



BSI Standards Publication

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

Part 71: Vandal resistant lifts

National foreword

This British Standard is the UK implementation of EN 81-71:2018. It supersedes BS EN 81-71:2005, which will be withdrawn on 31 August 2019.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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Date	Text affected
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English Version

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

Règles de sécurité pour la construction et
l'installation des élévateurs - Applications
particulières pour les ascenseurs et
ascenseurs de charge - Partie 71 : Ascenseurs
résistants aux actes de vandalisme

Sicherheitsregeln für die Konstruktion und den
Einbau von Aufzügen - Spezielle Anwendungen
für Personen- und Lastenaufzüge - Teil 71:
Schutzmaßnahmen gegen mutwillige Zerstörung

This European Standard was approved by CEN on 1 March 2018.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 81-71:2018) 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of an identical text or by endorsement, at the latest by November 2018, and conflicting national standards shall be withdrawn at the latest by August 2019.

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 81-71:2005+A1:2006.

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.

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.

Introduction

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

This document is a Type C standard as stated in EN ISO 12100.

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

This document provides guidance to the building designer, customer etc. and requirements for design, where it is considered additional security or other measures may be required in order to protect against the risk of vandalism. The customer will need to consider the extent of additional protection required, as covered by the enclosed proposals, which may be adopted according to the environment in which the lift installation is situated and the type of vandalism that is likely to be experienced. Every lift is subject to some amount of careless or rough use. Lifts built to [EN 81-20](#) offer a reasonable degree of protection against this and are referred to in this document as Category 0. This document addresses additional protective measures against deliberate acts that may result in equipment damage or injury to persons for lifts referred to in this document as Category 1 or Category 2.

With regard to potential hazards for vandalism the following factors are taken into consideration:

- degree of accessibility to the installation;
- the surrounding area;
- observation by others in the vicinity;
- extent of building security and surveillance of lift(s);
- period of access to the building, including the lift(s) (24 h);
- vulnerability of lift.

The clauses in this document apply to both Category 1 lifts and Category 2 lifts as defined in this document (see [Annex A](#)) unless otherwise stated in the text.

The following assumptions were made whilst writing this document:

- the lift is designed to meet the basic requirements detailed in [EN 81-20](#);
- the building and/or the lift structure are at least in accordance with the advice given in [Annex A](#), which form the basis of the negotiations outlined in [EN 81-20:2014](#), 0.4.2;
- the lift, its well, landing and access areas, machinery spaces(s) and all associated equipment are properly maintained in good, safe working order.

The forces exerted on the lift and its equipment will be as a result of manual effort or by item(s) such as those defined in [Annex E](#).

1 Scope

This document gives additional and deviating requirements to [EN 81-20](#) as applicable in order to ensure the safety of lift users and the availability of lifts, which may be used for vandal resistant purposes. In all other respects such lifts are designed in accordance with [EN 81-20](#). This document deals with the significant hazards, hazardous situations and events relevant to lifts which can be affected by vandalism (as listed in [Clause 4](#)) when they are used under the conditions as foreseen by the installer.

It does not cover building security or Category 0 lifts (see [definition 3.2](#)).

For other types of lifts, e.g. inclined lifts according to [EN 81-22](#), this standard can usefully be taken as a basis.

2 Normative references

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

[EN 81-20:2014](#), *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 81-72](#), *Safety rules for the construction and installation of lifts — Particular applications for passenger and goods passenger lifts — Part 72: Firefighters lifts*

[EN 81-73](#), *Safety rules for the construction and installation of lifts — Particular applications for passenger and goods passenger lifts — Part 73: Behaviour of lifts in the event of fire*

[EN 13501-1](#), *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

[EN 60529](#), *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in [EN 81-20:2014](#) and the following apply.

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

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

3.1

car ceiling

parts of the car roof accessible from inside the car

3.2

Category 0 lift

lift in conformity with [EN 81-20](#)

3.3

Category 1 lift

lift in conformity with [EN 81-20](#) and fulfilling supplementary requirements, in order to protect the lift installation from moderate acts of vandalism

NOTE See [Annex A](#).

3.4

Category 2 lift

lift in conformity with [EN 81-20](#) and fulfilling supplementary requirements in order to protect the lift installation from severe acts of vandalism

NOTE See [Annex A](#).

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this document, identified by risk assessment as significant for this type of lift and which require action to eliminate or reduce the risk. See [Table 1](#).

Table 1 — List of significant hazards

Hazards as listed in EN ISO 12100:2010, Annex B	Relevant clauses
Mechanical hazards due to:	
– Crushing	5.2.1.2 , 5.2.1.3 , 5.2.2.1 , 5.2.2.2 , 5.3.5 , 5.4.2.1 , 5.4.2.4 and 5.5.2
– Shearing	5.2.1.1 , 5.2.1.2 , 5.2.1.3 , 5.2.2.1 , 5.2.2.2 , 5.2.3 , 5.3.1 , 5.3.2 , 5.3.3 , 5.3.4 , 5.3.5 , 5.4.1.2 , 5.4.1.3 , 5.4.1.4 , 5.4.1.6 , 5.4.2.1 , 5.4.2.4 , 5.5.1.1 and 5.5.2
– Cutting	5.4.1.2 , 5.5.1.8 , 5.5.4 , 5.6.1.3 and 5.6.2.1
– Trapping	5.4.2.3 , 5.4.2.4 , 5.4.2.5 , 5.4.5 and 5.7
– Impact hazard	5.4.4
– Slipping, tripping and falling	5.2.1.1 , 5.2.2.2 , 5.2.3 , 5.3.3 , 5.3.4 , 5.3.5 , 5.3.6 , 5.4.1.2 , 5.4.1.3 , 5.4.2.1 , 5.4.2.3 , 5.4.2.4 , 5.4.6 , 5.5.1.1 , 5.5.1.6 , 5.5.2 and 5.8
Electrical hazards due to live parts	5.5.1.9 , 5.5.4 , 5.6.1.1 , 5.6.1.3 , 5.6.1.4 and 5.6.2.1
Thermal hazards due to flame	5.2.1.1 , 5.3.1 , 5.3.7 , 5.4.1.1 , 5.5.1.4 , 5.5.4 , 5.6.1.1 , 5.6.1.5 and 5.9
Hazards due to human behaviour	5.2.1.1 , 5.2.1.2 , 5.2.1.3 , 5.2.2.1 , 5.2.2.2 , 5.2.3 , 5.3.1 , 5.3.2 , 5.3.3 , 5.3.4 , 5.3.5 , 5.3.6 , 5.4.1.5 , 5.4.1.6 , 5.4.1.7 , 5.4.1.8 , 5.4.2.1 , 5.4.2.3 , 5.4.3 , 5.4.4 , 5.4.5 , 5.4.6 , 5.5.1.1 , 5.5.1.2 , 5.5.1.3 , 5.5.1.5 , 5.5.1.7 , 5.5.1.8 , 5.5.1.9 , 5.5.2 , 5.5.3 , 5.5.4 , 5.6.1.2 , 5.6.1.3 , 5.6.1.4 , 5.6.2.1 , 5.6.2.2 , 5.7 and 5.9

