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

Sicherheit für die Konstruktion und den Einbau vonAufzügen - Teil 70: Besondere Anwendungen für Personen - und Lastenafzüge - Zugängigkeit von Aufzügen für Personen, einschliesslich Personen mit Behinderungen. — —

Règles de sécurité pour la construction et l´installation des ascenseurs - Part 70: Applications particulières pour les ascenseurs et ascenseurs de charge - Accessibilité aux ascenseurs pour tous les usagers y compris les personnes avec handicap — —

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Foreword

This document has been prepared by CEN/TC 10/WG 7, “Accessibility to lifts for persons including persons with disability”, under the direction of Technical Committee CEN/TC 10, “Passenger, goods and service lifts”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Formal Vote.

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 EC Directive(s).

For relationship with EC Directive(s), see informative annex ZA, which is an integral part of this standard.

Introduction

General

This European Standard is a type C standard as stated in EN 1070.

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

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

Principles

In drawing up this standard the following have been used:

a) The Working Group based its activities on a resolution (CEN/TC 10/1995/7) which added the issue of accessibility to the work programme of CEN/TC 10, namely the necessity of formulating requirements for the accessibility to lifts for persons including persons with disability.

This resolution was the result of a mandate given to CEN as mentioned in the Foreword. It was decided that it would cover the design and construction of cars etc. in such a way that their features would not obstruct or impede access and use by disabled people.

b) The Working Group was composed of representatives of the European Disability Forum, National Standardisation Institutes and the Lift Industry. Data taken into account were

— demographic developments in Europe,

— the tendency of living independently and its consequences,

— the need for accessibility of buildings,

— the recognition of the existence of a variety of disabilities with different solutions on spatial and orientational levels,

— the combat of discrimination based on disability and age as mentioned in the non-discrimination clause (art 6a) of the Treaty of Amsterdam of the European Union.

The population of Europe is ageing and the prevalence of disability, including disability associated with the ageing process, is increasing. Older people and people with disabilities at present are estimated to number some 80 million people – a large and growing proportion of the European Union population. The changing demography presents both opportunities and challenges for the Union. The economic, social and cultural potential of older people and people with disabilities is underexploited at present. However there is a growing recognition that society needs to exploit this potential for the economic and social benefit of society generally.

NOTE Source for the above. Working document of the Commission Service, Oct. 1996, titles: Research and Development of Ageing and Disability in The European Union.

The work has led to this standard on the accessibility to lifts for persons, including persons with disability.

General information on accessibility is given in **Annex A**.

c) This standard does not only address the essential safety requirements of the Lift Directive, but additionally states minimum rules for the accessibility to lifts by persons including wheelchair users. There may be in

some countries regulations for the level of suitability of lifts which cannot be ignored. Typical clauses affected by this are those defining minimum sizes of cars.

d) This European Standard describes three sizes of lifts offering different levels of accessibility to wheelchair users. The degree of accessibility and usability is provided by dimensions, spatial and technical criteria (see the European Concept for Accessibility referred to in Bibliography).

Further, this European Standard defines the design provisions for the lift and its user interface for the different stages of usage under normal operation.

NOTE Each Member State may, according to its social requirements and economical situation, select the appropriate size of lift from **Table 1** as the minimum for a given type of building and define the application by law.

Assumptions

Intensive studies have been made on the different categories of disabilities to establish related hazards and their risks.

The Standard Rules of the Equalization of opportunities for persons with disabilities adopted by the United Nations General Assembly at its 48th session on 20 December 1993 (resolution 48/96) has also been considered. The requirements in this standard have been drawn up accordingly.

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;

b) temporary activation of features of the lift

c) environmental conditions;

d) civil engineering problems;

e) other aspects related to the place of installation.

1 Scope

This European Standard specifies the minimum requirements for the safe and independent access and use of lifts by persons, including persons with the disabilities mentioned in **Annex B**, **Table B.1.**

This European Standard covers lifts with minimum car dimensions according to **Table 1** and provided with car doors and landing doors constructed as automatic power operated horizontally sliding doors.

This European Standard considers accessibility to lifts for persons using wheelchairs with maximum overall dimensions defined in EN 12183 and EN 12184.

This European Standard also deals with the additional technical requirements to minimise the hazards listed in clause **4** that arise during the operation of lifts intended to be accessible to disabled users.

NOTE This standard may be used as guidance for upgrading 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.

2 Normative references

This European Standard incorporates by dated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision.

EN 81-1:1998, *Safety rules for the construction and installation of lifts - Part 1: Electric lifts.*

EN 81-2:1998, *Safety rules for the construction and installation of lifts - Part 2: Hydraulic lifts.*

prEN 81-5:1999, *Safety rules for the construction and installation of lifts - Part 5: Screw lifts.*

prEN 81-6:1999, *Safety rules for the construction and installation of lifts - Part 6: Guided chain lifts.*

prEN 81-7:1999, *Safety rules for the construction and installation of lifts - Part 7: Rack and pinion lifts.*

prEN 81-21:1998, *Safety rules for the construction and installation of lifts – Part 21: New passenger and goods passenger lifts in existing buildings.*

prEN 81-28:2000, *Safety rules for the construction and installation of lifts - Part 28: Remote alarms on passenger and goods passenger lifts.*

EN 292-2:1991 + A1:1995, *Safety of machinery – Basic concepts – General principles for design – Part 2: Technical principles and specifications*

EN 1070:1998, *Safety of machinery – Terminology.*

EN 12183:1999, *Manually propelled wheelchairs – Requirements and test methods.*

EN 12184:1999, *Electrically powered wheelchairs, scooters and their chargers – Requirements and test methods.*

EN 13015:2001, *Maintenance for lifts and escalators – Rules for maintenance instructions.*

ISO 7000:1989, *Graphical symbols for use on equipment - Index and synopsis*

3 Terms and definitions

For the purposes of this standard the definitions in EN 81-1,-2, prEN 81-5,-6,-7,- 21,-28, EN 13015 and the definitions given in EN 1070 apply.

