



SLOVENSKI STANDARD

oSIST prEN 81-22:2010

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Varnostna pravila za konstruiranje in vgradnjo dvigal (liftov) - Dvigala za prevoz oseb in blaga - 22. del: Električna poševna dvigala

Safety rules for the construction and installation of lifts - Lifts for transport of persons and goods - Part 22: Electric lifts with inclined path

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Aufzüge für den Personen- und Gütertransport - Teil 22: Elektrische Personen- und Lastenaufzüge mit geneigter Fahrbahn

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Règles de sécurité pour la construction et l'installation des ascenseurs - Ascenseurs pour le transport de personnes et d'objets - Partie 22: Ascenseurs électriques à voie inclinée

Ta slovenski standard je istoveten z: prEN 81-22

ICS:

91.140.90 Dvigala. Tekoče stopnice Lifts. Escalators

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EUROPEAN STANDARD
NORME EUROPÉENNE
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ICS 91.140.90

English Version

Safety rules for the construction and installation of lifts - Lifts for transport of persons and goods - Part 22: Electric lifts with inclined path

Règles de sécurité pour la construction et l'installation des ascenseurs - Ascenseurs pour le transport de personnes et d'objets - Partie 22: Ascenseurs électriques à voie inclinée

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 10.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

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prEN 81-22:2010 (E)**Foreword**

This document (prEN 81-22:2010) has been prepared by Technical Committee CEN/TC 10 "Lifts, escalators and moving walks", the secretariat of which is held by AFNOR.

The Working Group 9 in charge of the draft consisted of representatives from the National Standards Institutes of the Lift Industry, the Funicular Industry and Engineering Inspection Companies.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document is currently submitted to the CEN Enquiry.

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 Annexes ZA and ZB, which are integral parts of this document.

This standard is part of the EN 81 series of standards: "*Safety of LIFTS*".

This standard is based on the EN 81 (November 1998): *Safety rules for the construction and installation of lifts-Part 1: Electric Lifts* and the amendments A1, and A2 (1998) and take also into account the pr A3 (2009).

Considering that EN 81 did not fully comply with EN 414 (today CEN Guide 414 "Safety of machinery - Rules for the drafting and presentation of safety standards"), CEN/TC 10/ working group 9 was asked to cover the requirements of CEN Guide 414 by creating a new structure which addresses the safety rules for the lift with inclined path and provides requirements in the normative annexes and information in the informative annexes;

This task was completed by CEN/TC 10/WG 9 in 2006 by:

- adapting the requirements to the state of the art using the risk assessment methodology given in ISO/TS 14798:2006[1];
- improving the references to other standards according to the progress in that field;
- increasing the measures against foreseeable misuse;
- discussing the comments arising from a preliminary CEN Enquiry.

Introduction

This document is a type C standard as stated in EN ISO 12100-1.

The machinery concerned and the extent, to which hazards, hazardous situations and 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.

The purpose of this standard is to define safety requirements for inclined lift in order to safeguard people and objects against risks of accidents during installation, operation, maintenance, inspection work and emergency operations of lifts.

The contents of this standard are based on the assumption that persons using inclined lifts are able to do so unaided.

It is assumed that negotiations have been made for each contract between the customer and the supplier/installer (see also Annex Q) about:

- a) intended use of the inclined lift;
- b) environmental conditions;
- c) civil engineering problems;
- d) other aspects relating to the place of installation (high-voltage electric line, bridges, dangerous buildings, natural obstacle...).

Consideration has been taken into account on various categories of lifts with inclined travel path to ascertain the related hazards and risks owing to the configuration of structures (civil engineering works), inclination and outside influences such as the following:

- e) the large opening to the exterior;
- f) the possibility to walk around inside the lift well;
- g) the arrangement of the doors;
- h) the horizontal component of deceleration in the event of stopping of the vehicle.

The prescriptions relating to the protection of workers and to the evacuation from the car are different:

- i) if it is possible or not to walk in the well,
- j) if the car roof is used or not as working station for the maintenance.

An Interpretation Committee has been established to clarify, if necessary, the spirit in which the clauses of the standard have been drafted and to specify the requirements appropriate to particular cases. Interpretation Requests can be sent to the National Standard Bodies which will contact the responsible Technical Committee CEN/TC 10. The formats of an interpretation request and the interpretation are given in Annex S.

prEN 81-22:2010 (E)**Principles**

In drawing up this standard the following have been used.

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.

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.

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.

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.

Risk analysis, terminology and technical solutions have been considered taking into account the methods of the EN 61508 series of standards. This led to a necessary classification of safety functions applied to PESSRAL.”

Assumptions

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

Rules have been drawn up accordingly.

- Components are designed in accordance with usual engineering practice and calculation codes, taking into account all failure modes;
- of sound mechanical and electrical construction;
- made of materials with adequate strength and of suitable quality;
- be free of defects.

