



SLOVENSKI STANDARD

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Builders' hoists for goods - Part 2: Inclined hoists with non-accessible load carrying devices

Bauaufzüge für den Materialtransport - Teil 2: Schrägaufzüge mit nicht betretbaren Lastaufnahmemitteln

Monte-matériaux - Partie 2: Monte-matériaux inclinés à dispositifs porte-charge non accessible

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ICS:

53.020.99	Druga dvigalna oprema	Other lifting equipment
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EUROPEAN STANDARD
NORME EUROPÉENNE
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Builders' hoists for goods - Part 2: Inclined hoists with non-accessible load carrying devices

Monte-matériaux - Partie 2: Monte-matériaux inclinés à dispositifs porte-charge non accessible

Bauaufzüge für den Materialtransport - Teil 2: Schrägaufzüge mit nicht betretbaren Lastaufnahmemitteln

This European Standard was approved by CEN on 9 September 2000 and includes Amendment 1 approved by CEN on 12 June 2010.

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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 CEN Management Centre has the same status as the official versions.

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

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Foreword

This document (EN 12158-2:2000+A1:2010) has been prepared by Technical Committee CEN/TC 10 "Lifts, escalators and moving walks", 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of an identical text or by endorsement, at the latest by January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

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 includes Amendment 1, approved by CEN on 2010-06-12.

This document supersedes EN 12158-2:2000.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**.

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 Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This standard is one of a series of standards produced by CEN/TC 10/SC 1 as part of the CEN programme of work to produce machinery safety standards.

The standard is a Type C standard relating to safety for builders hoists for goods.

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery should comply as appropriate with A_1 EN ISO 12100:2003 A_1 for hazards which are not covered by this standard.

A_1 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 machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this European Standard. A_1

1 Scope

1.1 This standard deals with power operated temporarily installed builders hoists intended for use by persons who are permitted to enter sites of engineering and construction, serving either one upper landing or a work area extending to the end of the guides, (e.g. a roof) having a load carrying device (lcd):

- which is intended for the transportation of goods only;
- where it is forbidden for persons to step upon it at any time;
- which is guided;
- which is designed to travel at an angle of at least 30 degrees to the vertical but may be used at any angle between the vertical and the maximum inclination as specified by the manufacturer;
- which is sustained by steel wire rope and a positive drive system;
- which is controlled by hold-to-run controls by the operator;
- which does not benefit from the use of any counterweight;
- which has a maximum rated load of 300 kg;
- which has a maximum speed of 1,00 m/s;

and where the guides require support from separate structures.

1.2 The standard identifies hazards as listed in clause 4, which arise during the various phases in the life of such equipment and describes methods for the elimination or reduction of these hazards when used as intended by the manufacturer.

1.3 This European standard does not specify the additional requirements for:

- operation in severe conditions (e.g. extreme climates, strong magnetic fields);
- lightning protection;
- operation subject to special rules (e.g. potentially explosive atmospheres);
- electromagnetic compatibility (emission, immunity);
- handling of loads the nature of which could lead to dangerous situations (e.g. molten metal, acids/bases, radiating materials, fragile loads);
- the use of combustion engines;
- the use of remote controls;
- hazards occurring during manufacture;
- hazards occurring as a result of mobility;
- hazards occurring as a result of being erected over a public road;
- earthquakes;
- noise.

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1.4 This standard is not applicable to

- permanently installed lifts;
- builders hoists for persons and materials;
- builders hoists for the transport of goods with accessible platforms;
- builders hoists with an lcd driven by hydraulic jack (directly or indirectly);
- furniture hoists;
- conveyors;
- work cages suspended from lifting appliances;
- work platforms carried on the forks of fork trucks;
- work platforms;
- funiculars;
- lifts specially designed for military purposes;
- mine lifts;

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- theatre elevators;
- special purpose hoists.

