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SVENSK STANDARD SS-EN 1525

Handläggande organ	Fastställd	Utgåva	Sida
SVENSK MATERIAL- & MEKANSTANDARD, SMS	1997-11-28	1	1 (1+19)

Safety of industrial trucks – Driverless trucks and their systems

The European Standard EN 1525:1997 has the status of a Swedish Standard. This document contains the official English version of EN 1525:1997.

Swedish Standards corresponding to documents referred to in this Standard are listed in ”Catalogue of Swedish Standards”, issued by SIS. The Catalogue lists, with reference number and year of Swedish approval, International and European Standards approved as Swedish Standards as well as other Swedish Standards.

Säkerhet för industritruckar – Förarlösa truckar och deras system

Europastandarden EN 1525:1997 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 1525:1997.

Motsvarigheten och aktualiteten i svensk standard till de publikationer som omnämns i denna standard framgår av ”Katalog över svensk standard”, som ges ut av SIS. I katalogen redovisas internationella och europeiska standarder som fastställts som svenska standarder och övriga gällande svenska standarder.

ICS 53.060

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Postadress: SIS, Box 6455, 113 82 STOCKHOLM
Telefon: 08 - 610 30 00. *Telefax*: 08 - 30 77 57

Upplysningar om **sakinnehållet** i standarden lämnas av SMS.
Telefon: 08 - 459 56 00. *Telefax*: 08 - 667 85 42
E-post: info@sms-standard.se
Prisgrupp Q
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EN 1525

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Descriptors: handling equipment, industrial trucks, safety of machines, definitions, hazards, accident prevention, safety devices, safety measures, dangerous areas, utilization, information, marking

English version

Safety of industrial trucks – Driverless trucks and their systems

Sécurité des chariots de manutention – Chariots sans conducteur et leurs systèmes

Sicherheit von Flurförderzeugen – Fahrerlose Flurförderzeuge und ihre Systeme

This European Standard was approved by CEN on 22 June 1997.

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.

The European Standards exist 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.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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

Ref. No. EN 1525:1997 E

Contents

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 March 1998, and conflicting national standards shall be withdrawn at the latest by March 1998.

This European Standard is one of a series of standards for the safety of industrial trucks.

	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
prEN 1726-1	Part 1: General requirements
prEN 1726-2	Part 2: Additional requirements for trucks with elevating operator position and trucks specifically designed to travel with elevated loads
prEN 1551	Safety of industrial trucks - Self propelled trucks over 10 000 kg capacity
prEN 1459	Safety of industrial trucks - Self propelled variable reach trucks
	Safety of industrial trucks - Pedestrian propelled trucks
prEN 1757-1	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
prEN 1526	Safety of Industrial trucks - Additional requirements for automated functions on trucks
	Safety of Industrial trucks - Electrical requirements for trucks
prEN 1175-1	Part 1: Battery powered trucks
prEN 1175-2	Part 2: General requirements for internal combustion engine powered trucks
prEN 1175-3	Part 3: Specific requirements for the electrical power transmission systems of internal combustion engine powered trucks
prEN 1755	Safety of industrial trucks - Operation in potentially explosive atmospheres
prEN 12053	Safety of Industrial trucks - Test methods for measuring noise emissions
prEN 13564	Safety of Industrial trucks - Test methods for measuring visibility from self propelled trucks

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 Z, 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 harmonised standard to provide one means of conforming with the essential safety requirements of the Machinery Directive and associated EFTA Regulations.

The extent to which hazards are covered is indicated in the scope of this standard. In addition, driverless industrial trucks (hereinafter referred to as "trucks") and their systems should comply as appropriate with EN 292 for hazards which are not covered by this standard.

1 Scope

1.1 This European Standard applies to all trucks and their systems except:

a) trucks solely guided by mechanical means (rails, guides, etc);
b) trucks operating in areas open to persons unaware of the hazards.

1.2 For the purposes of this European Standard, a driverless industrial truck is a powered vehicle, including any trailers, designed to travel automatically in which the safety of operation does not depend on an operator. Remote controlled trucks are not considered driverless trucks.

1.3 For the purposes of this European Standard, a system comprises the control system, which may be part of the truck and/or separate from it, the guidance means and the battery charging system.

1.4 This European Standard deals with the technical requirements to minimise the hazards listed in clause 4 which can arise during the commissioning, operation and maintenance of trucks in accordance with the specifications given by the manufacturer or his authorised representative. In addition, trucks should comply as appropriate with EN 292 for hazards not covered by this standard or the applicable companion standards.

