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Mobile road construction machinery - Safety - Part 1: Common requirements

Bewegliche Straßenbaumaschinen - Sicherheit - Teil 1: Gemeinsame Anforderungen

Machines mobiles pour la construction de routes - Sécurité - Partie 1 : Prescriptions communes

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Mobile road construction machinery - Safety - Part 1: Common requirements

Machines mobiles pour la construction de routes - Sécurité - Partie 1 : Prescriptions communes

Bewegliche Straßenbaumaschinen - Sicherheit - Teil 1: Gemeinsame Anforderungen

This European Standard was approved by CEN on 17 August 2006.

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.

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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Foreword

This document (EN 500-1:2006) has been prepared by Technical Committee CEN/TC 151 “Construction equipment and building material machines — Safety”, 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of an identical text or by endorsement, at the latest by April 2007, and conflicting national standards shall be withdrawn at the latest by October 2008.

This document supersedes EN 500-1:1995.

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.

EN 500 ”Mobile road construction machinery — Safety” comprises the following parts:

— Part 1: Common requirements;

— Part 2: Specific requirements for road-milling machines;

— Part 3: Specific requirements for soil-stabilising machines and recycling machines;

— Part 4: Specific requirements for compaction machines;

— Part 6: Specific requirements for paver-finishers.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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 European Standard is a type C standard as stated in EN ISO 12100-1.

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

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.

1 Scope

1.1 This part of EN 500 specifies the common safety requirements for mobile road construction machinery[1)]. The EN 500 series is applicable to mobile road construction machinery as listed in Annex A. When no specific standard exists, EN 500-1 applies.

It specifies common requirements for the design and construction of mobile road construction machinery in order to protect workers from accidents and health hazards which could occur during operation, loading, transport and maintenance.

Additional specific requirements for certain types of mobile road construction machinery are given in parts 2 to 4 and 6 of this standard.

This part of this standard gives safety requirements for all types of mobile road construction machinery and shall be used in conjunction with one of the parts 2 to 4 and 6. These machine-specific parts do not repeat the requirements from part 1 but add to or replace the requirements for the type of mobile road construction machinery in question.

Machine-specific requirements in parts 2 to 4 and 6 take precedence over the respective requirements of this standard.

For types of mobile road construction machinery not dealt with in parts 2 to 4 and 6, EN 500-1 applies.

1.2 This European Standard deals with all significant hazards, hazardous situations and events relevant to mobile road construction machinery, when they are used as intended and under conditions of misuse which are reasonably foreseeable (see Clause 4).

This European Standard specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards as specified in Clause 4.

1.3 This European Standard applies to machines which are manufactured after the date of publication of this European Standard by CEN.

1) For travelling on traffic roads, the national traffic regulations apply.

2 Normative references

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.

CR 1030-1:1995, *Hand-arm vibration — Guidelines for vibration hazards reduction — Part 1: Engineering methods by design of machinery*

EN 3-7:2004, *Portable fire extinguishers — Part 7: Characteristics, performance requirements and test methods*

EN 286-2:1992, *Simple unfired pressure vessels designed to contain air or nitrogen — Part 2: Pressure vessels for air braking and auxiliary systems for motor vehicles and their trailers*

EN 418:1992, *Safety of machinery — Emergency stop equipment, functional aspects — Principles for design*

EN 811:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

EN 1050:1996, *Safety of machinery — Principles for risk assessment*

EN 12643:1997, *Earth-moving machinery — Rubber-tyred machines — Steering requirements (ISO 5010:1992 modified)*

EN 13309:2000, *Construction machinery — Electromagnetic compatibility of machines with internal electrical power supply*

EN 60204-1:1997, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:1997)*

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

EN 61310-1:1995, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, auditory and tactile signals (IEC 61310-1:1995)*

EN ISO 2860:1999, *Earth-moving machinery — Minimum access dimensions (ISO 2860:1992)*

EN ISO 2867:2006, *Earth-moving machinery — Access systems (ISO 2867:2006)*

prEN ISO 3411:2005, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope (ISO/DIS 3411:2005)*