1.5 The safety requirements and/or measures of this standard deal with the design of the base frame, guide rails, lcd, drive unit, electrical and/or hydraulic installation and the control of the hoist. Included is the design of any guide rail support but not the design of the supporting structure (e.g. building or scaffold) and any ties. Other aspects such as base enclosure, the design of any concrete, hard core, timber or other foundation arrangement, hoistway protection and the upper landing are dealt with in the users' manual section of this standard.

2 Normative references

[A1] 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. **[A1]**

[A1] *deleted text* **[A1]**

[A1] EN 982:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics* **[A1]**

EN 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

[A1] EN 60204-32:2008, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines (IEC 60204-32:2008)* **[A1]**

[A1] EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)* **[A1]**

[A1] EN 60947-5-1:2004, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:2003)* **[A1]**

[A1] EN ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)* **[A1]**

[A1] EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)* **[A1]**

[A1] EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)* **[A1]**

[A1] EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)* **[A1]**

[A1] EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)* **[A1]**

[A1] HD 22.1 S4:2002, *Cables of rated voltages up to and including 450/750 V and having cross-linked insulation — Part 1: General requirements* **[A1]**

[A1] ISO 2408:2004, *Steel wire ropes for general purposes — Minimum requirements* **[A1]**

[A1] ISO 4302:1981, *Cranes — Wind load assessment* **[A1]**

[A1] ISO 4309:2004, *Cranes — Wire ropes — Care, maintenance, installation, examination and discard* **[A1]**

3 Terms and definitions

A1 For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply. **A1**

A1 3.1

working load/rated load **A1**

maximum load which the hoist has been designed to carry in service. This load may depend on the configuration of the hoist (i.e. inclination, length of guide rail, load carrying device)

3.2

rated speed

speed of the lcd for which the equipment has been designed

3.3

positive drive

drive using means other than friction

3.4

rope hoist

hoist which uses rope as the load suspension system

3.5

wire rope termination

adaption at the end of a wire rope permitting attachment

3.6

check valve

valve, which allows flow of hydraulic fluid in the desired direction only if a predetermined pressure is maintained at the valve

3.7

base frame

lowest framework of the hoist, upon which all other components are mounted

3.8

chassis

chassis are base frames which enable road transport of the hoist

3.9

guide rails

rigid elements which determine the travel way of the lcd

3.10

knee section

guide rail element between two guide rail sections which changes the inclination

3.11

hoistway

total space which is travelled by the lcd and its load

3.12

guide rail section

indivisible piece of rail, between two adjacent rail joints

3.13

guide rail support

connection system between the rail and ground or any building structure, providing support for the rail

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EN 12158-2:2000+A1:2010 (E)**3.14****load carrying device (lcd)**

part of the hoist which carries the rated load

3.15**stopping distance**

distance the platform moves from the moment, when the control or safety circuit is broken until the platform has come to a full stop

3.16**slack rope**

rope, normally under tension, from which all external loads have been removed

3.17**broken rope device**

device which prevents the lcd from falling in the event of the breaking of the wire rope suspension

3.18**landing**

stopping level or work area for loading and unloading the lcd

3.19**safety distance**

minimum distance between any moving part of a hoist and any point of access

3.20**normal operation**

usual operating conditions for the equipment when in use for carrying loads but excluding routine maintenance, erection, dismantling, etc

3.21**competent person**

designated person, suitably trained, qualified by knowledge and practical experience, and provided with the necessary instructions to enable the required procedures to be carried out

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4 List of hazards

The list of hazards according to the following tables are based on **EN ISO 12100-1:2003** and **EN ISO 12100-2:2003**.

Tables 1 and 2 show the hazards which have been identified and where the corresponding requirements have been formulated in this standard, in order to limit the risk or reduce these hazards in each situation.

A hazard which is not applicable or is not significant and for which, therefore, no requirements are formulated, is shown in the relevant clauses column as n.a. (not applicable).