Additional definitions needed for this standard are added below.

3.1
stopping accuracy
maximum 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

3.2
levelling accuracy
maximum vertical distance between car sill and landing sill during loading or unloading of the lift

3.3
push button control system
a lift control system used for single lifts where the lift only has one button on each landing and only serves one car or landing call at a time

3.4
collective control system
a control system used for single lifts or multiple lifts where the system has the ability to accept several car calls and remember them so they are answered in a logical sequence and has the ability to accept any landing calls and distribute them to the lifts to ensure the best service to users

3.5
destination control system
a lift control system used for single lifts or multiple lifts where a destination call (target floor) is registered on the landing.

3.6
temporary activation control
a means to activate features or services for a single trip.

4 Significant hazards and barriers to accessibility

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

In this standard barriers to accessibility and additional risks encountered by the person with disability or by the devices used by that person are identified in **Annex C.**

NOTE Hazards resulting from allergic reactions to persons to persons are not addressed in this standard, but advice on such hazards is given in **Annex D.** Furthermore recommendations regarding certain design provisions for visually impaired persons are given in **Annex E.**

5 Safety requirements and/or protective measures

5.1 General

The requirements of EN 81-1,-2, prEN 81-5,-6,-7,- 21, -28 and EN 13015 apply with the deviations or additional requirements elaborated below.

5.2 Entrances - Door opening

5.2.1 Entrance clear opening shall be at least 800 mm.

NOTE National regulations may require more than 800 mm (see **Introduction**) - Type 2 lifts should be provided with an entrance clear opening of 900 mm, according to ISO 4190-1:1999 (series B) and type 3 lifts with a clear opening of 1100 mm according to the same standard (see **Table 1**).

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

5.2.2 Obstacle-free accessibility on the landing floors is required on all eligible floors (see **Introduction, Negotiations**).

5.2.3 The control system shall allow for the door dwell time to be adjustable to suit the conditions where the lift is installed (normally between 2 and 20 seconds). Means to reduce this time shall be installed e.g. by using a door close button in the car. The means of the adjustment shall not be accessible to users.

5.2.4 The protection device as required by 7.5.2.1.1.3 of EN 81-1 and –2 shall act continuously over a distance between 25 mm and at least 1800 mm above the car door sill. The device shall be a sensor which prevents physical contact between the user and the leading edges of the closing door panel(s).

5.3 Car dimensions, equipment in the car, stopping/levelling accuracy

5.3.1 Car dimensions

Inside dimensions of cars with a single entrance or with two opposite entrances shall be chosen in accordance with **Table 1** (see **Introduction, Negotiations**)

Car dimensions shall be measured between the structural car walls. Any decorative finishes of a wall that reduces the minimum car dimensions given by **Table 1**, shall not exceed 15 mm in thickness.

Any car with adjacent entrances shall have a width and depth appropriate to allow a wheelchair user to enter and leave the car.

Table 1 - Minimum car dimensions for cars with a single entrance or two opposite entrances

Type of lift	Minimum car dimensions[a)]	Accessibility level	Remarks
1	**450 kg** Car width: 1000 mm Car depth: 1250 mm	This car accommodates one wheelchair user.	Type 1 ensures accessibility to persons using a manual wheelchair described in EN 12183 or electrically powered wheelchair of class A described in EN 12184.
2	**630 kg** Car width: 1100 mm Car depth: 1400 mm	This car accommodates one wheelchair user and an accompanying person.	Type 2 ensures accessibility to persons using a manual wheelchair described in EN 12183 or an electrically powered wheelchair of class A or B described in EN 12184. Class B wheelchairs are intended for some indoor environments and capable of navigating some outdoor obstacles.
3	**1275 kg** Car width: 2000 mm Car depth: 1400 mm	This car accommodates one wheelchair user and several other users. It also allows a wheelchair to be rotated in the car.	Type 3 ensures accessibility to persons using a manual wheelchair described in EN 12183 or an electrically powered wheelchair of class A, B or C described in EN 12184. Class C wheelchairs are not necessarily intended for indoor use but are capable of travelling over longer distances and navigating outdoor obstacles. Type 3 provides sufficient turning space for persons using wheelchairs of class A or B and walking aids (walking frames, roller frames etc).

[a)] Car width is the horizontal distance between the inner surface of the structural walls, measured parallel to the front entrance.

Car depth is the horizontal distance between the inner surface of the structural walls, measured perpendicular to the width.

5.3.2 Equipment in the car

5.3.2.1 At least on one side wall of the car a handrail shall be installed. The gripping part of this handrail shall have cross-sectional dimensions between 30 mm and 45 mm with a minimum radius of 10 mm. The free space between the wall and the gripping part shall be minimum 35 mm. The height of the top edge of the gripping part shall be within 900 mm ±25 mm from the car floor.