5 Safety requirements and/or protective measures

5.1 General

Category 1 and Category 2 vandal resistant lifts shall comply with the safety requirements and/or protective measures of the following clauses. In addition, such lifts shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant that are not dealt with by this document (e.g. sharp edges).

5.2 Lift well

5.2.1 Well enclosure

5.2.1.1 Well enclosures shall be imperforate. The walls, floor and ceiling shall be made of materials such as steel, brick, concrete etc. with a mechanical strength such that when a force of 2 500 N being evenly distributed over an area of 100 cm² in round or square section is applied at right angles to the surface at any point on either face they shall resist without:

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

The materials used for the well enclosure shall be non-combustible, e.g. according to Class A1 of [EN 13501-1](#).

If the material used is glass, it shall be of an equivalent strength to the glass used for landing doors – see [5.4.1](#).

NOTE The above requirements apply in addition to any national regulations.

5.2.1.2 For Category 1 lifts with a partially enclosed well the height of the enclosure according to [EN 81-20:2014](#), 5.2.5.2.3 b) shall be a minimum of 5,0 m.

5.2.1.3 Category 2 lifts shall be provided with a totally enclosed well.

5.2.2 Access and emergency doors — Access trap doors — Inspection doors

5.2.2.1 Access and emergency doors, access trap doors and inspection doors shall be of such a construction that it is not possible to open them with any of the items as listed in [Table E.1](#).

5.2.2.2 Doors and trap doors with their locks shall be of sufficient strength that, in the locked position when a force of 2 500 N (from the side which is normally accessible to persons) is applied at right angles to the panel, at any point on the exposed face, evenly distributed over an area of 100 cm² of round or square section; they shall:

- a) resist the force without permanent deformation;
- b) resist without elastic deformation greater than 15 mm;
- c) not have their safety function affected during and after such a test;
- d) operate afterwards.

5.2.3 Ventilation

Ventilation openings shall be in accordance with [5.3.3](#) and [5.3.4](#).

5.3 Machinery spaces, pulley rooms and machinery cabinets

5.3.1 The materials used in the construction of any machinery space, pulley room or machinery cabinet outside of the well shall comply with [5.2.1.1](#).

5.3.2 Windows, if provided and accessible to persons, shall:

- a) be of a strength as specified in [5.2.2.2](#);
- b) have laminated glass panel(s).

Windows are not recommended.

5.3.3 If ventilation openings are accessible to persons from the outside, individual openings shall:

- a) not be greater than 250 mm × 250 mm;
- b) be provided with a means of protection so that a straight rod of any cross section, shall not pass through.

5.3.4 The means of protection in [5.3.3](#) shall be of a strength as specified in [5.2.1.1](#).

5.3.5 Doors and trap doors with their locks shall meet the requirements of [5.2.2.2](#).

5.3.6 For Category 2 lifts, an intruder alarm system shall operate if any of the following doors are opened:

- machine room and/or pulley room door;
- inspection doors, emergency doors and inspection traps;
- cabinet doors.

The intruder alarm system shall operate an audible alarm within 30 s after opening any of the above doors or traps.

The audible alarm shall:

- a) be audible at both the point of intrusion and at the main access floor, with an adjustable sound level between 70 dB(A) and 85 dB(A);
- b) stop automatically after an adjustable period between 5 min and 15 min.

It shall be possible to deactivate and re-activate the alarm system by the device referred to in [5.4.2.2](#).

In the event of loss of the electrical supply, the alarm system shall remain operative for at least two hours.

NOTE Time periods and sound level settings may depend upon local Regulation.

5.3.7 In the case of a Category 2 lift, machinery located in the pit, e.g. machine, tank, controller, shall be covered with a metallic enclosure. This enclosure is to prevent rubbish from entering the equipment and causing dangerous malfunctions or the ignition of the material or the creation of smoke.

5.4 Landing and car doors

5.4.1 Landing and car doors shall be of the automatically horizontally sliding power operated type.

5.4.1.1 Materials used for car and landing doors shall comply with the following:

- a) with the exception of decorative finishes, the materials used for door panels and frames/architraves shall be non-combustible, e.g. according to Class A1 of [EN 13501-1](#);
- b) for Category 2 lifts the materials used for decorative finishes shall be non-combustible according to Class A1 or A2 of [EN 13501-1](#).

