BS EN 81-70:2018

BSI Standards Publication

Safety rules for the construction and installation of lifts - Particular applications for passenger and goods passenger lift

Part 70: Accessibility to lifts for persons including persons with disability

bsi.

National foreword

This British Standard is the UK implementation of EN 81-70:2018. It supersedes BS EN 81-70:2003, which will be withdrawn on 31 August 2019.

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 secretary.

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

Règles de sécurité pour la construction et l'installation des élévateurs - Applications particulières pour les ascenseurs et ascenseurs de charge - Partie 70 : Accessibilité aux ascenseurs pour toutes les personnes y compris les personnes avec handicap

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Besondere Anwendungen für Personen- und Lastenaufzüge - Teil 70: Zugänglichkeit von Aufzügen für Personen einschließlich Personen mit Behinderungen

This European Standard was approved by CEN on 26 June 2017.

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European foreword

This document (EN 81-70:2018) 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of an identical text or by endorsement, at the latest by November 2018, and conflicting national standards shall be withdrawn at the latest by May 2020.

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 81-70:2003 and EN 81-70:2003/A1:2004.

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

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

EN 81-70:2018 is a full revision of the standard which reflects developments since the publication of EN 81-70:2003 and experience gained from its application. Consequently, most clauses have been changed. The main changes can be identified as:

— the addition of detailed specifications for contrast requirements;

— the increase of door widths;

— the deletion of items which are now covered by EN 81-20 (protection device on doors, stopping and levelling accuracy);

— the addition of two more lift car types;

— the clarification of arrangement and design of handrails;

— improved requirements for the design and arrangement of control devices and indicators;

— improved requirements for the arrangement of landing controls for lift groups;

— the addition of detailed requirements for landing control devices for destination control systems using touch screens;

— the clarification of requirements for extra large buttons;

— the deletion of previous Annexes A, C, D and E which included background and guidance information. Some of this information has been transferred into normative requirements. For remaining information, reference to ISO 21542 has been added.

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

0 Introduction

0.1 General

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

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

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 lifts that have been designed and built according to the provisions of this type C standard.

0.2 Principles

For the revision of this standard the following have been considered:

a) practical experience with the first version of this standard;

b) market demand for including new technology;

c) CEN-CENELEC Guide 6;

d) current legal framework for accessibility and usability, in particular:

The non-discrimination clause (art 6a) based on disability and age of Article 19 of consolidated version 2016 of the Treaty of Lisbon of the European Union requests a new understanding of diversity of users in the built environment, transport and products, similar to that established in information and communication technologies.

The UN Convention on the Rights of Persons with Disabilities with reference also to accessibility in the built environment – considering human diversity, social inclusion and equality for all people - is the first ratified EU agreement on human rights and ratified also by most Member States. It is also the first international legally binding instrument on human rights setting minimum standards for the rights for people with disabilities around the world.

0.3 Assumptions

Intensive studies have been made on the different categories of disability to establish related hazards and their risks (see Annex A).

The application of this standard is based on following assumptions:

a) It is the responsibility of national building regulations to specify in which buildings accessible lifts according to this standard will be installed.

b) National building regulations will not conflict with the provisions of this standard.

c) Obstacle-free accessibility on the landing floors is provided on all eligible floors.

d) Visual and tactile floor guidance systems for finding lifts and their landing control stations in a building are considered by building planners and building designers.

0.4 Negotiations

It is assumed that negotiations have been made for each contract between the customer and the supplier/installer about:

a) the intended use of the lift, particularly concerning the kind of expected passengers which may have an impact on the selection of appropriate and optional solutions of this standard (e.g. for buildings where a higher level of accessibility may be foreseen according to Annex D);

b) temporary activation of specific features of the lift;

c) environmental conditions;

d) civil engineering problems;

e) other aspects related to the place of installation e.g. how to ensure guidance to passengers about the specific operational features of the lift.

1 Scope

This European Standard specifies the minimum requirements for the safe and independent access and use of lifts by a wide range of persons, including persons with disabilities.

It is applicable to new passenger and goods passenger lifts according to EN 81-20. For other types of lifts, e.g. inclined lifts according to EN 81-22, this standard can usefully be taken as a basis.

NOTE 1 For guidance on solutions for increased accessibility and usability see Annex D.

NOTE 2 For the upgrading of accessibility of existing lifts in line with the recommendation of the European Commission dated 8th of June, 1995 (95/216/EC) concerning improvements to safety of existing lifts, see EN 81–82.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 81-20:2014, *Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger lifts*

EN 81-28:2018, *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 ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and EN 81-20:2014 and the following apply.

3.1
collective control system
lift control system where required direction of travel is registered on the landing and the destination floor is registered in the car

3.2
destination control system
lift control system where the destination floor is registered on the landing

3.3
accessibility button
means to activate enhanced accessibility features or services for a single trip

4 Significant hazards and barriers to accessibility

This clause contains all significant hazards, hazardous situations and events as far as they are dealt with in this standard, identified by risk assessment as significant for this type of machinery and which require actions to eliminate or reduce the risk (see Table 1).

In this European Standard, barriers to accessibility and additional risks encountered by the person with disability or by the devices used by that person are identified particularly in Table 1, No 8 (ergonomic hazards).

Table 1 — List of significant hazards

No	**Hazards** listed in EN ISO 12100:2010, Annex B	Relevant clauses
1	**Mechanical hazards due to:**	
	Crushing	5.3.2.3
	Impact	5.3.2.3
	Slip, trip, fall	5.3.2.4
8	**Ergonomic hazards** due to:	
	Access	5.2.1, 5.2.2, 5.3.1, 5.3.2.3
	Design or location of indicators, visual and audible display units	5.1.3, 5.4.2.4, 5.4.2.5, 5.4.3.3, 5.4.3.4
	Design, location or identification of control devices	5.1.2, 5.4.2.1, 5.4.2.2, 5.4.2.3, 5.4.3.1, 5.4.3.2
	Effort	5.3.2.1, 5.3.2.2

5 Safety requirements and/or protective measures

5.1 General

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

The requirements of EN 81-20 and EN 81-28 apply with additional requirements elaborated below.

