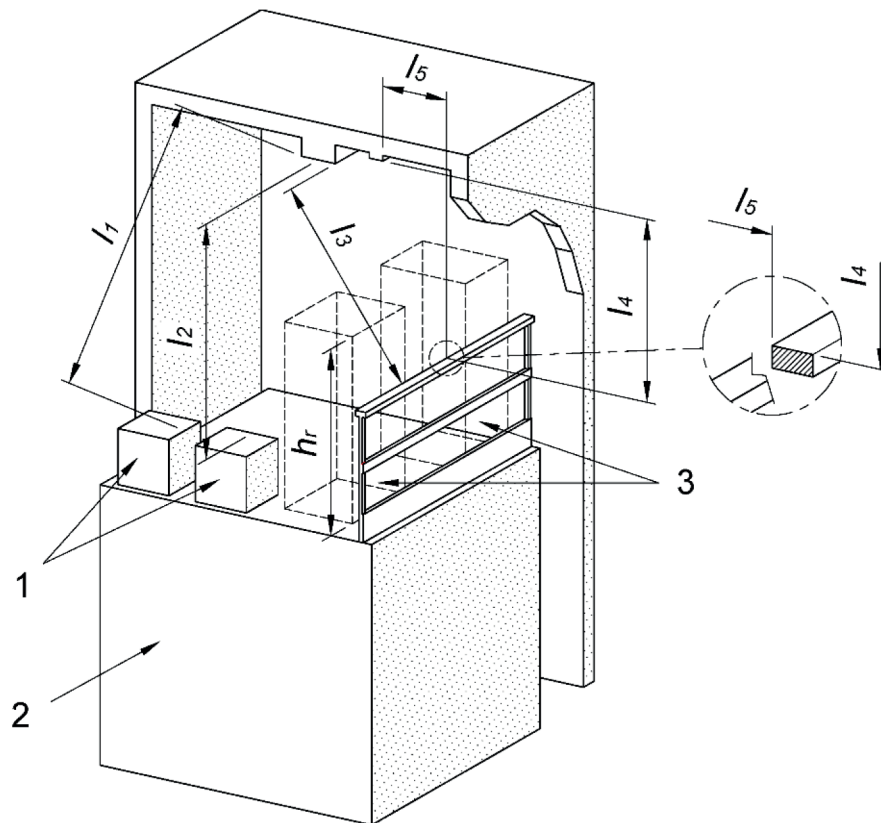
Table 2 — Dimensions of refuge spaces in headroom

Type	Posture	Sign	Horizontal dimensions of the refuge space m	Height of the refuge space m
1	Upright		0,40 × 0,50	2,00
2	Crouching		0,50 × 0,70	1,00

NOTE The overhead obstacle warning sign ISO 7010:2019, W020 is incorporated in these safety signs.

4.2.5.7.2 When the car is at its highest position according to [4.2.5.6.1](#), the clear distance between the lowest parts of the ceiling of the well (including beams and parts situated under the ceiling) (see [Figure 5](#)) and:

- a) the highest pieces of equipment fixed on the car roof, except for those covered in b) and c) below, shall be at least 0,50 m in any vertical or inclined direction within the projection of the car roof limited by the balustrade(s) [4.4.7.2](#) b) if any;
- b) the highest part of the guide shoes or rollers, of the suspension means terminations and of the header or parts of vertically sliding doors, if any, shall be at least 0,10 m in any vertical direction within a horizontal distance of 0,40 m within the projection of the car;
- c) the highest part of the balustrade shall be at least:
 - 1) 0,30 m within a horizontal distance of 0,40 m within the projection of the car and 0,10 m on the outside of the balustrade;
 - 2) 0,50 m in any inclined distance beyond 0,40 m within the projection of the car.



