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

Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Teil 2: Hydraulisch betriebene Personen- und Lastenaufzüge

Regles de sécurité pour la construction et l'installation des ascenseurs - Partie 2: Ascenseurs hydrauliques

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ICS:

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English version

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

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

Sicherheitsregeln für die Konstruktion und den Einbau von
Aufzügen - Teil 2: Hydraulisch betriebene Personen- und
Lastenaufzüge

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

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

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

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

Contents

Foreword	6
0 Introduction	7
0.1 General.....	7
0.2 Principles.....	8
0.3 Assumptions.....	9
1 Scope	11
2 Normative references	12
3 Definitions	14
4 Units and symbols	18
4.1 Units.....	18
4.2 Symbols.....	18
5 Lift well	18
5.1 General provisions.....	18
5.2 Well enclosure.....	18
5.3 Walls, floor and ceiling of the well.....	22
5.4 Construction of the walls of lift wells and landing doors facing a car entrance.....	24
5.5 Protection of any spaces located below the car or the balancing weight.....	25
5.6 Protection in the well.....	25
5.7 Headroom and pit.....	26
5.8 Exclusive use of the lift well.....	28
5.9 Lighting of the well.....	28
5.10 Emergency release.....	28
6 Machine and pulley rooms	29
6.1 General provisions.....	29
6.2 Access.....	29
6.3 Construction and equipment of machine rooms.....	30
6.4 Construction and equipment of pulley rooms.....	32
7 Landing doors	34
7.1 General provisions.....	34
7.2 Strength of doors and their frames.....	34
7.3 Height and width of entrances.....	35
7.4 Sills, guides, door suspension.....	36
7.5 Protection in relation to door operation.....	36
7.6 Local lighting and «car here» signal lights.....	38
7.7 Locking and closed landing door check.....	39
7.8 Closing of automatically operated doors.....	42
8 Car and balancing weight	43
8.1 Height of car.....	43
8.2 Available car area, rated load, number of passengers.....	43
8.3 Walls, floor and roof of the car.....	46
8.4 Apron.....	47
8.5 Car entrance.....	47
8.6 Car doors.....	47
8.7 Protection during operation of doors.....	49
8.8 Reversal of closing movement.....	51
8.9 Electrical device for proving the car doors closed.....	51
8.10 Sliding doors with multiple, mechanically linked panels.....	51

8.11	Opening the car door	52
8.12	Emergency trap doors and emergency doors	52
8.13	Car roof.....	53
8.14	Car header.....	54
8.15	Equipment on top of the car.....	54
8.16	Ventilation	54
8.17	Lighting	55
8.18	Balancing weight.....	55
9	Suspension, precautions against free fall, descent with excessive speed and creeping of the car	56
9.1	Suspension	56
9.2	Pulley and rope diameter ratios, rope/chain terminations.....	56
9.3	Distribution of load between the ropes or the chains.....	57
9.4	Protection for pulleys and sprockets	57
9.5	Precautions against free fall, descent with excessive speed and creeping of the car	59
9.6	Precautions against free fall of the balancing weight	61
9.8	Safety gear	61
9.9	Clamping device	63
9.10	Tripping means for safety gears and clamping devices	65
9.11	Pawl device.....	69
9.12	Electrical anti-creep system	71
10	Guide rails, buffers and final limit switch	71
10.1	General provisions concerning guide rails.....	71
10.2	Guiding of the car and balancing weight	73
10.3	Car buffers.....	73
10.4	Stroke of car buffers	74
10.5	Final limit switch.....	75
11	Clearances between car and wall facing the car entrance, and between car, balancing weight or balancing weight	77
11.1	General provision.....	77
11.2	Clearances between car and wall facing the car entrance	77
11.3	Clearances between car, balancing weight or balancing weight.....	78
12	Lift machine	78
12.1	General provisions	78
12.2	Jack	79
12.3	Piping.....	82
12.4	Stopping the machine and checking its stopped condition	84
12.5	Hydraulic control and safety devices.....	84
12.6	Checking the pressure	88
12.7	Tank	88
12.8	Speed	88
12.9	Emergency operation.....	88
12.10	Protection of the pulley(s) or sprocket(s) on the jack	89
12.11	Protection of machinery	89
12.12	Motor run time limiter	90
12.13	Slack rope (or chain) safety device for indirect acting lifts.....	90
12.14	Protection against overheating of the hydraulic fluid	90
13	Electric installations and appliances	90
13.1	General provisions	90
13.2	Contactors, relay-contactors, components of safety circuits	92
13.3	Protection of motors and other electrical equipment	93