5.4.1.2 Independently of their material, landing and car door assemblies, together with their frames and fixings shall withstand the soft pendulum shock test as specified in [EN 81-20:2014](#), 5.3.5.3.4 a) without component failure or permanent deformation which would affect the proper function of the doors. The door assemblies shall remain operative after the test. The falling heights for the tests shall be as follows:

- a) for Category 1 lifts: 700 mm;
- b) for Category 2 lifts: 1 000 mm.

5.4.1.3 Door panels with their retainers shall withstand the soft pendulum shock test as specified in [EN 81-20:2014](#), 5.3.5.3.2 with a falling height increased to 1 400 mm.

5.4.1.4 For Category 2 lifts glass panels shall not be used.

5.4.1.5 For Category 2 lifts, the distance between each landing door, or its attachments at the leading edge, and the car door(s), or its attachments at the leading edge, shall not exceed 35 mm. This distance shall be maintained back from the leading edge over a length of not less than 75 mm and returned at an angle not exceeding 45° to the rear of the door panel. This return angle may be omitted over a length not exceeding 200 mm at the top and/or bottom of the door panel to allow the fixing of door equipment. Where the distance is maintained back for a length of 200 mm or more, then the return angle is not required (see [Figure 1](#)).

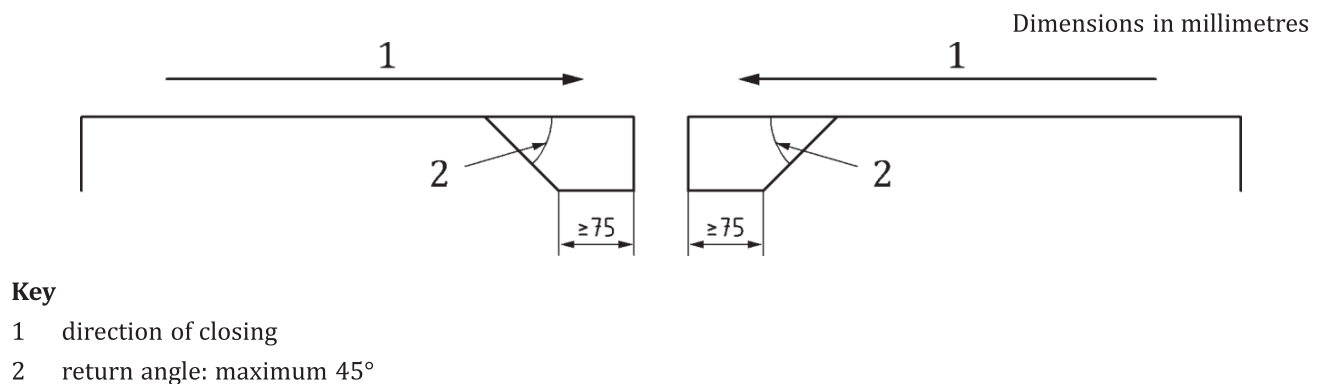


Figure 1 — Plan view of door panel with angled return

5.4.1.6 For Category 2 lifts, in addition to the requirements of [EN 81-20:2014](#), 5.3.5.3.3, it shall not be possible to pass a rod of 10 mm diameter from the landing side of the entrance into the well.

5.4.1.7 For Category 2 lifts, where panels are mechanically linked, the linkage shall be so designed or located that it cannot be disengaged by a user, with an item as described in [Annex E](#) within a period of 60 s.

5.4.1.8 For Category 2 lifts, the leading edge profile of car and landing doors shall be formed as an integral part of the door.

5.4.2 Landing door security system — Category 2 lifts

5.4.2.1 At any floor where the car is not present, a security system shall prevent opening the landing door with an emergency unlocking key as stated in [EN 81-20:2014](#), 5.3.9.3.1 or by using an item as described in [Annex E](#), unless this system has been de-activated.

5.4.2.2 A device to manually activate and de-activate the system shall be in at least one of the following locations:

- a) the machine room;
- b) control cabinet;
- c) emergency and inspection panel.

The device shall be clearly marked with a pictogram as shown in [Annex C](#). The pictogram shall also be located on or adjacent to the lift entrance at the main entry/exit floor of the building.

5.4.2.3 After manual de-activation, the system shall be automatically re-activated after a period of between 30 min and 60 min, to prevent the doors being left without the security system operative. However, when the lift is placed on inspection control, or a stopping device is operated, this time sequence shall stop. Once the lift is returned to normal operation, the time sequence shall be re-initiated. Each manual re-activation shall reduce any remaining time delay to a value between 30 s and 60 s.

5.4.2.4 In the event of failure of the main power supply, the system shall remain operative for at least two hours by means of a back-up power supply. In the event of disconnection of the main switch, the system shall be immediately deactivated.

NOTE The design of this back-up power is subject to negotiation, e.g. by battery or by secondary power supply.

5.4.2.5 Where this system is installed on:

- a) firefighters lifts in conformity with [EN 81-72](#), it shall be automatically de-activated when the lift is recalled (phase 1) or in firefighters control (phase 2);
- b) lifts in conformity with [EN 81-73](#), it shall be automatically de-activated when the lift is recalled by one of the means according to [EN 81-73](#).

5.4.3 Door coupling mechanism

For Category 2 lifts, whilst the car is stationary in the unlocking zone it shall not be possible to de-couple the car and landing doors by hand or the use of an item as described in [Annex E](#) within a period of 60 s.

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5.4.4 Door reversal mechanism

For Category 2 lifts, any protective devices for reversing the car and landing doors when closing shall be positioned such as to be inaccessible to unauthorised persons.

5.4.5 Locking of car doors

The car door(s) shall always be provided with a mechanical locking device in compliance with [EN 81-20:2014](#), 5.3.9.2.

5.4.6 Manipulation of door operator and locks

For Category 2 lifts, in addition to the requirements of [EN 81-20](#), it shall not be possible to manipulate the door operator and locks, to render them ineffective by use of any of the item described in [Annex E](#) within 60 s.

