



BSI Standards Publication

Mobile road construction machinery — Safety

Part 4: Specific requirements for
compaction machines

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

National foreword

This British Standard is the UK implementation of EN 500-4:2011. It supersedes BS EN 500-4:2006+A1:2009, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/513/1, Earth moving machinery (International).

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© BSI 2011

ISBN 978 0 580 68715 0

ICS 93.080.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2011.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 500-4

February 2011

ICS 93.080.10

Supersedes EN 500-4:2006+A1:2009

English Version

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

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

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

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

	Page
Foreword.....	6
Introduction	8
1 Scope	8
2 Normative references	8
3 Terms and definitions	9
4 List of significant hazards	11
5 Safety requirements and/or protective measures	11
5.1 Lighting, signalling and marking lights and reflex-reflector devices.....	11
5.2 Operation and handling	11
5.2.1 Retrieval transportation and towing	11
5.2.2 Pedestrian-controlled rollers.....	11
5.3 Operator's station.....	13
5.4 Operator's seat.....	13
5.5 Controls and indicators	13
5.5.1 General.....	13
5.5.2 Travel control of pedestrian-controlled machines with handle bar	13
5.5.3 Controls for towed machines	13
5.5.4 Remote control of pedestrian-controlled rollers	13
5.6 Starting	14
5.7 Stopping	14
5.7.1 General.....	14
5.7.2 Stopping device	14
5.7.3 Braking systems	14
5.8 Access system to operator's station and to maintenance points	15
5.9 Roll-over protective structure (ROPS).....	15
5.10 Noise and vibration.....	16
5.10.1 Noise measurement of vibratory plates and vibratory rammers	16
5.10.2 Noise measurement of rollers	16
5.10.3 Vibration measurement of hand-guided machines	16
6 Verification of safety requirements and/or protective measures	17
7 Information for the user	17
7.1 Warning signals and devices	17
7.2 Instruction handbook	17
7.3 Marking	18
Annex A (normative) Remote infrared controls for rollers with attending operator.....	19
A.1 General.....	19
A.2 Scope	19
A.3 Terms and definitions	19
A.4 Safety requirements and measures	19
A.5 Components and equipment	21
Annex B (normative) Noise-test-code for vibratory plates and vibratory rammers	23
B.1 Scope	23
B.2 Determination of the A-weighted sound power level.....	23
B.2.1 General.....	23
B.2.2 Measurement surface	24
B.2.3 Test procedure	28
B.2.4 Repetition of the test and calculation of the sound power level	28

B.3	Determination of the A-weighted emission sound pressure level at the operator's position.....	29
B.3.1	General	29
B.3.2	Operator's position	29
B.3.3	Test procedure.....	29
B.3.4	Repetition of the test and calculation of the emission sound pressure level.....	29
B.3.5	Determination of emission sound pressure spectra	29
B.3.6	Sound pressure level as a function of time	29
B.4	Installation and mounting conditions	30
B.4.1	General	30
B.4.2	Design of the test surface.....	30
B.4.3	Design of the test site	31
B.5	Operating conditions	33
B.6	Uncertainty	33
B.7	Information to be recorded.....	33
B.8	Information to be reported.....	34
B.9	Declaration and verification of noise emission values	35
Annex C (normative) Measurement of the hand-arm vibration of hand-guided vibratory ground compaction machines		36
C.1	General	36
C.2	Terminology	36
C.3	Quantities to be measured	36
C.3.1	R.m.s. value of the weighted acceleration	36
C.3.2	Frequency analysis	36
C.3.3	Time records	37
C.3.4	Other quantities to be measured	37
C.4	Measuring equipment	37
C.4.1	Requirements for the acceleration transducers	37
C.4.2	Fastening of the acceleration transducers	37
C.4.3	Frequency weighting filter.....	37
C.4.4	R.m.s. detector.....	37
C.4.5	Calibration	37
C.5	Measurement direction and measurement location	38
C.5.1	Measurement direction	38
C.5.2	Measurement location.....	40
C.6	Specification of working procedure	40
C.6.1	Operator.....	40
C.6.2	Other quantities to be determined (forces).....	40
C.6.3	Operating conditions	40
C.6.4	Requirements for the test site.....	40
C.6.5	Measurement procedure	41
C.7	Test report	41
C.7.1	Reference	41
C.7.2	Description of the object to be measured.....	41
C.7.3	List of measuring equipment	41
C.7.4	Fastening of the acceleration transducers	41
C.7.5	Operating conditions	41
C.7.6	Further specifications	41
C.7.7	Results	42
C.8	Report of results	42
C.9	Measurement uncertainty	42
Annex D (normative) Noise test code for vibratory rollers.....		43
D.1	Scope	43
D.2	Determination of the A-weighted sound power level	43
D.2.1	General	43
D.2.2	Measurement surface.....	43
D.2.3	Positioning of the machine.....	45
D.2.4	Repetition of the test.....	49

