

# DIN EN 14033-1:2017-10 (E)

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

---

<b>Contents</b>		<b>Page</b>
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

<b>Annex A (normative) Application of technical requirements to machines categories .....</b>	<b>69</b>
<b>Annex B (normative) Special national conditions .....</b>	<b>74</b>
<b>Annex C (normative) Machine diagram with gauge and critical points .....</b>	<b>86</b>
<b>Annex D (normative) Free space at the end of the machine .....</b>	<b>87</b>
<b>Annex E (informative) Steps, handrails and door handles .....</b>	<b>89</b>
<b>Annex F (informative) Identification plate .....</b>	<b>90</b>
<b>Annex G (normative) Marking .....</b>	<b>91</b>
<b>Annex H (normative) On board safety equipment .....</b>	<b>93</b>
<b>Annex I (informative) Structure of European Standards for track construction and maintenance machines .....</b>	<b>101</b>
<b>Annex J (informative) Clause by clause comparison with Commission Regulation (EU) No 1302/2014 (Loc&amp;Pas TSI) .....</b>	<b>103</b>
<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC .....</b>	<b>107</b>
<b>Bibliography .....</b>	<b>112</b>
<b>Tables Table 1 -- Machine categories by maximum running speed .....</b>	<b>16</b>
<b>Table 2 -- Static axle loading .....</b>	<b>22</b>
<b>Table 3 -- Wheelset dimension .....</b>	<b>23</b>
<b>Table 4 -- Distance between wheelsets .....</b>	<b>25</b>
<b>Table 5 -- Compulsory braking equipment .....</b>	<b>30</b>
<b>Table 6 -- Minimum compressed air production for the number of braked wheelsets .....</b>	<b>38</b>
<b>Table 7 -- Limit criteria for slipstream effects on passengers on platform and on workers trackside .....</b>	<b>58</b>
<b>Table A.1 -- Application of technical requirements to machines categories .....</b>	<b>70</b>
<b>Table B.1 -- Special national conditions .....</b>	<b>79</b>
<b>Table G.1 -- Marking .....</b>	<b>91</b>
<b>Table H.1 -- On board safety equipment .....</b>	<b>93</b>
<b>Table I.1 -- Structure of European standards for track construction and maintenance machines ....</b>	<b>102</b>
<b>Table J.1 -- Clause by clause comparison with Commission Regulation (EU) No 1302/1014 (Loc&amp;Pas TSI) .....</b>	<b>103</b>
<b>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 .....</b>	<b>108</b>
<b>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</b>	

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