5.5 Car

5.5.1 Car bodywork, Interior and fixings

5.5.1.1 The walls of the car shall have a mechanical strength at least equal to the landing doors as specified in [5.4.1.2](#) a) or b) as applicable.

5.5.1.2 For Category 1 lifts, the car ceilings shall:

- a) be able to support the mass of 150 kg at any point from which persons can suspend themselves;
- b) be so fixed to prevent unauthorised displacement, within a period of 60 s, either by hand or the use of items as described in [Annex E](#).

5.5.1.3 For Category 2 lifts the ceiling shall be so designed that there are no points from which persons can suspend themselves.

5.5.1.4 Materials used for the car shall comply with the following:

- a) the materials used for the car bodywork shall be non-combustible according to Class A1 of [EN 13501-1](#);
- b) for Category 2 lifts, the materials used for ceiling and wall finishes shall be non-combustible according to Class A2 of [EN 13501-1](#) and the materials used for the car flooring shall be non-combustible according to Class A2_{fl} of [EN 13501-1](#).

5.5.1.5 The car bodywork shall resist cutting through with items as identified in [Annex E](#).

5.5.1.6 Any car flooring material shall be so fixed as to prevent the creation of a tripping hazard when cut.

5.5.1.7 For Category 2 lifts, any handrail shall be capable of supporting at its most unfavourable point a force of 2 500 N applied in any direction.

5.5.1.8 For Category 2 lifts, where a mirror is installed it shall:

- a) be flush fitted;
- b) be laminated if made of glass.

5.5.1.9 Elements, e.g. fixtures and fittings, that are accessible to users shall:

- a) for Category 1 lifts, be removable only with special tools;
- b) for Category 2 lifts, be fitted with fixings that are not visible to users.

5.5.2 Car emergency doors and trap doors

For Category 2 lifts any emergency trap doors or emergency doors shall meet the requirements of [EN 81-20:2014](#), 5.4.6 and be provided with a security system in accordance with [5.4.2](#).

NOTE It is advised that trap doors and emergency doors are not provided unless called for by other parts of the EN 81 series of standards.

5.5.3 Car ventilation

Any normally accessible car ventilation openings shall be provided with a means of protection so that a straight rod of any cross section shall not pass through.

5.5.4 Car lighting

All light fixtures within the lift car shall:

- a) be flush fitted without visible fixings and in a manner such as to prevent unauthorised access;
- b) when tested as described in [Annexes B](#) and [F](#) remain functional and unbroken.

5.6 Car and landing fixtures

5.6.1 Car and landing controls

5.6.1.1 When mounted in their assemblies control buttons, indicators and other fixtures, when tested from the operating side, shall be water resistant to IPX3 as specified in [EN 60529](#).

5.6.1.2 The gap between the bezel and button shall be kept to a minimum to avoid jamming by the insertion of any object as listed in [Annex E](#).

5.6.1.3 Control button assemblies, indicators and other fixtures shall be tested in accordance with [Annex B](#).

5.6.1.4 The control buttons, indicators and other fixtures shall resist cutting through with any item listed in [Annex E](#).

5.6.1.5 The lift control buttons, indicators and other fixtures and their assemblies shall meet the requirements of [Annex E](#).

5.6.2 Car and Landing Control Stations

5.6.2.1 Car operating panel(s) and landing control stations shall:

- a) be fitted in accordance with [5.5.1.9](#);
- b) meet the requirements of [5.5.1.4](#);
- c) resist the impact test referred to in [Annex B](#);
- d) resist cutting through with any item listed in [Annex E](#).

5.6.2.2 Any information by way of symbols and markings on control panel faceplates or buttons shall not be made illegible within 60 s by use of any item listed in [Annex E](#).

5.6.3 Position indicators

In addition to the position indicator in the car, a position indicator shall be provided at the main floor.

5.7 Alarm sounder

Unless the car is at a floor with its doors open, operation of the alarm button shall cause a device to sound for 60 s or until the car doors open and the sound shall be audible from within the lift car, at a sound level adjustable between 70 dB(A) to 85 dB(A).

5.8 Steel work

For Category 2 lifts, measures shall be taken to prevent corrosion damage from cleaning solvents and bodily fluids for the following:

- a) the car sling, including car supporting members;
- b) the landing and car doors, sills, supporting members and tracks;
- c) landing door locks;
- d) car walls and floor.

5.9 Signs and markings

Signs and markings accessible to the public shall:

- a) be fixed in a manner that prevents removal with the use of items specified in [Annex E](#) and;
- b) not be made illegible within 60 s by use of an item listed in [Annex E](#) and;
- c) satisfy the requirements of [Annex F](#).

6 Verification of safety requirements and / or protective measures

This clause contains the methods of testing for the presence and adequacy of safety measures for requirements of [Clause 5](#). See [Table 2](#).

All safety measures of [Clause 5](#) contain self-evident criteria of acceptance.

Table 2 — Methods to be used to verify conformity to the requirements

Subclause	Requirements	Type of test /check			
		Visual Presence Inspection ^a	Measurement ^b	Function ^c	Design ^d
5.2.1.1	Imperforate well enclosure	X			
5.2.1.1	Well enclosure strength	X	X ^f		X ^f
5.2.1.1	Well enclosure fire resistance				X
5.2.1.2	Well enclosure size		X		
5.2.1.3	Total enclosure	X			
5.2.2.1	Door, trap construction	X			
5.2.2.2	Door, trap strength	X	X ^f	X	X ^f
5.2.3	Ventilation openings	X	X		
5.3.1	Imperforate machinery space enclosure	X			
5.3.1	Machinery space enclosure strength	X	X ^f		X ^f
5.3.1	Machinery space enclosure, fire resistance				X
5.3.2	Window strength	X			X
5.3.3	Ventilation opening size	X	X		
5.3.4	Ventilation opening protection	X	X ^f		X ^f
5.3.5	Door and lock construction	X			
5.3.5	Door and lock strength	X	X ^f	X	X ^f
5.3.6	Intruder alarm system operation		X ^e	X	
5.3.7	Machinery protection	X			
5.4.1	Door type	X			
5.4.1.1	Door panels, frames, fire resistance				X
5.4.1.2	Panel deformation		X		
5.4.1.2	Panel strength		X		
5.4.1.3	Door panel retainers		X		
5.4.1.4	Glass panels	X			