5.1.2 Where luminance contrast between adjacent surfaces is required the difference in light reflectance value (LRV) shall comply with Table 2.

Light reflectance values under viewing angles according to Table 2 taking into account lighting conditions and reflections of ceilings, walls and floors may be determined by a black and white photo of a sample with an adjacent LRV scale and comparing surfaces of the sample with the LRV scale. Alternatively, by placing a LRV scale against the surface of interest, a reasonable match can be identified.

NOTE On shiny and direct reflective surfaces, unfavourable reflections can reduce luminance contrast determined by LRV-method. Light colour tones for ceiling and wall surfaces, diffuse reflective materials and a wide light distribution prevent disturbing reflections on the controls. For further guidance on contrast see ISO 21542:2011, B.7.2.

Table 2 — Minimum difference of light reflectance value (LRV)

Clause	Item	At landings		In the car	
		Minimum LRV point difference	Viewing angle	Minimum LRV point difference	Viewing angle
Table 4, item c)	Active part of push buttons to their surrounding	30	45° above horizontal	30	45° above horizontal
Table 4, item d)	Face plate to its surrounding	30	Perpendicular	30	Perpendicular
Table 4, item j)	Symbols on push buttons to active areas	30 (60 recommended)	45° above horizontal	30 (60 recommended)	45° above horizontal
5.4.3.3 c)	Lift identification to background	30 (60 recommended)	Perpendicular	-	-

5.1.3 When an audible signal or voice announcement is required, the sound level shall be adjustable between 35 dB(A) and at least 65 dB(A) and to suit the site conditions. In noisy environments (e.g. on landings in train stations) the maximum sound level shall be adjustable up to 80 dB(A) (see 0.4). The means of adjustment shall be accessible only to authorized persons.

5.2 Entrances – Door openings

5.2.1 The landing and car doors shall be automatic power operated horizontally sliding doors.

The clear opening width shall be at least 800 mm for type 1 cars, 900 mm for type 2, type 3 and type 4 cars and 1 100 mm for type 5 cars. In existing buildings, the clear opening width shall be at least 800 mm for type 2 cars.

5.2.2 The door dwell time shall be adjustable at least between 2 s and 20 s to suit the conditions where the lift is installed (see 0.4). The means of adjustment shall be accessible only to authorized persons.

NOTE A door dwell time of at least 6 s is needed for persons with reduced mobility (see also 5.4.2.2.3).

A door close button may be provided to reduce the door dwell time.

5.3 Car dimensions and equipment in the car

5.3.1 Car dimensions

The inside dimensions of cars with a single entrance or with two opposite or two adjacent entrances shall be chosen in accordance with Table 3 (see 0.4).

Car dimensions shall be measured between the structural car walls. Decorative finishes on each wall that reduce the minimum car dimensions given by Table 3 shall not exceed 15 mm in thickness.

There shall be no additional features attached to the car walls below a height of 800 mm which may restrict the accommodation and turning of passengers using wheelchairs or passengers with other walking aids. This would particularly be the case for type 1 and type 2 cars restricting the minimum depth and for type 4 cars restricting the smaller minimum dimension.

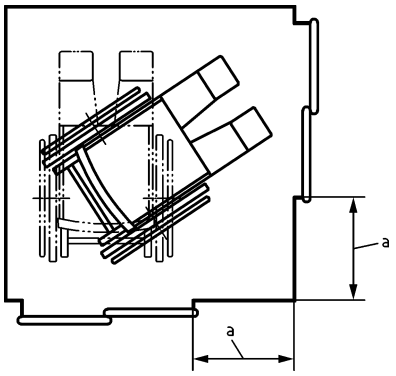
Table 3 — Minimum car dimensions for cars with a single entrance or two entrances

Type of car	Minimum car dimensions [a]	Accessibility level	Building types, usage	Remarks
1	Car width: 1 000 mm Car depth: 1 300 mm (450 kg)	This car accommodates one wheelchair user without an accompanying person.	Shall only be used in existing buildings where building constraints do not permit the installation of a type 2 car.	Type 1 provides only limited accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A described in EN 12184:2014. This type also provides accessibility for persons using walking aids (e.g. a walking stick) and for persons with sensory and intellectual disabilities.
2	Car width: 1 100 mm Car depth: 1 400 mm (630 kg)	This car accommodates one wheelchair user and an accompanying person.	Shall be the minimum size for new buildings.	Type 2 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A or B as described in EN 12184:2014. This type also provides accessibility for persons using walking aids (e.g. walking sticks, crutches or rollators). Passengers with wheelchairs or walking aids are unlikely to be able to turn around in this type of car and have to leave the car backwards.
3	Car width: 1100 mm Car depth: 2100 mm (1 000 kg)	This car accommodates one user with a wheelchair of class C and some other passengers. It also allows transport of stretchers.	Recommended size for cars in public areas (e.g. outdoor facilities, stations, etc.) and for cars where transport of wheelchairs of class C shall be provided	Type 3 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A, B or C described in EN 12184:2014. It also provides accessibility for persons using a manual wheelchair with tractor unit (propulsion attachment). When cars of this type are configured with two opposite entrances this can provide straight through circulation from the main entrance to different floor levels.
4	Car width: 1 600 mm Car depth: 1 400 mm	This car accommodates one wheelchair user and a few	Shall be the minimum size for cars with doors on adjacent walls[b].	Type 4 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an

Type of car	Minimum car dimensions [a]	Accessibility level	Building types, usage	Remarks
	or Car width: 1 400 mm Car depth: 1 600 mm (1 000 kg)	other passengers. It also allows a wheelchair to be rotated within the car.		electrically powered wheelchair of class A or B as described in EN 12184:2014. Type 4 provides sufficient space for most wheelchairs users and for passengers with walking aids.
5	Car width: 2 000 mm Car depth: 1 400 mm or Car width: 1 400 mm Car depth: 2 000 mm (1 275 kg)	This car accommodates one wheelchair user and several other passengers. It also allows a wheelchair to be rotated within the car.		Type 5 provides accessibility for persons using a manual wheelchair as described in EN 12183:2014 or an electrically powered wheelchair of class A, B or C as described in EN 12184:2014. Type 5 provides sufficient turning space for persons using wheelchairs of class A or B and for persons using walking aids (e.g. walking frames, rollators, etc.).