The handrail shall be interrupted where the car operating panel is located on the same wall in order to avoid obstructing buttons or controls.

The projecting ends of handrails shall be closed and turned towards the wall to minimise the risk of injury.

5.3.2.2 Where a tip-up seat is provided (see **Introduction, Negotiations**) it shall have the following characteristics:

a) seat height from the floor: 500 mm ± 20 mm ;

b) depth: 300 mm - 400 mm ;

c) width: 400 mm – 500 mm;

d) ability to support of load of: 100 kg.

5.3.2.3 In case of a car size of **Table 1**, type 1 and type 2, where a user of a wheelchair cannot turn it around, a device (e.g. mirror) shall be installed to enable this user to observe obstacles when moving backwards out of the car. Where a glass mirror is used it shall be safety glass.

Where any wall of the car is substantially mirrored, measures shall be taken to avoid creating optical confusion for users with impaired vision (e.g. decorated glass, or a minimum vertical distance of 300 mm between the floor and the bottom edge of the mirror, etc.)

5.3.3 Stopping/levelling accuracy

Under intended use:

— The stopping accuracy of the car shall be ± 10 mm ;

— A levelling accuracy of ± 20 mm shall be maintained.

5.4 Control devices and signals

Design provisions for control devices and signals are given in **Table 2**.

NOTE Guidance on other devices, exceeding the requirements in **5.4**, such as the design of extra large (XL) control devices (see **Introduction, Negotiations**) is given in **Annex G**.

5.4.1 Landing control devices

5.4.1.1. Where a push button type system is used, it shall meet the requirements in **Table 2**

5.4.1.2 Where a keypad system is used (see **Introduction, Negotiations**) it shall meet the requirements in **Annex F**.

5.4.1.3 Where temporary activation control is provided (see **Introduction, Negotiations)** the activation device shall be marked with the international symbol for provision for the disabled (see ISO 7000:1989, Symbole n° 0100).

5.4.1.4 Landing control devices shall be mounted adjacent to the landing doors in case of a single lift.

For group lifts, having common management of landing calls, the minimum number of control devices shall be as follows:

— one per face for lifts facing each other (opposite lifts)

— one for maximum four (4) adjacent lifts (if the control device is located between two lifts).

5.4.2 Car control devices

5.4.2.1 The push buttons used for the operation of the lift shall be identified as follows:

a) floor buttons: identified by symbols: -2, -1, 0, 1, 2, etc.;

b) alarm button: yellow with bell-shaped symbol;

c) door ”re-open” button: identified by the symbol ◁I▷ .

d) door close button: identified by the symbol ▷I◁.

NOTE See EN 81-1 and -2, 15.2.3

5.4.2.2 Car buttons shall meet the requirements in **Table 2** and be arranged as follows:

a) The centreline of alarm and door buttons shall be located at a minimum height of 900 mm above the car floor.

b) The call buttons shall be placed above the alarm and door buttons;

c) The order of the call buttons for a single horizontal row shall be from left to right. The order of call 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 The car control panel shall be located on the wall as follows:

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

b) with side opening door*s*, it shall be on the closing side.

In case of two car entrances the requirements in a) or b) shall be fulfilled as applicable.

5.4.2.4 Where keypads are used for call registration in the car (see **Introduction, Negotiations**), they shall meet the requirements of **Annex F**.

5.4.2.5 In destination control systems, (see **Introduction, Negotiation**) where a user has selected “temporary activation”, the start of the door closing shall be initiated by activating the door close button. If the car is not used it shall return to normal operation after 30 seconds to 60 seconds.

The above requirement serve as an option to the requirement in **5.2.3**

Table 2 - Control devices - Requirements

#	Subject	Landing controls	Car controls
a)	Minimum area of active part of buttons	490 mm^2	
b)	Minimum dimension of active part of buttons	Inscribed circle with a diameter of 20 mm	
c)	Identification of active part of buttons	identifiable visually and by touch from face plate or surrounds	
d)	Identification of face plate	colour to contrast to its surrounds (see **D.2**)	
e)	Operating force	2,5N - 5,0 N	

#	Subject	Landing controls	Car controls
f)	Operating feedback	required to inform user that the button, once pushed, has operated	
g)	Registration feedback	Visible and audible, adjustable between 35dB(A) and 65 dB(A) [b]. The audible signal shall be given on every individual operation of button even if the call is already registered.	
h)	Button for exit floor	Not applicable	Protrudes 5 mm ±1 mm beyond the other buttons (preferably green)
i)	Position of symbol	on active part (or 10 mm - 15 mm left of it)	
j)	Size of symbol (relief)	15 mm - 40 mm	
k)	Height of relief	Minimum 0,8 mm	
l)	Distance between active parts of buttons.	Minimum 10 mm	
m)	Distance between group of call buttons and other group of buttons. [a]	Not applicable	Minimum twice the distance between active parts of call buttons
n)	Minimum height between the floor level and the centreline of any button	900 mm	
o)	Maximum height between the floor level and the centreline of the highest button	1100 mm	1200 mm (preferably 1100mm)
p)	Arrangement of buttons	vertical	See **5.4.2.2**
q)	Minimum lateral distance between the centreline of any button to any corner of adjacent walls.	500 mm	400 mm

a) e.g. between alarm-/ door buttons and call buttons
b) adjustable between limits for adaptation to environmental conditions

5.4.3 Landing signals

5.4.3.1 For push button control systems an audible signal on the landing shall indicate when the doors start opening. The door noise is sufficient if the noise level is 45 dB(A) or above.

