SLOVENSKI STANDARD
SIST EN 1175-3:1998

01-april-1998

Varnost vozil za talni transport - Električne zahteve - 3. del: Posebne zahteve za motorna vozila za talni transport z motorjem z notranjim zgorevanjem in električnim prenosnikom

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

Sicherheit von Flurförderzeugen - Elektrische Anforderungen - Teil 3: Besondere Anforderungen für elektrische Kraftübertragungssysteme von Flurförderzeugen mit Verbrennungsmotoren

Sécurité des chariots de manutention - Prescriptions électriques - Partie 3: Prescriptions particulieres des systemes a transmission électrique des chariots équipés d'un moteur thermique

Ta slovenski standard je istoveten z: **EN 1175-3:1998**

ICS:

43.060.01	Motorji z notranjim zgorevanjem za cestna vozila na splošno	Internal combustion engines for road vehicles in general
53.060	Industrijski tovornjaki	Industrial trucks

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EUROPEAN STANDARD

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English version

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

Sécurité des chariots de manutention - Prescriptions électriques - Partie 3: Prescriptions particulières des systèmes à transmission électrique des chariots équipés d'un moteur thermique

Sicherheit von Flurförderzeugen - Elektrische Anforderungen - Teil 3: Besondere Anforderungen für elektrische Kraftübertragungssysteme von Flurförderzeugen mit Verbrennungsmotoren

This European Standard was approved by CEN on 23 November 1997.

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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 Central Secretariat 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 European Standard 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 July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.

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).

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

prEN 1726	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.
prEN 1726-2	Safety of 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 andtrucks specially designed to travel with elevated load
prEN 1551	Safety of industrial trucks - Self propelled trucks over 10 000 kg capacity
prEN 1459	Safety of industrial trucks - Variable reach trucks
prEN 1757-1	Safety of industrial trucks - Pedestrial controlled manual and semi manual trucks - Part 1 - Stacker trucks
prEN 1757-2	Part 2 - Pallet trucks with lift height up to 300 mm
prEN 1757-3	Part 3 - Platform trucks
prEN 1757-4	Part 4 - Scissor lift pallet-trucks
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
prEN 1755	Operation in potentially explosive atmospheres; Use in flammable gas, vapour, mist and dust

prEN 12053	Safety of industrial trucks - Test methods for measuring noise emission
prEN ISO/DIS 13564	Test method for measuring visibility from self-propelled trucks
prEN 13059	Safety of industrial trucks - Test methods for measuring vibration
prEN 12895	Industrial trucks - Electromagnetic compatibility

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

This European Standard is a type C standard as stated in EN 292-1. 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. In addition, machinery should comply as appropriate with EN 292 for hazards which are not covered by this standard.

1 Scope

1.1 This standard specifies the safety requirements for the design and construction of electrical power transmission systems of trucks with internal combustion engines driving one or more generators with outputs up to and including 600 V supplying power to function motors. The Annex A is normative and contains "Generators - Output and test rules".

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 electromagnetic compatibility (EMC).

NOTE 3 : The special requirements for operation in potentially explosive atmospheres are not covered in this standard.

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

- Maximum ambient temperature, continuous duty: .... +40°C;
- Lowest ambient temperature: .... -20 °C;
- Service altitude: ....up to 2000 m;
- Relative humidity: .... in the range 30 % to 95 % (non condensing).

1.3 This standard covers specific hazards which could occur during the intended use of trucks. For hazards occurring during construction, transportation, commissioning, de-commissioning and disposal, reference should be made to EN 292.

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.

EN 292-1:1991	Safety of machinery - Basic concepts, general principles for design Part 1: Basic terminology, methodology
EN 292-2:1991	Safety of machinery - Basic concepts, general principles for design Part 2: Technical principles and specification
EN 954-1:1996	Safety of machinery - Safety related parts of control systems Part 1: General principles for design
EN 1050:1996	Safety of machinery - Risk assessment
EN 1175-1:1998	Safety of industrial trucks - Electrical reqirements Part 1: General requirements of battery powered trucks
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 60947-1:1991	Low-voltage switchgear and controlgear - Part 1: General rules (IEC 947-1:1988, modified)
EN 60947-4-1:1992	Low-voltage switchgear and controlgear - Part 4: Contactors and motor-starters Section one: Electromechanical contactors and motor-starters (IEC 947-4-1:1990)
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)
IEC 349:1991	Electric traction - Rotating electrical machines for rail and road vehicles
IEC 384-14:1993	Fixed capacitors for use in electronic equipment. Part 14: Sectional specification: Fixed capacitors for electromagnetic interference
ISO 5053:1987	Powered industrial trucks - Terminology

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

3 Definitions

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

3.1 live part: A conductor or conductive part intended to be energized in normal use.

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 rated rotational frequency of generator: The frequency assigned by the manufacturer. This frequency is equivalent to the rated frequency of the internal combustion engine, if the generator is directly coupled with the engine.

3.5 rated voltage of generator: For the generator two rated voltages is assigned by the manufacturer in accordance with the continuous rated output defined in A.2.3.1.

3.6 rated generator output: The output in kW at the terminals of the generator assigned by the manufacturer.

3.7 continuous rated output of generator: For the generator two continuous outputs are assigned. The first is determined by the temperature rise of the windings carrying the load current (higher value of the load-current and lower voltage); the second is determined by the temperature rise of the field windings at maximum excitation (lower value of the load-current with higher voltage). Both continuous rated outputs correspond to points of the full-load characteristic defined in A.3.1

4 List of hazards

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.

Hazard		Corresponding requirements	
4.1	Mechanical hazards (1)	5.4.1	Electricla circuit design
4.1.1	Impact by collision (1.6)	5.4.2	Travel control system
4.1.1.1	- when driven by the operator	5.4.3	Electronic travel control system
4.1.2	Loss of stability (1.11)	5.4.4	Speed limitation devices
	- from excess speed		
4.2	Electrical hazards (2)	5.1	Contactors
4.2.1	Electric shock (2.1)	5.2	Electric machines (motors and enerators)
4.2.2	Short circuit	5.3.1	Protection of circuits
4.2.3	Overloading	5.3.2	Overcurrent protective devices
		5.5.1	Conductors, insulation
		5.5.3	Cables, wiring
		5.5.4	Conductors, cross-sectional area
		5.5.5	Main current cables
		5.5.6	Wiring that flexes
		5.5.7	Cable specifications
		5.5.9	Cable insulation
		5.6.1	Degree of protection
		5.6.2	Protection against indirect contact
		5.6.3	Connecting to the frame
		5.6.4	Maximum voltages
		5.6.5	Equipotential bonding
		5.7	Dielectric test
		5.8	Insulation resistance test
4.4	Hazards generated by substances (7)	5.3.3	Protection of electrical machines
		5.5.2	Protection against fuel leakage
4.4	Ergonomic hazards (8)	5.5.8	Electrical circuit identification
4.4.1	Human error (8.6)	6.1	Electrical diagram
4.4.1.1	- when the truck is serviced	6.2	Safety checks
		6.3	Minimum marking
4.5 (10)	Hazards due to functional disorders	5.1	Contactors
		5.2	Electric machines
		5.4.1	Electrical circuit design
		5.4.2	Travel control
		5.4.3	Electronic travel control system
		5.4.4	Speed limitation
		5.5.6	Wiring that flexes
		5.5.7	External copper conductors