Subclause	Requirements	Type of test /check			
		Visual Presence Inspection ^a	Measurement ^b	Function ^c	Design ^d
5.4.1.5	Distance between doors		X		
5.4.1.6	Gap between door panels		X		
5.4.1.7	Panel linkage	X			
5.4.1.8	Panel profile	X			
5.4.2.1	Security system	X		X	X
5.4.2.2	Security system deactivation / reactivation			X	
5.4.2.3	Automatic reactivation			X	
5.4.2.4	Supply failure			X	
5.4.2.5	Automatic deactivation		X		X
5.4.3	De-coupling doors			X	
5.4.4	Inaccessibility	X			
5.4.5	Car door locking			X	
5.4.6	Manipulation of door operator and/or locks		X	X	
5.5.1.1	Car wall strength		X		
5.5.1.2 a)	Car ceiling strength			X ^f	X
5.5.1.2 b)	Car ceiling fixing			X	
5.5.1.3	Car ceiling design	X			
5.5.1.4	Car bodywork				X
5.5.1.5	Car bodywork – resistance to cutting				X
5.5.1.6	Car floor fixing				X
5.5.1.7	Handrail strength				X
5.5.1.8^a	Mirror fixing	X			
5.5.1.8^b	Glass type	X ^f			X ^f
5.5.1.9	Fixtures and fittings			X	
5.5.2	Emergency door and trap door			X	X
5.5.3	Car ventilation	X			
5.5.4^a	Car Lighting (light fixtures)	X			
5.6.1.1	Water resistance				X
5.6.1.2	Bezel gaps	X			X
5.6.1.3	Impact tests		X		
5.6.1.4	Resistance to cutting		X ^f		X ^f
5.6.1.5	Fire resistance		X ^f		X ^f
5.6.2.1^a	Operating panel and landing controls (fixings)	X			
5.6.2.1^b	Operating panel and landing controls (fire resistance)				X
5.6.2.1^c	Operating panel and landing controls (impact test)		X		
5.6.2.1^d	Operating panel and landing controls (cutting through)		X ^f		X ^f
5.6.2.2	Symbols markings		X ^f		X ^f

Subclause	Requirements	Type of test /check			
		Visual Presence Inspection ^a	Measurement ^b	Function ^c	Design ^d
5.6.3	Indicator location	X			
5.7	Alarm sounder		X	X	
5.8	Corrosion resistance	X			X
5.9 a)	Signs and markings (fixing)			X	
5.9 b)	Signs and markings (legibility)		X ^f		X ^f
5.9 c)	Signs and markings (fire resistance)				X
7.1	Instruction manual	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. ^f Denotes choice of verification means.					

7 Information for use

7.1 Instruction manual

The manufacturer/installer shall provide an instruction manual according to [EN 81-20:2014](#), 7.2.

7.2 Guidance

7.2.1 General

In addition the following guidance shall be provided.

7.2.2 Guidance to the owner

- a) suitable cleaning materials that can be used;
- b) the need for regular checks by building management to detect signs of damage;
- c) the need to repair damage quickly or remove the lift from service if it presents a danger;
- d) the need to keep floors clean and especially dry;
- e) the operation of the unlocking system for rescue purposes;
- f) the need to keep lift landing areas and access ways free from combustible materials.

7.2.3 Guidance to the maintenance company

Undetected corrosion can lead to a major failure of load bearing elements of the lift. It is therefore vital to include guidance on the examinations of the platform, car frame, car and landing door shoes and any other critical elements that may become corroded.

Annex A (informative)

Guidance to the purchaser/designer

A.1 General

Vandalism may result from frustration and/or other behavioural patterns.

In order to determine the likely degree of vandalism that may occur to a given lift, a number of factors should be considered. This should include consideration of the type of users the lift will be required to provide service to and the degree of importance the lift will have in the particular building.

Study has shown that the amount of vandalism a lift may suffer is directly related to the degree of observation that the users are under. This level of observation will be dependent on the design of the building and/or the control measures put in place to control access to the lift.

By considering these issues, the most appropriate lift type may be selected as follows (See [Table A.1](#)):

Table A.1 — Category of lift

Type of lift user	Category of lift
Observed restricted user	0
Unobserved restricted user	0
Observed general public	0
Unobserved general public	1
Potential vandals	2

A.2 Examples of different user types

Observed restricted user: Glass observation lift within an office complex with a reception desk controlling who may enter the building, will have observed restricted users and therefore a Category 0 lift complying with [EN 81-20](#) is suitable.

Unobserved restricted user: A lift in a building with a reception or security desk controlling who may enter the building will have restricted users, but their movement within the lift is unobserved. A Category 0 lift is suitable in most instances.

Observed general public: A lift with security surveillance cameras or of glass construction, in a shopping mall will have this type of user and therefore a Category 0 lift is still suitable in most instances.

Unobserved general public: An enclosed lift in a shopping mall will have unobserved general public as users and therefore a Category 1 lift is most suitable.

Potential vandals: In some building types, vandalism can be reasonably expected. These buildings include sports stadiums, railway stations, hospital emergency departments, social housing developments and other similar environments, a Category 2 lift is normally suitable.

NOTE In the above definitions 'building' can be read as a department or area of a building.

A.3 Other considerations

Observation in the form of security cameras or by extensive use of glass in the lift car and doors, with the lift located to allow observation, will greatly reduce the degree of vandalism that may be encountered. Consideration should be given to how effective the observation is likely to be and how effective any planned response to a given situation would be.