5.4.3.2 Where, prior to entering the car, the control system establishes the next direction of travel (collective control) illuminated indicator arrows (see EN 81-1 and –2 clause 14.2.4.3) shall be placed above or near the doors.

The indicator arrows shall be positioned between 1,80 m and 2,50 m from the floor with an angle of view from the landing of at least 140°. The height of the arrows shall be at least 40 mm.

An audible signal shall accompany the lighting of the arrows. The audible signals shall use different sounds for up and down e.g.

— one sound for up

— two sounds for down

5.4.3.3 The requirements of **5.4.3.2** may in the case of a single lift be satisfied by a device in the car visible and audible from the landing.

5.4.3.4 For lifts with destination control systems (see **Introduction, Negotiations**):

a) the selected floor number shall be confirmed with a visible and audible signal. The visible signal shall be placed near the input device for the destination call

b) each lift shall individually be marked (e.g. A, B, C etc.). The marking shall be placed directly above the landing door. The designation marking shall have a height of at least 40 mm and be contrasted to its surround.

c) the allocated lift shall be indicated by a visible and audible signal. The visible signal shall be placed near the input device for the destination call.

d) A visible and audible information shall allow the lift to be easily identified.

e) The users shall visually and audibly be informed that they are about to enter the allocated car.

5.4.3.5 The audible signals shall have a sound level of between 35 dB(A) and 65 dB(A) adjustable to suit the site conditions. The means of the adjustment shall not be accessible to users.

5.4.4 Car signals

5.4.4.1 A position signal shall be located within or above the car operating panel. The centreline of the indicator shall be positioned between 1,60 m and 1,80 m from the car floor. The height of the floor numbers shall be between 30 mm and 60 mm.

A second indicator (see **Introduction, Negotiations**) may be located elsewhere e.g. above the car door, or on a second car operating panel.

As an alternative the indicator in the car operating panel can be located below 1,60 m if the second indicator is provided at high level (e.g. above the car door).

5.4.4.2 When the car stops, a voice in at least one of the official local languages shall indicate, the car position.

5.4.4.3 The alarm system shall conform to the requirements in prEN 81-28 and the following.

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

a) a yellow illuminated pictogram in addition to the audible signal for the emergency alarm transmission to indicate that the alarm has been given;

b) a green illuminated pictogram in addition to the audible signal normally required (voice link), to indicate that the emergency call/alarm has been registered. The audible signal (voice link) shall have a sound level between 35 dB(A) and 65 dB(A), adjustable to suit the site conditions;

c) an aid to communication, such as an acoustic coupler with the loud speaker, for people with impaired hearing.

NOTE The acoustic coupler is used as an interface with electronic hearing aids

The push button of the emergency alarm device shall be positioned, sized and identified in accordance with the requirement of **5.4.2**.

6 Verification of safety requirements and / or protective measures

The verification of the requirements in this standard comprises different types of tests/checks according to **Table 3.**

Table 3. – Methods to be used to verify conformity to the requirements

Subclause	Requirements	Type of test /check			
		Visual Presence Inspection [a)]	Measure-ment [b)]	Function [c)]	Design [d)]
5.1	General	See EN 81-1 --2, prEN 81-5, -6, -7, -21, -28 and EN 13015			
5.2.1	Entrance clear opening width	X	X		
5.2.2	Obstacle free accessibility	X			
5.2.3	Door dwell time		X		
5.2.4	Protection devices	X	X	X	
5.3.1.1	Car dimensions		X		
5.3.2.1	Handrail		X		
5.3.2.2	Tip-up seat	X	X		X
5.3.2.3	Wall mirrors, etc.	X	X	X	X
5.3.3	Stopping/levelling accuracy		X	X	
Table 2, a)	Area of buttons		X		
Table 2, b)	Dimension of active part of buttons		X		
Table 2, c)	Identification of active part of buttons	X			
Table 2, d)	Identification of face plate	X			
Table 2, e)	Operating force		X		
Table 2, f)	Operation feedback	X	X		
Table 2, g)	Registration of feedback	X	X		
Table 2, h)	Exit button	X	X		
Table 2, i)	Position of symbol	X	X		
Table 2, j)	Size of symbol		X		
Table 2, k)	Height of relief		X		
Table 2, l)	Distance between active parts of call buttons		X		
Table 2, m)	Distance between groups of buttons		X		

Subclause	Requirements	Type of test (check)			
		Visual/ Presence [1)] Inspection	Measure-ment [2)]	Function [3)]	Design [4)]
Table 2, n)	Minimum height from floor level		X		
Table 2, o)	Maximum height from floor level		X		
Table 2, p)	Arrangements of buttons	X			
Table 2, q)	Minimum distance		X		
5.4.1.2	Keypads (**Annex F**)	X	X	X	
5.4.1.3	Temporary activation	X		X	
5.4.1.4	Mounting of landing control devices	X			
5.4.2.1	Identification of buttons	X			
5.4.2.2	Arrangement of buttons	X			
5.4.2.3	Location of car control panels		X		
5.4.2.4	Keypads (**Annex F**)	X	X	X	
5.4.2.5	Door close button	X		X	
5.4.3.1	Audible signal on the landing [e)]		X	X	
5.4.3.2	Indicator arrows and audible signals [e)]	X	X	X	
5.4.3.3	Single lift requirements	X	X	X	
5.4.3.4 a)	Confirmation of selected floor	X			
b)	Marking of lifts	X			
c)	Lift allocation	X			
5.4.3.5	Sound level [e)]		X		
5.4.4.1	Position signal	X	X		
5.4.4.2	Voice [e)]		X	X	
5.4.4.3	Emergency alarm device	X	X	X	
F.1	Keypad (general)	X			
F.2 first sentence	5.4.1 and 5.4.2	X	X	X	
F.2 a)	Distance between buttons		X		
F.2 b)	Registration feedback	X	X		
F.2 c)	Size of symbols		X		
F.2 d)	Dot on 5 button	X	X		