Table 1 — Hazards relating to the general design and construction of inclined hoists

	Hazards	Relevant clauses in this standard
1	Mechanical hazards	
1.1	Crushing	5.5.2, 5.6.2, 7.1.2.8
1.2	Shearing	5.6.2, 7.1.2.8
1.3	Cutting or severing	5.5.2, 5.6.2, 7.1.2.8
1.4	Entanglement	5.6.2, 7.1.2.8
1.5	Drawing-in or trapping	5.6.2, 7.1.2.8
1.6	Impact	7.1.2.8

	Hazards	Relevant clauses in this standard
1.7	Stabbing or puncture	n.a.
1.8	Friction or abrasion	5.6.2, 7.1.2.8
1.9	High pressure fluid ejection	5.7
1.10	Ejection of parts	5.5, 5.6.1
1.11	Loss of stability	5.2, 5.3, 5.4, 7.1.2.8
1.12	Slip, trip and fall	5.3.4, 5.5.2
2	Electrical hazards	
2.1	Electrical contact	5.8
2.2	Electrostatic phenomena	n.a.
2.3	Thermal radiation	n.a.
2.4	External influences	5.6.2, 5.6.4.11, 5.8.2
3	Thermal hazards	
3.1	Burns and scalds	n.a.
3.2	Health-damaging effects	n.a.
4	Hazards generated by noise	
4.1	Hearing losses	not dealt with, see 1.3
4.2	Interference with speech	not dealt with, see 1.3
5	Hazards generated by vibration	n.a.
6	Hazards generated by radiation	
6.1	Electrical arcs	n.a.
6.2	Lasers	n.a.
6.3	Ionising radiation sources	n.a.
6.4	Use of H F electromagnetic fields	not dealt with
7	Hazards generated by materials and substances processed, used or exhausted by machinery	
7.1	Contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	n.a.
7.2	Fire or explosion	n.a.
7.3	Biological and microbiological	n.a.
8	Hazards generated by neglecting ergonomic principles in machine design	
8.1	Unhealthy postures or excessive effort	5.1
8.2	Inadequate consideration of human hand/arm or foot/leg anatomy	5.5.1
8.3	Neglected use of personal protection equipment	n.a.
8.4	Inadequate area lighting	7.1.2.8.2
8.5	Mental overload or underload, stress	5.9
8.6	Human error	7.3
9	Hazard combinations	not dealt with
10	Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders	
10.1	Failure of energy supply	5.6.4.1, 5.9.5
10.2	Unexpected ejection of machine parts or fluids	5.7.2
10.3	Failure or malfunction of control system	5.8.1, 5.9.3
10.4	Errors of fitting	5.4.3, 5.8.3, 7.1.2.8
10.5	Overturn, unexpected loss of machine stability	5.2, 7.1.2.8
11	Hazards caused by missing and / or incorrectly positioned safety related measures / means	
11.1	Guards	5.5.1, 7.1.2.8.3
11.2	Safety related (protection) devices	7.1.2.8.3
11.3	Starting and stopping devices	5.8.4, 5.9.4, 7.1.2.8
11.4	Safety signs and signals	7.2
11.5	Information or warning devices	7.2, 7.3

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	Hazards	Relevant clauses in this standard
11.6	Energy supply disconnecting devices	5.8.1
11.7	Emergency devices	5.9.3, 5.9.4, 7.1.2.10
11.8	Feeding/removal means of work pieces	n.a.
11.9	Essential equipment and accessories for safe adjusting and/or maintaining	5.9.4.3
11.10	Equipment evacuating gases	n.a., see 1.3

Table 2 — Particular hazards involving the mobility and/or load lifting ability of hoists

	Hazards	Relevant clauses in this standard
	Hazards due to mobility	
12	Inadequate lighting of moving / working area	Not dealt with, see 1.3
13	Hazards due to sudden movement instability etc. during handling	Not dealt with, see 1.3
14	Inadequate/non-ergonomic design of operating position	Not dealt with, see 1.3
15	Mechanical hazards	Not dealt with, see 1.3
16	Hazards due to lifting operations	
16.1	Lack of stability	5.1, 5.2, 5.3
16.2	Derailment of load carrying device	5.4
16.3	Loss of mechanical strength of machinery and lifting accessories	5.1, 5.4, 5.6.3
16.4	Hazards caused by uncontrolled movement	5.4, 5.6.4, 5.6.5, 5.8
17	Inadequate view of trajectories of the moving parts	5.8, 7.2
18	Hazards caused by lightning	Not dealt with, see 1.3
19	Hazards due to loading / overloading	5.2, 5.5.1, 7.1.2.9

5 Safety requirements and/or measures

5.1 General

The design of the hoist shall consider safe use, frequent erection and dismantling as well as maintenance and transportation. At least an ambient temperature range between – 5 °C and + 40 °C shall be taken into account for correct operation.

