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BSI Standards Publication

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

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Part 20: Passenger and goods passenger lifts

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## National foreword

This British Standard is the UK implementation of EN 81-20:2020. It supersedes BS 8486-1:2007+A1:2011 and BS 8486-2:2007+A1:2011, which will be withdrawn on 28 February 2022. It also supersedes BS EN 81-20:2014, which is withdrawn.

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

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

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association and is intended to support essential requirements of the EU legislation detailed in the European foreword. Annex ZA/ZZ describes how the publication relates to the legislation.

For the Great Britain market (England, Scotland and Wales), if the UK Government has designated this publication for conformity with UKCA marking legislation and has not amended the essential requirements of that legislation, Annex ZA/ZZ and any references to EU law in the publication should be read in accordance with the designation as applying to UK legislation in the same way as to EU law. Further information on designated standards can be found at [www.bsigroup.com/standardsandregulation](http://www.bsigroup.com/standardsandregulation).

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. References to EU legislation are therefore still valid.

More information on legislation can be found at [www.gov.uk](http://www.gov.uk).

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#### **Amendments/corrigenda issued since publication**

Date	Text affected
30 April 2021	Correction to supersession details in national foreword

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## EUROPÄISCHE NORM

February 2020

ICS 91.140.90

Supersedes EN 81-20:2014

English Version

## Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger lifts

Règles de sécurité pour la construction et l'installation  
des élévateurs - Élévateurs pour le transport de  
personnes et d'objets - Partie 20 : Ascenseurs et  
ascenseurs de charge

Sicherheitsregeln für die Konstruktion und den Einbau  
von Aufzügen - Aufzüge für den Personen- und  
Gütertransport - Teil 20: Personen- und Lastenaufzüge

This European Standard was approved by CEN on 1 December 2019.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 81-20:2020) 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 August 2020, and conflicting national standards shall be withdrawn at the latest by February 2022.

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 81-20:2014.

This document is a revision of EN 81-20:2014. Significant changes made are as follows:

- All externally referenced standards have now been dated.
- A new Annex ZA has been developed in order to be aligned with the requirements of the EU Commission Standardization Request "M/549 C(2016) 5884 final".

No technical changes have been made during this revision.

This standard is the culmination of the progressive development of the EN standards for lifts. Previous versions of the EN 81-1 and EN 81-2 standards incorporated into EN 81-20:2020 and EN 81-50:2020 include:

- EN 81-1:1985, Safety rules for electric lifts
- EN 81-1:1998, Safety rules for electric lifts
- EN 81-1:1998, Corrigendum No 1:1999;
- EN 81-1:1998/A1:2005, incorporating programmable electronic system in safety related applications for lifts;
- EN 81-1:1998/A2:2004, incorporating machine-room-less lifts;
- EN 81-1:1998+A3:2009, Incorporating unintended car movement with open doors;
- EN 81-2:1987, Safety rules for hydraulic lifts
- EN 81-2:1998, Safety rules for hydraulic lifts
- EN 81-2:1998, Corrigendum No 1:1999;
- EN 81-2:1998/A1:2005, incorporating programmable electronic system in safety related applications for lifts;
- EN 81-2:1998/A2:2004, incorporating machine-room-less lifts;
- EN 81-2:1998+A3:2009, incorporating unintended car movement with open doors.

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This document is part of a series of standards giving safety rules for the construction and installation of lifts which are listed below.

Standard	Use
EN 81-21	Provides alternative technical requirements to those given in EN 81-20 to overcome certain specific problems encountered when installing lifts into existing buildings
EN 81-28	Provides the requirements for the alarm systems to be used on passenger carrying lifts to enable trapped persons to contact a rescue service.
EN 81-50	Used in conjunction with EN 81-20 to provide rules for type testing of safety related components and calculation methodology.
EN 81-58	Provides a unified method of testing the fire resistance of lift landing doors
EN 81-70	Provides additional requirements to EN 81-20 for accessible passenger lifts
EN 81-71	Provides additional requirements to EN 81-20 for vandal resistant lifts
EN 81-72	Provides additional requirements to EN 81-20 for lifts used by fire fighters
EN 81-73	Provides additional requirements to EN 81-20 for lifts used in the evacuation of disabled persons from buildings.
EN 81-77	Provides additional requirements to EN 81-20 for lifts subject to seismic conditions
EN 12015	Provides additional requirements to EN 81-20 for electromagnetic compatibility emissions
EN 12016	Provides additional requirements to EN 81-20 for electromagnetic compatibility immunity
EN 13015	Gives rules for the drafting of maintenance manuals to accompany lifts.

In addition CEN TR 81-10 gives information with regard to the structure of the EN 81 series of standards.