[a] The car width is defined as the horizontal distance between the inner surface of the structural walls of the car, measured parallel to the front entrance. The car depth is defined as the horizontal distance between the inner surfaces of the structural walls of the car, measured perpendicular to the width.

[b] The distances between doors and adjacent car walls as shown in Figure 1 should be as large as possible.



Key

a distance between door and adjacent car wall

Figure 1 —Cars with doors on adjacent walls

5.3.2 Equipment in the car

5.3.2.1 A handrail shall be installed on the side wall where the car operating panel is located as follows:

a) the handrail shall be interrupted where the car operating panel is located in order to avoid obstructing control devices;

b) the handrail may only be installed on one side of the car operating panel if the shorter side would not accommodate a handrail with an overall length of at least 400 mm;

c) the gripping part of the handrail shall have cross-sectional dimensions between 30 mm and 45 mm with a minimum radius of 10 mm (see Figure 2);

d) the distance between the wall and the gripping part of the handrail shall be at least 35 mm;

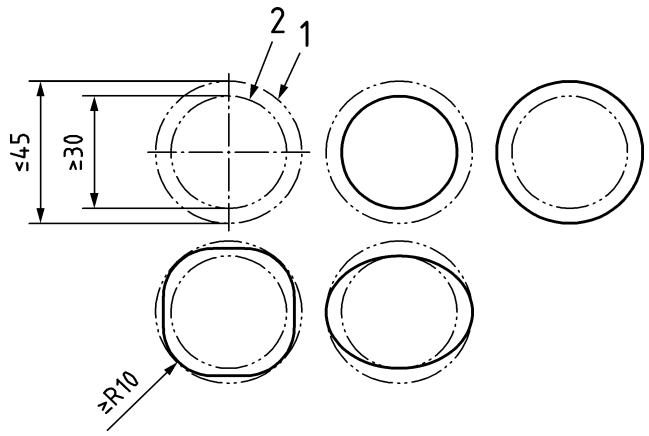
e) the height of the top edge of the gripping part of the handrail shall be 900 mm ± 25 mm from the finished floor level;

f) the ends of the handrails shall be closed. Where there is a risk of collision with the projecting ends, e.g. where the handrail is interrupted in front of the car operating panel, the handrail shall return towards the wall.

For car types 1, 2 and 3, the handrail may be installed on the opposite side wall if the handrail would restrict the car entrance width.

For car types 4 and 5 a second handrail shall be installed on the opposite side wall or on the rear wall.

Dimensions in millimetres



Key

1 maximum outer circle for handrail profile

2 minimum inner circle for handrail profile

Figure 2 —Cross sectional dimensions of handrails

5.3.2.2 Where a tip-up seat is provided in the car (see 0.4) it shall have the following characteristics:

a) a height from the finished floor level of 500 mm ± 25 mm;

b) a depth of 300 mm to 400 mm;

c) a width of 400 mm to 500 mm;

d) an ability to support a load of at least 120 kg.

5.3.2.3 For car types 1, 2 and 3, a device shall be installed to enable passengers to observe obstacles behind them when moving backwards out of the car.

5.3.2.4 The car floor shall be slip-resistant, taking into consideration the environment in which the lift is installed, in particular where passengers with wet shoes are regularly expected to enter the car. The same material as used in the lift lobbies may be used for the lift car floor.

5.4 Control devices and signals

5.4.1 General

5.4.1.1 Control devices for collective control systems

Collective control systems shall be used in general applications.

The following control devices according to 5.4.2 shall be used:

— push buttons on landings and in the car; or

— extra large push buttons on landings and in the car; or

— push buttons on landings, keypads in the car for floor selection and push buttons in the car for other control operations.

NOTE For buildings with many landings, keypad-devices may help to fulfil the requirements of Table 5.

Additional control devices (e.g. magnetic or chip card, mobile phone, etc.) may be used to temporarily activate personalized lift and signal functions.

5.4.1.2 Control devices for destination control systems

Destination control systems may only be used where guidance to passengers about the specific operational features of the lift can be ensured (see 0.4).

NOTE Due to their complexity destination control systems provide a lower level of accessibility for some passengers than collective control systems, particularly where a touch screen with an accessibility button and associated acoustic menu is used. When using the acoustic menu passengers are required to listen, understand and react to audible information within a specific time period.

The following control devices according to 5.4.3 shall be used:

— keypads and if applicable accessibility buttons on landings, and push buttons in the car; or

— touch screens and accessibility buttons on landings, and push buttons in the car.

Additional control devices (e.g. magnetic or chip card, mobile phone, etc.) may be used to temporarily activate personalized lift and signal functions.

5.4.2 Control devices and signals for collective control systems

5.4.2.1 Requirements for design and arrangement of control devices

Requirements for the design of control devices are given in Table 4 and requirements for the arrangement of control devices are given in Table 5.