Harmful materials, such as asbestos are not used.

Components are kept in good repair and working order, so that the required dimensions remain fulfilled despite wear.

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

Especially for the extreme temperatures which were agreed between the customer and the supplier, the choice of materials and components shall be made with particular attention that they shall keep their characteristics for impact strength for the steel, rigidity and function for plastics, functional for the electronic components, viscosity for oils ...

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.

The requirements of this European Standard regarding electrical safety devices are such that the possibility of a failure of an electric safety device (see 5.10.1.2.1.1, b)) complying with all the requirements of this European Standard need not to be taken into consideration.”

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

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.

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.

For horizontal forces, the following have been used:

- static force : 300 N;
- force resulting from impact : 1000 N;

reflecting the values that one person can exert.

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:

- breakage of the suspension;
- uncontrolled slipping of the ropes on the traction sheave;
- breakage and slackening of all linkage by auxiliary ropes, chains and belts;
- 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;
- failure of a component associated with the main drive elements and the traction sheave;
- derailment of ropes;
- blockage of the rope movement;
- blockage or derailment of the vehicle.

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

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When the speed of the vehicle 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.

The organisation within the building, where the lift is installed, is such that it can respond effectively to emergency calls without undue delay.

Means of access are provided for the hoisting of heavy equipment.

To ensure the correct functioning of the equipment in the machinery space(s), 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.

Access ways to the working areas are adequately lit (see above Principles).

Minimum passageways required by building regulations 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 above Principles).

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

The fixing system of guards, which have to be removed during maintenance and inspection, remains attached to the guard or to the equipment, when the guard is removed.

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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 landings levels, having a vehicle designed to convey passengers or passengers and loads, suspended by ropes or chains and travelling in straight path along guide rails that are inclined at an angle of between 15° and 75° in relation to the horizontal.

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 ¹⁾ 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 with guide rail inclination to the horizontal greater than 75° or lower than 15°.
- f) safety during transport, installation, repairs, and dismantling of lifts.
- g) installations with curves in a horizontal plan.
- h) Lifts with rated speed ≤ 0.15 m/s. [oSIST prEN 81-22:2010](https://standards.iteh.ai/catalog/standards/sist/b0ce1230-1dd2-451c-aa35-163ff422160a/osist-pr-en-81-22-2010)

However, this standard may usefully be taken as a basis. <https://standards.iteh.ai/catalog/standards/sist/b0ce1230-1dd2-451c-aa35-163ff422160a/osist-pr-en-81-22-2010>

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

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

1.5 The scope of this standard has been deliberately limited in view of the current state of the art to such moving devices as the following:

- inclination : a variation in inclination is allowed for the guideway;
- travel path : confined within the vertical plane;
- maximum capacity of the car : 7 500 Kg (100 passengers);*
- maximum rated speed (v): 4 m/s*.

These both characteristics (capacity and speed) are linked by the relation given in the following Figure 1:

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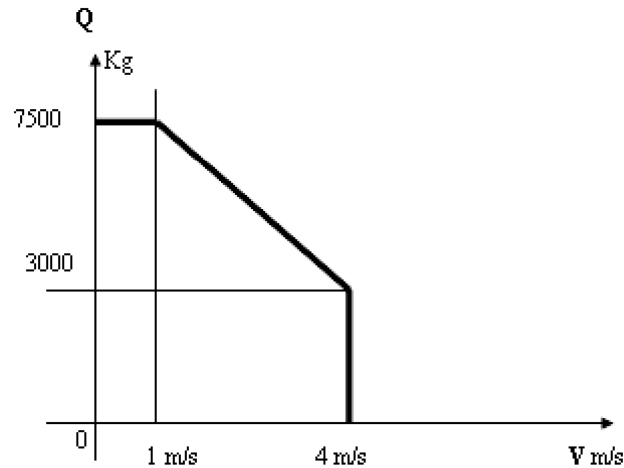


Figure 1

For the applications requiring superior specifications or those do not fall within the fixed limits or for lifts with curved path, a risk analysis shall determine at least the measures needed to reach the safety level fixed by the lift Directive.

The standard applies to all the constituent components of the including: running tracks, guides, safety gear operating device, counter-rails, but excludes the supporting structures, civil engineering structures and anchorages that are dealt with by other regulations.

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2. Normative references

The following referenced documents are indispensable for the application 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.

IEC 60664-1 Insulation co-ordination for equipment within low-voltage systems - Part 1 : Principles, requirements and tests

IEC 60747-5-5 Semiconductor devices – Discrete devices – Part 5-5: Optoelectronic devices Photocouplers (NOTE: This standard is intended to be published unmodified as an EN 60747-5-5.)

