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Varnost vozil za talni transport - Električne zahteve - 1. del: Splošne zahteve za električna vozila za talni transport na baterijski pogon (vključno z dopnilom A1)

Safety of industrial trucks - Electrical requirements - Part 1: General requirements for battery powered trucks

Sicherheit von Flurförderzeugen - Elektrische Anforderungen - Teil 1: Allgemeine Anforderungen für Flurförderzeuge mit batterieelektrischem Antrieb

Sécurité des chariots de manutention - Prescriptions électriques - Partie 1: Prescriptions générales des chariots alimentés par batterie

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43.120	Električna cestna vozila	Electric road vehicles
53.060	Industrijski tovornjaki	Industrial trucks

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Safety of industrial trucks - Electrical requirements - Part 1: General requirements for battery powered trucks

Sécurité des chariots de manutention - Prescriptions
électriques - Partie 1: Prescriptions générales des chariots
alimentés par batterie

Sicherheit von Flurförderzeugen - Elektrische
Anforderungen - Teil 1: Allgemeine Anforderungen für
Flurförderzeuge mit batterieelektrischem Antrieb

This European Standard was approved by CEN on 23 November 1997 and includes Amendment 1 approved by CEN on 26 September 2010.

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
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Annex ZA (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC 47

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EN 1175-1:1998+A1:2010 (E)**Foreword**

This document (EN 1175-1:1998+A1:2010) has been prepared by Technical Committee CEN/TC 150 "Industrial trucks - Safety", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.

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. **A1**

This document includes Amendment 1, approved by CEN on 2010-09-26.

This document supersedes EN 1175-1:1998.

A1 The main changes compared to the previous version are:

- modification of Annex ZA; **iTeh STANDARD PREVIEW**
- minor technical changes in 5.9.4 to 5.9.11 and 7.3; **(standards.iteh.ai)**
- reference to EN 292-1 be replaced with EN ISO 12100-1:2003, EN 292-2 be replaced with EN ISO 12100-2:2003 and EN 954-1 be replaced with EN ISO 13849-1:2008;
- addition of requirements for radiation and software parameter. **A1**

A1 *deleted text* **A1**

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

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 European Standard is one of a package of standards for the safety of industrial trucks:

A1 prEN ISO 3691-1, *Industrial trucks — Safety requirements and verification — Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks (ISO/DIS 3691-1:2008)* **A1**

A1 EN 1726-2 **A1** Safety of machinery - Industrial trucks - Self propelled trucks up to and including 10 000 kg capacity and tractors with a drawbar pull up to and including 20 000 N - Part 2: Additional requirements for trucks with elevating operator position and trucks specially designed to travel with elevated load

A1 EN 1551 **A1** Safety of industrial trucks - Self propelled trucks over 10 000 kg capacity

A1 EN 1459 **A1** Safety of industrial trucks - **A1** Self propelled variable **A1** reach trucks

A1 EN ISO 3691-5, *Industrial trucks — Safety requirements and verification — Part 5: Pedestrian-propelled trucks (ISO 3691-5:2009)* **A1**

A1 deleted text **A1**

A1 EN 1757-3 **A1** Safety of industrial trucks - Pedestrian controlled manual and semi manual trucks - Part 3: Platform trucks

A1 deleted text **A1**

EN 1525 Safety of industrial trucks - Driverless trucks and their systems

EN 1175-1 Safety of industrial trucks - Electrical requirements - Part 1 - General requirements for battery powered trucks

EN 1175-2 Safety of industrial trucks - Electrical requirements - Part 2 - General requirements for internal combustion engine powered trucks

EN 1175-3 Safety of industrial trucks - Electrical requirements - Part 3 - Specific requirements for the electric power transmission systems of internal combustion engine powered trucks

EN 1526 Safety of industrial trucks - Additional requirements for automated functions on trucks

A1 EN 1755 **A1** Safety of **A1** industrial **A1** trucks - Operation in potentially explosive atmospheres; Use in flammable gas, vapour, mist and dust

A1 EN 12053 **A1** Safety of industrial trucks - Test methods for measuring noise **A1** emissions **A1**

prEN ISO/DIS 13564 Test method for measuring visibility from self-propelled trucks (ISO/DIS 13564:1996)

A1 EN 13059 **A1** Safety of industrial trucks - Test methods for measuring vibration

A1 EN 12895 **A1** Industrial trucks - Electromagnetic compatibility

A1 deleted text **A1**

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.