D.3	Determination of the A-weighted emission sound pressure level at the operators positions for vibratory rollers.....	49
D.3.1	General.....	49
D.3.2	Operator's positions	49
D.3.3	Enclosed operator's positions	49
D.3.4	Quantities to be determined	49
D.3.5	Microphone position(s)	49
D.3.6	Test procedure	49
D.3.7	Repetition of the test	50
D.4	Test conditions	50
D.4.1	Installation and mounting conditions.....	50
D.4.2	Operating conditions.....	50
D.5	Uncertainty	50
D.6	Information to be recorded	51
D.7	Information to be reported	51
D.8	Declaration and verification of noise emission values.....	52
Annex E (normative)	Noise test code for non-vibrating rollers	53
E.1	Scope	53
E.2	Determination of the A-weighted sound power level.....	53
E.2.1	General.....	53
E.2.2	Measurement surface	53
E.2.3	Positioning of the machine	55
E.2.4	Repetition of the test	56
E.3	Determination of the A-weighted emission sound pressure level at operator's positions for non-vibrating rollers	56
E.3.1	General.....	56
E.3.2	Operators positions	56
E.3.3	Enclosed operator's positions	56
E.3.4	Quantities to be determined	56
E.3.5	Microphone position(s)	56
E.3.6	Test procedure	56
E.3.7	Repetition of the test	57
E.4	Test conditions	57
E.4.1	Installation and mounting conditions.....	57
E.4.2	Operating conditions.....	57
E.5	Uncertainty	57
E.6	Information to be recorded	58
E.7	Information to be reported	58
E.8	Declaration and verification of noise emission values.....	59
Annex ZA (informative)	Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	60
Bibliography	61	

Figures

Figure 1 — Vertical swinging of single-drum walk-behind rollers	12
Figure 2 — Position of the stopping device at pedestrian-controlled rollers	13
Figure 3 — Minimum clearance of lower limbs at access to the operator's station on machines with articulated steering	15
Figure 4 — Deflection-limiting volume, front view, side view.....	16
Figure 5 — Warning decal	17

Figure B.1 — Arrangement of test positions for hand-guided vibratory plates and hand-guided vibratory rammers	25
Figure B.2 — Arrangement of test positions for remote controlled vibratory plates.....	27
Figure B.3 — Grading-size diagram of the material to be compacted (gravel).....	31
Figure B.4 — Test site and arrangement with test track	32
Figure C.1 — Directions of measurement and examples for attachment of the acceleration transducer.....	39
Figure C.2 — Arrangement of the coupling device on the drawbar	40
Figure D.1 — Basic length L	44
Figure D.2 — Arrangement of test positions for ride-on vibratory rollers	45
Figure D.3 — Arrangement of test positions for hand-guided vibratory rollers	46
Figure D.4 — Arrangement of test positions for remote controlled vibratory rollers	47
Figure D.5 — Arrangement of test positions for towed vibratory rollers.....	48
Figure E.1 — Basic length L	54
Figure E.2 — Microphone positions	55

Tables

Table B.1 — Coordinates of microphones	28
Table B.2 — Operating conditions	33
Table B.3 — Uncertainties applicable to gravel course	33
Table D.2 — Uncertainties applicable to cushion mounted machines	50
Table E.1 — Coordinates of microphone positions.....	54
Table E.2 — Uncertainties.....	57