Subclause	Requirements	Type of test (check)			
		Visual Presence Inspection [a]	Measure-ment [b)]	Function [c)]	Design [d)]
F.2 e)	Position of marking	X			
F.2 f)	Exit button	X	X	X	

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

b) Measurement will verify by the use of instruments that requirements are met, to specified limits. Appropriate measuring methods to be used together with applicable testing standards.

c) A function check/test will verify that the features provided perform their function in such a way that the requirement is met.

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

e) Sound pressure level in dB(A) (fast) measured at a distance of 1 m.

7 Information for use

7.1 General

All lifts are required to be provided with documentation that shall include an instruction manual relating to maintenance, inspection, repair, periodic checks and rescue operations. All information for use shall be in accordance with EN 292-2:1991 + A1:1995, clause 5.

7.2 Information for the lift owner

The instruction manual shall, in addition to the requirements of EN 81-1, -2, prEN 81-5,-6,-7,-21,-28 and EN 13015, bring to the attention of the owner of the installation the following:

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 noise level of audible signals in the car and at the landings;

d) the need for person(s) authorised by the owner of the installation to rescue trapped users (rescue service), to immediately react on signals from the emergency alarm device even when no response is given by the person in the car

NOTE The person in the car may have impaired hearing or speech.

e) the need for a procedure for the safe rescue of disabled persons with disabilities according to **B.1**;

f) any other safety information required as a result of the design that the installer thinks is needed to ensure safe use for all users.

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

Annex A
(informative)

General remarks on accessibility

ACCESSIBILITY is a basis feature of the built environment. It is the way in which houses, public buildings, places of work, etc. can be reached and used. Accessibility enables people, including persons with disability, to participate in the social and economic activities for which the built environment is intended. This approach is based on the universal design principles. These principles apply to the design of buildings, installations and facilities, infrastructure and products.

The objective is the provision of environments which are convenient, safe and enjoyable to use by everyone, including people with disabilities.

The universal design principles reject the division of the human population into able-bodied and disabled people. Universal design principles includes supplementary provisions where appropriate.

In the context of this European Standard **ACCESSIBILITY** is described as “the characteristic of lifts which enables people (including people with disabilities) to access it and use its features equally and independently”.

Universal design relates to this basic accessibility.

The aim is: **everyone must be able to use the built environment in an independent and equal way.**

NOTE A large majority of persons using walking aids are unable to move backwards. The width of the car size in this European Standard is therefore an important criteria. Tests have revealed that 1200 mm width is needed to be able to turn while using a walking frame; and even then the users have to lift the frame around themselves. The smallest lift in this standard does not take into account the need for this turning space.

— **Everyone**

The term “everyone” refers to an unlimited number of different people, each with his or her own, individual characteristics. Of course, also in the case of lifts it is practically impossible to know whether in reality everyone can make use of this facility. Also this is partly dependent of the state of technical development. To cover this criteria, requirements are formulated in this standard.

— **Independence**

The aim is not just that people can make use of a lift in the absolute sense but that they can do so as independently as possible, without the help of other persons. The requirements with regards to independence cannot literally include everyone. However, in a general sense they do guarantee that everyone can make use of a lift, although sometimes the help of a personal assistant, companion, porter or passer-by may be necessary.

— **Equality**

It is not enough that people, including people with a disability, can use a lift independently , but that in their use no distinction is made between various categories of people. Of course equality does not mean that provisions for specific needs of certain people – such as contrasting materials and textures which are essential for impaired vision people – cannot be implemented. This approach makes it possible that – in principle – also persons with disabilities can use a lift on equal terms as anybody else.

Advantages

When policy-makers, legislators, owners of buildings, manufacturers, etc. take the criteria on accessibility into account in general everybody benefits from the accessible lifts; for example people with heavy luggage, furniture, prams and trolleys. An accessible lift is a client-friendly lift and therefore important for social and economic success

In a pluralistic democratic society an inaccessible lift is an act of discrimination which is in conflict with the civil-rights of their citizens. especially in public buildings. The decision about what kind of lift with respect to accessibility is not only a commercial one but also a political decision.

The importance of accessibility has been recognised by, amongst others, all member states of the European Union by underwriting the Standard Rules on equal opportunities for persons with disabilities of the United Nations. Adopting these Standard Rules is an encouragement and a moral obligation for all involved in the lift industry.

Annex B
(normative)

Categories of disability and disabilities considered

B.1 Categories of disability are defined in **Tables B.1** and **B.2**.

B.2 The disabilities in **Table B.1,** are considered in the scope of this standard and the analysis for accessibility and safety (see **Annex C**) have been carried out accordingly.

