
Varnostna pravila za konstruiranje in vgradnjo dvigal (liftov) - 3. del: Električni in hidravlični na mala tovarna dvigala

Safety rules for the construction and installation of lifts - Part 3: Electric and hydraulic service lifts

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Teil 3: Elektrisch und hydraulisch betriebene Kleingüteraufzüge

Regles de sécurité pour la construction et l'installation des ascenseurs - Partie 3: Montage électrique et hydraulique

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Safety rules for the construction and installation of lifts - Part 3: Electric and hydraulic service lifts

Règles de sécurité pour la construction et l'installation des
ascenseurs - Partie 3: Monte-charge électriques et
hydrauliques

Sicherheitsregeln für die Konstruktion und den Einbau von
Aufzügen - Teil 3: Elektrisch und hydraulisch betriebene
Kleingüteraufzüge

This European Standard was approved by CEN on 13 October 2000.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 10 "Passenger, goods and service lifts", 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of an identical text or by endorsement, at the latest by May 2001, and conflicting national standards shall be withdrawn at the latest by May 2001.

This European Standard 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 standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This is the first edition of the Standard.

This standard is part of the EN 81- series of standards " Safety rules for the construction and installation of lifts ".

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0 Introduction

0.1 General

0.1.1 The object of this standard is to define safety rules related to service lifts with a view to safeguarding persons and objects against the risk of accidents associated with the user-, maintenance- and emergency operation of service lifts¹⁾.

0.1.2 A study has been made of the various aspects of incidents possible with service lifts in the following areas :

0.1.2.1 Risks possible due to :

- a) shearing ;
- b) crushing ;
- c) falling ;
- d) impact ;
- e) trapping ;
- f) fire ;
- g) electric shock ;
- h) failure of material due to :
 - 1) mechanical damage,
 - 2) wear,
 - 3) corrosion.

0.1.2.2 Persons to be safeguarded :

- a) users ;
- b) maintenance and inspection personnel ;
- c) persons outside the service lift well and the machine room, if any.

¹⁾ Within CEN/TC 10 an interpretation committee has been established to answer questions about the spirit in which the experts have drafted the various clauses of this standard. The issued interpretations are available from National Standard Bodies.

0.1.2.3 Objects to be safeguarded :

- a) loads in car ;
- b) components of the service lift installation ;
- c) building in which the service lift is installed.

0.2 Principles

In drawing up this standard the following have been used.

0.2.1 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, seemed necessary to establish certain requirements of good construction, either because they are peculiar to service lift manufacture or because in the case of service lift utilisation the requirements may be more stringent than elsewhere.

0.2.2 This standard does not only address the essential safety requirements of the Machinery Directive, but additionally states minimum rules for the installation of service 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 room and for their access doors dimensions.

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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0.2.4 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 service lifts.

0.2.5 Negotiations have been made between the customer and the manufacturer, or his authorised representative, about :

- a) the intended use of the service lift ;
- b) environmental conditions ;

- c) civil engineering problems ;
- d) other aspects related to the place of installation, e.g. presence of unsupervised children.
See also Annex J (information about access and maintenance with ladders).

0.2.6 This standard does not address the health and safety of domestic animals.

0.3 Assumptions

Possible risks have been considered of each component that may be incorporated in a complete service lift installation.

Rules have been drawn up accordingly.

0.3.1 Components are :

- a) designed in accordance with usual engineering practice 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) be free of defects.

Harmful materials, such as asbestos are not used.

0.3.2 Components, and where appropriate well and machine room, are kept in good repair and working order, so that the required dimensions remain fulfilled despite wear.

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

0.3.4 By design of the load bearing elements, a safe operation of the service lift is assured for loads ranging from 0 % to 100 % of the rated load.

0.3.5 The requirements of this standard regarding electrical safety devices are such that the possibility of a failure of an electric safety device complying with all the requirements of the standard needs not to be taken into consideration.

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

0.3.7 Persons are not moved inside the well.

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

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

0.3.9 For horizontal forces, the following have been used :

- a) static force : 300 N ;
- b) force resulting from impact : 1000 N ;

reflecting the values that one person can exert.

0.3.10 With the exception of the items listed below, a mechanical device built according to good practice and the requirements of the standard will not deteriorate to a point of creating hazard without the possibility of detection.

The following mechanical failures are considered :

- a) breakage of the suspension ;
- b) uncontrolled slipping of the ropes on the traction sheave ;
- c) breakage and slackening of all linkage by auxiliary ropes, chains and belts ;
- 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).

0.3.11 The possibility of devices against free fall or descent with excessive speed not setting, should the car free fall from the lowest landing, before the car strikes the buffer(s) is considered acceptable.

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0.3.12 When the speed of the car is linked to the electrical frequency of the mains up to the moment of application of the mechanical brake the speed is assumed not to exceed 115 % of the rated speed or a corresponding fractional speed.

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0.3.13 From the definition (**3 Terms and definitions**), service lifts are regarded as inaccessible for users.

0.3.13.1 The well is regarded as inaccessible to maintenance personnel if either any opening giving access to the well has dimensions, one of which does not exceed 0,30 m or regardless of their dimensions :

- a) the depth of the well does not exceed 1 m,

- b) the area of the well does not exceed 1 m^2 , and
- c) provisions are taken to enable easy maintenance from outside.