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

## 0 Introduction

### 0.1 General

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

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

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

### 0.2 General remarks

**0.2.1** The object of this standard is to define safety rules related to passenger and goods passenger lifts with a view to safeguarding persons and objects against the risk of accidents associated with the normal use, maintenance and emergency operation of lifts.

**0.2.2** A study has been made of the various possible hazards with lifts, see Clause 4.

**0.2.2.1** Persons to be safeguarded:

- a) users, including passengers and competent and authorized persons, e.g. maintenance and inspection personnel (see EN 13015);
- b) persons in the surrounding area of the well, or any machine room and pulley room, who may be effected by the lift.

**0.2.2.2** Property to be safeguarded:

- a) loads in car;
- b) components of the lift installation;
- c) building in which the lift is installed;
- d) the immediate surrounding area of the lift installation.

NOTE EN 81-71 gives additional requirements covering lifts resistant to acts of vandalism and EN 81-77 gives additional requirements covering lifts in seismic conditions.

**0.2.3** When the weight, size and/or shape of components prevent them from being moved by hand, they are:

- a) either fitted with attachments for lifting gear; or
- b) designed so that they can be fitted with such attachments (e.g. by means of threaded holes); or
- c) shaped in such a way that standard lifting gear can easily be attached.

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## 0.3 Principles

### 0.3.1 General

In drawing up this standard the following principles have been used:

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

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

**0.3.3** This standard states minimum rules for the installation of lifts into buildings/constructions. There may be in some countries regulations for the construction of buildings etc. which cannot be ignored.

Typical clauses affected by this are those defining minimum values for the height of the machine and pulley rooms and for their access doors dimensions.

**0.3.4** As far as possible the standard sets out only the requirements that materials and equipment have to meet in the interests of safe operation of lifts.

**0.3.5** Risk analysis, terminology and technical solutions have been considered taking into account the methods of EN ISO 12100, EN ISO 14798 and the EN 61508 series of standards.

**0.3.6** In order for EN 81-20 to be a widely applicable standard the average weight of a person has been determined to be 75 kg.

This standard defines the maximum car area related to a specified design load in the car (rated load) and the minimum car area to transport a corresponding number of persons, based on 75 kg per person, in order to detect and discourage overloading.

## 0.4 Assumptions

### 0.4.1 General

In drawing up this standard the following assumptions have been made:

**0.4.2** Negotiations have been made between the customer and the supplier and agreement reached about:

- a) the intended use of the lift;
- b) the type and mass of the handling devices intended to be used to load and unload the car in the case of goods passenger lifts;
- c) environmental conditions such as temperature, humidity, exposure to sun or wind, snow, corrosive atmosphere;
- d) civil engineering problems (for example, building regulations);
- e) other aspects related to the place of installation;
- f) the dissipation of heat from the components / equipment of the lift which would require ventilation of the well and/or the machinery space / location of equipment;

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g) information concerning the aspects relating to noise and vibrations emitted by the equipment.

**0.4.3** Relevant risks have been considered for each component that may be incorporated in a complete lift installation and rules have been drawn up accordingly:

Components are:

- a) designed in accordance with usual engineering practice (see CEN/TR 81-12) and calculation codes, taking into account all failure modes;
- b) of sound mechanical and electrical construction;
- c) made of materials with adequate strength and of suitable quality;
- d) free of defects;
- e) free from harmful materials, e.g. asbestos.

**0.4.4** Components are kept in good repair and working order, so that the required dimensions remain fulfilled despite wear. All lift components are considered as requiring inspection to ensure safe continued operation during their use.

The operational clearances specified in the standard should be maintained not only during the examination and tests before the lift is put into service, but also throughout the life of the lift.

**NOTE** Components not requiring maintenance (e.g. maintenance free, sealed for life) are still required to be available for inspection.

**0.4.5** Components will be selected and installed so that foreseeable environmental influences and special working conditions do not affect the safe operation of the lift.

**0.4.6** By design of the load bearing elements, safe normal operation of the lift is ensured for loads ranging from 0 % to 100 % of the rated load, plus any designed overload capacity (see 5.12.1.2).

**0.4.7** The requirements of this standard are such that the possibility of a failure of an electric safety device (see 5.11.2) or a type tested safety component complying with all the requirements of this standard and EN 81-50 needs not to be taken into consideration.

**0.4.8** Users have to be safeguarded against their own negligence and unwitting carelessness when using the lift in the intended way.

**0.4.9** A user may, in certain cases, make one imprudent act. The possibility of two simultaneous acts of imprudence and/or the abuse of instructions for use is not considered.

