



BSI Standards Publication

Railway applications — Track — Railbound construction and maintenance machines

Part 1: Technical requirements for running

National foreword

This British Standard is the UK implementation of EN 14033-1:2017. It supersedes BS EN 14033-1:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RAE/2, Railway Applications - Track.

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

The UK committee draws users' attention to the distinction between normative and informative elements, as defined in Clause 3 of the CEN/CENELEC Internal Regulations, Part 3.

Normative: Requirements conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted.

Informative: Information intended to assist the understanding or use of the document. Informative annexes do not contain requirements, except as optional requirements, and are not mandatory. For example, a test method may contain requirements, but there is no need to comply with these requirements to claim compliance with the standard.

The UK committee draws users' attentions to Annex C, which is erroneously shown as 'Normative'. The committee suggests that Annex C is informative because it is referred to in subclause 20.3.1 c) as an example, therefore making it not mandatory.

The UK committee draws users' attentions to Annex B, Table B.1, line 12, where the minimum energised overhead contact line height is shown as 4190 mm. It should be noted that this height is for machine design purposes only; the actual minimum wire height in some locations is lower than this, but special operational rules cover these areas.

The UK committee would also like to highlight that subclause 11.2 of BS EN 14033-1:2017 makes reference to Figure A.11 in EN 50238-1:2003. Unfortunately, BS EN 50238-1:2003 has an error in numbering and the correct figure, which should be used as a reference, is titled Figure A.22, Sensitive zone of wheel detector, in BS EN 50238-1:2003.

When speeds in km/h require unit conversion for use in the UK, users are advised to use equivalent values rounded to the nearest whole number. The use of absolute values for converted units should be avoided in these cases. Please refer to the table below for agreed conversion figures:

INS, RST and ENE speed conversions	
km/h	mph
5	3
10	5
20	10
30	20
80	50

INS, RST and ENE speed conversions	
km/h	mph
160	100
190	120

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

© The British Standards Institution 2018
Published by BSI Standards Limited 2018

ISBN 978 0 539 00285 0

ICS 45.120; 93.100

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 June 2017.

Amendments/corrigenda issued since publication

Date	Text affected
31 October 2017	Missing text added to National foreword
30 April 2018	Further information added to National foreword

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14033-1

May 2017

ICS 45.120; 93.100

Supersedes EN 14033-1:2011

English Version

**Railway applications - Track - Railbound construction and
maintenance machines - Part 1: Technical requirements
for running**

Applications ferroviaires - Voie - Machines de
construction et de maintenance empruntant
exclusivement les voies ferrées - Partie 1 :
Prescriptions techniques pour la circulation

Bahnanwendungen - Oberbau - Schienengebundene
Bau- und Instandhaltungsmaschinen - Teil 1:
Technische Anforderungen an das Fahren

This European Standard was approved by CEN on 2 October 2016.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

	Page
European foreword.....	7
Introduction	10
1 Scope	11
2 Normative references	11
3 Terms and definitions	15
4 Machine categorization.....	16
4.1 General rules.....	16
4.2 Demountable modules	16
5 Rolling stock gauge.....	17
5.1 General rules.....	17
5.2 Stowing of moveable machine parts in running positions	17
5.2.1 Component locks	17
5.2.2 Exemption from locking	17
5.2.3 Secondary support.....	17
5.2.4 Indication of locked state	18
5.2.5 Running.....	18
6 Frame.....	18
6.1 Design of the machine frame and attachments	18
6.2 Lifting and jacking points.....	18
6.3 Hook for stowage on boats and for towing	19
7 Bogie and running gear.....	20
7.1 General.....	20
7.2 Structural design	21
7.2.1 Structural design of the bogie frame.....	21
7.2.2 Other components	21
7.3 Wheel diameter	21
7.4 Static axle loading	22
7.5 Wheel profile	22
7.6 Shape and dimensions of the axles and wheelsets.....	22
7.7 Machine mass measurement.....	24
7.7.1 Axle arrangement and axle loads	24
7.7.2 Operational mass of the machine.....	25
7.7.3 Maximum mass of the machine without payload	26
7.7.4 Maximum mass of the machine with payload.....	26
7.7.5 Weighing method	26
7.8 Design for longitudinal compressive forces.....	27
7.9 Lifeguards	27
7.10 Obstacle deflector	28
8 Running safety.....	28
8.1 Running tests	28
8.2 Running safety on track twists	29
8.3 Running simulation	29
9 Brakes.....	29

