



**SLOVENSKI STANDARD**  
**SIST EN 81-1:1999**  
**01-marec-1999**

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Safety rules for the construction and installation of lifts - Part 1: Electric lifts

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Teil 1: Elektrisch betriebene Personen- und Lastenaufzüge

Regles de sécurité pour la construction et l'installation des ascenseurs - Partie 1:  
Ascenseurs électriques

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**ICS:**

91.140.90 Öçã apãV^[ ^Áq ] } Æ^ Lifts. Escalators

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English version

## Safety rules for the construction and installation of lifts - Part 1: Electric lifts

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Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Teil 1: Elektrisch betriebene Personen- und Lastenaufzüge

This European Standard was approved by CEN on 21 February 1998.

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

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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 replaces EN 81-1:1985

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of an identical text or by endorsement, at the latest by February 1999, and conflicting national standards shall be withdrawn at the latest by February 1999.

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 third edition of the standard. It is an amendment of the edition 1985 and shall be given the status of a harmonised standard. The amendment is mainly based on the following points :

- elimination of national deviations ;
- incorporation of essential health and safety requirements from the relevant EU Directives ;
- elimination of obvious errors ;
- incorporation of proposals resulting from interpretation requests dealing with the improvement relative to the progress in technology ;
- improvement of the references to other standards according to the progress in that field.

After the CEN Enquiry on prEN81-1:1994 the EU Directive on Lifts (95/16/EC) was adopted. The requirements resulting from the essential health and safety requirements of this Directive being not taken into consideration in the draft have been summarised in the Addendum prA1:1996 to prEN81-1:1994 and submitted to the members of CEN/TC 10 for approval. Having received the approval this Addendum has been incorporated into this standard taking into account the comments received from TC members.

This standard does not correspond in all points to the present internal rules of CEN regarding the format of safety standards. However, the format of this standard has been accepted by the interested parties and is therefore regarded as the better way of implementation of the essential health and safety requirements than a formalistic re-draft. This mainly because of the coming into force of the EU Directive 95/16/EC on 97-07-01.

With the next revision of the standard, being already intended, this shortcomings will be removed.



## 0 Introduction

### 0.1 General

**0.1.1** 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 user-, maintenance- and emergency operation of lifts <sup>1)</sup>.

**0.1.2** A study has been made of the various aspects of incidents possible with 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 lift well, the machine room and pulley room (if any).

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<sup>1)</sup> 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 Standards Bodies.

**0.1.2.3** Objects to be safeguarded :

- a) loads in car ;
- b) components of the lift installation ;
- c) building in which the 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 lift manufacture or because in the case of lift utilization the requirements may be more stringent than elsewhere.

**0.2.2** This standard does not only address the essential safety requirements of the Lift Directive, but additionally 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.

**0.2.3** 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.

**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 lifts

**0.2.5** Negotiations have been made between the customer and the supplier about :

- a) the intended use of the lift ;
- b) environmental conditions ;
- c) civil engineering problems ;
- d) other aspects related to the place of installation.

### **0.3 Assumptions**

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

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

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**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 lift in the intended way.

**0.3.7** 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.

**0.3.8** If in the course of maintenance work a safety device, normally not accessible to the users, is deliberately neutralised, safe operation of the 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 one of the mechanical components of the electromechanical brake which take part in the application of the braking action on the drum or disk ;
- e) failure of a component associated with the main drive elements and the traction sheave.

**0.3.11** The possibility of the safety gear not setting, should the car free fall from the lowest landing, before the car strikes the buffer(s) is considered acceptable.

**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.

**0.3.13** The organisation within the building, where the lift is installed, is such that it can respond effectively to emergency calls without undue delay (see **0.2.5**).

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

**0.3.15** To ensure the correct functioning of the equipment in the machine room, i.e. taking into account the heat dissipated by the equipment, the ambient temperature in the machine room is assumed to be maintained between + 5 °C and + 40 °C.

## 1 Scope

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

**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) lifts with drives other than those stated in **1.1**;
- b) installation of electric lifts in existing buildings <sup>2)</sup> to the extent that space does not permit ;
- c) important modifications (see **annex E**) to a lift installed before this standard is brought into application ;
- 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 ;
- e) installations where the inclination of the guide rails to the vertical exceeds 15° ;
- f) safety during transport, installation, 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 because these are not relevant to the safe use of the lift.

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**1.4** This standard does not specify the additional requirements necessary for the use of lifts in case of fire.

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<sup>2)</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.

## 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.

### CEN/CENELEC standards

EN 294	1992	Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs
EN 1050		Safety of machinery - Principles for risk assessment
EN 10025		Hot rolled products of non alloy structural steels -Technical delivery conditions
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 60068-2-29		Basic environmental testing procedures - Part 2 : Tests - Test Eb and guidance : Bump
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 : Epoxyde cellulose paper copper-clad laminated sheet of defined flammability (vertical burning test)
EN 60742		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 60950		Safety of information technology equipment, including electrical business equipment

EN 62326-1		Printed boards – Part 1 : Generic specification
EN 12015	1998	Electromagnetic compatibility - Product family standard for lifts, escalators and passenger conveyors – Emission
EN 12016	1998	Electromagnetic compatibility - Product family standard for lifts, escalators and passenger conveyors - Immunity
prEN 81-8	1997	Fire resistance tests of lift landing doors - Method of test and evaluation

#### IEC standards

IEC 60664-1		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

#### CENELEC Harmonization Documents

HD 21.1 S3		Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1: General requirements
HD 21.3 S3		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		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		Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5 : Flexible cables (cords)
HD 22.4 S3		Rubber insulated cables of rated voltages up to and including 450/750 V - Part 4 : Cords and flexible cables
HD 214 S2		Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions
HD 323.2.14 S2		Basic environmental testing procedures - Part 2 : Tests - Test N : Change of temperature
HD 360 S2		<small>SIST EN 81-1:1999</small> Circular rubber insulated lift cables for normal use
HD 384.4.41 S2		<small>https://standards.icta.org/catalog/standards/sist/62ac71ba-5a5c-4652-bd51-7bfff1a96767/sist-en-81-1-1999</small> Electrical installations of buildings - Part 4 : Protection for safety - Chapter 41 : Protection against electric shock

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