Excluded are all combinations of disabilities, (see **Table B.2**), because it has been assumed that the requirements of a combination of disabilities are either;

— covered by the provisions for the different single disabilities., or

— the combination leads to such a demand on lift functions that this has to 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 an other person (see **Introduction; Negotiations)**.

Excluded are disabilities with requirements not clearly related to lift functions (e.g. claustrophobia). See **Table B.2.**

Table B.1 - Disabilities included in the scope of the standard

Category	Sub-Category	Characteristics
Physical disability	Impaired mobility	- Need for use of : - Wheelchair - Walking stick, - Crutches - Walking frame, - Roller frame
	Impaired endurance, equilibrium	Slow mover
	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
Intellectual disability	Learning difficulty	Reduced understanding of controls

Table B.2 (informative) - Disabilities not included in the scope of the standard

Category	Sub-Category	Remarks
Combinations	Included disabilities	see explanation in **B.1** above
Physical disability	Extreme dexterity impairment	Upper limbs are missing
	Size related disability	Less than 1,5 m or over 2,0 m body length
Allergies		See **Annex D**
Phobia	Claustrophobia	

Annex C
(normative)

Risk analysis

Table C.1 shows a list of significant hazardous situations and hazardous events that could result in risks to persons during normal use and foreseeable misuse of the lift. It contains corresponding references to certain parts of EN 292, and the relevant clauses in this standard that are necessary to reduce or eliminate the risks associated with those hazards.

Sensory disabilities with undefined degrees were considered as a total loss, e.g. impaired vision is considered as blind.

NOTE Regarding principles for risk assessment see EN 1050:1996.

Table C.1 - List of significant hazards

Significant hazards or hazardous events	Clauses in Annex A of EN 292-2:1991/A1:1995	Relevant clauses in this standard
General hazards of lifts	**all**	**(EN 81 Part 1, EN 81 Part 2)**
Specific hazards for disabled persons		
1 Mechanical hazards		
1.1 Crushing	1.3, 1.3.4, 1.3.7	5.2.4, 5.3.2.3, 5.4.4.3
1.2 Shearing		
1.3 Drawing in or trapping		
1.6 Impact		
1.11 Loss of stability	1.5.4	5.3.2.1, 5.3.2.2
1.12 Slip, trip, fall	1.6.2, 4.2.3	5.3.3
8 Hazards generated by neglecting ergonomic principles in machinery design.		See table C.2

A separate analysis has been carried out in order to detect barriers to accessibility and the result is shown in **Table C.2**.

Table C.2 (informative) - List of accessibility requirements

Significant aspects for accessibility	Relevant clauses in this standard
1 Access to lift	
1.1 Car size	5.3
1.2 Door size, performance	5.2
1.3 Steps	5.3.3
1.4 Others	5.3.3
2 Controls & signals	
2.1 Perception (detection, identification, interpretation)	5.4
2.2 Actuation (position, size, force, confirmation)	5.4
3 Others	
3.1 Support	5.3.2
3.2 Communication	5.4.4.3

Annex D
(informative)

Materials likely to cause allergies

D.1 General

Typical materials to which the user may be allergic include nickel, chromium, cobalt and natural or synthetic rubber.

Materials causing allergies should be avoided in buttons, controls, handles or handrails.

D.2 Nickel

Nickel causes sensitisation and contact allergy. Often a metal surface is coated with nickel. In stainless steel the nickel is so tightly alloyed that it does not cause allergy. Nickel may nevertheless be released if it is in contact with acidic substances. There may also be nickel underneath another metal plating, which may surface as a result of wear. There may for instance be a nickel-plating underneath a chrome-plating or a gold-plating. There may also be nickel in so-called white gold.

The maximum amount of nickel in metal objects which come in contact with the skin (fingers, hands) expressed as the mass of nickel to total mass must be less than 0,05 % or the rate of nickel released from the metal object must be less than 0,5 $\mu g/cm^2$/week (for a period of at least two years of normal use).

D.3 Chromium

Water-soluble chromium may cause an allergy in skin contact, though not as metallic chrome. A chrome-plated object or stainless steel containing chrome thus does not cause allergy. Chrome-tanned leather, chrome-plated galvanised metal and zinc-coated steel surfaces which have been chrome-plated may cause an allergy.

D.4 Cobalt

Cobalt does not cause problems because alloys such as stainless steel contain much less cobalt than nickel. It is sufficient to control nickel content because then the cobalt content is even smaller.

D.5 Surface materials

Surface materials in a lift-car, wall-textiles or plastic wall-papers with relief texture, thick carpets etc. should not be used because they collect dust. This causes allergic reactions, particularly in people suffering from allergic asthma.

D.6 Cleaning and ventilation of car

The car should be designed so that it is easy to clean and it, along with the car ventilation, should be cleaned regularly.

Annex E
(informative)
Guidelines regarding features for visually impaired persons

E.1 General

In order to maximise the use of any remaining vision, contrasts in colour, or, more importantly, tone, can be used positively to help identifying objects and avoid hazards. Proper lighting is essential in conjunction with colours. Blind people need tactile and audible arrangements to be able to function independently.

E.2 Colour/tone contrasting and surface condition

E.2.1 Often colours which appear to be very different from each other in terms of colour (chroma), such as green and brown or grey and pink, are very similar tonally, and therefore provide insufficient contrast to be useful. An easy method of determining whether a colour scheme provides contrast is to take a black and white photocopy or photograph of the colour scheme; good contrasts will show up as black and white, and poor contrasts will show up as grey in grey.