Key

l_1	distance $\geq 0,50$ m [4.2.5.7.2 a)]	1	highest parts installed on the car roof
l_2	distance $\geq 0,50$ m [4.2.5.7.2 a)]	2	car
l_3	distance $\geq 0,50$ m [4.2.5.7.2 c) 2)]	3	refuge space(s)
l_4	distance $\geq 0,30$ m [4.2.5.7.2 c) 1)]	h_r	height of refuge spaces (Table 2)
l_5	distance $\leq 0,40$ m [4.2.5.7.2 c) 1)]		

Figure 5 — Minimum distances between parts fixed on car roof and lowest parts fixed to ceiling of well

4.2.5.7.3 Any single continuous area on the car roof, or on equipment on the car roof, with a minimum clear area of $0,12 \text{ m}^2$ and the minimum dimension of the smallest side being greater than $0,25 \text{ m}$, is considered as a place where a person can stand. When the car is at its highest position according to 4.2.5.6.1, the vertical clearance above any such area and the lowest parts of the ceiling of the well (including beams and parts situated under the ceiling), shall be the height of the relevant refuge space(s) according to 4.2.5.7.1.

4.2.5.7.4 When the car is at its highest position according to 4.2.5.6.1, the free vertical distance between the lowest parts of the ceiling of the well and the highest parts of an upward travelling ram-head assembly shall be at least $0,10 \text{ m}$.

4.2.5.8 Refuge spaces and clearances in the pit

4.2.5.8.1 When the car is at its lowest position according to 4.2.5.6.1, at least one clear area on the pit floor shall provide a refuge space selected from Table 3.

If more than one person is necessary in the pit to carry out inspection and maintenance work, an additional refuge space shall be provided for each additional person.

Where due to restricted free floor area it is necessary to have the compensation means entering the refuge space, it is allowed under the following conditions:

- a) Where the compensation means comprises of several elements, only a single compensation element may enter the refuge space;
- b) This single compensation element shall not enter the refuge space by more than 0,15 m measured in the horizontal direction;
- c) The compensation means shall be able to be pushed away from the refuge space with a force not exceeding 300 N, when the car is at its lowest position;
- d) The compensation means shall have a smooth surface and be free of snags;
- e) A warning sign shall be placed in the pit, visible from the entrance to the well stating.

“Attention – flexible component enters the refuge space”

In the case of more than one refuge space, they shall be of the same type and not interfering with each other.

A sign in the pit readable from the entrance(s) shall clearly indicate the allowed number of persons and the type of posture ([Table 3](#)) considered for the refuge spaces(s) accommodation.

Table 3 — Dimensions of refuge spaces in the pit

Type	Posture	Sign	Horizontal dimensions of the refuge space m	Height of the refuge space m
1	Upright		0,40 × 0,50	2,00
2	Crouching		0,50 × 0,70	1,00
3	Laying		0,70 × 1,00	0,50

NOTE The overhead obstacle warning sign ISO 7010:2019, W020 is incorporated in these safety signs.

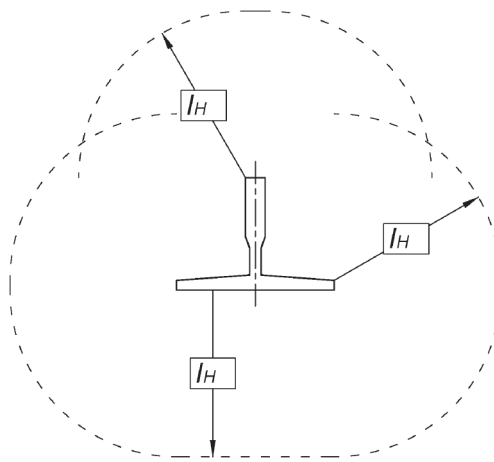
4.2.5.8.2 When the car is at the lowest position according to [4.2.5.6.1](#), the following conditions shall be satisfied:

- a) the free vertical distance between the bottom of the pit and the lowest parts of the car shall be at least 0,50 m. This distance may be reduced:
 - 1) for parts of the apron or parts of the vertically sliding car door(s) within a maximum horizontal distance from the adjacent wall(s) according to [Figure 7](#);

- 2) for car frame parts, safety gears, guide shoes, pawl devices, within a maximum horizontal distance from the guide rails according to [Figure 6](#) and [Figure 7](#).
- b) the free vertical distance between the highest parts fixed in the pit and on the pit platform, for instance a tensioning device for compensation means being in its highest position, jack supports, pipes and other fittings, and the lowest parts of the car, except for items detailed in [4.2.5.8.2](#) a) 1) and 2), shall be at least 0,30 m;
- c) the free vertical distance between the bottom of the pit or the top of equipment installed there and the lowest parts of the downwards-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 (e.g. by providing screens in accordance with [4.2.5.5.1](#)), this vertical distance may be reduced from 0,50 m to 0,10 m minimum;