9.1	Mandatory braking equipment	29
9.2	Characteristics	31
9.2.1	Performance	31
9.2.2	Brake testing	31
9.2.3	Mechanical characteristics of the brake	32
9.2.4	Automatic compressed air brake	33
9.2.5	Direct brake	34
9.2.6	Brake functions to keep a machine stationary	35
9.2.7	Dynamic brake	36
9.2.8	Emergency brake	36
9.2.9	Brake distributor controls	37
9.2.10	Other brake systems	37
9.3	Air reservoirs	37
9.4	Compressed air production of self-propelled machines	38
9.5	Brake hose connections	38
9.6	Special braking equipment	38
10	Buffing and draw gear	39
10.1	General	39
10.2	Conventional connection between machines/vehicles	39
10.2.1	Couplings	39
10.2.2	Buffers	39
10.2.3	Interaction of buffers and screw couplings	39
10.3	Connection between machines/vehicles	40
10.4	Interaction forces between the machine and coupled vehicles	41
10.5	Space to be kept free at the end of the machine	41
10.6	Shunters' handrail	42
10.7	Shunters' step	42
11	Operation of track circuits, axle-counters, treadles for level crossings, hot box detectors and unreleased brake detectors	42
11.1	Operation of track circuits	42
11.2	Operation of axle-counters and treadles for level crossings	42
11.3	Operation of hot axle box and unreleased brake detectors	43
11.4	On board hot box detection	43
11.5	Operation of other signalling systems	43
12	Running safety equipment	43
12.1	Indication equipment	43
12.2	Data recorder	43
13	Warning equipment and lights	43
13.1	Warning horns	43
13.1.1	Audibility	43
13.1.2	Warning horn sound pressure level	44
13.1.3	Protection	44
13.2	Headlights	44
13.3	Lamp brackets and marker lights	44
13.3.1	Lamp brackets	44
13.3.2	Arrangement of marker lights	46
13.3.3	Additional devices	47
13.3.4	Light switching arrangements	47
14	Drivers cabs and driving positions	47
14.1	General	47
14.2	Access to cab	47

14.2.1	General.....	47
14.2.2	Steps, handrails, platforms and railings.....	48
14.2.3	Doors.....	48
14.3	Interior of cab.....	48
14.3.1	Driver's position.....	48
14.3.2	Additional seats.....	48
14.3.3	Layout of driver's cab(s).....	49
14.3.4	Windscreens and forward facing windows.....	49
14.3.5	Other glazing.....	49
14.3.6	Cab side windows.....	49
14.4	Heating, cooling and ventilation.....	50
14.5	Internal lighting.....	50
14.6	Area of visibility.....	50
14.7	Driver's desks.....	51
14.8	Controls and indicators.....	51
14.9	Driver's and assistant's seats.....	52
14.10	Equipment and controls.....	52
14.10.1	Minimum equipment necessary for the driving of the machine.....	52
14.10.2	Equipment necessary for the monitoring of the machine.....	53
14.10.3	Arrangement of instruments for the driver's assistant.....	53
14.10.4	Miscellaneous accessories.....	53
14.11	Driver's vigilance device.....	53
15	Safety design features.....	54
15.1	Electrical protection measures.....	54
15.2	Mechanical protection measures.....	55
15.3	Fire protection.....	55
15.3.1	Material requirements.....	55
15.3.2	Specific measures for flammable liquids.....	55
15.3.3	Portable fire extinguishers.....	55
15.3.4	Fire detection and suppression systems.....	55
15.3.5	Driver's cab emergency exit.....	55
15.3.6	Floors.....	55
15.4	Personnel protection.....	55
15.5	Electromagnetic compatibility.....	56
16	Environmental conditions.....	56
16.1	General.....	56
16.2	Carriage and storage of fuel and oil.....	56
16.3	Tanks and equipment.....	56
16.3.1	Fuel tanks and pipework.....	56
16.3.2	Hydraulic oil circuit.....	57
16.4	Power equipment.....	57
17	Aerodynamic effects.....	57
17.1	Cross wind.....	57
17.2	Slipstream effect of machines with maximum speed greater than 160 km/h.....	57
17.3	Head pressure pulse.....	58
18	Design for recovery purposes.....	58
19	Machine marking.....	59
19.1	Lettering on the machine.....	59
19.2	Machine identification number.....	59
19.3	Details of the railway infrastructure where the machine is allowed to run.....	59