E.2.2 Contrast is the difference in reflectivity between one surface against another. 100 % contrast is white/black, since a matt black surface absorbs all light (0 % reflectance), and a white surface reflects all light (100 % reflectance).

E.3 Lighting

E 3.1 Reflection and glare cause visual confusion and discomfort. Glare can be caused by incorrectly positioned luminaries, particularly where the viewing angel is such that the lamp is in the line of vision. Careful use of non-reflective internal surfaces and carefully designed light fittings will reduce the effects of glare. Daylight can also be a source of glare.

E.3.2 Careful use of indirect lighting, such as uplighters, can help to prevent glare. Shadows often create visual illusions, and can mask potential hazards. Large variations in level of illumination from one area to another should be avoided. Any change in level of illumination should be gradual.

E.3.3 Spotlights should not be used as the sole light source in an area, since this method of lighting creates “pools” of light and dark contrast. Spotlights can be effectively used to supplement ambient lighting.

E.3.4 Care should be exercised when installing feature lighting such as downlighters, to ensure that shadows are not being cast over peoples faces, making lip reading especially difficult.

E.4 Tactile figures and symbols, braille

E.4.1 Tactile figures are at the same time both visual and tactile. They should have a good contrast. A black number or letter on white background is easiest to perceive, if the sign is lit, the contrast should be the other way round in order to avoid glare. Tactile figures in order to be easy to perceive should not be smaller than 15 mm high. The profile of the relief figure should be shaped as a rounded upside-down turned letter V with the height of at least 0,8 mm.

E.4.2 Braille can be used as a complementary and independent feature to tactile figures and is useful where large texts are necessary.

E.5 Landing

E.5.1 The colour and tone of the doors should contrast with the surrounding wall finish to assist location of doors.

E.5.2 The lift call button should be colour and tone contrasted with the surrounding finishes. This can be achieved using a contrasting panel, or a contrasting border around the button panel.

E.5.3 A distinguishable floor surface, approximately 1500 mm by 1500 mm outside the doors will aid location. This could comprise a change of colour or floor finish. Changes in floor finish should be flush.

E.6 Car

E.6.1 Internal lighting should provide a level of illumination of minimum 100 lux at floor level uniformly distributed, avoiding the use of spotlights.

E.6.2 Internal walls should have a non-reflective, matt finish in a colour and tone contrasting with the floor, which should also have a matt finish.

E.6.3 The floor of the car should have a similar surface characteristic to the landing floor.

E.6.4 The control buttons should protrude some millimetres from the car wall.

E.6.5 The use of speech as an audible indication is recommended. Speech can also provide information, among other things, about locations of shops and offices at a floor level. A visual indicator is also useful.

Annex F
(normative)

Keypads

F.1 General

Keypads may be applied (see, **Introduction,Negotiation**s) in the car or at the landing. The arrangement of the numbered keys shall be according to the standards telephone type see **Figure F.1**.

NOTE The negotiations should consider the location of the lift and the possibilities for the users to be properly instructed in the method of use of the keypad system.

F.2 Design requirements

The requirements of **5.4.1** and **5.4.2**. apply with the following exceptions and additional requirements:

a) in order to be recognised as keypad, the distance between the buttons shall be between 10 mm and 15 mm. For inclined keypads the distance may be reduced to between 5 mm and 15 mm;

b) the user shall be able to know that the button has been operated, either because it possesses perceivable movement or an audible feedback. The call registration shall be confirmed by a visible and audible signal (adjustable between 35dB(A) and 65 dB(A). The audible signal shall be given on every individual call registration even if the call is already registered;

c) the size of the floor numbers shall be a minimum of 15 mm, maximum 40 mm and contrasted to the background;

d) the button number 5 shall have a single tactile dot as orientation for users with impaired vision;

e) numbers and symbols shall be on the active part of the button;

f) for keypads in the car the exit button (main floor) shall be clearly distinguishable from the other buttons. This shall be provided by a green button protruding 5 mm ± 1 mm above the plane of the other buttons or a button marked with a relief star ("✶").

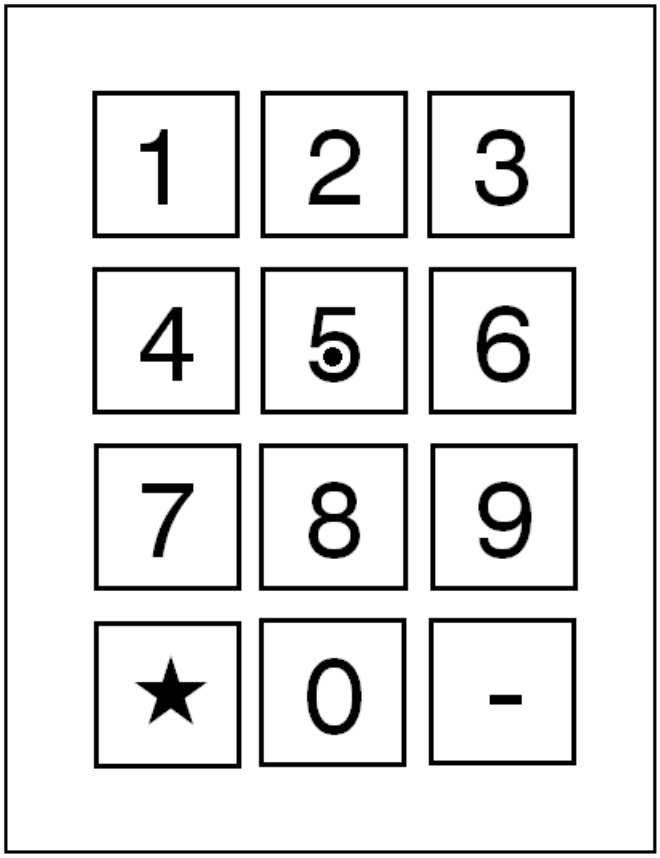

Figure F.1 - Illustration of keypad type system

Annex G
(informative)