0.3.13.2 The machine room is regarded as accessible to maintenance personnel if :

- a) the openings giving access have a minimum size of $0,60 \text{ m} \times 0,60 \text{ m}$, and
- b) the height of the machine room is at least $1,80 \text{ m}$.

0.3.14 Means of access are provided for the hoisting of heavy equipment (see **0.2.5** and **6.3.4**).

1 Scope

1.1 This standard specifies the safety rules for the construction and installation of permanently installed new electric service lifts with traction or positive drive, or hydraulic service lifts defined as lifting equipment, serving defined landing levels, having a car, the interior of which is regarded as inaccessible to persons on account of its dimensions and means of construction, suspended by ropes or chains or supported by a ram and moving between rigid vertical guide rails or guide rails whose inclination to the vertical does not exceed 15° and driven electrically or hydraulically.

This standard covers service lifts with rated load not exceeding 300 kilogrammes and not intended to move persons.

1.2 In addition to the requirements of this standard supplementary requirements shall be considered in special cases (potentially explosive atmosphere, extreme climate conditions, seismic conditions, transporting dangerous goods, etc.).

1.3 This standard does not cover :

- a) service lifts with drives other than stated in **1.1** ;
- b) important modifications (see **annex E**) to a service lift installed before this standard is brought into application ;
- c) lifting appliances, such as paternosters, mines lifts, theatrical lifts, appliances with automatic caging, skips and hoists for building and public works sites, ships' hoists, platforms for exploration or drilling at sea, construction and maintenance appliances ;
- d) installations where the inclination of the guide rails to the vertical exceeds 15° ;
- e) safety during transport, installation, repairs and dismantling of service lifts ;
- f) the use of glass for the walls of the well, for the car and for the landing doors including the vision panels.

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

Noise and vibrations are not dealt with in this standard because these are not relevant to the safe use of the service lift.

Fire propagation is not dealt with in this standard.

1.4 To satisfy the condition of inaccessibility to the car, the car dimensions shall not exceed :

- a) for floor area, 1,0 m² ;
- b) for depth, 1,0 m ;
- c) for height, 1,20 m.

The height of 1,20 m shall not be limited if the car comprises several permanent compartments, each of which satisfies the above requirements.

In particular, lifting equipment intended exclusively for the transportation of goods, but having a car with dimensions exceeding any one of the figures above shall not be entered in the category 'service lifts'.

1.5 This standard covers the safety requirements for service lifts with rated speeds up to 1 m/s.

NOTE : For service lifts with higher rated speeds additional requirements shall be applied as appropriate in order to maintain the same level of safety.

2 Normative references

This European standard incorporates by dated or undated 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. For undated references the latest edition of the publication referred to applies (including amendments).

CEN/CENELEC standards

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 81-8: 1997	Safety rules for the construction and installation of lifts – Part 8: Lift landing doors – Fire resistance testing
EN 294 : 1992	Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs
EN 50214	Flexible cables for lifts
EN 60068-2-6	Environmental testing - Part 2 : Tests - Test Fc : Vibration (sinusoidal)

EN 60068-2-27	Basic environmental testing procedures - Part 2 : Tests - Test Ea and guidance : Shock.
EN 60249-2-2	Base materials for printed circuits - Part 2 : Specifications – Specification N° 2 : Phenolic cellulose paper copper-clad laminated sheet, economic quality.
EN 60249-2-3	Base materials for printed circuits - Part 2 : Specifications – Specification N° 3 : Epoxide cellulose paper copper-clad laminated sheet of defined flammability (vertical burning test).
EN 60742: 1995	Isolating transformers and safety isolating transformers – Requirements.
EN 60947-4-1	Low-voltage switchgear and controlgear - Part 4 : Contactors and motor-starters – Section 1 : Electromechanical contactors and motor-starters.
EN 60947-5-1	Low-voltage switchgear and controlgear - Part 5 : Control circuit devices and switching elements - Section 1 : Electromechanical control circuit devices.
EN 62326-1	Printed boards – Part 1 : Generic specification.

IEC standards

IEC 60664-1: 2000	Insulation co-ordination for equipment within low-voltage systems - Part 1 : Principles, requirements and tests.
IEC 60747-5	Semiconductor devices – Discrete devices and integrated circuits – Part 5 : Optoelectronic devices.

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CENELEC Harmonisation Documents

HD 21.3 S3: 1995	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 3 : Non-sheathed cables for fixed wiring.
HD 21.4 S2: 1990	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 4 : Sheathed cables for fixed wiring.
HD 21.5 S3: 1994	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5 : Flexible cables (cords).
HD 22.4 S3: 1995	Rubber insulated cables of rated voltages up to and including 450/750 V - Part 4 : Cords and flexible cables.
HD 360 S2	Circular rubber insulated lift cables for normal use.
HD 384.4.41 S2: 1996	Electrical installations of buildings - Part 4 : Protection for safety – Chapter 41 : Protection against electric shock.
HD 384.5.54 S1	Electrical installations of buildings - Part 5 : Selection and erection of electrical equipment - Chapter 54 : Earthing arrangements and protective conductors.
HD 384.6.61 S1	Electrical installations of buildings - Part 6 : Verification - Chapter 61 : Initial verification.

ISO Standards

ISO 1219-1: 1991	Fluid power systems and components – Graphic symbols and circuit diagrams – Part 1 : Graphic symbols.
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