BRITISH STANDARD

BS 5655-2: 1988
EN 81-2:1987
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Lifts and service lifts —

Part 2: Safety rules for the construction and installation of hydraulic lifts

[EN title: Safety rules for the construction and installation of lifts and service lifts — Part 2: Hydraulic lifts]

This European Standard EN 81-2 has the status of a British Standard.

UDC 692.6 [621.867.7 + 621.876.112-82]

Cooperating organizations

The European Committee for Standardization, under whose supervision this European Standard was prepared, comprises the national standards organizations of the following Western European countries.

Austria	Öesterreichisches Normungsinstitut
Belgium	Institut Belge de Normalisation
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United Kingdom	British Standards Institution

This British Standard, having been prepared under the direction of the Mechanical Handling Standards Committee, was published under the authority of the Board of BSI on 30 June 1988. It comes into effect on 30 June 1989 (see national foreword)

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6220	April 1989	Indicated by a sideline in the margin

Contents

National foreword

This revision of BS 5655-2, which supersedes the 1983 edition, has been prepared under the direction of the Mechanical Handling Standards Committee and is identical with European Standard EN 81-2:1987.

It is the second Part of a British Standard relating to lifts and service lifts, which supersedes portions of relevant Parts of BS 2655, the relevant obsolescent requirements being retained for reference purposes and to enable existing lift installations to be maintained. The standard comprises the following Parts.

— *Part 1: Safety rules for the construction and installation of electric lifts (implementing EN 81-1), together with PD 6500 "Explanatory supplement to BS 5655-1";*

— *Part 2: Safety rules for the construction and installation of hydraulic lifts;* (implementing EN 81-2)

— *Part 3: Electric service lifts*[1)]*;*

— *Part 4:*[2)]

— *Part 5: Specification for dimensions of standard lift arrangements;* (implementing ISO 4190-1 and ISO 4190-3)

— *Part 6: Code of practice for selection and installation;*

— *Part 7: Specification for manual control devices, indicators and additional fittings;* (implementing ISO 4190-5)

— *Part 8: Specification for eyebolts for lift suspension;*

— *Part 9: Specification for guide rails;* (implementing ISO 7465)

— *Part 10: Specification for testing and inspection of electric and hydraulic lifts;*

— *Part 11: Recommendations for the installation of new and the modernization of electric lifts in existing buildings*[1)]*;*

— *Part 12: Recommendations for the installation of new and the modernization of hydraulic lifts in existing buildings*[1)]*;*

— *Part 13: Code of practice for vandal resistant lifts*[1)].

Further Parts are anticipated.

Subclause **0.1.4** of the general introduction to EN 81 (see the explanatory note at the end of this national foreword) permits each country to append to the European Standard certain amendments that are necessary to comply with current national legislation or codes of practice; the United Kingdom national variations for Part 2 of EN 81 are given in National appendix V.

[1)] In preparation.
[2)] Reserved for future publications.

Prior to 30 June 1989 all new and replacement hydraulic lifts may comply with the requirements of either this standard or those of BS 5655-2:1983. The requirements of this standard only are applicable to all new installations which are tendered for after 30 June 1989, unless it can be shown that owing to space limitations, compliance is not reasonably practicable. Special provisions are permissible to meet certain site conditions often present in buildings that have been in use for many years. It is intended that the use of new equipment should not automatically be restricted because certain site conditions are now more rigorous than formerly. However, any deviations from this standard will have to ensure a minimum acceptable standard of safety having regard to the circumstances affecting the installation, whilst permitting an installation of reasonable standard to be modernized or reconstructed, in stages if necessary (see BS 5655-12[3)]).

EXPLANATORY NOTE ON THE ARRANGEMENT OF EN 81-2. EN 81-2 contains the "General introduction" and the "Scope and field of application" for EN 81 as a whole; these are followed by a contents list for Part 2 and then the text of Part 2 (beginning with the "Introduction" to Part 2 and followed by the "Scope and field of application" for Part 2).