Table 4 — Control devices-Requirements for design

#	Subject	Landing controls devices	Car controls devices
a)	Minimum area of active part of push buttons	490 mm^2	
b)	Minimum dimension of active part of push buttons	Inscribed circle with a diameter of 20 mm	
c)	Identification of active part of push buttons	Identifiable visually (by contrast, see 5.1.2) and by touch (protruded) from face plate or immediate surrounds	
d)	Identification of face plate	Luminance contrast to its surrounds (see 5.1.2)[a]	Luminance contrast to its surrounds (see 5.1.2) in case of less than 5 buttons
e)	Operating force	2,5 N to 5,0 N	
f)	Operating feedback	Required to inform passengers that the button, once pushed, has been operated (e.g. button possesses perceivable movement or is provided with a system of mechanical feedback)	
g)	Registration feedback	Required to inform passengers that the call or function has been registered by visible and audible signal. The audible signal shall comply with 5.1.3 and shall be given on every individual operation of button even if the call is already registered.	
h)	Button for building exit floor	Not applicable	Protruded 5 mm ± 1 mm beyond the other buttons (preferably green)
i)	Position of symbol	When provided, on active part or 10 mm to 15 mm to the left of it	On active part or 10 mm to 15 mm to the left of it
j)	Symbol	When provided, in relief, luminance contrast to the background (see 5.1.2), 15 mm to 40 mm high	In relief, luminance contrast to the background (see 5.1.2), 15 mm to 40 mm high
k)	Height of relief of active part (c) and symbol (j)	Minimum 0,8 mm (recommended 1,0 mm)	
l)	Distance between active parts of call buttons or floor selection buttons	Minimum 10 mm	
m)	Distance between group of call or floor selection buttons and other group of buttons [b]	Not applicable	Minimum twice the distance between active parts of floor selection buttons

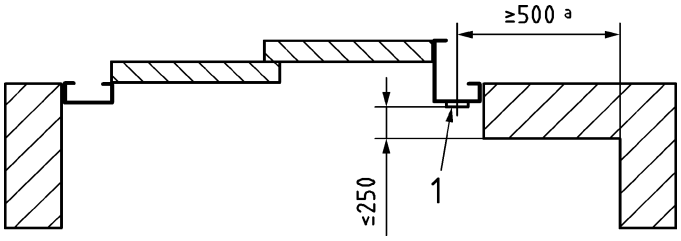
[a] Only required for collective controls where the control devices are not mounted in the door frame.

[b] E.g. between alarm-/ door buttons and floor selection buttons.

Table 5 — Control devices-Requirements for arrangement

#	Subject	Landing controls devices	Car controls devices
a)	Minimum height between the finished floor level and the centreline of the lowest button (door close button and additional control devices may be located at different height)	850 mm	
b)	Maximum height between the finished floor level and the centreline of the highest button	1 100 mm	1 200 mm (preferably 1 100 mm)
c)	Arrangement of buttons	Vertical	See 5.4.2.3.1, 5.4.2.3.3
d)	Minimum lateral distance between the centreline of any button to the corner of any adjacent walls	500 mm (Preferably 700 mm) The depth of any recess where the button may be located shall be limited to 250 mm (see Figure 3)	400 mm

Dimensions in millimetres



Key

1 landing button

a preferably 700

Figure 3 — Arrangement of landing buttons

5.4.2.2 Landing control devices

5.4.2.2.1 Where call buttons are used, they shall meet the requirements in Table 4 and Table 5 and where symbols are provided, they should comply with ISO 4190-5:2006, Table C.1, No. 6. Additional buttons shall be marked according to 5.4.2.3.2 a).

5.4.2.2.2 Where extra large call buttons are used, they shall comply with Annex B.

5.4.2.2.3 Where an accessibility button is provided (e.g. for increasing the door dwell time, assigning the call to a larger car, etc.) it shall comply with 5.4.3.1.2.

5.4.2.2.4 In the case of a single lift one set of landing control devices shall be mounted adjacent to the landing doors.

For two or more lifts, having common management of landing calls, at least one set of control devices for each wall shall be arranged between two landing doors.

5.4.2.3 Car control devices

5.4.2.3.1 Car control devices shall meet the requirements in Table 4 and Table 5 and shall be arranged as follows:

a) the floor selection buttons shall be placed above the alarm and door buttons;

b) the order of the floor selection buttons for a single horizontal row shall be from left to right. The order of floor selection buttons for a single vertical row shall be from the bottom to the top and for multiple vertical rows from left to right and then from the bottom to the top.

5.4.2.3.2 Where push buttons are used for the operation of the lift they shall be identified as follows:

a) floor selection buttons: identified by symbols, (e.g. numbers, characters or pictograms) consistent with the building's floor nomenclature, preferably: −2, −1, 0, 1, 2, etc.;

b) alarm button: yellow with bell-shaped symbol (ISO 4190-5:2006, Table C.1, No. 1);

c) door open button: identified by the symbol ⊲I⊳ (ISO 4190-5:2006, Table C.1, No. 2);

d) door close button, where provided: identified by the symbol ⊳I⊲ (ISO 4190-5:2006, Table C.1, No. 3).

5.4.2.3.3 Where keypads are used for call registration, they shall comply with 5.4.3.1.1. Alarm and door buttons shall be placed below the keypad.

5.4.2.3.4 Where extra large push buttons are used, they shall comply with Annex B.

5.4.2.3.5 The car operating panel shall be located on the side wall as follows:

a) with centre opening doors, it shall be on the right hand side when entering the car from the main entrance side;

b) with side opening doors, it shall be on the closing jamb side when entering the car from the main entrance side;

c) when the car width exceeds 1600 mm a car operating panel shall be provided on both side walls of the car;

d) in the case of cars with adjacent doors, a car operating panel shall be provided on each car wall without door.