EN ISO 3457:2003, *Earth-moving machinery — Guards — Definitions and requirements (ISO 3457:2003)*

EN ISO 3744:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 3746:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995)*

EN ISO 5353:1998, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point (ISO 5353:1995)*

EN ISO 6682:1995, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682:1986 including Amendment 1:1989)*

EN ISO 11201:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995)*

EN ISO 11688-1:1998, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

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)*

IEC 60364-4-41:2001, *Low-voltage electrical installations — Part 4- 41: Protection for safety — Protection against electric shock*

IEC 60364-5-55:2001, *Electrical installations of buildings — Part 5-55: Selection and erection of electrical equipment — Other equipment*

ISO 3795:1989, *Road vehicles and tractors and machinery for agriculture and forestry — Determination of burning behaviour of interior materials*

ISO 5006-1:1991, *Earth-moving machinery — Operator's field of view — Part 1: Test method*

ISO 6405-1:2004, *Earth-moving machinery — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 6750:2005, *Earth-moving machinery — Operator's manual — Content and format*

ISO 9244:1995, *Earth-moving machinery — Safety signs and hazard pictorials — General principles*

ISO 9533:1989, *Earth-moving machinery — Machine-mounted forward and reverse audible warning alarm — Sound test method*

ISO 10261:2002, *Earth-moving machinery — Product identification numbering system*

ISO 10570:2004, *Earth-moving machinery — Articulated frame lock — Performance requirements*

ISO 11112:1995, *Earth-moving machinery — Operator's seat — Dimensions and requirements*

ISO 11862:1993, *Earth-moving machinery — Auxiliary starting aid electrical connector*

ISO 12508:1994, *Earth-moving machinery — Operator station and maintenance areas — Bluntness of edges*

ISO 12509:2004, *Earth-moving machinery — Lighting, signalling and marking lights, and reflex-reflector devices*

ISO 13333:1994, *Earth-moving machinery — Dumper body support and operator's cab tilt support devices*

ISO 14396:2002, *Reciprocating internal combustion engines — Determination and method for the measurement of engine power — Additional requirements for exhaust emission tests in accordance with ISO 8178*

ECE R34, *Annex 5, Uniform provisions concerning the approval of vehicles with regard to the prevention of fire risks. Testing of fuel tanks of a plastic material*

3 Terms and definitions

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

3.1
mobile road construction machinery
machine intended for construction, maintenance and marking of roads

NOTE The machines are listed in Annex A.

3.2
machine mass

3.2.1
operating mass
mass of the base machine with all standard equipment, with or without cab, with or without ROPS etc., with operator (75 kg) plus half full fuel tank and all fluid systems, when applicable, with sprinkler water tank half full

3.2.2
maximum mass
operating mass with all components required for their attachment to the base machine (e.g. ballast and all combinable options), and full sprinkler water tank

3.3
hold-to-run control
device by which the operating function is only carried out as long as the control is actuated. The operation is automatically reset into hazardless conditions as the control is released

3.4
pedestrian-controlled machine
self-propelled mobile road construction machine where the control of the machine is undertaken by an attending operator or by remote control

4 List of significant hazards

This clause contains all significant hazards, as far as they are treated in the set of standards for mobile road construction machinery, identified by risk assessment as significant for mobile road construction machinery defined in 1.1 and which require action to eliminate or reduce risk.

The risks arising from the hazards listed in Annex F are eliminated or minimised by combining the technical measures given in Clause 5 and those given in the machine-specific parts.

5 Safety requirements and/or protective measures

5.1 General

Mobile road construction machinery shall comply with the safety requirements and/or protective measures of this clause.

In addition, the machines shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant which are not dealt with by this European Standard (e.g. sharp edges).

5.2 Lighting, signalling and marking lights and reflex-reflector devices

Self-propelled mobile road construction machines for ride-on operators shall be fitted with working lights.