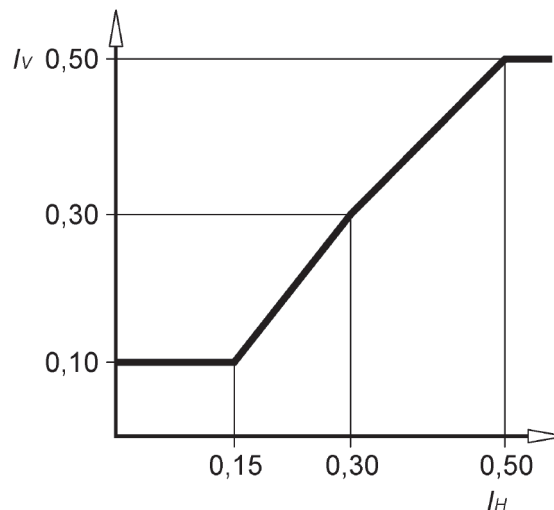
- d) the free vertical distance between the bottom of the pit and the lowest guiding yoke of a telescopic jack below the car of a direct acting lift shall be at least 0,50 m.



Key

I_H horizontal distance around guide rail

Figure 6 — Horizontal distance around guide rail

**Key** I_V minimum vertical distance [m] I_H horizontal distance X_H [m]**Figure 7 — Minimum vertical distances****4.2.6 Machinery spaces and pulley rooms****4.2.6.1 General provisions**

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

4.2.6.2 Notices

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

4.2.6.2.2 If, after release of the main switch, some parts remain live (interconnection between lifts, lighting, on-board power supplies etc.) notice (s) located close to the main switch shall indicate this and allow to locate and to identify the relevant disconnection and isolation device(s) (see [4.10.5](#)).

4.2.6.2.3 In the machine room ([4.2.6.3](#)), the machinery cabinet ([4.2.6.5.1](#)) or at the emergency and tests panel(s) ([4.2.6.6](#)), there shall be detailed notices to be followed in the event of lift breakdown ([6.2.5](#)), particularly concerning the use of the device for emergency operation and the emergency unlocking key for landing doors.

4.2.6.3 Machinery in a machine room**4.2.6.3.1 Traction sheave in the well**

Where the traction sheave is installed in the well, means shall be provided to carry out examinations and the tests and the maintenance operations from the machine room.

4.2.6.3.2 Dimensions

4.2.6.3.2.1 In the machine room a clear height of at least 2,10 m shall be provided at working areas, and:

- a) a clear horizontal area in front of the control panels and cabinets. This area is defined as follows:
 - 1) depth, measured from the external surface of the enclosures, at least 0,70 m;
 - 2) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel.
- b) a clear horizontal area of at least 0,50 m × 0,60 m for maintenance and inspection of moving parts at points where this is necessary and, if need be, emergency operation ([4.9.2.3.4](#)).

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

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

The access ways to the clear spaces mentioned in [4.2.6.3.2.1](#) shall have:

- a) a width of at least 0,50 m; or
- b) a width of at least 0,40 m where there are no moving parts or hot surfaces, as defined in 4.10.1.1.6.

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

4.2.6.3.2.4 When the machine room floor comprises a number of levels differing by more than 0,50 m, fixed ladders according to ISO 14122-4:2016 or stairways and guardrails according to ISO 14122-3:2016, clause 7 shall be provided.

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

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

4.2.6.3.3 Other openings

The dimension of holes in the slab and room floor shall be limited for their purpose.

Ferrules, projecting at least 50 mm above the slab or finished floor, shall be provided

4.2.6.4 Machinery inside the well

4.2.6.4.1 General provisions

4.2.6.4.1.1 The clear height for moving inside the well from one working area to another one shall not be less than 1,80 m.

