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Mobile road construction machinery - Safety - Part 4: Specific requirements for compaction machines

Bewegliche Straßenbaumaschinen - Sicherheit - Teil 4: Besondere Anforderungen an Verdichtungsmaschinen

Machines mobiles pour la construction de routes - Sécurité - Partie 4: Prescriptions spécifiques pour compacteurs

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English Version

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Machines mobiles pour la construction de routes - Sécurité - Partie 4: Prescriptions spécifiques pour compacteurs

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This European Standard was approved by CEN on 9 January 2011.

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Foreword

This document (EN 500-4:2011) has been prepared by Technical Committee CEN/TC 151 Building material construction machinery and equipment — 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of an identical text or by endorsement, at the latest by August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.

This document supersedes EN 500-4:2006+A1:2009.

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 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.

For relationship with EU Directive, see informative Annex ZA which is an integral part of this document.

The following changes have been introduced during the revision of EN 500-4:2006+A1:2009:

— exclusion of machines for seated ride-on operated rollers with a drum width less than nominal 0,8 m;

— addition of warnings and instructions regarding use of machines with a drum width less than nominal 1 m;

— vibrating rollers, irrespective whether they are intended for ride-on operation, pedestrian- or remote-controlled are measured on a cushion/elastic underlay;

— non-vibrating rollers, irrespective whether they are intended for ride-on operation, pedestrian- or remote-controlled are measured on a rigid reflecting plane without load and engine operating at nominal power-output;

— vibratory rammers are measured on the gravel-track;

— vibratory plates are measured on the gravel-track;

— for pragmatic reasons the deletion of explosion rammers and non-vibrating towed rollers/equipment is suggested ancillary, because today explosion-rammers cannot be found in the market any longer and non-vibrating towed rollers/equipment represent a passive attachment without any power-source and a function based on static-load only.

EN 500 "Mobile road construction machinery — Safety" comprise 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, 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.

Introduction

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

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

This part of EN 500 specifies the safety requirements for compaction machines as defined in Clause 3 and deals with all significant hazards, hazardous situations and events relevant to compaction machines, when they are used as intended and under conditions of misuse which are reasonably foreseeable.

This document specifies additional requirements to and/or exceptions from EN 500-1 ”Common requirements”.

This part of EN 500 is not applicable for seated ride-on operated rollers with a drum width less than nominal 0,8 m.

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.

EN 500-1:2006+A1:2009, *Mobile road construction machinery — Safety — Part 1: Common requirements*

EN 954-1:1996, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60664 (all parts), *Insulation coordination for equipment within low-voltage systems*

EN ISO 3164:2008, *Earth-moving machinery — Laboratory evaluations of protective structures — Specifications for deflection-limiting volume (ISO 3164:1995)*

EN ISO 3450:2008, *Earth-moving machinery — Braking systems of rubber-tyred machines — Systems and performance requirements and test procedures (ISO 3450:1996)*

EN ISO 3471:2008, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements (ISO 3471:2008)*

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 6683:2008, *Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests (ISO 6683:2005)*

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

EN ISO 20643:2008, *Mechanical vibration — Hand-held and hand-guided machinery — Principles for evaluation of vibration emission (ISO 20643:2005)*

ISO 17063:2003, *Earth-moving machinery — Braking systems of pedestrian-controlled machines — Performance requirements and test procedures*

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
compaction machine
machine which compacts materials, e.g. rock fills, soil or asphalt surfacing, through a rolling, tamping, percussive or vibrating action of the working tool or a combination of the latter. It may be self-propelled, towed or carried as attachment to a carrying machine. A compaction machine may be controlled by direct control of an operator in physical contact with the machine (seated or standing on the machine, or walking behind operating the controls directly mounted on the machine), or indirect control without physical contact of an operator with the machine (remote controlled by wire or wireless in accordance with Annex A)

NOTE ISO 8811:2000; Clause 4 provides a methodology for a further sub-classification of vibratory and non-vibrating rollers.

Compaction machines are subdivided as follows:

3.1.1
vibratory roller
self-propelled or towed compaction machine with one or more metallic cylindrical bodies (drums), rubber tyres or a combination of the latter

NOTE The compaction of materials is performed through a rolling and directional oscillating action of the working tool.