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0 Introduction

^{A1} This European Standard is a type C standard as stated in EN ISO 12100-1:2003. ^{A1} This standard has been prepared to be a harmonized standard to provide one means of conforming with the electrical aspects of the Essential Safety Requirements of the Machinery Directive and associated EFTA Regulations. Electrical installations complying with this standard are deemed to satisfy these requirements.

The extent to which hazards are covered is indicated in the scope of this standard. ^{A1} In addition, machinery should comply as appropriate with EN ISO 12100-2:2003 for hazards which are not covered by this European Standard. ^{A1}

1 Scope

1.1 This standard specifies electrical and related mechanical safety requirements for design and construction of the electrical installation in battery powered industrial trucks hereinafter referred to as trucks, with nominal voltages of the truck system up to 240 V. The Annex A is normative and gives requirements for "Connectors for traction batteries". Annex B is normative and contains "Electric motors - Output and test rules" and Annex C is normative and contains "Electromagnetic contactors".

NOTE 1 Reference is made to this standard in other standards which cover the non-electrical requirements of the various industrial truck types.

NOTE 2 This standard does not address the subject of charging of traction batteries (CENELEC TC 21X is preparing safety standards for battery charging).

^{A1} *deleted text* ^{A1}

^{A1} NOTE 3 The special requirements for operation in potentially explosive atmospheres are not covered in this European Standard. ^{A1}

1.2 The requirements of this standard are applicable, when trucks are operated under the following climatic conditions:

- Average ambient temperature for continuous duty: +25°C;
- Maximum ambient temperature, short term (up to 1 h): +40°C;
- Lowest ambient temperature for trucks intended for use in normal indoor conditions: +5 °C;
- Lowest ambient temperature for trucks intended for use in normal outdoor conditions: -20 °C;
- Altitude: up to 2000 m;
- Relative humidity: in the range 30 % to 95 % (non condensing).

1.3 This standard covers specific hazards (listed in clause 4), which could occur during the intended use of trucks. ^{A1} For hazards occurring during construction, transportation, commissioning, decommissioning and disposal, reference should be made to EN ISO 12100-2:2003. ^{A1}

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.

A1 deleted text **A1**

EN 563:1994 Safety of machinery - Temperatures of touchable surfaces - Ergonomic data to establish temperature limit values for hot surfaces

A1 deleted text **A1**

EN 1050:1996 Safety of machinery - Principles for risk assessment

A1 EN 12895:2000, *Industrial trucks — Electromagnetic compatibility* **A1**

EN 60034-1:1995 Rotating electrical machines
Part 1: Rating and performance (IEC 34-1:1994, modified)

EN 60204-1:1992 Safety of machinery - Electrical equipment of machines
Part 1: General requirements (IEC 204-1:1992, modified)¹⁾

EN 60529:1991 Degrees of protection provided by enclosures (IP Code) (IEC 529:1989)

EN 60947-3:1992 Low-voltage switchgear and controlgear
Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
(IEC 947-3:1990, modified + Corrigendum December 1991)

EN 60947-5-1:1991 Low-voltage switchgear and controlgear
Part 5: Control circuit devices and switching elements
Section one: Electromechanical control circuit devices (IEC 947-5-1:1990)

HD 53.6 S2:1992 Rotating electrical machines;
Part 6: Methods of cooling (IC Code) (IEC 34-6:1991)

HD 53.8 S4:1993 Rotating electrical machines;
Part 8: Terminal markings and direction of rotation of rotating machines
(IEC 34-8:1972 + A1:1990, modified)

HD 405.1 S1 Tests on electric cables under fire conditions. Part 1 : Test on a single vertical insulated wire or cable

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

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

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design* (ISO 13849-1:2006) **A1**

IEC 85:1984 Thermal evaluation and classification of electrical insulation

¹⁾ This standard applies only in parts (option 3). Specific clauses have been indicated in the text.

