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Obratovanje cestnih strojev - Varnost - 1. del: Splošne zahteve

Road operation machinery - Safety - Part 1: General requirements

Maschinen für den Straßenbetriebsdienst - Sicherheit - Teil 1 Grundlegende Sicherheitsanforderungen

Machines d'exploitation des routes - Sécurité - Partie 1 : Exigences générales

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Road operation machinery - Safety - Part 1: General requirements

Machines d'exploitation des routes - Sécurité - Partie 1
: Exigences générales

Maschinen für den Straßenbetriebsdienst - Sicherheit -
Teil 1 Grundlegende Sicherheitsanforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 151.

If this draft becomes a European Standard, 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.

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

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prEN 17106-1:2017 (E)**European foreword**

This document (prEN 17106-1:2017) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 13019:2001+A1:2008, EN 13021:2003+A1:2008, EN 13524:2003+A2:2014.

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 17016 consists of the following parts under the general title “Road operation machinery – Safety”:

- Part 1: General requirements
- Part 2: Specific requirements for road surface cleaning machines
- Part 3-1: Winter service machines - Specific requirements for snow clearing machines with rotating tools and snow ploughs
- Part 3-2: Winter service machines - Specific requirements for spreading machines
- Part 4-1: Road service area maintenance machines - Specific requirements for grass and brush cutting machines

Introduction

This European Standard is a Type C-standard as stated in EN ISO 12100.

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.

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1 Scope

This European Standard specifies the common safety requirements for road operation machinery.

This European Standard deals with the significant hazards common to road operation machinery, when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer associated with the whole life time of the machine (transportation, travel and work mode mounting and dismounting of equipment/attachments in service, routine maintenance, and storage).

NOTE 1 The requirements specified in this part of the standard are common to two or more families of road operation machinery.

This European Standard gives safety requirements for all types of road operation machinery and should be used in conjunction with parts 2 to 4-1. These machine specific parts do not repeat the requirements from part 1 but supplement or modify the requirements for the type of road operation machinery in question. Therefore, additional specific requirements are given in separate parts of this standard.

This European Standard applies to:

- a) road surface cleaning machines (as currently defined in EN 15429-1);
- b) winter maintenance equipment (as defined in groups 1 and 2 of EN 15144:2007);
- c) road service area maintenance machines for grass/brush cutting (as defined in EN 15436-1:2008)

This European Standard deals with:

- equipment permanently mounted on carrier vehicles;
- interchangeable equipment;
- self-propelled machinery with an integrated specially designed chassis;
- trailed machines;
- interfaces.

This European Standard deals with all significant hazards identified through a risk assessment pertinent to the machines within the scope of this standard when they are used as intended and under the conditions foreseen by the manufacturer (see Clause 4).

A machine which is a combination of several parts with different applications should conform to all relevant requirements of the standards referring to the corresponding parts of the machine.

For multipurpose machinery the parts of the standard that cover the specific functions and applications have to be used, e.g. sweeper used for spreading thawing material or snow removing machines with brooms and ploughs should use the relevant requirements of prEN 17106 parts 2 to 4-1.

This European Standard does not deal with:

- carrier vehicles, e.g. trucks, tractors, construction machinery, mobile industrial handling equipment;

NOTE 2 These requirements are covered in directives related to the construction of vehicles.

- demountable bodyworks on carrier vehicles (e.g. load platforms, boxes);
- risks associated with the operation of machines in potentially explosive atmospheres;

- pedestrian controlled and hand-held machines;
- remote controlled machines, except for the risks related to the working equipment only;
- lawn and garden equipment;
- machines for the maintenance of sports grounds;
- machines for agriculture, horticulture and forestry;
- earth-moving and mobile road construction machinery according to EN 474-1:2006+A4:2013 and EN 500-1:2006+A1:2009;
- road surface treatment machines according to EN 13020:2015;
- snow-grooming equipment according to EN 15059:2009+A1:2015;
- machines or components which are solely designed for clearing rails such as rail/tram-line sweepers or blowers;
- sweeping/cleaning equipment according to EN 60335-2-72;
- pit and sewer cleaning vehicles/-machines;
- refuse-collecting vehicles;
- airport machines and equipment;
- snow throwers according to ISO 8437-1.

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This European Standard does not include requirements which are covered in directives related to the construction of vehicles or national road regulations.

NOTE 3 For specific directives and/or road regulations, see bibliography.

The use in public road traffic is governed by the national regulations.

This European Standard does not deal with significant hazards associated with Electromagnetic compatibility (EMC).