**0.4.10** If in the course of maintenance work a safety device, normally not accessible to the users, is deliberately neutralized, safe operation of the lift is no longer ensured, but compensatory measures will be taken to ensure users safety in conformity with maintenance instructions.

It is assumed that maintenance personnel are instructed and work according to the instructions.

**0.4.11** Horizontal forces and/or energies to consider are indicated in the applicable clauses of the standard. Typically, where not otherwise specified in this standard, the energy exerted by a person results in an equivalent static force of:

- a) 300 N;

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b) 1000 N where impact can occur.

**0.4.12** With the exception of the items listed below which have been given special consideration, a mechanical device built according to good practice and the requirements of the standard, including uncontrolled slipping of the ropes on the traction sheave will not deteriorate to a point of creating hazard without the possibility of detection provided that all of the instructions given by the manufacturer have been duly applied:

- a) breakage of the suspension;
- b) breakage and slackening of all linkage by auxiliary ropes, chains and belts;
- c) failure of one of the mechanical components of the electromechanical brake which take part in the application of the braking action on the drum or disk;
- d) failure of a component associated with the main drive elements and the traction sheave;
- e) rupture in the hydraulic system (jack excluded);
- f) small leakage in the hydraulic system (jack included, see 6.3.10).

**0.4.13** The possibility of the safety gear not engaging, should the car free fall from a stationary position at the lowest landing, before the car strikes the buffer(s) is considered acceptable.

**0.4.14** When the speed of the car is linked to the electrical frequency of the mains, the speed is assumed not to exceed 115 % of the rated speed or a corresponding lesser speed where specified in this standard for inspection control, levelling, etc.

**0.4.15** Means of access are provided for the hoisting of heavy equipment (see 0.4.2 e)).

**0.4.16** To ensure the correct functioning of the equipment in the well and machinery space(s), i.e. taking into account the heat dissipated by the equipment, the ambient temperature in the well and the machinery space(s) is assumed to be maintained between + 5 °C and + 40 °C.

NOTE See HD 60364-5-51, Code AA5.

**0.4.17** The well is suitably ventilated, according to national building regulation, taking into consideration the heat output as specified by the manufacturer, the environmental conditions of the lift and the limits given in 0.4.16, e.g. ambient temperature, humidity, direct sunlight, air quality and air tightness of buildings due to energy saving requirements.

NOTE See 0.4.2 and E.3 for further guidance.

**0.4.18** Access ways to the working areas are adequately lit (see 0.4.2).

**0.4.19** Minimum passageways, corridors, fire escapes, etc. are not obstructed by the open door/trap of the lift and/or any protection means for working areas outside of the well, where fitted according to the maintenance instructions (see 0.4.2).

**0.4.20** Where more than one person is working at the same time on a lift, an adequate means of communication between these persons is ensured.

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

**0.4.22** The fluids used for the operation of hydraulic lifts are according to EN ISO 6743-4.

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## 1 Scope

**1.1** This document specifies the safety rules for permanently installed new passenger or goods passenger lifts, with traction, positive or hydraulic drive, serving defined landing levels, having a car designed for the transportation of persons or persons and goods, suspended by ropes, chains or jacks and moving between guide rails inclined not more than 15° to the vertical.

**1.2** In addition to the requirements of this document, supplementary requirements have to be considered in special cases (use of lifts by persons with disabilities, in case of fire, potentially explosive atmosphere, extreme climate conditions, seismic conditions, transporting dangerous goods, etc.).

**1.3** This standard does not cover:

a) lifts with:

- 1) drive systems other than those stated in 1.1;
- 2) rated speed  $\leq 0,15$  m/s;

b) hydraulic lifts:

- 1) with a rated speed exceeding 1 m/s;
- 2) where the setting of the pressure relief valve (5.9.3.5.3) exceeds 50 MPa;

c) new passenger or goods passenger lifts in existing buildings <sup>1)</sup> where in some circumstances due to limitations enforced by building constraints, some requirements of EN 81-20 cannot be met and EN 81-21 should be considered;

d) lifting appliances, such as paternosters, mine lifts, theatrical lifts, appliances with automatic caging, skips, lifts and hoists for building and public works sites, ships' hoists, platforms for exploration or drilling at sea, construction and maintenance appliances or lifts in wind turbines;

e) important modifications (see Annex C) to a lift installed before this standard is brought into application;

f) safety during operations of transport, erection, repairs, and dismantling of lifts.

However, this standard may usefully be taken as a basis.

Noise and vibrations are not dealt with in this standard as they are not found at levels which could be considered as harmful with regard to the safe use and maintenance of the lift (see also 0.4.2).

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

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<sup>1)</sup> Existing building is a building which is used or was already used before the order for the lift was placed. A building whose internal structure is completely renewed is considered as a new building.