The design of all components that have to be handled during erection e.g. guide rail sections, shall have their weight assessed against manual handling. Where the permissible weight for manual handling is exceeded, the manufacturer shall give recommendations in the instruction handbook. ^[A1] All removable and detachable covers shall be retained by captive fastenings. ^[A1]

5.2 Load combinations and calculations

5.2.1 The structure of the hoist shall be designed and constructed in such a way that its strength is satisfactory under all intended operating conditions, including erection and dismantling and e.g. low temperature environments as intended by the manufacturer.

The design of the structure as a whole and each part of it shall be based on the effects of any possible combination of loads as specified in this 5.2. The load combinations shall consider the least favourable locations of the lcd and load relative to the guide rails and its support, both during the passage of the lcd and

any movement, e.g. tilting of the lcd. The whole range of possible inclinations, as intended by the manufacturer, shall be considered. The guide rail support is considered to be part of the hoist structure.

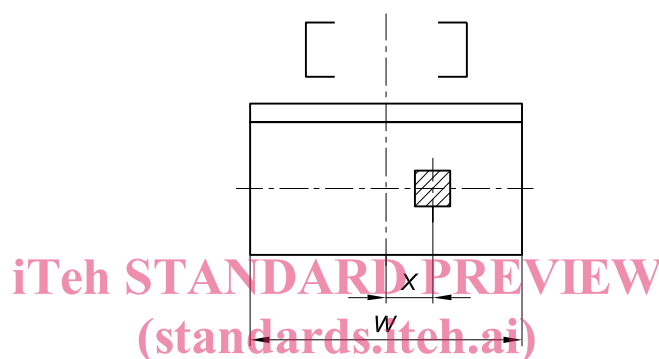
5.2.2 When calculating the hoist structure and every related component, the following forces and loads shall be taken into account:

5.2.2.1 All dead weights with exception of the lcd and equipment which moves together with the lcd.

5.2.2.2 Dead weights of the unladen lcd and all equipment which moves together with the lcd.

5.2.2.3 Rated load on the lcd.

The rated load shall be considered to act off centre, either side, by an amount which is equivalent to 10 % of the width (W) of the LCD (25 %, when the lcd is intended to be used with overhanging loads) (See Figure 1). Special arrangements for specific materials may need other load configurations.



Key

$X = 10 \% W$ or $25 \% W$ – see 5.2.2.3

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Figure 1 — Rated load acting off centre

5.2.2.4 For calculation purposes a load of at least 3 kN/m² shall be considered as being placed over the area of the lcd, defined as the area, which supports the load at right angles to the guide rails.

5.2.2.5 Where the hoist is designed such that the lcd is driven against the end of the guide rails before the terminal stopping switch is actuated, it shall be designed to tolerate being driven against the end of the guide rails at rated speed with and without rated load (See also 5.5.1.8). The stalling torque and inertia of the drive system shall be taken into account.

5.2.2.6 The effect of moving loads shall be determined by taking the weight of all actual loads (lcd, rated load, wire ropes, etc.) and multiplying them by an impact factor $\mu = (1,1 + 0,264v)$ where v is the hoisting speed in m/s. Alternative factors may be used if they can be proved to be more accurate.

5.2.2.7 To determine the forces produced by an operation of the broken rope device, the sum total of the moving load shall be multiplied by the factor 2,5. Alternative factors, but not less than 1,2, may be used if they can be verified under all conditions of loading up to 1,25 times rated load.

5.2.2.8 Design wind conditions

The aerodynamic pressure q is given by the general equation: