

DIN EN 14033-2:2012-03 (E)

Railway applications - Track - Railbound construction and maintenance machines - Part 2: Technical requirements for working (includes Amendment A1:2011)

Contents		Page
Foreword		5
Introduction		6
1	Scope	7
1.1	General	7
1.2	Validity of this European Standard	8
2	Normative references	8
3	Terms and definitions	9
3.1	General terms and definitions	9
3.2	Additional terms and definitions	9
4	Field of use of machines	10
5	Specific railway requirements and/or measures	10
5.1	Interaction with the Infrastructure	10
5.1.1	General	10
5.1.2	Stress induced into the rails	11
5.1.3	Auxiliary wheels, auxiliary guides and working parts	11
5.1.4	Maximum wheel loads	11
5.1.5	Loads applied to the ballast	13
5.1.6	Loads applied to the formation	14
5.1.7	Loads on structures	14
5.2	Stability and safety against derailment	14
5.2.1	Proof of overturning stability, machine stationary	14
5.2.2	Prevention of derailment during working movements	16
5.3	Working limit contour	18
5.3.1	General	18
5.3.2	Lateral limit of working zone	18
5.3.3	Working limit in the lower area	19
5.3.4	Working limit in the upper area	19
5.4	Working places	19
5.4.1	General	19
5.4.2	Arrangement of working places	19
5.4.3	Work positions - Visibility	19
5.4.4	Cabin windows used solely for working	20
5.5	Access to places of work	20
5.5.1	General	20
5.5.2	Access to work cabins	20
5.6	Influences on the environment	20
5.6.1	Exhaust gases	20
5.6.2	Noise levels outside the machine	20
5.7	Electromagnetic compatibility	20
5.8	Protection from risks due to electric traction equipment	20
5.8.1	General	20
5.8.2	Protection from live overhead lines	21
5.8.3	Minimum safety distance between machine parts and catenary	21
5.8.4	Minimum safety distance between machine parts and conductor rail	21
5.8.5	Special earthing devices and/or protection from return traction currents	22

5.9	Protection from the risks of fire	22
5.9.1	Fire detection and extinguishing systems	22
5.9.2	Fire extinguishing outside of the machine	22
5.10	Lighting for work	22
5.11	Visibility of machines	22
5.12	Braking	22
5.12.1	General	22
5.12.2	Stopping distances	22
5.12.3	Holding on gradients	23
5.13	!Warning systems	23
5.13.1	System for warning personnel of traffic on adjacent tracks	23
5.14	Recovery conditions	24
5.14.1	Emergency towing devices	24
5.14.2	Devices for packing away movable machine-parts	24
6	Verification of the conformity to the requirements and/or particular safety measures	24
6.1	General	24
6.2	Methods of testing	24
6.2.1	General	24
6.2.2	Visual check	24
6.2.3	Measurement	24
6.2.4	Functional test	24
6.2.5	Load test(s)	25
6.2.6	Specific verification/measurements	25
7	User information	25
7.1	General	25
7.1.1	Instructions	25
7.1.2	Special operating instructions	25
7.1.3	Maintenance information	26
7.2	Warning signs and pictograms	27
8	Marking and numbering of machines	27
8.1	Machine marking	27
8.2	Service number of the machine	27
Annex A (informative) Special national conditions		28
Annex B (normative) Check list for conformity		31
Annex C (normative) Warning plate		34
Annex D (normative) Working gauge		35
D.1	General	35
D.1.1	Introduction	35
D.1.2	Scope	35
D.1.3	List of symbols used	35
D.2	Determination of the horizontal working limit	38
D.2.1	General	38
D.2.2	Characteristics of the working track and the machine	39
D.2.3	Characteristics of a standard vehicle travelling on the adjacent line in service	39
D.3	Calculation of the reductions for the limit line of Figure D.2, applicable to the critical parts of the machine	39
D.4	Determination of clearance of the working parts	40
D.4.1	General	40
D.4.2	Method of calculation	41
D.4.3	Addition for curvature, for working parts (Zb)	41
D.4.4	Addition for cant (Zu)	41
D.4.5	Addition for safety (zs)	42
D.4.6	Kinematic clearance necessary for a standard vehicle on the track in service (RBk)	42
D.4.7	Possible exterior clearance for a working part (AWz)	42

Annex E (normative) Technical documentation	48	
E.1	General	48
E.2	General notices on the machine	48
E.3	Assembly drawing indicating the following:	48
E.4	Detailed drawings indicating the following:	48
E.5	Detailed drawings with the following indications	49
E.6	Technical details	49
E.7	Possible functions of the working parts	49
Annex F (normative) Limiting geometric parameters of the working track	50	
Annex G (normative) Pictograms	51	
G.1	Pictogram "Forbidden to climb if there is a catenary"	51
G.2	Pictogram "Working direction"	52
Annex H (informative) Certificates	53	
H.2	Working authorisation for the machine	54
H.2.1	Machine identification	54
H.2.2	General working characteristics (Assembly drawing to be enclosed, see E.3)	55
H.2.3	Declaration of the authorised body	55
Annex I (informative) Method of calculating safety from derailment	56	
I.1	Calculation of the safety against derailment	56
I.1.1	General	56
I.1.2	Calculation of the vehicle testing twist	57
I.1.3	Limit value of the safety against derailment	58
I.1.4	Guiding force and vertical wheel-load of the leading wheel	58
I.1.5	Guiding force and vertical wheel-load of the leading wheel in the working load case	59
I.1.6	Calculation of the torsional stiffness of the vehicle	59
Annex J (informative) Procedure for working authorisation	63	
J.1	General	63
J.2	Validity and application of the authorisation to work	63
J.2.1	Validity	63
J.2.2	Field of application	63
J.2.3	Enlargement of field of application	63
J.2.4	Withdrawal of the authorisation to work	63
J.2.5	Renewal of the authorisation to work	64
J.3	Applications for authorisation to work	64
J.4	Submission of the technical documentation	64
J.5	Type testing	64
J.6	Quality testing	64
J.7	Type approval	65
J.8	Examining the finished machine	65
J.9	Authorisation to work for machines identical to a machine that has received type approval	65
J.10	Refusal of working authorisation	65
J.11	Validity of working authorisation	65
J.12	Procedure for working agreement	67
J.13	Infrastructure managers and authorised bodies (non-exhaustive list)	68
Annex K (informative) Basis of calculations	71	
K.1	General	71
K.2	Machines without load control devices	71
K.3	Machines with load control devices	72

Annex L (informative) Instruction handbook	73
Annex M (informative) "Structure of European Standards for track construction and maintenance machines"	74
Bibliography	76