5.4.2.4 Landing signals

5.4.2.4.1 The illuminated signals according to EN 81-20:2014, 5.12.4.3, shall be arrows and shall be placed above or adjacent to the landing doors.

The indicator arrows shall be positioned between 1 800 mm and 2 500 mm above the finished floor level with an angle of view from the landing of at least 140° in the horizontal plane and 70° from the horizontal in the vertical down plane. The height of the arrows shall be at least 40 mm.

For single lifts the indicator arrows may be placed inside the car at a height above the finished floor level of between 1 600 mm and 2 000 mm and shall be clearly visible from the landing when doors are open.

5.4.2.4.2 An audible signal shall accompany the lighting of the arrows. The audible signals shall be one sound for up and two sounds for down. The audible signals shall comply with 5.1.3.

5.4.2.4.3 An audible signal on the landing shall indicate when the doors start opening. The door noise itself is sufficient if the noise level is 45 dB(A) or above.

5.4.2.5 Car signals

5.4.2.5.1 A position signal shall be located within or above the car operating panel. The centreline of the signal shall be positioned between 1 600 mm and 1 800 mm from the finished floor level. The height of the floor numbers shall be between 30 mm and 60 mm.

Additional indicators (see 0.4) may be located elsewhere, e.g. above the car door, or on a second car operating panel.

5.4.2.5.2 When the car stops, a voice in at least one of the official local languages shall announce the car position. The voice announcement shall comply with 5.1.3.

5.4.2.5.3 The alarm system shall be equipped with visible and audible signals, integrated in or above the control panel, consisting of:

a) a yellow graphical symbol in accordance with ISO 4190-5:2006, Table C.1, No. 1, illuminated from initiation of the alarm until the end of the alarm;

b) an audible signal from initiation of the alarm until the voice communication is established; the audible signal shall comply with 5.1.3;

c) a green graphical symbol in accordance with ISO 4190-5:2006, Table C.1, No. 8, illuminated during voice communication.

5.4.2.5.4 An induction loop according to EN 60118-4:2015 should be provided as hearing assistance for alarm systems (see 0.4). If provided, a symbol according to ISO 4190-5:2006, Table C.1, No. 9 shall be placed close to the microphone. The induction loop should also be used for announcements according to 5.4.2.5.2.

5.4.3 Control devices and signals for destination control systems

5.4.3.1 Landing control devices

5.4.3.1.1 Where keypads are used, the arrangement shall be according to Figure 4.

Keypads shall meet the requirements of Table 4 and Table 5 with the following exceptions and additional requirements:

a) the width of the keypad shall not exceed 120 mm;

b) the height of the keypad shall not exceed 160 mm;

c) the distance between the push buttons shall be between 5 mm and 15 mm;

d) numbers shall be on the active part of the push buttons and shall not be in relief, however may be engraved;

e) the star symbol on the exit button (main floor) acc. to ISO 4190-5:2006, Table C.1 No. 11, and the minus symbol shall be in relief;

f) the button number “5” shall have a single relief dot.

Braille shall not be used.

Dimensions in millimetres

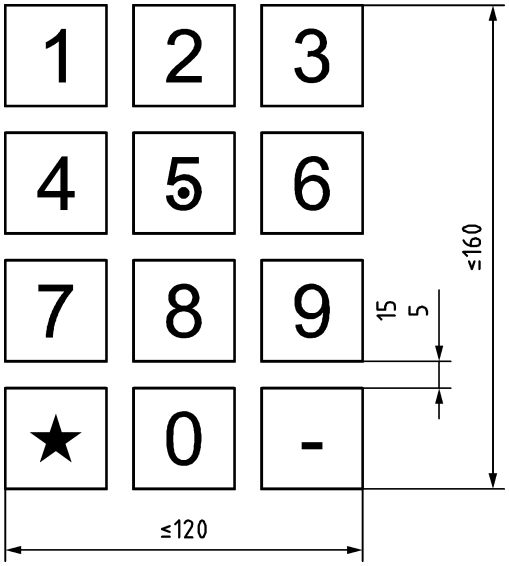


Figure 4 — Illustration of keypad

5.4.3.1.2 An accessibility button shall be provided. It shall be marked with the international symbol for Provision for the Disabled (ISO 4190-5:2006, Table C.1, No 10). The push button shall comply with the requirements of Table 4 and Table 5 (except c)) and shall be placed adjacent to the keypad, preferably below.

The accessibility button shall initiate the audible information according to 5.4.3.3 b), if not permanently activated. It shall allocate a car adjacent to the relevant control device or alternatively shall extend the door dwell time of the allocated car. It may also activate additional features like extended time to place a call, assignment of the call to a larger car, etc. where appropriate (see 0.4).

5.4.3.1.3 Where touch screens are used, they shall comply with Annex C.

5.4.3.1.4 At least one set of control devices for each wall shall be arranged between two landing doors.

5.4.3.2 Car control devices

Push buttons for alarm, door open and, where provided, door close, shall comply with 5.4.2.3.2 where applicable.

5.4.3.3 Landing signals

Landing signals shall meet the following requirements:

a) the selected floor and allocated lift shall be confirmed with a visible signal. The visible signal shall be placed near the input device for the destination call. Lift assignment characters on display screens shall be at least 25 mm high. After operation of the accessibility button, the visible signal shall be displayed for the duration of the associated voice announcement;

b) the selected floor, the allocated lift and its location shall be confirmed with a voice announcement which shall be activated by the accessibility button (see 5.4.3.1.2), if not permanently active;

c) each lift shall be marked individually (e.g. A, B, C etc.). The marking shall be placed directly above or adjacent to the landing door at a height between 1 800 mm and 2 500 mm from the finished floor level. The designation marking shall have a height of at least 40 mm and be contrasted to its surround (see 5.1.2);

d) if the accessibility button has been activated, the allocated lift shall identify itself with an audible signal or with a voice announcement (e.g. lift A), when being available for the passenger;

e) audible signals and voice announcements according to b) and d) shall comply with 5.1.3.

5.4.3.4 Car signals

Car signals shall comply with 5.4.2.5.

6 Verification of safety requirements and/or protective measures

Table 6 indicates the methods by which the safety requirements and/or protective measures described in Clause 5 shall be verified.

Table 6 — Means of verification of the safety requirements and/or protective measures

Subclause	Safety requirements	Visual inspection[a]	Performance check/test[b]	Measurement[c]	Drawing/ Calculation[d]	User information[e]
5.1	**General**					
5.1.1	Non-significant hazards	✓	▪	▪	▪	✓
5.1.1	Compliance with EN 81–20 and EN 81–28	See EN 81–20 and EN 81–28				
5.1.2	Contrast	✓	▪	▪	▪	▪
5.1.3	Audible signals	▪	✓	✓	▪	✓
5.2	**Entrances – Door opening**					
5.2.1	Door width	▪	▪	✓	▪	▪
5.2.2	Door dwell time	▪	✓	✓	▪	✓
5.3	**Car dimensions and equipment in car**					
5.3.1	Car dimensions	▪	▪	✓	▪	▪
5.3.2.1	Handrail	✓	▪	✓	▪	▪
5.3.2.2	Tip-up seat	▪	✓	✓	▪	▪
5.3.2.3	Device to observe obstacles	✓	▪	▪	▪	▪
5.3.2.4	Slip resistance	✓	✓	▪	▪	▪

Subclause	Safety requirements	Visual inspection[a]	Performance check/test[b]	Measurement[c]	Drawing/ Calculation[d]	User information[e]
5.4	**Control devices and signals**					
5.4.1	Control devices	✓	✓	▪	▪	✓
Table 4, a)	Area of active part of push buttons	▪	▪	✓	▪	▪
Table 4, b)	Dimension of active part of push buttons	▪	▪	✓	▪	▪
Table 4, c)	Identification of active part of buttons	✓	▪	✓	▪	▪
Table 4, d)	Identification of face plate	✓	▪	▪	▪	▪
Table 4, e)	Operating force	▪	▪	✓	▪	▪
Table 4, f)	Operation feedback	▪	✓	▪	▪	▪
Table 4, g)	Registration of feedback	▪	✓	✓	▪	▪
Table 4, h)	Building exit button	✓	▪	✓	▪	▪
Table 4, i)	Position of symbol	✓	▪	✓	▪	▪
Table 4, j)	Size of symbol	✓	▪	✓	▪	▪
Table 4, k)	Height of relief	▪	▪	✓	▪	▪
Table 4, l)	Distance between active parts of call or floor selection buttons	▪	▪	✓	▪	▪
Table 4, m)	Distance between groups of buttons	▪	▪	✓	▪	▪
Table 5, a)	Minimum height from floor level	▪	▪	✓	▪	▪
Table 5, b)	Maximum height from floor level	▪	▪	✓	▪	▪
Table 5, c)	Arrangements of buttons	✓	▪	▪	▪	▪
Table 5, d)	Minimum lateral distance	▪	▪	✓	▪	▪
5.4.2.2.1	Marking of call buttons	✓	▪	▪	▪	▪

Subclause	Safety requirements	Visual inspection[a]	Performance check/test[b]	Measurement[c]	Drawing/ Calculation[d]	User information[e]
5.4.2.2.2	Extra large buttons	✓	▪	✓	▪	▪
5.4.2.2.3	Accessibility button	✓	✓	▪	▪	✓
5.4.2.2.4	Arrangement of landing control devices	✓	▪	▪	▪	▪
5.4.2.3.1	Arrangement of control devices	✓	▪	▪	▪	▪
5.4.2.3.2	Marking of car push buttons	✓	▪	▪	▪	▪
5.4.2.3.3	Keypads	✓	▪	✓	▪	▪
5.4.2.3.4	Extra large buttons	✓	▪	✓	▪	▪
5.4.2.3.5	Location of car operating panel	✓	▪	✓	▪	▪
5.4.2.4.1	Indicator arrows	✓	✓	✓	▪	▪
5.4.2.4.2	Audible signal	▪	✓	✓	▪	▪
5.4.2.4.3	Audible signal on landing door opening	▪	✓	✓	▪	▪
5.4.2.5.1	Position signal	✓	▪	✓	▪	▪
5.4.2.5.2	Voice announcement	▪	✓	✓	▪	▪
5.4.2.5.3	Visible and audible alarm signals	✓	✓	✓	▪	▪
5.4.2.5.4	Induction loop	✓	✓	▪	▪	✓
5.4.3.1.1	Keypads	✓	✓	✓	▪	▪
5.4.3.1.2	Accessibility button	✓	✓	▪	▪	▪
5.4.3.1.3	Touch screen	✓	✓	✓	▪	▪
5.4.3.1.4	Arrangement of landing controls	✓	▪	▪	▪	▪
5.4.3.2	Design and arrangement of car control devices	✓	▪	✓	▪	▪

Subclause	Safety requirements	Visual inspection[a]	Performance check/test[b]	Measurement[c]	Drawing/ Calculation[d]	User information[e]
5.4.3.3	Visible and audible signals on landings for destination control systems	✓	✓	✓	▪	▪
5.4.3.4	Car signal	✓	✓	✓	▪	▪

[a] Visual inspection will be used to verify the features necessary for the requirement by visual examination of the components supplied.

[b] A performance check/test will verify that the features provided perform their function in such a way that the requirement is met.

[c] Measurement will verify by the use of instruments that requirements are met, to the specified limits.

[d] Drawings/calculations will verify that the design characteristics of the components provided meet the requirements.

[e] Verify that the relevant point is dealt with in the instruction handbook or by marking.