4.2.6.4.1.2 In the case of:

- a retractable platform ([4.2.6.4.5](#)) and/or movable stops ([4.2.6.4.5.2 b](#)); or
- manually operated mechanical device ([4.2.6.4.3.1](#), [4.2.6.4.4.1](#)),

a clear notice(s) giving all the necessary instructions for operation shall be affixed adjacent to the activation point(s) of those device(s).

4.2.6.4.2 Dimensions of working areas inside the well

4.2.6.4.2.1 In the well a clear height of at least 2,10 m shall be provided at working areas, and:

- a) a clear horizontal area in front of the control panels and cabinets. This area is defined as follows:
 - 1) depth, measured from the external surface of the enclosures, at least 0,70 m;
 - 2) width, the greater of the following values: 0,50 m or the full width of the cabinet or panel;
 Car balustrades are not considered as an obstacle.
- b) a clear horizontal area of at least 0,50 m × 0,60 m for maintenance and inspection of parts at points where this is necessary.

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

4.2.6.4.3 Working areas in the car or on the car roof

4.2.6.4.3.1 Where maintenance/inspection work on the machinery is to be carried out from inside the car or from the car roof, and if uncontrolled or unexpected car movement resulting from maintenance/inspection can be dangerous to persons, the following applies:

- a) any dangerous movement of the car shall be prevented by a mechanical device;
- b) the inactive position of the mechanical device shall be checked by an electric safety device in conformity with [4.11.2](#);
- 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 car door header/door drive;
 - 2) via the car by access through an emergency trap door in the car roof according to [4.4.6](#). Steps, ladder and/or hand hold(s) shall be provided to allow a safe descent into the car; or
 - 3) via an emergency door as described in [4.2.3](#).

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

4.2.6.4.3.2 If inspection doors are located in the walls of the car, they shall:

- a) comply with [4.2.3.2 e](#));
- b) in the case of inspection doors with a width of more than 0,30 m, be provided with a barrier to avoid falling into the well;
- c) not open towards the outside of the car;
- d) be provided with a key-operated lock, capable of being closed without the use of a key and automatically locked when closed;
- e) be provided with an electric safety device in conformity with [4.11.2](#), checking the locked position;
- f) satisfy the same requirements as the walls of the car.

4.2.6.4.3.3 Where it is necessary to move the car from inside with an open inspection door, the following applies:

- a) an inspection control station according to [4.12.1.5](#) shall be available near the inspection door;
- b) this inspection control station shall be accessible only by use of a key and arranged so that it is not possible to use it to drive the car when standing on the car roof;
- c) if the smaller dimension of the opening exceeds 0,20 m the clear horizontal distance between the outside edge of the opening in the car wall and equipment installed in the well in front of that opening shall be at least 0,30 m.

4.2.6.4.4 Working areas in the pit

4.2.6.4.4.1 Where machinery is to be maintained or inspected from the pit, and if uncontrolled or unexpected car movement resulting from maintenance/inspection can be dangerous to persons, the following applies:

- a) a permanently installed device shall be provided to mechanically stop the car with any load up to rated load and from any speed up to rated speed to create a free distance of at least 2,00 m between the floor of the working area and the lowest parts of the car, excluding those mentioned in [4.2.5.8.2](#) a) 1) and [4.2.5.8.2](#) a) 2). The retardation of the car by mechanical devices other than safety gears shall not exceed that produced by the buffers (see [4.8.2](#));
- b) the mechanical device shall be able to maintain the car stopped;
- c) the mechanical device can be operated manually or automatically;
- d) the opening by the use of a key of any door providing access to the pit shall be checked by an electric safety device in conformity with [4.11.2](#), which prevents all further movement of the lift. Movement shall only be possible under the requirements given in f) below;
- e) all movement of the car shall be prevented by an electric safety device in conformity with [4.11.2](#) unless the mechanical device is in its inactive position;
- f) when the mechanical device is in its active position as checked by an electric safety device in conformity with [4.11.2](#), electrically driven movement of the car shall only be possible from the inspection control station(s);
- g) the return of the lift to automatic operation shall only be permitted after operation of an electrical reset device placed outside of the well in close proximity of the door giving access to the pit and accessible only by use of a key.