This European Standard does not deal with significant hazards associated with vibration.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1037, *Safety of machinery - Prevention of unexpected start-up*

EN 15431:2008, *Winter and road service area maintenance equipments - Power system and related controls - Interchangeability and performance requirements*

EN 15432-1:2011, *Winter and road service area maintenance equipments - Front-mounted equipments - Part 1: Fixed front mounting plates*

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EN 15432-2:2013, *Winter and road service area maintenance equipments - Front-mounted equipments - Part 2: Interchangeability on lifting systems*

EN 16330:2013, *Winter and road service area equipment - Power system and related controls - Power hydraulic system and electric interfaces*

FprEN 60204-1:2016, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)*

EN ISO 2867:2011, *Earth-moving machinery - Access systems (ISO 2867:2011)*

EN ISO 3411:2007, *Earth-moving machinery - Physical dimensions of operators and minimum operator space envelope (ISO 3411:2007)*

EN ISO 3744:2010, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4254-1:2015, *Agricultural machinery — Safety — Part 1: General requirements (ISO 4254-1:2013)*

EN ISO 4413:2010, *Hydraulic fluid power - General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 4414:2010, *Pneumatic fluid power - General rules and safety requirements for systems and their components (ISO 4414:2010)*

EN ISO 6682:2008, *Earth-moving machinery - Zones of comfort and reach for controls (ISO 6682:1986, including Amd 1:1989)*

EN ISO 6683, *Earth-moving machinery - Seat belts and seat belt anchorages - Performance requirements and tests (ISO 6683)*

EN ISO 11201:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11204:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

EN ISO 11688-1:2009, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13732-1:2008, *Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1:2015, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13850:2015, *Safety of machinery - Emergency stop function - Principles for design (ISO 13850:2015)*

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

EN ISO 14120:2015, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)*

ISO 730:2009, *Agricultural wheeled tractors — Rear-mounted three-point linkage — Categories 1N, 1, 2N, 2, 3N, 3, 4N and 4*

ISO 3600:2015, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and format*

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

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO/DIS 5006:2016, *Earth-moving machinery — Operator's field of view - Test method and performance criteria*

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

ISO 7000:2014, *Graphical symbols for use on equipment — Registered symbols*

ISO 8759-1:1998, *Agricultural wheeled tractors — Front-mounted equipment — Part 1: Power take-off and three- point linkage*

ISO 9533:2010, *Earth-moving machinery — Machine-mounted audible travel alarms and forward horns — Test methods and performance criteria*

ISO 10968:2004, *Earth-moving machinery — Operator's controls*

ISO 11684:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles*

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

ISO/FDIS 15818:2016, *Earth-moving machinery — Lifting and tying-down attachment points — Performance requirements*

ISO 25119 (all parts), *Tractors and machinery for agriculture and forestry — Safety-related parts of control systems*

ISO 26262 (all parts), *Road vehicles — Functional safety*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

3.1

interface

device mounted on a machine to allow the installation of attachments and/or equipment

3.2

interchangeable equipment

attachment which is intended by design is assembled or dismounted with a carrier vehicle (e.g. machine, tractor, truck) by the operator himself in order to change its function or attribute a new function, in so far as this equipment is not a tool

3.3

self-propelled machine

specially designed chassis, where the working attachments are integrated and propelled by its own power source

Note 1 to entry: The self-propelled machine can be a ride-on machine, operator-assisted machine or pedestrian controlled machine fitted with a seat or a sulky.

3.4

trailed machine

vehicle which is designed to be towed by a self-propelled vehicle or tractor, permanently incorporates an implement or is designed to process materials, which may include a load platform designed and constructed to receive any tools and appliances needed for those purposes and to store temporarily any materials produced or needed during work

3.5

equipment permanently mounted

device which is fixed assembled with the machine and which cannot be changed by the operator

3.6

demountable bodywork

specially designed frame with superstructure that can be easily mounted on, removed from and transported by a suitable vehicle, e.g. flexible swap bodies, trailers and container chassis for combined transport by road, rail or ship

3.7

road surface cleaning machine

machine for removal of spoil on traffic areas, where the machine is permanently fixed or demountable from a carrier vehicle or specially designed chassis (see Annex B)

3.8

snow plough

machine to remove snow from the traffic area by pushing aside

3.9

snow clearing machine with rotating tool

self-propelled and attached machine with which snow can be removed from traffic areas by rotating means, accelerated and ejected by blower means, e.g. snow cutter, snow blower, snow cutter-blower and snow sweeper

3.9.1**snow cutter**

machine for snow clearing with the rotary tools set at a right angle to the longitudinal axis of the vehicle

3.9.2**snow blower**

machine for snow clearing with the rotary tools set parallel to the longitudinal axis of vehicle