7 Information for use

The following information shall be provided in the owner's documentation:

a) the need to maintain safe and unobstructed access to the lift and its control devices on landings;

b) information for adjusting the door dwell time;

c) information for adjusting the sound level of audible signals in the car and at the landings and for adjusting the amplifier of induction loops, if provided;

d) instructions for passenger on how to use specific control devices and features of the lift, e.g. accessibility button, destination control, etc.

Any feature that is designed to be controlled by the owner of the installation shall be provided with instructions.

Annex A
(informative)

Categories of disability considered

The disabilities in Table A.1, are covered in this standard and the analysis for accessibility and safety have been carried out accordingly.

Some combinations of disabilities are not covered in this standard (see Table A.2) because it has been assumed that the requirements of such combinations are either:

— covered by the provisions for the different single disabilities; or

— the combination leads to such a demand on lift functions that this shall be addressed by individual means which have to be negotiated between customer and manufacturer or the use of the lift can only be achieved with assistance of another person (see 0.4).

Also not covered in this standard are disabilities with requirements not clearly related to lift functions (e.g. claustrophobia). See Table A.2.

Table A.1 — Categories covered in this standard

Category	Sub-Category	Characteristics
Physical disability	Impaired mobility	Need for use of: - wheelchair; - walking stick; - crutches; - walking frame; - rollator.
	Impaired endurance, equilibrium	Slow mover, poor balance
	Impaired dexterity	Reduced function of upper limbs (arms, hands, fingers)
Sensory disability	Impaired vision	Blind (Stick, guide dog), partially sighted, colour blindness
	Impaired hearing	Deaf, hard of hearing
	Impaired speech	Reduced ability and inability to communicate by voice
Cognitive disability	Learning difficulty	Reduced understanding of the functions of control devices

Table A.2 — Categories not covered in this standard

Category	Sub-Category	Remarks
Physical disability	Extreme dexterity impairment	Upper limbs missing or paralyzed
	Size related disability	Less than 1,5 m or over 2,0 m body length
Phobia	Claustrophobia	
	Acrophobia (fear of heights)	

Annex B
(normative)

Extra large control devices

B.1 Introduction

This annex provides guidance on the design of extra large control devices to provide enhanced accessibility (see 0.4).

B.2 Landing control devices

Push buttons shall meet the requirements of 5.4.2.2.1 with the following deviations:

a) the minimum dimension of the active part shall be 50 mm × 50 mm or a diameter of 50 mm;

b) the size of symbols shall be 25 mm to 40 mm, located on the active part of the button.

B.3 Car control devices

Push buttons shall meet the requirements of 5.4.2.3 with the following deviations and additional requirements for their arrangement:

a) The specifications in B.2 a) and b) apply;

b) The floor selection buttons shall be arranged on a tilted, horizontal panel. The projection of the tilted panel shall not exceed 100 mm with an angle of 30° ± 15° to the vertical. See example in Figure B.1;

c) The maximum height between the finished floor level and the centreline of the highest button shall not exceed 1 000 mm;

d) With one row of floor selection buttons, the buttons shall be set from left to right;

e) The door open button, alarm button and, where provided, door close button shall be separated from the floor selection buttons by a minimum distance of twice that between the active parts of the floor selection buttons. See example in Figure B.2;

f) With two or more rows of floor selection buttons, the floor selection buttons shall be arranged from left to right and then from the bottom to the top. See example in Figure B.3.

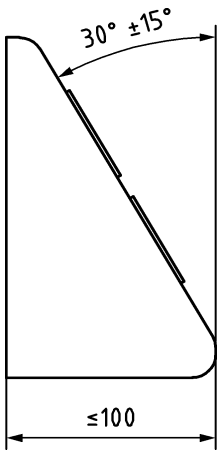


Figure B.1 — Car operating panel – Side view, example

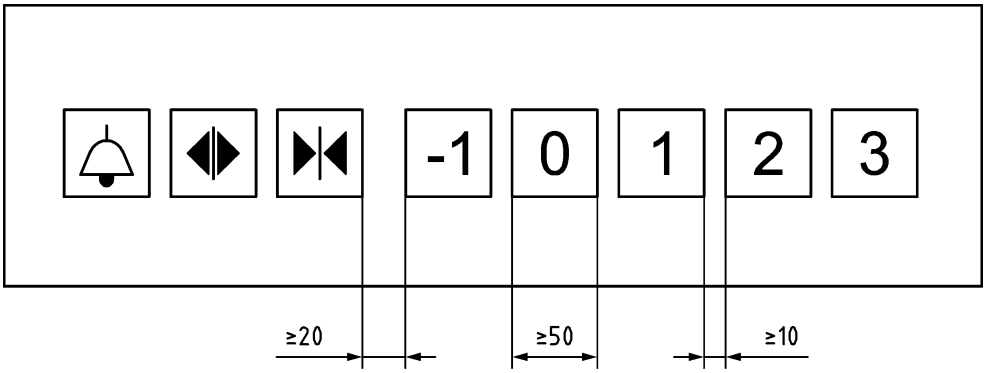


Figure B.2 — Example of arrangement of one row of push buttons

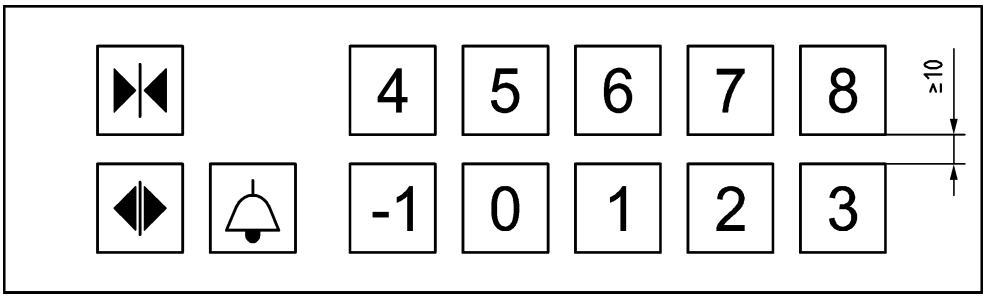


Figure B.3 — Example of arrangement of two rows of push buttons

Annex C
(normative)