The provision of a mirror within the car can provide a useful distraction, but consideration should be given to the selection of the material used.

High levels of lighting are a deterrent to vandals and where surveillance systems are present provides for increased definition for identification purposes.

In selecting the Category of lift to be installed, the following may be adopted as a guide:

- will there be access control of the area containing the lift;
- is the building located in an area likely to be subject to vandalism;
- is the type of building known to suffer from vandalism;
- is the intended use of the lift likely to contribute to damage - (use of trolleys, etc.);
- what type of user as defined above will be expected to use the lift.

The building designer and lift contractor should seriously consider these aspects and the benefits of providing additional surveillance before selecting the Category of lift required.

Having determined the Category of lift, the designer also needs to consider the number, speed and size of the lifts. Incorrect selection of these parameters can also encourage vandalism and therefore very serious attention should be given to the following section.

A.4 Lift performance

The waiting time for users and the time spent travelling in the car should be as short as possible.

To avoid users being frustrated by long waiting periods, the number and speed of cars in a multiple lift installation should be selected to provide an average interval of less than 45 s.

Select the size of the lift, taking account that in buildings where the use of push chairs or trolleys is expected, the lift car will in effect be full when one or two such devices are in the car. Where such devices are to be expected, lifts of suitable size should be selected.

The lift may incorporate a load by-pass feature to prevent car stopping at floors when full or nearly full.

In buildings where push chairs, wheelchairs, etc. are likely to be used, they will take up the available car floor area thus preventing other passengers entering the car even though it is not fully loaded. In such situations any load non-stop device should be set to operate at approximately 60 % of the rated load to avoid abortive car stops that will frustrate users.

A device to shorten the door dwell time should be considered to minimize user frustration. Such devices may be a door close button, light ray device or other similar means.

A door nudging feature in accordance with [EN 81-20:2014](#), 5.3.6.2.2.1 b) 4) will help to keep the lift operational and thereby minimize user frustration.

A.5 Corrosion protection

Consideration should be given to the selection of car and landing finishes to ensure they resist corrosion from bodily fluids and cleaning solvents.

It is recognized that fouling can occur in Category 1 lifts but it is not envisaged this will be on a continuous basis. Therefore specific anti-corrosion measures are not essential for Category 1 lifts.

[5.8](#) requires specific corrosion protection to be provided to those parts of Category 2 lifts that provide structural integrity to the doors and lift car.

The type of anti-corrosion measures taken will depend on the design of the lift, its environment and the materials selected. This is not defined by this document but the following may be used as a useful guide.

The designer may choose a special design to keep corrosive agents away from critical parts and/or provide additional anti-corrosive measures to critical parts. Steel can be treated by galvanising or anti-corrosion paint treatments. Hot dip galvanising is best avoided due to the distortion of steel members caused by the heat process. Bronze alloys also offer good long-term protection as do many plastics and composite materials.

A.6 Durability of finishes

Consideration should be given to the selection of car and landing finishes to ensure they are not easily scratched and are suitable for sustained and frequent cleaning. Such cleaning is often required due to the spraying of graffiti or other defacement.

A.7 Protection of power supplies

To avoid problems associated with vandalism of the lift power supply any electrical cables and their isolation switches should not be placed in areas accessible to persons other than authorized persons.

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Annex B

(normative)

Impact test

B.1 Equipment

The test rig shall be capable of dropping a pointed impactor upon a test sample.

The impactor shall have a mass of 1,0 kg and a 10 mm radius point.

B.2 Samples

Every test sample shall be installed in a supporting frame.

B.3 Method

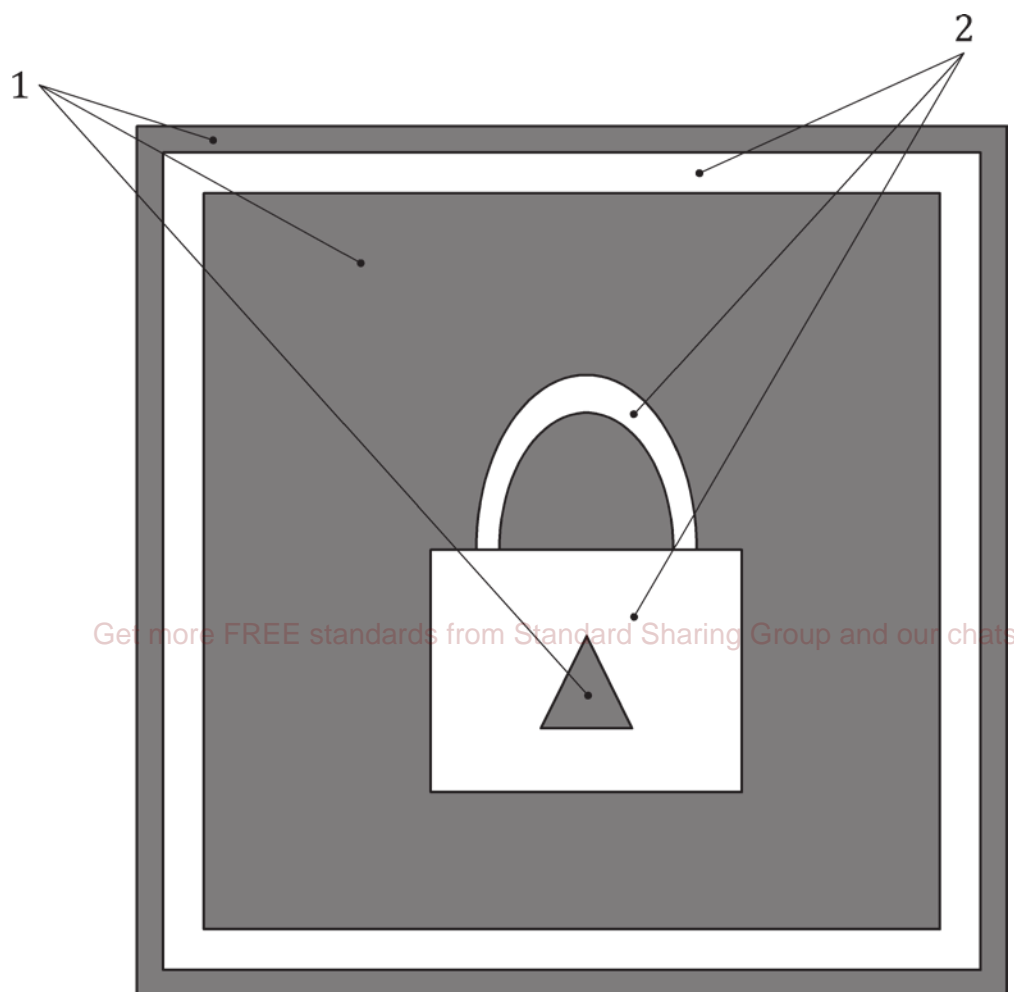
The impactor shall be dropped three times onto the most unfavourable point of the test sample from a height of 0,2 m for Category 1 lifts and 1,0 m for Category 2 lifts.

