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Mobile road construction machinery — Safety —

Part 4:
Specific requirements for compaction machines

Machines mobiles pour la construction de routes — Sécurité —

Partie 4: Prescriptions spécifiques pour compacteurs

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 195, *Building construction machinery and equipment*.

ISO 20500 consists of the following parts, under the general title *Mobile road construction machinery — Safety*:

— *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 5: Specific requirements for paver-finishers*

— *Part 6: Specific requirements for mobile feeders*

— *Part 7: Specific requirements for slip form pavers and texture curing machines*

A list of all parts in the ISO 20500 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

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

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

Mobile road construction machinery — Safety —

Part 4:
Specific requirements for compaction machines

1 Scope

This part of ISO 20500, together with part 1, deals with all significant hazards for compaction machines 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 (see Annex D).

The requirements of this part are complementary to the common requirements formulated in ISO 20500-1.

This document does not repeat the requirements from ISO 20500-1, but adds or replaces the requirements for application for compaction machines. Rollers as defined in ISO 6165 are excluded from the scope of this standard.

The following significant and relevant hazards are not covered in this document:

— Lightning.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

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 5006:2017, *Earth-moving machinery — Operator's field of view — Test method and performance criteria*

ISO 6165:2012, *Earth-moving machinery — Basic types — Identification and terms and definitions*

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

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

ISO 15817:2012, *Earth-moving machinery — Safety requirements for remote operator control systems*

ISO 20643:2005+Amd1:2012, *Mechanical vibration — Hand-held and hand-guided machinery — Principles for evaluation of vibration emission — Amendment 1: Accelerometer positions*

ISO 20500-1, *Mobile road construction machinery — Safety — Part 1: Common requirements*

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
compaction machine
machine intended to densify materials, e.g. rock fills, soil or asphalt surfacing, through a tamping, percussive or vibrating action of the working tool or a combination of the latter

Note to entry: It can be self-propelled, towed or carried as attachment to a carrying machine. A compaction machine can be controlled by direct control of an operator in physical contact with the machine (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).

3.2
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 to entry: The compaction of materials is performed through an oscillating action of the working tool.

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

3.3
vibratory rammer
compaction machine with mainly a flat foot-plate (shoe), which is made to move in a predominantly vertical direction by displacement

Note to entry: The compaction of materials is performed through a percussive or a tamping action of the working tool or a combination of them.

4 Safety requirements and/or protective/risk reduction measures

4.1 General

Compaction machines shall comply with the safety requirements and/or protective/risk reduction measures of this clause. In addition, the machines shall be designed according to the principles of EN ISO 12100:2010 for relevant but not significant hazards which are not dealt with by this document.

Compaction machines shall comply with the requirements of ISO/DIS 20500-1, as far as not modified or replaced by the requirements of this part.

4.2 Visibility

4.2 of ISO 20500-1 does not apply.

4.3 Remote control

4.3.1 General

ISO 20500-1, 4.6.2.4 shall apply with the following modification:

Remote controlled non-riding machines shall be conform to Annex A of this standard.

4.3.2 Cable remote control

ISO 20500-1, 4.6.2.4 shall apply with the following addition:

The stretched cable length shall not be more than 4 m.

4.4 Starting

ISO 20500-1, 4.7.1 shall apply with the following exception:

— the requirement for a neutral start function does not apply to vibratory plates and vibratory rammers if they are furnished with a centrifugal clutch in their driving system;

— the requirement for prevention of unauthorized access to engine motor start does not apply to machines furnished with a mechanical starter (e.g. recoil starter, crank handle).

4.5 Stopping

4.5.1 General

ISO 20500-1, 4.7 shall apply with the following exceptions:

— hold-to-run control for forward and reverse function is not required for vibratory plates and vibratory rammers;

— an emergency stop is not required for vibratory plates and vibratory rammers.

ISO 20500-1, 4.7.4 does not apply.

4.5.2 Stopping device

For vibratory plates and vibratory rammers equipped with a centrifugal force clutch a separate means for stopping the movement is not required.

4.6 Operation and handling

ISO 20500-1, 4.3.2.3.2 applies with following modification:

Tie-down points are not required for machines < 300 kg, if structural parts of the machine can be used for tie-down.

4.7 Operator's places

The operator´s place(s) shall meet the following minimum requirements:

— edges shall be shaped in accordance with ISO 12508;

— the engine exhaust gas shall be directed away from the operator's place(s).

4.8 Electrical and electronic systems

4.8.1 Degree of protection

ISO 20500-1, 4.17.2 applies with following modification:

— electronic controls, connectors in control circuits, multi-pin connectors and control switches installed exterior of the machine or directly exposed to the environment, shall have a minimum protection of IP22 for switchgear assembly casing and IP23 for electrical engine casing of IEC 60529:1989+A1: 1999+A2:2013 (EN 60529:1991+A1:2000+A2:2013).