1.5 This European Standard covers specific hazards related to the automated functions of trucks and their systems listed in clause 4. This standard must be used in conjunction with one or more of the applicable companion standards listed in the Foreword.

1.6 The provision of a portable control unit does not classify the truck as a pedestrian controlled truck.

1.7 The environment of trucks can have a significant effect on their safe operation. Annex A establishes requirements for the preparation of the environment to eliminate the associated hazards. For the person responsible for the integration of the trucks into the workplace, Annex A is normative.

1.8 This European Standard does not establish the following additional requirements for:

a) operation in severe conditions (e.g. extreme climates, freezer applications, strong magnetic fields);
b) operation in environments subject to special rules (e.g. potentially explosive atmospheres);
c) electromagnetic compatibility;
d) transportation of passengers;
e) handling of loads the nature of which could lead to dangerous situations (e.g. molten metals, acids/bases, radiating materials);
f) parts of trucks requiring manual intervention during operation.

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 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 - Part 1: Basic terminology, methodology
EN 292-2:1991	Safety of machinery - Basic concepts - General principles of design - Part 2: Technical principles and specifications
EN 418:1992	Safety of machinery - Emergency stop equipment - Functional aspects
EN 953:1997	Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards
EN 954-1:1996	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design
prEN 1726-1:1996	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 1: General requirements
ISO 6292:1996	Powered industrial trucks - Brakes performance and component strength

3 Definitions

For the purposes of this European Standard, the following definitions apply:

3.1 **load**: Item to be handled with mass, dimensions, integrity and positioning in accordance with the manufacturer's specifications.

3.2 **bumper**: A device which generates a signal to stop the truck on physical contact with a person.

3.3 **actuating force**: The force applied to the bumper when the signal to stop the truck is generated.

3.4 **control system**: Automatic means which controls and manages the truck(s) and associated equipment.

3.5 **guide path**: Intended travel path under automatic control.

3.6 **load handling**: Lifting, lowering, load transfer and load manipulation (e.g. rotation, reach, tilting, clamping).

3.7 **modes of operation**

3.7.1 **automatic**: No operator intervention is required for operation.

3.7.2 **manual**: Operation is under the control of an operator.

3.8 **operator**: Any person who is responsible for the movement of the truck and the handling of the load.

3.9 **path**: Area swept by the truck with its load and its trailer(s) if towed.

3.10 **competent person**: Designated person, suitably trained and qualified by knowledge and practical experience, and in possession of the necessary instructions to enable the assigned task to be carried out.

3.11 **zones**

3.11.1 **common zone**: A zone not exclusively reserved for automated traffic.

3.11.2 **hazard zone**: Part of a common zone where there is an increased hazard e.g. due to inadequate clearance for personnel or where a load transfer operation takes place.

3.11.3 **restricted zone**: A physically separated zone reserved for automated traffic in which only authorised persons are permitted to enter.

4 List of hazards

The following hazards related to travelling and load handling of trucks 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.

Hazard	Corresponding requirement
4.1 Crushing	
- in path of truck	5.2 Braking system 5.4 Speed control 5.9.5 Personnel detection means
- between trailers	5.10 Operation with trailers
4.2 Direct electrical contact	
- with exposed connections	5.5 Protected battery charging connections
4.3 Electromagnetic radiation	Not dealt with
4.4 Programming errors	Not dealt with
4.5 Failure of control system	
- unexpected start-up	5.2 Braking system 5.9.1 Protective devices for rider operation 5.9.2 Protective devices for pedestrian operation
- communication error between control system and truck	Not dealt with
4.6 Restoration of energy supply	5.9.3 Warning systems
4.7 Falling objects	5.6 Load handling
4.8 Movement without an operator	5.2 Braking system 5.7 Steering system
4.9 Insufficient ability to stop	5.2 Braking system 5.9.4 Emergency stop device 5.9.5 Personnel detection means
4.10 Inadequate location of controls	5.3.1 Controls for temporary tasks 5.3.2 Hold-to-run controls 5.7 Steering system
4.11 Unauthorised start-up/use	5.1 Protection against unauthorised use
4.12 Lack of warning means	5.9.3 Warning systems

Hazard	Corresponding requirement
4.13 Insufficient instructions for operator	5.3.1 Controls for temporary tasks 7.1.2 Information on intended use of controls
4.14 Lack of stability	5.4 Speed control 5.6 Load handling 5.7 Steering system 5.8 Stability
4.15 Inadequate load holding devices	5.6 Load handling