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Descriptors: elevators, road vehicles, safety requirements, accident prevention, hazards, lists, control devices, safety devices, specifications, verification, tests, utilization, information, name plates, mechanical strength, computation

English version

Vehicle lifts

Elévateurs de véhicules

Fahrzeug-Hebebühnen

This European Standard was approved by CEN on 10 July 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 98 "Lifting platforms", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by February 1999, and conflicting national standards shall be withdrawn at the latest by February 1999.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

0 INTRODUCTION

The object of this European Standard is to define rules for safeguarding persons against the risk of accidents associated with the operation of vehicle lifts.

While elaborating this standard it was assumed that only trained persons operate the vehicle lifts and that the working area is sufficiently lit. Furthermore it was assumed that no persons are permitted to stand under the vehicle during lifting and lowering.

The requirement concerning loading control is not deemed pertinent to this standard insofar as:

- Experience and the state of the art suggests that failing to observe this requirement has not historically given rise to unsafe situations.
- Such devices which would give protection against overall and local overloading are not currently available in forms which cover all eventualities.
- The weight and weight distribution is freely available for the type of vehicles to be lifted and as such it is the responsibility of the user to prevent an unsafe situation arising.
- Vehicle lifts are generally designed to suit the maximum weight of vehicle to which it would reasonably be subjected, hence the normal duty of a lift is substantially lower than the maximum.

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery should comply as appropriate with EN 292 for hazards which are not covered by this standard.

1 SCOPE

This standard applies to stationary, mobile and movable vehicle lifts, which are not intended to lift persons but which are designed to raise vehicles totally, for the purpose of examining and working on or under the vehicles whilst in a raised position. The vehicle lift may consist of one or more lifting-units.

Power supply to the vehicle lift by internal combustion engines is not considered. The floor or ground supporting the vehicle lift in use is assumed to be horizontal.

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 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 applies.

EN 292-1:1991	Safety of Machinery - Basic concepts - General principles of design. Basic terminology, methodology.
EN 292-2:1991	Safety of Machinery - Basic concepts - General principles of design. Technical principles and specifications.
EN 414:1992	Safety of machinery - Rules for drafting and presentation of safety standards.
EN 418:1992	Safety of Machinery - Emergency stop equipment, functional aspects - Principles for design.
EN 954-1:1996	Safety of Machinery - Safety related parts of control systems. Part 1: General principles for design.
EN 982:1996	Safety requirements for fluid power systems and components - Hydraulics
EN 983:1996	Safety requirements for fluid power systems and components - Pneumatics
prEN 1760-2:	Safety of Machinery - Pressure sensitive protective devices. Part 2: General principles for the design and testing of pressure sensitive edges and bars.
EN 10025:1990	Hot-rolled products of no-alloy structural steels - Technical delivery conditions.
EN 60204-1:1992	Safety of machinery - Electrical equipment of machines. Part 1: General requirements.

- EN 60529:1992 Degrees of protection provided by enclosures.
- EN 60947-5-1:1991 Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices.

3 DEFINITIONS

For the purposes of this standard the following definitions apply:

3.1 Vehicle lift

Lifting device with guided load carrying device for lifting land based means of transport such as cars, motorcycles, lorries, buses, trams, rail vehicles, industrial trucks and similar, in the following named vehicle, and designed for working on or under the load. The guidance of the load carrying device is given by the supporting structure.

A vehicle lift may have the ability to tilt the load carrying device about a horizontal axis parallel to or perpendicular to the main axis of the lifted vehicle.

The following types of vehicle lift are examples of those covered by this definition: single and multi-column lifts, single and multi-cylinder lifts, mobile column lifts, scissor and parallelogram lifts, short stroke lifts, which support vehicle wheels, chassis or other designated lifting points (see Annex B (informative)).

NOTE: Short stroke lifts are floor mounted vehicle lifts with a maximum vertical travel of not more than 500 mm, which are not designed for working under the raised load.

3.2 Manually driven vehicle lift

Vehicle lift where the load carrying device is driven by manual effort.

3.3 Power driven vehicle lift

Vehicle lift where the load carrying device is not driven by manual effort.

3.4 Fixed vehicle lift

Vehicle lift fixed permanently to its location.

3.5 Movable vehicle lift

Vehicle lift which can fulfil its function without being fixed to the floor and may be designed to be transportable.

3.6 Mobile vehicle lift

Movable vehicle lift equipped with wheels, rollers etc. such that it can be moved from one place to another with or without load.

3.6.1 Manually mobile vehicle lift

Mobile vehicle lift which is moved by manual effort alone.

3.6.2 Vehicle lift with powered mobility

Mobile vehicle lift which is not moved by manual effort.

3.7 Initial position

Lower limit position of the carrying device.