4.2.6.4.4.2 When the car is in the position according to [4.2.6.4.4.1](#) a), it shall be possible to leave the pit either:

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

4.2.6.4.5 Working areas on a platform

4.2.6.4.5.1 Where machinery is to be maintained or inspected from a platform, it shall be:

- a) permanently installed; and
- b) retractable if it is in the travel path of the car or counterweight/balancing weight.

4.2.6.4.5.2 Where machinery is to be maintained or inspected from a platform positioned into the travel path of the car, the counterweight or the balancing weight:

- a) the car shall be stationary by using a mechanical device in conformity with [4.2.6.4.3.1](#) a) and b); or
- b) where the car needs to be moved, the travel path of the car, the counterweight or the balancing weight shall be limited by movable stops, working with any load up to rated load and from any speed up to rated speed, in such a way that the car, the counterweight or the balancing weight are stopped:
 - 1) at least 2,00 m above the platform when running down with rated speed towards the platform;
 - 2) below the platform in compliance with [4.2.5.7.2](#), when running up with rated speed towards the platform.

4.2.6.4.5.3 The platform shall be:

- a) able to support at any position the mass of two persons, each counting for 1 000 N over an area of 0,20 m × 0,20 m without permanent deformation. If the platform is intended to be used for handling heavy equipment, the dimensions shall be considered accordingly, and the platform shall have a mechanical strength to withstand the loads and forces to which it is intended to be subjected.
- b) provided with a balustrade in conformity with [4.4.7.4](#);
- c) equipped with means ensuring that:
 - 1) the vertical distance between the floor of the platform and the level of the access does not exceed 0,50 m;
 - 2) it shall not be possible to pass a ball with a diameter of 0,15 m through any gap between the platform and the sill of the access door.

4.2.6.4.5.4 In addition to [4.2.6.4.5.3](#), any retractable platform shall be provided with:

- a) an electric safety device in conformity with [4.11.2](#), checking the fully retracted position;
- b) means for putting it into or removing it from the working position. This operation shall be possible from the pit or by means located outside of the well and accessible only by use of a key. The manual effort for operation of the platform shall not exceed 250 N;
- c) if the access to the platform is not through a landing door, the opening of the access door shall be impossible when the platform is not in the working position, or alternatively, means shall be provided to prevent persons from falling into the well.

4.2.6.4.5.5 In the case of [4.2.6.4.5.2](#) b), movable stops shall be automatically operated when the platform is lowered. They shall be provided with:

- a) buffers in conformity with [4.8](#);
- b) an electric safety device in conformity with [4.11.2](#), which only allows car movement if the stops are in their fully retracted position;
- c) an electric safety device in conformity with [4.11.2](#), which only allows car movement with a lowered platform if the stops are in their fully extended position.

4.2.6.4.5.6 Where it is necessary to move the car from the platform, an inspection control station according to [4.12.1.5](#) shall be available for use on the platform.

When the movable stop(s) is(are) in its active position, electrically driven movement of the car shall only be possible from the inspection control station(s).

4.2.6.4.5.7 The maximum permissible load shall be indicated on the platform.

4.2.6.4.6 Working areas outside of the well

When the machinery is in the well and is intended to be maintained/inspected from outside of the well, the working areas in accordance with [4.2.6.3.2.1](#) and [4.2.6.3.2.2](#) shall be provided outside of the well. Access to this equipment shall be possible by an inspection door in conformity with [4.2.3](#).

4.2.6.5 Machinery outside of the well

4.2.6.5.1 Machinery cabinet

4.2.6.5.1.1 The machinery of a lift shall be located inside a cabinet which shall not be used for purposes other than the lift. It shall not contain ducts, cables or devices other than for the lift.

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

The only permissible openings are:

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

These openings ,except openings towards the well, the machine room or the pulley room, shall comply with the following requirements:

- protection according to ISO 13857:2019, Table 5 against contact with danger zones; and
- degree of protection of at least IP2XD to IEC 60529:1989+AMD1:1999+AMD2:2013 against contact with electrical equipment.

4.2.6.5.1.3 The door(s) shall:

- a) have dimensions which enables to carry out the required work through the open door;
- b) not open towards the inside of the cabinet;
- c) be provided with a key-operated lock, capable of being closed without the use of a key and automatically locked when closed.

4.2.6.5.2 Working area

The working area in front of a machinery cabinet shall comply with the requirements according to [4.2.6.4.2](#).