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the EN title page, pages 2 to 90, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

[3)] Inpreparation.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 81-2

November 1987

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Key words: Lifts, goods lifts, hydraulic equipment, building codes, safety requirements, lift cars, landing doors, lift shaft, extension wires, shock absorbers, machine rooms, electrical installation, safety devices, stopping devices, locking devices, name plates, conformity tests, certification.

English version

Safety rules for the construction and installation of lifts and service lifts Part 2: Hydraulic lifts

Règles de sécurité pour la construction et l'installation des ascenseurs et monte-charge
Partie 2. Ascenseurs hydrauliques

Sicherheitsregeln für die Konstruktion und den Einbau von Personen- und Lastenaufzügen, sowie Kleingüteraufzügen
Teil 2. Hydraulische betriebene Aufzüge

This European Standard was accepted by CEN on 1987-11-27. The CEN members are bound to adhere to the CEN Internal Regulations which specify under which conditions this European Standard has to be given, without any alteration, the status of a national standard.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Central Secretariat or to any CEN member.

This European Standard is established by CEN in three official versions (English, French, German). A translation made by another member under its own responsibility, in its own language, and notified to CEN has the same status.

CEN members are the national standards organizations of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Brief history

This European Standard was drawn up by the Technical Committee CEN/TC 10 "Lifts and service lifts" the Secretariat of which is held by AFNOR.

A large number of dispositions of standard EN 81-1 on electric lifts also apply to hydraulic lifts.

For an easier reading of this standard, it seemed advisable to republish without modifications the parts also applying to hydraulic lifts in standard EN 81-2, instead of referring to standard EN 81-1 of December 1985.

In accordance with the CEN/CENELEC Rules, all CEN members are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

Contents

0 General introduction

The object of this standard is to define safety rules related to passenger, goods and service lifts with a view to safe-guarding persons and objects against the risk of accidents associated with the operation of lifts and service lifts[4)].

0.1 In drawing up this standard the following methods have been adopted.

0.1.1 An analysis of the risks has been carried out for each component that may be incorporated in a complete lift or service lift installation.

Rules have been drawn up accordingly.

0.1.2 This standard, specially associated with lifts and service lifts, does not repeat all the general technical rules applicable to every electrical, mechanical or building construction, or to environmental protection. It is of course assumed that all components shall:

0.1.2.1 be correctly designed, be of sound mechanical and electrical construction, be made of materials with adequate strength and of suitable quality and be free of defects;

0.1.2.2 be kept in good repair and working order. It will in particular be ensured that the dimensional requirements remain fulfilled despite wear.

0.1.3 This special standard for lifts and service lifts does not give rules relating to the protection against fire of building elements. However, as these rules have a direct influence on the choice of landing doors and on the specification and design of electrical control systems, it is necessary to refer to them.

0.1.3.1 The choice of the landing doors which depends on the required behaviour in fire, is dealt with in **7.2.2**. The most common structural arrangements have been shown with the corresponding types of door designated by F and S.

However, if statutory requirements lay down for certain arrangements type F instead of type S, the National Committees may make the necessary amendment.

0.1.3.2 The electrical control systems recommended for each example of structural arrangement given are described in Appendix G.

0.1.4 This special standard for lifts and service lifts cannot ignore certain specifications which do not belong intrinsically to the field of these appliances or which are not the cause of barriers to trade, but which have an effect on the safety of users or servicing personnel and the upkeep of the installation.

In certain countries these specifications come within the legislative field or accepted Codes of Practice. The National Committees may, therefore, make one or more of the following amendments to the specifications of the standard which refer to this clause:

a) delete the marked text;

b) provide additional clauses (for example, definitions, clauses concerned, frequency of inspections, . . .);

c) replace the value indicated by a value providing greater safety.

NOTE 1 Reference to this clause appears in the body of the standard in the form (N.a, b or c). The clauses concerned are indicated in the margin by the sign (N).