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IEC 384-14:1993	Fixed capacitors for use in electronic equipment. Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains
ISO 5053:1987	Powered industrial trucks - Terminology
ISO 6743-4:1982	Lubricants, industrial oils and related products (class L). Classification - Part 4: Family H (Hydraulic systems)

3 Definitions

For the purposes of this standard, definitions given in ISO 5053:1987 apply together with the following:

- 3.1 nominal voltage (of the truck system)**
the total number of battery cells connected in series in the truck system multiplied by 2 V for lead acid batteries and by 1,2 V for alkaline batteries
- 3.2 truck type test**
one-off test to verify compliance with this standard for each truck type.
- 3.3 truck routine test**
repetitive test required for all production trucks.
- 3.4 nominal current**
current in amperes that the connector is able to carry continuously without exceeding the allowable temperature indicated in A.3.7
- 3.5 emergency breaking current**
current in amperes specified in A.4.11 that the connector shall be able to break in the case of exceptional circumstance or hazard.
- 3.6 motor type test**
a test made on one or more items of electrical equipment of a new design or of a new manufacture to demonstrate that it complies with this standard.
- 3.7 motor routine test**
a test to which the electrical equipment on an order is subjected to prove its soundness. This can be reduced by agreement to testing a percentage of a production batch.
- 3.8 maximum service rotational frequency (speed) of a motor**
the highest rotational frequency assigned to the machine by the manufacturer.

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3.9**rated motor voltage**

rated voltage is equal to the nominal voltage of the vehicle battery, i.e. the maximum number of cells which are connected in series multiplied by the nominal voltage of each cell, which for lead acid cells is 2,0 V and 1,2 V for conventional alkaline batteries.

3.10**rated motor output**

the output in kW at the shaft of an electric motor as agreed by the manufacturer under the associated conditions (e.g. rotational frequency, rated voltage and current).

3.11**continuous rated motor output**

The rated output assigned by the manufacturer that can be sustained indefinitely on test without exceeding the temperature rises specified in table B.1

3.12**one hour rated motor output**

the rated output assigned by the manufacturer that can be sustained for one hour, starting from normal ambient temperature without exceeding the temperature rises specified in table B.1

3.13**short time rated motor output**

the rated output assigned by the manufacturer that can be sustained for a specified period starting from the normal ambient temperature without exceeding the temperature rises specified in table B.1

3.14**duty type motor rating**

the time for a duty cycle is 10 min and the cyclic duration factor is expressed as a percentage that can be sustained, starting from the normal ambient temperature without exceeding the temperature rise specified in table B.1

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4 A1 List of significant hazards A1

The following significant hazards from Annex A of EN 1050:1996 (within brackets) 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 remove the hazard in each situation.

Table 1 — List of hazards

Hazard	Corresponding requirements
4.1 Mechanical hazards (1) 4.1.1 Crushing hazard (1.1) - between truck components - between truck & obstacles 4.1.2 Impact by collision (20) 4.1.2.1 - when driven by the operator 4.1.3 Loss of stability (18) - from excess speed - from faulty battery mass	5.1.2 Constraining 5.6 Electro-mechanical brakes 5.9.3 Travel control system 5.9.4 Pulse control travel system 5.9.8 Tiller control 5.9.9 Speed limitation 5.9.10 Slack wire-ropes or chains 7.4 Battery
4.2 Electrical hazards (2) 4.2.1 electric shock (2.1) 4.2.2 short circuit 4.2.3 overloading - all voltages	5.1.1.1 Covers 5.1.1.2 Design of covers 5.1.3 Disconnection 5.2 Battery connectors 5.4 Electric motors 5.5 Contactors 5.7.1 Direct contact 5.7.2 Indirect contact 5.7.3 Connection to the frame 5.7.4 On-board chargers 5.8 Protection of electrical equipment 5.10.1 Protection 5.10.2 Cross-sectional area 5.11.1 Multicore cables 5.11.2 Main current cables 5.11.3 Wiring that flexes 5.11.4 Protection 5.12.1 Movement during charging

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	5.12.2	Charger switching	
	5.14	Dielectric test	
	5.15	Insulation resistance test	
120 V < voltages ≤ 240 V	6.1.1	Battery	
	6.1.2	Terminals and connectors	
	6.1.3	Poles	
	6.1.4	Cover	
	6.2	Battery connectors	
	6.3.1	Electrical enclosures	
	6.3.2	Circuits	
	6.3.3	Bonding	
	6.3.4	Detection of frame faults	
	6.5	Insulation resistance test	
	7.4	Minimum marking	
4.3 Thermal hazards (3)	5.3	Heat dissipating electrical components	

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