4.2.6.6 Devices for emergency operation and tests

4.2.6.6.1 In the case of [4.2.6.4.3](#), [4.2.6.4.4](#) and [4.2.6.4.5](#), the devices for emergency operation and tests shall be provided on a panel(s) suitable for carrying out from outside of the well all emergency operation and dynamic tests of the lift such as tests of traction, safety gear, buffer, ascending car overspeed protection means, unintended car movement protection, rupture valve, restrictor, pawl device, cushioned stop and pressure.

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

- a) does not open towards the inside of the well;

- b) is provided with a key-operated lock, capable of being closed without the use of a key and automatically locked when closed.

4.2.6.6.2 The panel(s) shall provide the following:

- a) emergency operation devices according to [4.9.2.3](#) or [4.9.3.9](#), together with an intercom system in conformity with [4.12.3.2](#);
- b) devices which enables dynamic tests to be carried out;
- c) direct observation of the lift machine or display device(s), which gives indication of:
 - the direction of movements of the car;
 - the reaching of an unlocking zone; and
 - the speed of the car.

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

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

The electrical supply for this lighting shall be in conformity with [4.10.7.1](#).

4.2.6.6.4 There shall be working areas according to [4.2.6.3.2.1](#) in front of emergency and test panels.

4.2.6.7 Construction and equipment of pulley rooms

4.2.6.7.1 Dimensions

4.2.6.7.1.1 Pulley room dimensions shall provide:

- a) a clear height for movement of at least 1,50 m.

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

- b) a clear horizontal area, of at least 0,50 m × 0,60 m, for maintenance and inspection of moving parts at points where it is necessary.
- c) access ways to these areas having:
 - 1) a width of at least 0,50 m.
 - 2) a width of at least 0,40 m where there are no moving parts or hot surfaces, as defined in [4.10.1.1.6](#).

4.2.6.7.1.2 There shall be a clear vertical distance of at least 0,30 m high above unprotected pulleys.

4.2.6.7.2 Openings

The dimensions of holes in the slab and pulley room floor shall be limited for their purpose.

Ferrules, projecting at least 50 mm above the slab or finished floor, shall be provided.

4.3 Landing doors and car doors

4.3.1 General provisions

4.3.1.1 Landing levels shall be provided with landing doors and the access of passengers into the car shall be through a car door.

4.3.1.2 The doors shall be imperforate.

4.3.1.3 When closed, the landing and car doors shall, apart from the necessary clearances, completely close the landing and car entrances.

4.3.1.4 When closed, the clearance between door panels, or between panels and uprights, lintels or sills, shall not exceed 5 mm. This values, due to wear, may reach 8 mm, except for doors as required in [4.3.6.2.2.1 i\)](#) and [4.3.6.2.2.1 j\)](#). These clearances are measured at the back of recesses, if present.

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

4.3.1.6 In the case of hinged landing doors, they shall strike stops to prevent them swinging inside the well.

4.3.1.7 In the case of vertically sliding doors:

- a) They shall be provided with means to stop the closing panel(s) when the distance between the closing rigid members of the panel is not less than 20 mm and not more than 50 mm.
- b) A non-shearing, and non-crushing member of either the meeting or overlapping type shall be provided on the leading edge of the panel to close the distance between the rigid door sections when in contact with the stops. This member shall allow a minimum compressible clearance of 20 mm.
- c) Rigid members that overlap the meeting edge within the opening width are prohibited.

4.3.2 Height and width of entrances

4.3.2.1 Height

Landing doors and car doors shall be such that a minimum clear height of the entrance is 2,00 m.

4.3.2.2 Width

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

4.3.3 Sills, guides, door suspension

4.3.3.1 Sills

Every landing door and car door shall incorporate a sill withstanding forces as defined in [4.7.2.3.6](#) to withstand the passage of loads being introduced into the car.

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

4.3.3.2 Guides

4.3.3.2.1 Landing and car doors shall be designed to prevent, derailment, mechanical jamming, or displacement.

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

4.3.3.2.3 Vertically sliding landing and car doors shall be guided at both sides.

4.3.3.3 Suspension of vertically sliding doors

4.3.3.3.1 Panels of vertically sliding landing and car doors shall be fixed to two independent suspension elements.

The failure of one suspension element shall by design not permit a panel to fall or means shall be provided to prevent the panel from falling if one suspension element fails.