NOTE 2 These amendments shall form the subject, in each country, of a national appendix.

0.2 It has, however, seemed 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 As far as possible the standard sets out only the requirements that materials and equipment have to meet in the interests of lift safety.

0.4 When mention is made of a design for the sake of clarity, this should not be considered to be the only possible design; any other solution leading to the same result can be applied if it is equivalent in operation and at least equally safe.

0.5 A study has been made of the various accidents possible with lifts in the following areas.

0.5.1 Types of possible accidents

a) shearing;

b) crushing;

c) falling;

d) impact;

e) trapping;

f) fire;

g) electric shock;

h) damage to material;

i) due to wear;

j) due to corrosion.

0.5.2 Persons to be safeguarded

a) users;

b) servicing and inspection personnel;

c) persons outside the lift well, the machine room and pulley room (if any).

[4)] An interpretation committee has been established to make clear, if necessary, the spirit in which the experts have drafted the various clauses of this standard.

0.5.3 Objects to be safeguarded

a) loads in car;

b) components of the lift or service lift installation;

c) the building in which the lift or service lift is installed.

0.6 In the standard it has been taken into account:

0.6.1 that the users have to be safeguarded against their own negligence and unwitting carelessness;

0.6.2 that there are other categories of users for whom certain rules may be less severe (N.a). In the remainder of the text these users are referred to as "authorized and instructed users".

In the absence of another definition (N.b), it is permissible for the use of a lift to be reserved for authorized and instructed users if the instructions given them concerning its use are issued by the person responsible for the lift and if one of the following two conditions is satisfied:

a) operation of the lift is only possible when a key held by authorized and instructed users only is placed in a lock situated inside or outside the car;

b) the lift is situated on premises to which access by the public is prohibited and which, when not locked, is permanently supervised by one or more agents of the person responsible for the lift.

0.6.3 that there are service lifts, the car of which is, by definition, not accessible to persons, for which certain rules may be less severe or even waived.

0.7 The standard has been drawn up, taking into account in certain cases the imprudent act of a user, but it is necessary to limit this and the possibility of two simultaneous acts of this nature or the abuse of instructions for use has not been considered.

0.8 This standard deals, in the appendices, with the way in which tests must be made on certain components, as well as on the completed lift installation, when such tests are required.

0.8.1 Referring to the lift itself, the appendices mentioned below indicate the maximum which can be required.

0.8.1.1 Appendix C. Technical dossier to be provided when a preliminary authorization is required.

0.8.1.2 Appendix D. Examinations and tests before putting a lift into service.

0.8.1.3 Appendix E. The periodical examination and tests, also the examinations and tests after an important modification or after an accident. The frequency of the periodical examination and test may be specified in the national regulations.

0.8.2 Appendix F. Type examinations on certain components of the lift permit limited and simplified testing after installation of a lift and make possible batch production of these components.

1 General scope and field of application

This standard deals with permanently installed new lifts serving defined landing levels, having a car designed for the transportation of persons and/or goods, suspended by rope(s) or chain(s) or supported by one or more rams and moving at least partially between vertical guides or guides slightly inclined to the vertical. [For appliances where the inclination of the guides to the vertical exceeds 15 , this standard may usefully be taken as a basis (N.a, b).]

It does not cover the lifts which come under the following headings: paternosters, rack and pinion elevators, screw-driven elevators, 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. However, this standard may usefully be taken as a basis.

This standard need not be applied (N.a) in the following cases:

a) a lift installed in a private residence or as a means of access to a private residence in a building, such that the lift is inaccessible to the other occupants of the building and to the general public, and if there are specific national rules concerning this type of lift;

b) the installation of lifts serving only two levels, specialized for transporting the handicapped and where the travel does not exceed 4 m, the speed does not exceed 0.1 m/s, and the movement of the car requires continuous pressure on a button.