Touch screen devices for destination control systems

For touch screen devices, the following shall be provided:

a) The display screen shall be capable of providing a luminance of at least 300 cd/m^2. The active areas and symbols of the display screen shall provide suitable luminance contrast to their immediate surroundings. The background design shall be solid and static.

b) Touch buttons on the touch screen shall comply with Table 4 with the following exceptions and additional requirements:

   1) items c), d), e), g), h), i), j) k) and l) of Table 4 do not apply;

   2) the exit button shall be preferably green or have a green frame;

   3) the symbols shall be on the active area;

   4) the symbol height shall be between 15 mm and 40 mm;

   5) the distance between active parts of buttons shall be at least 5 mm.

c) The arrangement of the touch screen shall comply with Table 5 except c);

d) Lift assignment symbols on display screens shall be at least 25 mm high and shall be displayed for the duration of the associated audible announcement, if activated;

e) An accessibility button according to 5.4.3.1.2 shall be placed adjacent to the touch screen, preferably below, for activating the verbal announcements and floor selection according to Annex C f). It may also activate additional features like larger symbols and enhanced contrast, where appropriate (see 0.4);

f) Upon activation of the accessibility button, the following sequence shall be followed:

   1) sequential announcements of available destinations (e.g. at the entrance level counting from the lowest to the highest floor or at an upper floor starting with the entrance floor than counting from the highest to the lowest floor);

   2) Selection of the destination by a subsequent operation of the accessibility button or by operation of the relevant touch button.

   In buildings with many floors, first a zone of destinations may be selected before the final destination is selected by another operation of the accessibility button.

   NOTE For confirmation of and direction to assigned lift, see 5.4.3.3.

Annex D
(informative)

Guidance for increased accessibility and usability

The following items may be considered for improving the accessibility and usability of lifts. This may be particularly important in public facilities (e.g. train stations) and specific buildings (e.g. hospitals, nursing homes, etc.) where passengers with higher degree and/or combinations of disabilities should be able to use the lift.

a) Glass landing doors should be marked in order to avoid confusion caused by transparent materials and to allow the lift entrances to be easily identified. The same marking as for walls and doors in the building may be used.

   NOTE For further guidance on design rules for visually impaired persons see ISO 21542.

b) Transparent elements in walls of the car and the well or in landing and car doors may reduce the risk of panic and, in the case of trapped passengers, support communication with other persons outside of the lift. However transparent elements may also exacerbate anxiety associated with fear of height.

c) The height of landing and car doors and the clear height of the car should be at least 2 100 mm.

d) Handrails should be installed on all car walls without doors.

e) Walls should have matt surfaces to prevent reflections, optical confusion and glare caused by the reflection of light sources. Where any wall of the car is substantially mirrored the glass should be decorated, or there should be a minimum vertical distance of 300 mm between the floor and the bottom edge of the mirror.

f) Braille characters may be provided. If provided, they should comply with ISO 17049 and should have a minimum distance of 5 mm to their associated symbols.

Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of Directive 2014/33/EU aimed to be covered

This European Standard has been prepared under a Commission's standardization request "M/549 C(2016) 5884 final" to provide one voluntary means of conforming to requirements of Directive 2014/33/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to lifts and safety components for lifts (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 and Table ZA.2 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2014/33/EU

Essential health and safety requirements of Annex I to Directive 2014/33/EU	Clause(s)/sub-clause(s) of this EN	Qualifying remarks/Notes
1.1	See below Table ZA.2	
1.2	5.2.1, 5.2.2, 5.3.1	
1.6.1	5.1.2, 5.1.3, 5.4	
1.6.2	5.4	
6.2	Clause 7	

Table ZA.2 — Correspondence between this European Standard and Annex I of Directive 2006/42/EC

Essential health and safety requirements of Annex I to Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Qualifying remarks/Notes
1.1.2	5.1.1	
1.1.6	5.2.1, 5.2.2, 5.3.2, 5.4	
1.5.15	5.3.2	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] CEN-CENELEC Guide 6:2014, *Guide for addressing accessibility in standards*

[2] EN 81-22:2014, *Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 22: Electric lifts with inclined path*

[3] EN 81-82, *Safety rules for the construction and installation of lifts - Existing lifts - Part 82: Rules for the improvement of the accessibility of existing lifts for persons including persons with disability*

[4] EN 12183:2014, *Manual wheelchairs - Requirements and test methods*

[5] EN 12184:2014, *Electrically powered wheelchairs, scooters and their chargers - Requirements and test methods*

[6] EN 60118-4:2015, *Electroacoustics - Hearing aids - Part 4: Induction-loop systems for hearing aid purposes - System performance requirements (IEC 60118-4:2014)*

[7] ISO 4190-1, *Lift (Elevator) installation — Part 1: Class I, II, III and VI lifts*

[8] ISO 7176-5, *Wheelchairs — Part 5: Determination of dimensions, mass and manoeuvring space*

[9] ISO 17049, *Accessible design — Application of braille on signage, equipment and appliances*

[10] ISO 21542:2011, *Building construction — Accessibility and usability of the built environment*

[11] Directive 2014/33/EU of the European Parliament and of the Council on the approximation of the laws of the member states relating to lifts

[12] European Commission recommendation of 8 June 1995 concerning improvement of safety of existing lifts (95/216/EC)

[13] Treaty of Lisbon of the European Union:2016

[14] United Nations Convention on the Rights of Persons with Disabilities. 2006

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