4.8.2 Batteries

ISO 20500-1, 5.17.4 shall apply with the following exceptions:

— the requirement for handles and/or grips on batteries does not apply to batteries < 10 kg.

4.9 Noise and vibration

4.9.1 Noise measurement of vibratory plates and vibratory rammers

ISO 20500-1, 4.19.2 and 4.19.3 shall apply with the following additions:

— the noise emission of vibratory plates and vibratory rammers shall be determined according to Annex B of this standard.

4.9.2 Vibration measurement of hand-guided machines

ISO 20500-1, 4.19.4 and 4.19.5 shall apply with the following additions:

— the hand-arm vibration of hand-guided machines shall be determined according to Annex C of this standard.

5 Verification of the safety requirements and/or protective/risk reduction measures

Safety requirements and/or protective/risk reduction measures of Clauses 4 and 6 of this document shall be verified according to Table 1.

Table 1 sets out verification methods which shall be applied for each safety requirement in this document.

Where X(s) is indicated in the table, the corresponding verification method(s) shall be applied.

Table 1 shall be read in conjunction with the corresponding clauses.

Table 1 includes the following verification methods:

a) calculation: to establish that the requirements of this document have been met;

b) visual verification: to establish that something is present (e.g. a guard, a marking, a document);

c) measurement: to show that the required numerical values have been met (e.g. geometric dimensions, safety distances, resistance of insulation of the electric circuits, results of physical tests);

d) functional tests: to show that the adequate signals intended to be forwarded to the main control system of the complete machine are available and comply with the requirements and with the technical documentation;

e) special verification: by reference to a standard which is mentioned in the corresponding clause.

Table 1 — Verification of safety requirements and/or protective/risk reduction measures

Clause number	Title	a) Calculation	b) Visual verification	c) Measurement	d) Functional test	e) Special verification
4	Safety requirements and/or protective/risk reduction measures					
4.1	General					
4.2	Visibility					
4.3	Remote control					
4.3.1	General					X
4.3.2	Cable remote control			X		
4.4	Starting		X			
4.5	Stopping					
4.5.1	General					
4.5.2	Stopping device		X			
4.6	Operation and handling		X			
4.7	Operator´s places		X			X
4.8	Electrical and electronic systems					
4.8.1	Degree of protection			X		X
4.8.2	Batteries		X	X		
4.9	Noise and vibration					
4.9.1	Noise measurement of vibratory plates and vibratory rammers			X		
4.9.2	Vibration measurement of hand-guided machines			X		
6	Information for use		X			
Annex A	Remote controls for machines with attending operator				X	X
Annex B	Noise-test-code for vibratory plates and vibratory rammers			X		X

Clause number	Title	a) Calculation	b) Visual verification	c) Measurement	d) Functional test	e) Special verification
Annex C	Measurement of the hand-arm vibration of hand-guided vibratory ground compaction machines			X		X
Annex D	Noise test code for vibratory plates exceeding a working width of 1 m			X		X

6 Information for use

Operator's manual ISO 20500-1, 6.2 shall apply with the following addition:

— instructions for the proper use including cleaning and maintenance of the water sprinkler system;

— safe procedure for transporting the machine.

Annex A
(normative)

Remote controls for machines with attending operator

A.1 General

ISO 15817:2012 applies with the following additions for wireless remote controls.

A.2 Safety requirements and measures

All travel movements shall be switched off automatically by the receiver if the distance between the transmitter hold by the operator and the machine is less than 2 m.

All travel movements shall be switched off automatically by the control system if the machine is leaving the work- and travel area (maximum distance between transmitter and machine less than 50 m).

If there is an insufficient state of charge concerning the battery of the transmitter, this state should be indicated (e.g. acoustically or optically) before the function of the equipment is affected in any way (e.g. alteration of the transmission of control commands).

Transmitters and receivers shall be assigned to each other.

ISO 15817:2012, 4.4.2.4 is considered to be fulfilled by a lockable storage place on the machine for the remote control box.

ISO 15817:2012, 4.5.3 applies with the following modification: An emergency stop on the machine is not required.

No movements shall be caused on connection of transmitter or receiver to a power source.

The alignment of the remote control shall not exceed horizontally ± 30°.

NOTE It is intended that this measure limits the possibility of a command being unintentionally issued due to reflecting walls or obstacles.

A.3 Components and equipment

It shall be possible to operate the controls while wearing protective gloves.

If programming is used in the process of transmitting commands in conjunction with the remote controls, it shall only be possible to alter the programme with a special tool.

The description of type shall clearly indicate the relationship between transmitter and receiver.

The following message shall be legibly and durably shown on the transmitter (either by text or by an appropriate pictogram):

“Check the operational functionality of the remote control system prior to use.”