20	User information.....	59
20.1	General	59
20.2	Data for inclusion in National Vehicle Register	60
20.3	Instruction Handbook.....	63
20.3.1	Technical documentation	63
20.3.2	Technical documentation for operators	65
20.4	Maintenance instructions.....	67
20.4.1	Maintenance schedule	67
20.4.2	Maintenance manual	67
Annex A (normative)	Application of technical requirements to machines categories	69
Annex B (normative)	Special national conditions	74
Annex C (normative)	Machine diagram with gauge and critical points.....	86
Annex D (normative)	Free space at the end of the machine	87
Annex E (informative)	Steps, handrails and door handles	89
Annex F (informative)	Identification plate.....	90
Annex G (normative)	Marking	91
Annex H (normative)	On board safety equipment.....	93
Annex I (informative)	Structure of European Standards for track construction and maintenance machines.....	101
Annex J (informative)	Clause by clause comparison with Commission Regulation (EU) No 1302/2014 (Loc&Pas TSI).....	103
Annex ZA (informative)	Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC	107
Bibliography		112

Tables

Table 1 — Machine categories by maximum running speed	16
Table 2 — Static axle loading.....	22
Table 3 — Wheelset dimension	23
Table 4 — Distance between wheelsets.....	25
Table 5 — Compulsory braking equipment	30
Table 6 — Minimum compressed air production for the number of braked wheelsets.....	38
Table 7 — Limit criteria for slipstream effects on passengers on platform and on workers trackside	58
Table A.1 — Application of technical requirements to machines categories	70
Table B.1 — Special national conditions	79
Table G.1 — Marking	91
Table H.1 — On board safety equipment.....	93
Table I.1 — Structure of European standards for track construction and maintenance machines.....	102

Table J.1 — Clause by clause comparison with Commission Regulation (EU) No 1302/1014 (Loc&Pas TSI)	103
Table ZA.1 — Correspondence between this European Standard, the Commission Regulation (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the ‘rolling stock — locomotives and passenger rolling stock’ subsystem of the rail system in the European Union published in the Official Journal L356/228 on 12/12/2014 and Directive 2008/57/EC	108
Table ZA.2 — Correspondence between this European Standard, the Commission Decision 2012/88/EU of 25 January 2012 on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system published in the Official Journal L 51/1 on 23/2/2012 and Directive 2008/57/EC.....	109
Table ZA.3 — Correspondence between this European Standard, Commission Regulation (EU) No 1304/2014 of 26 November 2014 on the technical specification for interoperability relating to the subsystem ‘rolling stock — noise’ amending Decision 2008/232/EC and repealing Decision 2011/229/EU - published in the Official Journal L356/421 on 12/12/2014 and Directive 2008/57/EC	110
Table ZA.4 — Correspondence between this European Standard, the Commission Decision (EU) No 2011/314/EU of 12 May 2011 concerning the technical specification for interoperability relating to the ‘operation and traffic management’ subsystem of the trans-European conventional rail system - published in the Official Journal L 144/1 on 31/5/2011 and Directive 2008/57/EC	111
 Figures	
Figure 1 — Stowage and towing hook.....	20
Figure 2 — Wheelset dimensions	24
Figure 3 — Distance between buffer and drawhook	40
Figure 4 — Tail signal lamp brackets.....	45
Figure 5 — Tail signal lamps, required space – envelope.....	46
Figure 6 — Control directions.....	51
Figure C.1 — Machine diagram with gauge and critical points.....	86
Figure D.1 — Free space at the end of the machine	87
Figure D.2 — ISO 7010-W019 "Warning; Crushing"	88
Figure E.1 — Steps, handrails and door handles.....	89
Figure F.1 — Identification plate	90
Figure I.1 —Flowchart of European standards for track construction and maintenance machines	101