3.1.1.1
vibratory roller for ride-on operations
self-propelled and direct controlled machine as defined in 3.1.1, where a seated or standing operator rides on the machine present at a machine integrated operator's station

3.1.1.1.1
vibratory single-drum roller
self-propelled and direct controlled compaction machine as defined in 3.1.1.1 with one vibrating metallic cylindrical body (drum) and two rubber tyres

3.1.1.1.2
vibratory tandem roller
self-propelled and direct controlled compaction machine as defined in 3.1.1.1 with one metallic cylindrical body (drum) in the front and one in the rear

NOTE The drums can be split.

3.1.1.1.3
vibratory combined roller
self-propelled and direct controlled compaction machine as defined in 3.1.1.1 with one or more metallic cylindrical body (drum) and more than two rubber tyres

3.1.1.1.4
vibratory three-wheel roller
self-propelled and direct controlled compaction machine as defined in 3.1.1.1 with one metallic body (drum) in the front (or rear) and two in the rear (or front)

NOTE The drums can be split.

3.1.1.2
vibratory pedestrian controlled roller
self-propelled and by walking operator directly controlled or attending operator indirectly controlled machine as defined in 3.1.1

3.1.1.3
vibratory towed roller
towed and indirectly controlled machine as defined in 3.1.1 with one or more metallic cylindrical bodies (drums) or rubber tyres which do not possess an independent drive system and where the operator's station is located at the towing unit

3.1.2
non-vibrating roller
self-propelled or towed compaction machine with one or more metallic cylindrical bodies (drums), rubber tyres or a combination of the latter

NOTE The compaction of materials is performed through a rolling action of the working tool.

3.1.2.1
pneumatic-tyre roller
self-propelled compaction machine as defined in 3.1.2 with three or more tyres in the front and the rear

3.1.2.2
static towed roller
towed machine as defined in 3.1.2 with one or more metallic cylindrical bodies (drums) or rubber tyres which do neither possess an independent drive system nor an independent vibration system and where the operator's station is located at the towing unit

3.1.3
vibratory plate
compaction machine with mainly flat base-plate which is transposed into vibration and moving into a predominantly horizontal direction by directional oscillation

NOTE 1 The compaction of materials is performed through an oscillating action of the working tool.

NOTE 2 ISO 19433:2008 provides a methodology for a further sub-classification of vibratory plates.

3.1.4
vibratory rammer
compaction machine with mainly a flat foot-plate (shoe), which is made to move in a predominantly vertical direction by displacement

NOTE The compaction of materials is performed through a percussive or a tamping action of the working tool or a combination of the latter.

3.2
braking system
system affecting all machine components between the operator and the wheels and drums, which effects the machine stopping and holding (see EN ISO 3450:2008 for further definition)

4 List of significant hazards

EN 500-1:2006+A1:2009, Annex F shall apply.

5 Safety requirements and/or protective measures

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

EN 500-1:2006+A1:2009, 5.2 shall apply.

5.2 Operation and handling

5.2.1 Retrieval transportation and towing

EN 500-1:2006+A1:2009, 5.3.2 shall apply.

5.2.2 Pedestrian-controlled rollers

5.2.2.1 General

EN 500-1:2006+A1:2009, 5.3.3 shall apply with the following addition:

5.2.2.2 Handle bar

To prevent dangerous vertical swinging of the steering element (handle bar) of the single-drum pedestrian-controlled rollers, movement of the handle in the vertical direction shall be not less than 0,2 m and not more than 1,4 m above the ground (see Figure 1).