3.9.3**snow cutter blower**

combination of a snow cutter and snow blower; snow is collected by the cutter and expelled by the blower

3.9.4**snow sweeper**

machine for snow clearing with rotating brushes

3.10**spreading machine****3.10.1****spreader**

machine for defined application of substances to traffic areas to maintain or to improve the skid resistance of the traffic area

3.10.2**sprayer**

machine able to spray liquid de-icing material on the traffic area

3.11**traffic area**

paved area on which there is vehicular and/or pedestrian traffic. Not included are rail tracks which are solely for rail-mounted traffic, as well as traffic areas inside buildings and underground

3.12**demountable equipment**

equipment that may be demounted from and remounted to the carrier vehicle

3.13**lashing point**

point or device (e.g. ring device) at the machine or at the demountable equipment which allows its lifting by an appropriate lifting device

3.14**hazard zone**

any zone within and/or around road operation machinery in which a person is exposed to risk of injury or damage to health

Note 1 to entry: Definitions of hazard zones are given in the separate parts of this standard.

3.15**operator**

person controlling the equipment while operating and/or driving the machine

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prEN 17106-1:2017 (E)**3.16****operator station**

area from which an operator controls the travel and/or work functions of the machine

3.17**normal operation**

use of the machine for the purpose intended by the manufacturer by an operator familiar with the machine characteristics and complying with the information for operation, routine maintenance and safe practices, as specified by the manufacturer in the operator's manual and by signs on the machine

3.18**routine maintenance**

maintenance that is specified in the periodic maintenance schedule of the operator's manual for performing scheduled daily/weekly/monthly maintenance on the machine

3.19**positive engagement (form locked engagement)**

engagement system which retains the attachment in the normal working position by a system of at least two components that engage each other perpendicular to the working forces such that the working forces do not tend to cause disengagement (e.g. pin in shear)

3.20**operator's station**

area from which an operator controls the travel and/or work functions of the machine

4 List of significant hazards

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See Annex A.

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NOTE Annex A (normative) contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as common to two or more machinery families and which require action to eliminate or reduce the risk.

5 Safety requirements and/or measures**5.1 Safety requirements and/or measures applicable to all machines****5.1.1 Fundamental principles, design guidance**

The machine shall be designed according to the principles of risk reduction specified in EN ISO 12100:2010, Clause 6, for hazards relevant but not significant.

5.1.2 Noise**5.1.2.1 General**

The technical information given in EN ISO 11688-1:2009 shall be used as means to design low-noise machinery.

NOTE 1 EN ISO 11688-1:2009 also gives useful information on noise-generation mechanisms in machinery.

NOTE 2 Noise generation may vary considerably between machinery types. Noise reduction measures are therefore dealt with in product specific standards.

5.1.2.2 Noise reduction by design

5.1.2.2.1 Noise reduction at source

Machines shall be so designed and constructed that risks resulting from the emission of airborne noise are reduced to the lowest possible level, taking account of technical progress and the availability of means of reducing noise, in particularly, at source.

The available information and technical measures for reducing noise at source (see for example EN ISO 11688-1) shall be taken into account in the design.

NOTE EN ISO 11688-2 provides useful information on noise generation mechanisms in machinery.

5.1.2.2.2 Noise reduction by protective measures

The following measures - if practicable - are among those that are suitable:

- a cab;
- encapsulation of the engine(s);
- exhaust silencer.

NOTE Guidelines for the design of enclosures can be found in EN ISO 15667.

5.1.2.3 Noise reduction by information

The operating instructions shall contain information on residual risks associated with noise (see 7.3.2).

5.1.2.4 Noise measurement

The measurement of the sound power and the emission sound pressure level at the operator's position shall be carried out in accordance with Annex B and the results shall be stated in the operator's manual.

5.1.3 Visibility

5.1.3.1 General

Visibility from the operating positions shall be such that the operator can operate the machine safely when used in its foreseen conditions and its intended use with regard to themselves and other persons and operating positions adjacent to the machine.

When it is necessary to aid visibility of the working area and equipment, additional visual aids shall be provided.

5.1.3.2 Closed circuit television system

If a closed circuit television system (CCTV) is fitted, it shall meet the following requirements:

The minimum size of the monitor screen sector for the rear view shall be 12,7 cm (approx. 5 inches) diagonal (4:3 or 16:9 format). The screen sector for the rear view can be used for other purposes e.g. reading or making adjustments or settings when the parking brake is activated, but not for other CCTV views.

NOTE Requirements for the installation of the monitor are given in the road safety regulations and truck cabin manufacturer guidelines.

CAUTION — The described CCTV systems are not related to road safety requirements.