Certain clauses need not be applied (N.b) to the extent that space does not permit, in the following cases:

c) lifts installed in buildings in existence at the time this standard is brought into application;

d) important modifications (Appendix E) to a lift installed before this standard is brought into application.

This standard is divided into four Parts.

— *Part 1: deals with electric lifts;*

— *Part 2: deals with hydraulic lifts;*

— *Part 3: deals with electric service lifts (in preparation);*

— *Part 4: deals with hydraulic service lifts (in preparation).*

Part 2. Hydraulic lifts

0 Introduction

See general introduction (page 3).

1 Scope and field of application

Part 2 of this standard deals with the hydraulic lifts, defined in clause **3**, where the car is directly or indirectly driven by the action of one or more hydraulic single acting jacks and whereby the down movement, even with the empty car, takes place by the influence of gravity.

NOTE The text covers the safety requirements for hydraulic lifts, with rated speed v_s up to 1.0 m/s. For lifts with higher rated speed v_s additional requirements shall be applied as appropriate in order to maintain the same level of safety.

In particular, lifts serving exclusively for the transportation of goods, but having a car dimensioned and constructed to allow access by people, shall be entered in the category "lifts" and not in the category "service lifts" (clause **3**).

For lifts with double acting jacks or for traction drive or positive drive lifts driven by a hydraulic motor, Part 1 and/or 2 shall be used by analogy according to the technical characteristics of the installation.

2 References

ISO 834:1975, *Fire resistance tests — Elements of building construction.*

ISO 1219:1976, *Fluid power systems and components — Graphic symbols.*

ISO 2532:1974, *Steel wire ropes — Vocabulary.*

IEC Publication . . ., *Clearances and creepage distances for low-voltage contactors (in preparation within SC 28A of the IEC, at present Appendix B of IEC Publication 158-1).*

CENELEC Harmonization Documents

HD 21 S2:1981, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V.*

HD 22 S2:1981, *Rubber insulated cables of rated voltages up to and including 450/750 V.*

HD 214 S2:1980, *Recommended method for determining the comparative tracking index of solid insulating materials under moist conditions.*

HD 359:1976, *Flat polyvinylchloride sheathed flexible cables.*

HD 360:1976, *Rubber-insulated lift cables for normal use.*

HD 384.4.41:1980, *Electrical installations of buildings — Part 4: Protection for safety — Chapter 41: Protection against electric shock.*

HD 419:1982, *Low-voltage switchgear and controlgear contactors.*

HD 420:1982, *Control switches (low-voltage switching devices for control and auxiliary circuits, including contactor relays).*

HD . . ., *Classification of external influences (in preparation, at present clause **32** of IEC Publication 364-3:1977).*

3 Definitions

The following definitions are intended to indicate precisely the technical sense in which the terms are used in the present standard.

For convenience of reference they are grouped in alphabetical order rather than according to the types of equipment to which they apply. This is in order to avoid needless repetition.

authorized and instructed user (usager autorisé et averti) (befugter und eingewiesener Benutzer)

person authorized by the person responsible for the installation to use the lift and who has been instructed in its use

available car area (surface utile de la cabine) (Nutzfläche des Fahrkorbes)

area of the car measured at a height of 1.0 m above floor level, disregarding handrails, which is available for passengers or goods during operation of the lift

in the case of a car without doors, a strip 0.1 m deep in front of each car sill is omitted from the calculation of the available area

buffer (amortisseur) (Puffer)

a resilient stop at the end of travel, and comprising a means of braking using fluids or springs (or other similar means)

clamping device (dispositif de blocage) (Klemmvorrichtung)

a mechanical device which when activated stops the car in downward motion and maintains it stationary at any point of the travel to limit the extent of creep

direct acting lift (ascenseur à action directe) (direkt angetriebener Aufzug)

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

down direction valve (soupape descente) (Abwärtsventil)

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

electrical anti-creep system (système électrique anti-dérive) (elektrisches Absinkkorrektursystem)

a combination of precautions against the danger of creeping