13.4	Main switches	93
13.5	Electric wiring	94
13.6	Lighting and socket outlets	96
14	Protection against electric faults ; controls ; priorities	97
14.1	Failure analysis and electric safety devices	97
14.2	Controls	102
15	Notices, markings and operating instructions	107
15.1	General provisions	107
15.2	Car	107
15.3	Car roof	108
15.4	Machine and pulley rooms	109
15.5	Well	109
15.6	Overspeed governor	110
15.7	Pit	110
15.8	Buffers	110
15.9	Landing identification	110
15.10	Electrical identification	110
15.11	Unlocking key for landing doors	110
15.12	Alarm device	110
15.13	Locking devices	111
15.14	Safety gear	111
15.15	Emergency lowering valve	111
15.16	Hand pump	111
15.17	Groups of lifts	111
15.18	Tank	111
15.19	Rupture valve/one-way restrictor	112
16	Examinations - Tests - Register - Maintenance	112
16.1	Examinations and tests	112
16.2	Register	113
16.3	Installer information	113
Annex A (normative)	List of the electric safety devices	115
Annex B (normative)	Unlocking triangle	116
Annex C (informative)	Technical dossier	117
C.1	Introduction	117
C.2	General	117
C.3	Technical details and plans	117
C.4	Electric schematic diagrams and hydraulic circuit diagram	118
C.5	Verification of conformity	119
Annex D (normative)	Examinations and tests before putting into service	120
D.1	Examinations	120
D.2	Tests and verifications	120
Annex E (informative)	Periodical examinations and tests, examinations and tests after an important modification or after an accident.	126
E.1	Periodical examinations and tests	126
E.2	Examinations and tests after an important modification or after an accident	126
Annex F (normative)	Safety components - Tests procedures for verification of conformity	128
F.0	Introduction	128
F.1	Landing door locking devices	131
F.2	Kept free	136

F.3	Safety gear	136
F.4	Overspeed governors	143
F.5	Buffers	146
F.6	Safety circuits containing electronic components.....	152
F.7	Rupture valve/one-way restrictor.....	156
Annex G (informative) Proof of guide rails.....		162
G.1	General	162
G.2	Loads and forces	162
G.4	Impact factors	165
G.5	Calculations	166
G.6	Permissible deflections	173
G.7	Examples of calculation method	173
Annex H (normative) Electronic components - Failure exclusion		197
Annex J (normative) Pendulum shock tests.....		205
J.1	General.....	205
J.2	Test rig	205
J.3	Panels.....	206
J.4	Test procedure.....	206
J.5	Interpretation of the results	206
J.6	Test report	207
J.7	Exceptions from the tests.....	207
Annex K (normative) Calculations of rams, cylinders, rigid pipes and fittings		211
K.1	Calculation against over pressure.....	211
K.2	Calculations of the jacks against buckling.....	213
Annex ZA (informative) Clauses of this standard addressing essential requirements or other provisions of EU Directives.....		218

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<https://standards.iteh.ai/catalog/standards/sist/82b38c7f-a7c8-4125-8d61-da262e885ae1/sist-en-81-2-1999>

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 81-2:1987

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 second edition of the standard. It is an amendment of the edition 1987 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 prEN81-2:1994 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 prEN81-2:1994 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 ¹⁾

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).

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 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.

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) breakage and slackening of all linkage by auxiliary ropes, chains and belts ;
- c) rupture in the hydraulic system (jack excluded) ;
- d) small leakage in the hydraulic system (jack included).

0.3.11 The possibility of the 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.

0.3.12 Provided that none of the failure mentioned in **0.3.10** occurs the speed of the car in down direction with any load (up to the rated load) is assumed not to exceed the rated speed downwards by more than 8 %.

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.

0.3.16 In the case of lifts provided with a restrictor/one-way restrictor as precaution against descent with excessive speed an impact speed of the car on the buffer (s) or the pawl device equal to rated speed downwards $v_d + 0,3$ m/s shall be taken into account.

0.3.17 In the case of goods passenger lifts having a car whose available area in relationship to the rated load is greater than defined in **table 1.1**, a complete filling of the car with persons shall not create a dangerous situation.

1 Scope

1.1 This standard specifies the safety rules for the construction and installation of permanently installed new hydraulic lifts serving defined landing levels, having a car designed for the transportation of persons or persons and goods, suspended by jacks, 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 hydraulic lifts in existing buildings ²⁾ 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 ;
- g) hydraulic lifts with a rated speed exceeding 1 m/s.

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.

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

²⁾ 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 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 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	Circular rubber insulated lift cables for normal use
HD 384.4.41 S2	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

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