Other devices

G.1 Extra large (XL) control devices

G.1.1 Introduction

This Annex provides guidance on the design of extra large (XL) control devices to provide increased accessibility (see **Introduction, Negotiation**s).

The type of control device specifications used in **G. 1** is referred to as XL-control devices. This designation is given in order to enable specifiers to easily describe their requirements and for suppliers to readily identify what they are being asked to provide.

The XL-control devices may, in particular, be used in passenger lifts with a rated load greater than or equal to 630 kg.

G.1.2 Landing controls

On every landing where buttons are used for the operation of the lift they should meet the following specifications: (apart from or in addition to the minimum requirements in **5.4.1**):

a) the minimum dimension of the active part should be 50 mm x 50 mm or a diameter of 50 mm;

b) if marking exists, the size of the symbol should be 30 mm, maximum 40 mm, in relief located on the active part of the button and contrasted to the background.

G.1.3 Car controls

Where buttons are located within the car they should meet the following specifications (apart from, or in addition to, the minimum requirements in **5.4.2**)**:**

a) the specifications in **G.1.2 a)** and **b)**

b) The distance between the active part of two adjacent buttons should be 10 mm.

c) the call buttons should be laid horizontally on a tilted, horizontal plate. The projection of the tilted plate should be the 100 mm. See example **Figure G.1** ;

d) with one row of floor buttons the floor buttons should be set from left to right on the centreline of the plate. On the left of the plate should be the door and alarm buttons. The alarm button should be above the door button with 10 mm distance between active parts. See example **Figure G.2** ;

With two rows of floor buttons the floor buttons should be staggered above and below each other in growing order, from bottom to top and from left to right. On the left of the plate should be the door and alarm button. The alarm button should be on the left of the door button and set on the centreline of the plate, see example **Figure G.3** .

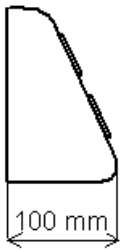

Figure G.1 – Side view, example

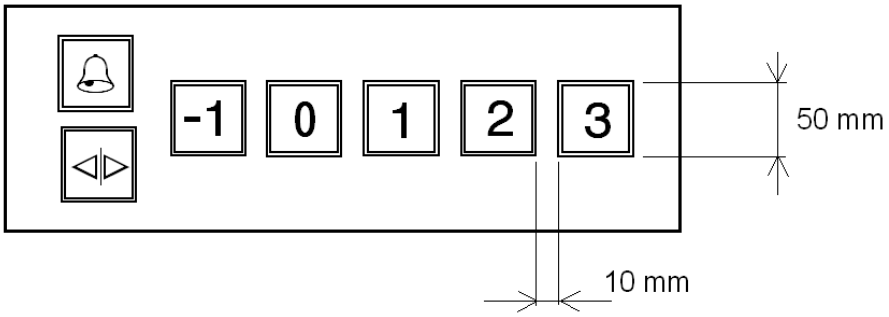

Figure G.2 – Example of arrangement of one row of square push buttons

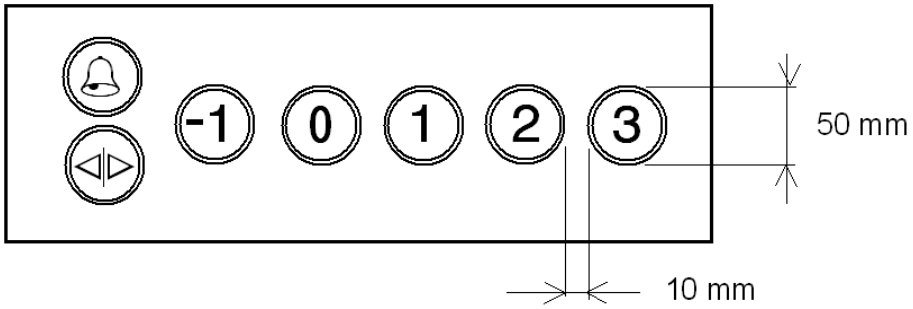

Figure G.3– Example of arrangement of two rows of round push buttons

G.2 Remote call registration

Where necessary or required remote control systems (magnetic or chip card, infra red sender, etc.) may be applied. These systems can activate personalised lift and signal functions for a disabled person

Annex ZA
(informative)

General remarks on accessibility

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and with the exception of clauses 5.2.2, 5.3.2.1, 5.3.2.2, 5.3.2.3, the clauses of this standard are likely to support essential requirements of EC Directive(s):

Lift Directive 95/16/EEC

Compliance with this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

WARNING: Other requirements and other EC Directive may be applicable to the product(s) falling within the scope of this standard.

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