Dimensions in millimetres

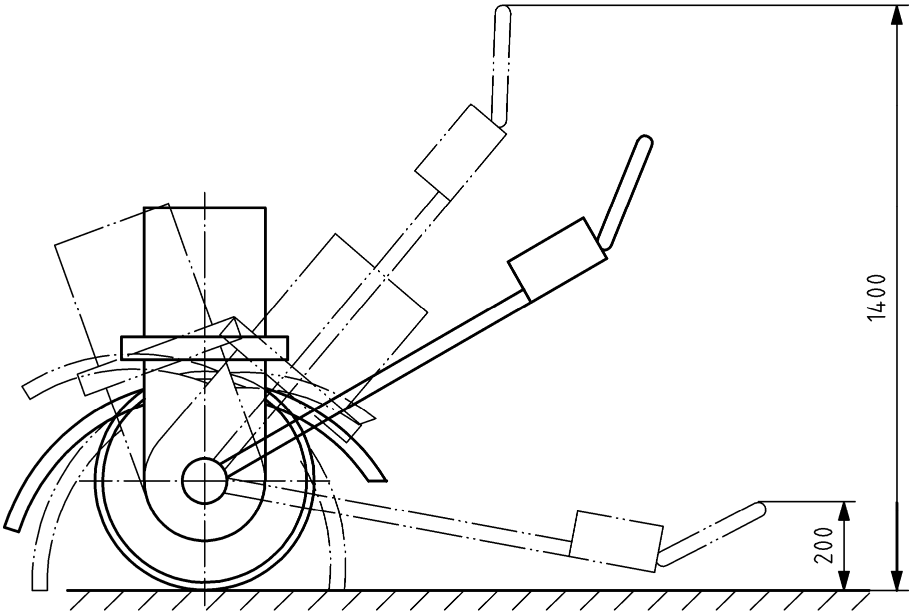


Figure 1 — Vertical swinging of single-drum walk-behind rollers

5.2.2.3 Stopping device against crushing

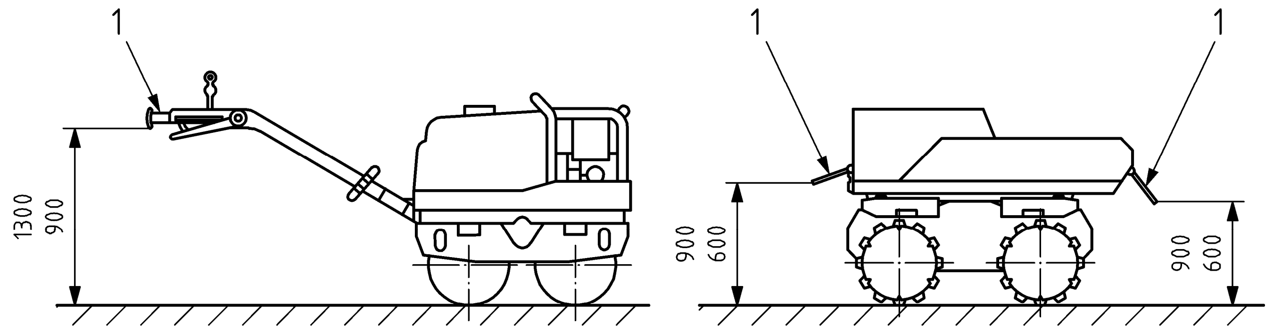
Pedestrian-controlled rollers shall be provided with a stopping device against crushing which is designed to prevent the operator from being trapped between the machine and an obstacle.

The device shall be so designed in a way to stop the machine in a distance that is less than the total operating range of the device.

This device shall have an effective operating force not exceeding 230 N.

The device shall be positioned according to Figure 2.

Dimensions in millimetres



a rollers with handle bar

b remote-controlled rollers

Key

1 stopping device

Figure 2 — Position of the stopping device at pedestrian-controlled rollers

5.3 Operator's station

EN 500-1:2006+A1:2009, 5.4.1 shall apply with the following addition:

— if the operator's position is offset from the space envelope width centreline, then the internal distance from the seat centreline to the side of the enclosure shall not be less than 295 mm.

5.4 Operator's seat

EN 500-1:2006+A1:2009, 5.5 shall apply.

5.5 Controls and indicators

5.5.1 General

EN 500-1:2006+A1:2009, 5.6 shall apply with the following addition:

5.5.2 Travel control of pedestrian-controlled machines with handle bar

The machine-travel control of pedestrian-controlled rollers shall be of the hold-to-run type.

5.5.3 Controls for towed machines

For towed vibratory-rollers, it shall be possible to control the on/off operate of the vibration from the operator's station on the towing unit.

5.5.4 Remote control of pedestrian-controlled rollers

5.5.4.1 Infrared remote control

Infrared remote-controlled pedestrian-controlled rollers shall conform to Annex A.