B.4 Result

Following the test the sample shall remain both safe and functional.

Annex C (normative)

Information sign for landing door security system



Key

- 1 green
- 2 white

Figure C.1 — Information sign for landing door security system

For the information sign located at the main landing, the minimum size shall be 50 mm × 50 mm.

For the information sign located at the switching device, the minimum size shall be 20 mm × 20 mm.

Annex D **(informative)**

Additional advice for building designers

D.1 Vandalism may result from frustration and/or other behavioural patterns, providing the means and opportunity will increase the severity and frequency of the occurrence.

D.2 The lift may not operate reliably if quantities of water enter the lift car, lift well or other areas containing lift equipment. To minimize this risk water should not be readily available to vandals. Designers should avoid locating hoses, hydrants or similar equipment on landings close to the lift. To minimize the risk of liquids entering the lift well, the landing floors should be sloped away from the lift entrance.

D.3 In order to reduce the frequency and severity of damage caused by fire and water due consideration should be given to the location of certain building services in relation to the lift installation:

- dry and wet risers;
- fire hoses;
- incoming mains supplies;
- the storage and disposal of waste materials;
- the storage of fuels and other liquids.

D.4 As machine room doors are not normally located in public areas there is always the risk that vandals may attack the door for long periods, unobserved. This increases the risk of unauthorised entry to the lift equipment. In such circumstances consideration should be given to restricting access to such unobserved areas by additional means.

D.5 The strength of the machine room door has been selected in this document to prevent vandals from gaining easy access to the lift equipment. It is, however, always possible for a determined vandal to gain access and then start a fire. As machine rooms are often in remote areas of a building such a fire may be undetected for long periods. Consideration therefore should be given to the provision of a fire detection system in such areas.

D.6 Damage to walls and other items may result from vandalism sustained over periods of days or even months. Building management should regularly inspect for signs of damage and make repairs as necessary before any serious condition develops.

D.7 Irrespective of the design of the lift it is always possible by a simple action to put the lift out of service, e.g. the pouring of sand or sawdust into the doorsill. Security observation of the lift will help to minimize such risks.

D.8 Certain items when placed in the lift car will always be subject to vandalism. For this reason, ashtrays, seats, etc. should not be provided in the lift car unless called for by other European Standards.

D.9 Statistically, accidents through persons slipping or falling are amongst the most common. Materials used for floor finishes should be selected to minimize this risk, particularly when wet.

Annex E (normative)

Typical items that may be used by vandals

In order for designers to be able to have understanding of what they should design for, it has been assumed that the following items could be reasonably expected to be carried by a person in the course of their everyday activities. It is therefore assumed that one or other of these may be used to commit an act of vandalism on the lift. Other items could easily be carried by a person, but it is clearly not possible to design the lift to resist attack by all of the different items, which might be used. Where this annex is referenced in a clause of this document, the relevant items for testing the equipment have to be selected from [Table E.1](#) with the resultant effects in [Table E.2](#).

Table E.1 — Typical items that may be used by vandals

Vandal items	Lift Category	
	1	2
Ball pen	x	x
Cord/string/wire	x	x
Keys	x	x
Walking stick	x	x
Chewing gum	x	x
Cigarette	x	x
Human body weight (75 kg)	x	x
Cigarette lighter	x	x
Pocket knife (100 mm blade)	x	x
Medium-sized screwdriver (200 mm long)	x	x
Bottle top	x	x
Hand cutter (medium size without multiplying action)	-	x

Table E.2 — Likely effects resulting from the use of readily available items/implements

Equipment concerned	Fixtures							Lighting						Door mechanism				Door, ceiling, walls, floor			
Effects	Aes- thetic	Ob- struct- ing	Cut- ting	Lev- ering	Im- pact	Burn- ing	Dis- man- tling	Aes- thetic	cut- ting	Lev- ering	Im- pact	Burn- ing	Dis- man- tling	Ob- struct- ing	Cut- ting	Lev- ering	Im- pact	Aes- thetic	Lev- ering	Im- pact	Cor- ro- sion
Ball pen	C							C										C			
Cord/string/wire														A		A					
Keys	C							C										C			
Walking stick	C				A, B			C		B	B					B	B	C	A		
Chewing gum		B												B							
Cigarette	C					C		C				C						C			
Human body weight					A, B						B						B			A	
Pocket knife	C		A, B	A, B	A, B		A, B	C	C	B	B		B		B	B	B	C	B		
Cigarette lighter	C					A, B		C				C						C			
Medium screwdriver	C			A, B	A, B		A, B	C		B	B		B			B	B	C	B		

Table E.2 (continued)