ISO 7465 1997 Passenger lifts and service lifts – Guide rails for lifts and counterweights – T type

EN ISO 12100-1 2003 Safety of machinery – Basic concepts, general principles for design-Part 1: Basic terminology, methodology

EN ISO 12100-2 2003 Safety of machinery – Basic concepts, general principles for design-Part 2: Technical principles

EN ISO 13857 2006 Safety of machinery – Safety distances to prevent hazard zones being reached by the upper and lower limbs (ISO 13857:2008)

EN 81-1 1998 Safety rules for the construction and installation of lifts-Part 1: Electric Lifts.

Corrigendum 1999

EN 81-1 Amendment A1, 2005

EN 81-1Amendment A2 2003

EN 81-1 Pr Amendment A3 2009

- EN 81-28 Safety rules for the construction and installation of lifts -Lifts for the transport of persons and goods - Part 28: Remote alarm on passenger and goods passenger lifts
- EN 81-58 Safety rules for the construction and installation of lifts-Part 58 Examination and tests.Landing doorsfire resistance test.
- 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 1990 Eurocode 0 Basis calculation of structures
- EN 1991 Eurocode 1 Actions on structures
- EN 1992 Eurocode 2 Design of concrete structures
- EN 1993 Eurocode 3 Design of steel structures
- EN 1994 Eurocode 4 Design of composite steel and concrete structures
- EN 1995 Eurocode 5 Design of timber structures
- EN 1996 Eurocode 6 Design of masonry structures
- EN 1997 Eurocode 7 Geotechnical design
- EN 1998 Eurocode 8 Design provisions for earthquake resistance of structures
- EN 1999-1-1 2007 Eurocode 9, Design of aluminium structures .Part 1-1General structural rules
- EN 10025 Hot rolled products of non alloy structural steels - Technical delivery conditions
- 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
- EN 12930 Safety requirements for cableway installations designed to carry persons - Calculations
- EN 13015: 2001 Maintenance for lifts and escalators – Rules for maintenance instructions
- EN 13107 Safety requirements for passenger transportation by rope – Civil engineering works.
- 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

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- EN 60249-2-3 Base materials for printed circuits - Part 2 : Specifications - Specification N° 3 : Epoxyde cellule 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 control gear - Part 4-1: Contactors and motor-starters; Electromechanical contactors and motor-starters (IEC 60947-4-1:2000)*
- EN 60947-5-1 *Low-voltage switchgear and control gear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices (IEC 60947-5-1:2003)*
- EN 60950 Safety of information technology equipment, including electrical business equipment
- EN 61249 series *Materials for printed boards and other interconnecting structures (IEC 61249 series)*
- EN 61508-1:2001, *Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements (IEC 61508-1:1998 + Corrigendum 1999).*
- EN 61508-2:2001, *Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems (IEC 61508-2:2000).*
- EN 61508-3:2001, *Functional safety of electrical/electronic/programmable electronic safety related systems - Part 3: Software requirements (IEC 61508-3:1998 + Corrigendum 1999).*
- EN 61508-4:2001, *Functional safety of electrical/electronic/programmable electronic safety related systems - Part 4: Definitions and abbreviations (IEC 61508-4:1998 + Corrigendum 1999).*
- EN 61508-5:2001, *Functional safety of electrical/electronic/programmable electronic safety related systems - Part 5: Examples of methods for the determination of safety integrity levels (IEC 61508-5:1998 + Corrigendum 1999).*
- EN 61508-7:2001, *Functional safety of electrical/electronic/programmable electronic safety related systems – Part 7: Overview of techniques and measures (IEC 61508-7:2000)."*
- EN 62326-1, Printed boards – Part 1 : Generic specification
- 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) (IEC 60227-5:1979, modified)
- 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, Circular rubber insulated lift cables for normal use

HD 516 S2/A1, Guide to use of low voltage harmonized cables; Amendment A1

HD 60364-4-41, Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock (IEC 60364 - 4-41:2005, modified)

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 60364-6-61, Low-voltage electrical installations - Part 6 : Verification-Chapter 61 : Initial verification

3. Terms and definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003; EN 81-1:1998 and the following apply.

Some terms used in the EN81-1 are understood as follows: lift (ascenseur) (Auzug)
lift with an inclined path.

3.1.1

building

engineering works

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Additional definitions specifically needed for this document are added below.

3.1.2

angle of inclination (α) (*angle d'inclinaison*)

Angle of inclination of the travel path as measured against the horizontal.

3.1.3

apron (garde-pieds) (Schürze)

Smooth vertical part extending downwards from the sill of the landing or car entrance.

3.1.4

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

Area of the car measured at a height of 1 m above floor level, disregarding handrails, which is available for passengers or goods during operation of the lift.

3.1.5

balancing weight (masse d'équilibrage) (Ausgleichgewicht) :

Mass which saves energy by balancing all or part of the mass of the vehicle.

3.1.6

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).

3.1.7

car (cabine) (Fahrkorb) :

A part of the lift which carries the passengers and/or other loads.