3.8 Rated load

Maximum load that a lift has been designed to carry.

3.9 Load carrying device

Part(s) of the vehicle lift which supports the load either by direct contact with the vehicle or through contact with pick-up plates or pads.

Load carrying devices include tracks, carrying arms or other mechanical devices designed to raise and support a vehicle by designated lifting points.

3.10 Carrying arm

Load carrying device attached at one end, directly or indirectly to the lifting element and supporting the load at its other end. Carrying arms are usually used on two column lifts.

3.11 Pick-up plate

Part of the load carrying device, e.g. on two column lifts with carrying arms, which has direct contact to the vehicle and which has an assigned position on the load carrying device (see figure 1).

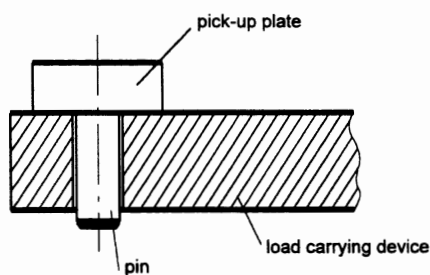


Figure 1: Pick-up plate

3.12 Pick-up pad

Vehicle supporting pad which has direct contact with the vehicle but which does not have an assigned position, e. g. pads used on wheel free systems with platforms (see figure 2).

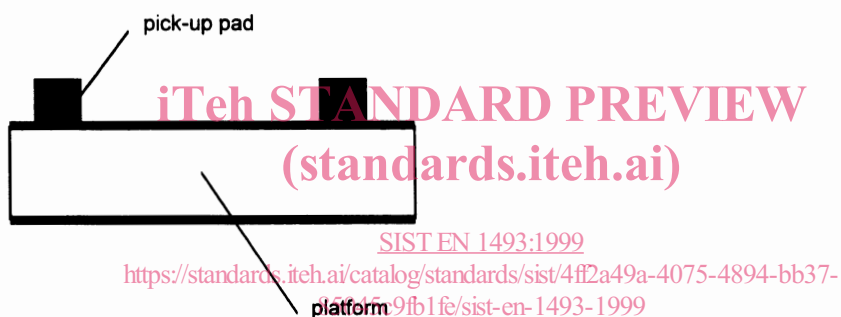


Figure 2: Pick-up pad

3.13 Lifting element

Medium through which the force is transmitted from the power source to the load carrying device. Lifting elements include hydraulic and pneumatic cylinders, lead screw and nut systems as well as any flexible connections such as steel wire ropes and chains.

3.14 Catching device

Device which holds the load carrying device in case of failure of the lifting element.

3.15 Re-raising prevention device

Device which prevents re-raising of the load carrying device from the initial position in the event of failure of the lifting element.

3.16 Unauthorized use

Use by a person who has not received permission to operate the lift and instruction on its safe operation.

3.17 Hold-to-run control

Control device which initiates and maintains operation of machine elements only as long as the manual control (actuator) is actuated and the manual control (actuator) automatically returns to the stop position when released (see 3.23.2 of EN 292-1:1991).

3.18 Braking**3.18.1 Automatic brake**

Braking device which is normally held on and which is released only by application of power. Operation is also instigated automatically by releasing the lift controls and by interruption of the power supply.

3.18.2 Self braking system

System which, due to its inherent resistance to movement, stops the movement of the load carrying device when the drive power is interrupted.

3.19 Safety switch

Switch in which the opening contacts are directly connected to the control mechanism without springs or flexible elements. The whole of the specified opening of the contacts shall be achieved by operation of the control mechanism through its intended travel using the force stated by the manufacturer of the switch (see clause 2.1 of EN 60947-5-1:1991).

3.20 Normative vehicle

Road vehicle used for calculations in 5.6.

3.21 Wheel track

Distance between the centre lines of the wheels on one axle or between centre lines of wheel pairs on twin wheel axles.

3.22 Wheel base

Distance between the centres of wheels of front and rear axle or from the centre of the wheels on the front axle to a point mid way between axle pairs on twin axle vehicles.

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4 LIST OF HAZARDS

The following hazards from Annex A of EN 414:1992 are applicable in the situations described and could involve risks to persons if not reduced or eliminated. The corresponding requirements are designed to limit the risk or reduce these hazards in each situation.

„Not applicable“ in table 1 means that this hazard does not exist on vehicle lifts.

„Not significant“ in table 1 means that this hazard can exist on vehicle lifts, but it causes no risk to persons.