Equipment concerned	Fixtures							Lighting						Door mechanism				Door, ceiling, walls, floor			
Effects	Aes- thetic	Ob- struct- ing	Cut- ting	Lev- ering	Im- pact	Burn- ing	Dis- man- tling	Aes- thetic	cut- ting	Lev- ering	Im- pact	Burn- ing	Dis- man- tling	Ob- struct- ing	Cut- ting	Lev- ering	Im- pact	Aes- thetic	Lev- ering	Im- pact	Cor- ro- sion
Bottle top	C							C										C			
Hand-cutter	C				A, B			C	C	B	B				A	B	B	C	B		
A: damage that can result in harm to users from sharp edges, exposed terminals, etc. B: malfunction or stoppage of the lift or lift equipment C: aesthetic damage (spoiling appearance)																					

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Annex F **(normative)**

Fire tests

F.1 Equipment

- a) gas cigarette lighter capable of producing a flame height of 40 mm;
- b) a supporting frame capable of securing the lighter and the sample. The supporting frame shall be capable of holding the sample in its normal working position. It shall be capable of holding the lighter in any position between horizontal and vertical.

F.2 Samples

Every test sample shall be installed in a supporting frame.

The test sample shall be mounted in its normal assembly, (for example a button shall be mounted in its faceplate).

F.3 Method

The vertical flame from the lighter shall be set to a length of 40 mm \pm 5 mm.

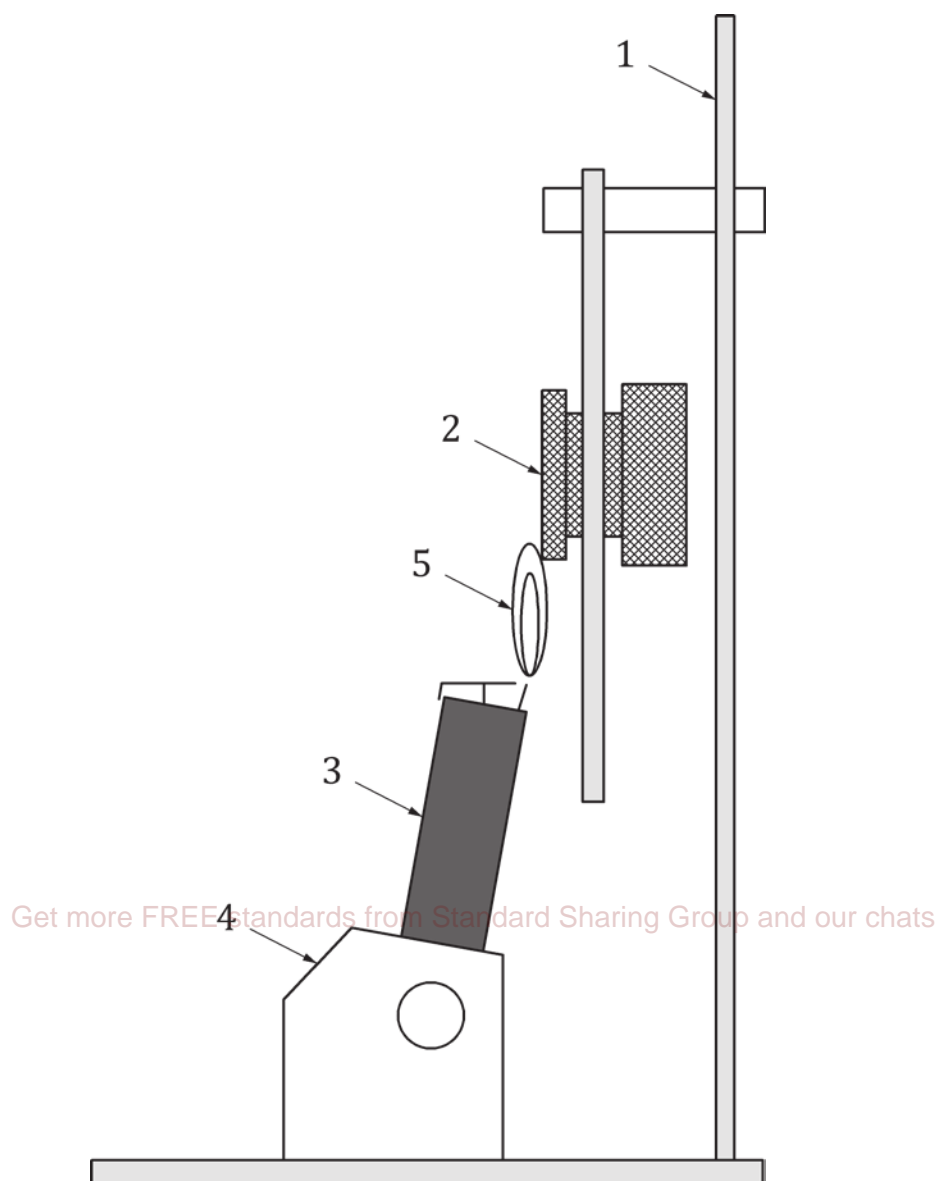
The test sample shall be mounted in its usual operating plane.

The flame shall be applied at the most unfavourable point of the test sample and at an angle, which will create the worst condition – see [Figure F.1](#).

The duration of each test shall be 60 s for lifts of Category 1 and 120 s for lifts of Category 2.

F.4 Results

Following the test the sample shall remain safe and functional:



Ignitability:	The sample shall not support flaming.
Discolouration:	After the test any soot deposits may be wiped from the test sample. Any discolouration shall not obliterate markings.
Functionality:	After the test, buttons and similar device shall remain fully operational after cleaning of the external parts.

Key

- 1 sample holder
- 2 sample (push Button)
- 3 burner (cigarette lighter)
- 4 directional burner support
- 5 flame

Figure F.1 — Fire tests — Equipment

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BSI Group Headquarters

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