In the event of a failure of at least one suspension element the door shall not operate further.

4.3.3.3.2 Suspension elements shall be designed with a safety factor of at least 8.

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

4.3.3.3.4 Suspension elements shall be guarded against leaving the pulleys, pulley grooves or sprockets.

4.3.3.3.5 Vertically sliding panels shall be counterbalanced, that they will not open or close by gravity.

Fastenings shall be provided to prevent the fall and the detachment or dislodgment of the balancing weights ballast.

Balancing weight(s) shall be fixed securely to the supporting system. Where more than one suspension element is fastened to one balancing weight, they shall be individually fixed to the balancing weight. Balancing weights shall not be fixed using clamping screws only. The method of fixing shall ensure that accidental displacement is prevented.

4.3.4 Horizontal door clearances

4.3.4.1 The horizontal distance between the sill of the car and sill of the landing doors shall not exceed 35 mm (see [Figure 3](#)).

4.3.4.2 The horizontal distance giving access to the well shall not exceed 0,10 m (see [Figure 3](#)):

- a) between the leading edges of the car door and the landing doors during their operation cycle;
- b) between the door jambs at the closing side of side opening doors;
- c) between the door jambs of vertical sliding doors up to a height of 2,50 m.

4.3.4.3 In the case of;

- a) the combination of:
 - a hinged landing door and a folding car door (see [Figure 8](#));

- a hinged landing door and a horizontal sliding car door (see [Figure 9 a\)](#) and [Figure 9 b\)](#); except a hinged landing door and a horizontal sliding car door 3 panel side-opening or 6 panel centre-opening having a door width more than 0,90 m (See [Figure 9 c\)](#);

- horizontal sliding car and landing doors, which are not mechanically coupled (see [Figure 10\)](#);

it shall not be possible to place a ball with a diameter of 0,12 m according to [Figure 8](#), [Figure 9 a\)](#), [Figure 9 b\)](#) or [Figure 10](#) respectively in any gap between the closed door.

b) the combination of:

- a hinged landing door and a horizontal sliding car door 3 panel side-opening or 6 panel centre opening having a door width of more than 0,90 m [see [Figure 9 c\)](#)];

it shall not be possible to place a ball with a diameter of 0,15 m according to [Figure 9 c\)](#) in any gap between the closed doors.

c) the combination of:

- a hinged landing door and a vertical sliding car door (see [Figure 11\)](#);

it shall not be possible to place a ball with a diameter of 0,15 m according to [Figure 11](#) between the closed landing door and leading panel(s) of the car door.

The top edge of the fast panel and the inner lower edge of the following panel shall be chamfered to at least 45° to the horizontal (see [Figure 13\)](#).

d) the combination of:

- a vertical sliding landing door and a vertical sliding car door, which are not mechanically coupled (see [Figure 12\)](#);

it shall not be possible to place a ball with a diameter of 0,15 m according to [Figure 12](#) in any gap between the leading edge of the fast panel of one door and the leading panel of the opposite door.

The top edge of the fast panel and the inner lower edge of the following panel of landing and car doors shall be chamfered to at least 45° to the horizontal (see [Figure 13\)](#).

Dimensions in metres

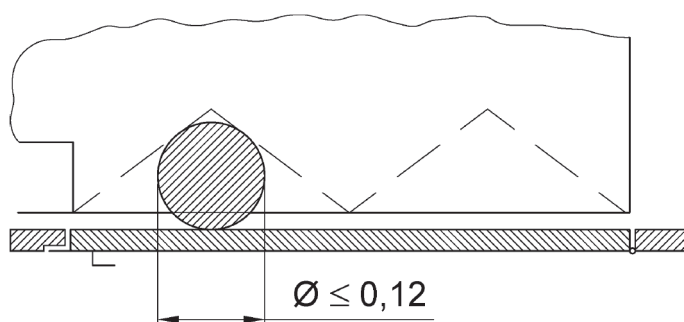


Figure 8 — Hinged landing door and folding car door