Table 1: List of hazards

HAZARDS		CORRESPONDING REQUIREMENT
1	Mechanical hazards	5.6/5.8/5.16.1
1.1	Crushing hazards	5.2.1/5.5.1/5.5.2/5.16
1.2	Shearing hazard	5.2.1/5.5.1/5.5.2/5.16
1.3	Cutting or severing hazard	5.7.3.3/5.17
1.4	Entanglement hazard	5.3.3
1.5	Drawing-in or trapping hazard	5.3.4
1.6	Impact hazard	5.4/5.7.3.1/5.7.3.2/5.10/5.11/5.12/5.13
1.7	Stabbing or puncture hazard	not applicable
1.8	Friction or abrasion hazard	not applicable
1.9	High pressure fluid injection hazard	5.7.4.1/5.7.4.3/5.18.3
1.10	Ejection of parts (of machinery and processed materials/ workpieces)	not applicable
1.11	Loss of stability (of machinery and machine parts).	5.6.6
1.12	Slip, trip and fall hazards in relationship with machinery (because of their mechanical nature).	5.7.3.4/5.9
2	Electrical hazards.	
2.1	Electrical contact direct or indirect.	5.20.1, 5.20.3
2.2	Electrostatic phenomena.	not applicable
2.3	Thermal radiation or other phenomena such as ejection of molten particles, and chemical effects from short-circuits, overloads etc.	not applicable
2.4	External influences on electrical equipment.	5.20.1
3	Thermal hazards resulting in:	
3.1	burns and scalds, by a possible contact of persons, by flames or explosions and also by the radiation of heat sources	not applicable
3.2	health-damaging effects by hot or cold work environment	not applicable

HAZARDS		CORRESPONDING REQUIREMENT
4	Hazards generated by noise	
4.1	Hearing losses (deafness), other physiological disorders (e.g. loss of balance, loss of awareness, etc.)	not significant
4.2	interferences with speech communication, acoustic signals, etc.	not applicable
5	Hazards generated by vibration (resulting in a variety of neurological and vascular disorders)	not applicable
6	Hazards generated by radiation, especially by:	
6.1	electrical arcs	not applicable
6.2	lasers	not significant
6.3	ionizing radiation sources	not applicable
6.4	machines making use of high frequency electro magnetic fields	not applicable
7	Hazards generated by materials and substances processed, used or exhausted by machinery.	
7.1	Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dust	5.7.4
7.2	Fire or explosion hazard.	not applicable
7.3	biological and microbiological (viral or bacterial) hazards	not applicable
8	Hazards generated by neglecting ergonomic principles in machine design (mismatch of machinery with human characteristics and abilities) caused for example by	5.3/5.15.3
8.1	unhealthy postures or excessive efforts	5.15.5, 5.19
8.2	inadequate consideration of human hand-arm or foot-leg anatomy	5.3.1
8.3	neglected use of personal protection equipment	not applicable
8.4	inadequate area lighting	not applicable
8.5	mental overload or underload, stress, etc.	not applicable
8.6	human error	5.1/5.2.1/5.2.2/5.2.3/5.2.4/5.2.5
9	Hazards combinations	not applicable

HAZARDS		CORRESPONDING REQUIREMENT
10	Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders.	
10.1	failure of energy supply (of energy and/or control circuits).	5.7.4.4/5.7.4.5/5.7.4.6/5.7.5.4/5.7.5.5/ 5.7.5.6/5.14
10.2	unexpected ejection of machine parts or fluids.	5.7.4.2/5.7.4.7/5.7.5.1/5.7.5.2/5.7.5.3
10.3	failure/disorder of control system (unexpected start up, unexpected overrun).	5.2.1, 5.7.1
10.4	errors of fitting	7.3.1
10.5	overturn, unexpected loss of machine stability	5.6.6
11	Hazards caused by (temporary) missing and/or incorrect positioned safety related measures/means.	
11.1	all kinds of guard	5.9/5.16.3
11.2	all kinds of safety related (protection) devices.	5.6.5.1/5.16.3/5.17
11.3	starting and stopping devices.	5.7.2
11.4	safety signs and tags	5.2.4
11.5	all kinds of information or warning devices.	7.2/7.3
11.6	energy supply disconnecting devices.	5.20.1, 5.20.2, 5.20.3
11.7	emergency devices.	5.3.5
11.8	feeding/removal means of workpieces	not applicable
11.9	essential equipment and accessories for safe adjusting and/or maintaining.	7.3
11.10	equipment evacuating, gases, etc.	not applicable
	HAZARDS DUE TO MOBILITY	
12	Inadequate lighting of moving/working area	5.3.1/5.3.3
13	Hazards due to sudden movement, instability etc. (during handling)	5.15.1/5.15.2
14	Inadequate/ineergonomic design of driving/operating position	5.3.1
14.1	hazards due to dangerous environments (contact with moving parts, exhaust gases etc.)	not applicable
14.2	inadequate visibility from driver's/operator's position	not applicable
14.3	inadequate seat/seating (seat index point)	not applicable