Lighting, signalling and marking lights and reflex-reflector devices shall comply with the appropriate clauses of ISO 12509.

5.3 Operation and handling

5.3.1 Uncontrolled motion

Machine-, equipment- or attachment-movement from the holding position (except for setting controls by the operator), e.g. due to drifting and/or creeping (e.g. caused by leakage of oil) shall only be possible in such a way that these do not create a hazard to exposed persons. For additional requirements, see machine-specific parts of EN 500.

5.3.2 Retrieval, transportation, lifting and towing

5.3.2.1 General

The devices for retrieval, tie-down, lifting and towing may be the same if allowed by the configuration of the machine.

5.3.2.2 Lifting (slinging) points for lifting and loading

Appropriate lifting points (e.g. lugs, lifting-eyes or -lugs) shall be fitted to ensure safe loading, retrieval and transportation.

The attachments shall facilitate reliable fitting of the lifting tackles and be arranged in such a way as to contribute to safe anchoring of the machine during lifting and recovery.

For mobile road construction machinery with an operating mass less or equal to 40 kg, such lifting points can have the form of a handle.

The method of lifting heavy attachments, components and machines which are transported in parts shall be described in the instruction handbook.

Lifting points shall to be easily identified on the machine, e.g. marked by symbol 7.23 of ISO 6405-1:2004, and described in the instruction handbook.

5.3.2.3 Tie-down points

Appropriate tie-down points shall be provided for the safe transportation of the machines.

Tie down points shall to be easily identified on the machine, e.g. marked by symbol 7.27 of ISO 6405-1:2004, and described in the instruction handbook.

5.3.2.4 Towing points

Mobile road construction machinery with an operating mass greater than 2 000 kg shall be equipped with towing points (hooks, rings, ears) to allow slow towing and retrieval out of possible danger-zone. Their location, permissible forces, the procedure of towing as well as the maximum towing speed shall be clearly described in the instruction handbook.

5.3.2.5 Fixing of movable elements

Means shall be available to prevent moving of movable parts which could exceed the permissible transport width during transport (e.g. hydraulic or mechanical devices).

5.3.3 Pedestrian-controlled machinery

The maximum travel speed of mobile road construction machinery controlled by an attending operator shall be limited to 6 km/h. If the controls are located at the rear of the machine, the reverse speed shall be limited to 2,5 km/h.

When operating downhill at the maximum gradeability, the travel speed of the machine shall not increase more than 2 m/min with the speed selector in its pre-set position.

5.3.4 Steering system

Mobile road construction machinery shall be provided with a steering system that ensures safe steering with consideration to the rated speed of the machine and its stopping capability. Rubber-tyred mobile road construction machinery with a ride-on operator, having a speed capability exceeding 20 km/h, shall be equipped with a steering system that conforms to EN 12643. The steering shall be such that the movement of the steering control corresponds to the intended direction of steering.

5.3.5 Tyres and rims

Rims shall be easily identified (see e.g. ISO 4250-3). Instructions regarding safety rules, pressure, inflation and checking shall be provided in the operation manual.

Special precautions shall be taken when ballasted tyres are used and warnings shall be specified in the instruction handbook.

5.3.6 Storage facilities

Easily accessible storage facilities for the instruction handbook and for any special tools supplied shall be provided.

5.4 Operator's station

5.4.1 General

The operator’s station shall meet the following minimum requirements:

— operator's space envelope shall conform to prEN ISO 3411;

— edges shall be shaped in accordance with ISO 12508;

— the engine exhaust system shall direct the exhaust gas away from the operator and of the air inlet into the cab;

— floor material shall be slip-resistant (see 5.9);

— mobile road construction machines shall be designed so that the operator has sufficient visibility from the operator’s station in relation to the travel and work areas of the machine that are necessary for the intended use of the machine;

— if the requirements cannot be met by direct view and through rear view mirrors and where hazards due to restricted visibility exist, indirect visibility with, preferably CCTV or detecting systems, e.g. ultra-sonic warning device, can additionally be provided.

NOTE Visibility standards are under preparation.