DIN EN 14033-2:2008-08 (E)

Railway applications - Track - Railbound construction and maintenance machines - Part 2: Technical requirements for working

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 before movement on adjacent lines ... 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 ... 30

Annex C (normative) Warning plate ... 33

Annex D (normative) Working gauge ... 34

D.1 General ... 34
D.1.1 Introduction ... 34
D.1.2 Scope ... 34
D.1.3 List of symbols used ... 34
D.2 Determination of the horizontal working limit ... 37
D.2.1 General ... 37
D.2.2 Characteristics of the working track and the machine ... 38
D.2.3 Characteristics of a standard vehicle travelling on the adjacent line in service ... 38
D.3 Calculation of the reductions for the limit line of Figure D.2, applicable to the critical parts of the machine ... 38
D.4 Determination of clearance of the working parts ... 39
D.4.1 General ... 39
D.4.2 Method of calculation ... 40
D.4.3 Addition for curvature, for working parts (Zb) ... 40
D.4.4 Addition for cant (Zu) ... 40
D.4.5 Addition for safety (zs) ... 41
D.4.6 Kinematic clearance necessary for a standard vehicle on the track in service (RBk) ... 41
D.4.7 Possible exterior clearance for a working part (AWz) ... 41

Annex E (normative) Technical documentation 47

E.1 General 47
E.2 General notices on the machine 47
E.3 Assembly drawing indicating the following: 47
E.4 Detailed drawings indicating the following: 47
E.5 Detailed drawings with the following indications 48
E.6 Technical details 48
E.7 Possible functions of the working parts 48

Annex F (normative) Limiting geometric parameters of the working track 49

Annex G (normative) Pictograms 50

G.1 Pictogram "Forbidden to climb if there is a catenary" 50
G.2 Pictogram "Working direction" 51

Annex H (informative) Certificates 52

H.2 Working authorisation for the machine 53
H.2.1 Machine identification 53
H.2.2 General working characteristics (Assembly drawing to be enclosed, see E.3) 54
H.2.3 Declaration of the authorised body 54

Annex I (informative) Method of calculating safety from derailment 55

I.1 Calculation of the safety against derailment 55
I.1.1 General 55
I.1.2 Calculation of the vehicle testing twist 56
I.1.3 Limit value of the safety against derailment 57
I.1.4 Guiding force and vertical wheel-load of the leading wheel 57
I.1.5 Guiding force and vertical wheel-load of the leading wheel in the working load case 58
I.1.6 Calculation of the torsional stiffness of the vehicle 58

Annex J (informative) Procedure for working authorisation 62

J.1 General 62
J.2 Validity and application of the authorisation to work 62
J.2.1 Validity 62
J.2.2 Field of application 62
J.2.3 Enlargement of field of application 62
J.2.4 Withdrawal of the authorisation to work 62
J.2.5 Renewal of the authorisation to work 63
J.3 Applications for authorisation to work 63
J.4 Submission of the technical documentation 63
J.5 Type testing 63
J.6 Quality testing 63
J.7 Type approval 64
J.8 Examining the finished machine 64
J.9 Authorisation to work for machines identical to a machine that has received type approval 64
J.10 Refusal of working authorisation 64
J.11 Validity of working authorisation 64
J.12 Procedure for working agreement 66
J.13 Infrastructure managers and authorised bodies (non-exhaustive list) 67

Annex K (informative) Basis of calculations 70

K.1 General 70
K.2 Machines without load control devices 70
K.3 Machines with load control devices 71

Annex L (informative) Instruction handbook 72

Annex M (informative) Structure of European Standards for track construction and maintenance machines 73

Bibliography 74