

**Raudteealased rakendused. Rööbastee. Maanteel ja raudteel liikuvad masinad ning juurdekuuluv lisavarustus. Osa 1: Tehnilised nõuded liikumiseks ja tööks KONSOLIDEERITUD TEKST**

Railway applications - Track - Road-rail machines and associated equipment - Part 1: Technical requirements for running and working CONSOLIDATED TEXT

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 15746-1:2010+A1:2011 sisaldab Euroopa standardi EN 15746-1:2010+A1:2011 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.10.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 12.10.2011.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 15746-1:2010+A1:2011 consists of the English text of the European standard EN 15746-1:2010+A1:2011.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.10.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 12.10.2011.

The standard is available from Estonian standardisation organisation.

ICS 93.100

### Standardite reprodutseerimis- ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:  
Aru str 10 Tallinn 10317 Eesti; [www.evs.ee](http://www.evs.ee); Telefon: 605 5050; E-post: [info@evs.ee](mailto:info@evs.ee)

### Right to reproduce and distribute belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:  
Aru str 10 Tallinn 10317 Estonia; [www.evs.ee](http://www.evs.ee); Phone: 605 5050; E-mail: [info@evs.ee](mailto:info@evs.ee)

English Version

**Railway applications - Track - Road-rail machines and  
associated equipment - Part 1: Technical requirements for  
running and working**

Applications ferroviaires - Voie - Machines rail-route et  
équipements associés - Partie 1: Prescriptions techniques  
pour la circulation et le travail

Bahnanwendungen - Oberbau - Zwei-Wege-Maschinen und  
zugehörige Ausstattung - Teil 1: Technische Anforderungen  
an das Fahren und den Arbeitseinsatz

This European Standard was approved by CEN on 11 March 2010 and includes Amendment 1 approved by CEN on 22 August 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.....	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
4 Machine categorisation .....	13
4.1 Categories .....	13
4.1.1 General.....	13
4.1.2 Example of Category 8 machine .....	13
4.1.3 Examples of Category 9 A machines.....	14
4.1.4 Examples of Category 9 B machines.....	15
4.1.5 Examples of Category 9 C machines.....	16
4.2 Type approval and categories .....	17
4.3 Type qualification for being in a train.....	17
5 Railway specific safety requirements and/or measures.....	17
5.1 General.....	17
5.2 Gauge.....	17
5.2.1 Running gauge.....	17
5.2.2 Road-rail machine in running configuration.....	18
5.2.3 Working limit .....	19
5.2.4 Determination of lateral limit of exceedance allowed on curves in working configuration.....	20
5.2.5 Limits in lower area in working and running configuration .....	20
5.2.6 Working limit in the upper area .....	21
5.3 Requirement for clearance of track obstacles.....	22
5.4 Interaction with the infrastructure .....	22
5.4.1 General.....	22
5.4.2 Main wheels.....	22
5.4.3 Auxiliary wheels, auxiliary guides and working parts .....	23
5.4.4 Loads applied to the ballast .....	23
5.4.5 Loads applied to the formation .....	23
5.4.6 Forces on structures as a function of axle load configurations.....	24
5.5 Running safety equipment.....	24
5.6 Running safety and prevention of derailment .....	24
5.6.1 General.....	24
5.6.2 Running safety for Category 8 machines and Category 9 machines with an admissible speed of $60 \text{ km/h} < v \leq 100 \text{ km/h}$ .....	24
5.6.3 Running safety for Category 9 machines with an admissible speed $v \leq 60 \text{ km/h}$ .....	25
5.6.4 Track test for all machines .....	26
5.6.5 Lifeguards.....	26
5.7 Stability and prevention of overturning .....	26
5.8 Machine frame and structure.....	26
5.8.1 Design of the machine frame.....	26
5.8.2 Lifting and jacking points .....	27
5.9 Inter machine couplings .....	27
5.9.1 General.....	27
5.9.2 Category 8 machines buffing and drawgear.....	28
5.10 Running gear.....	28

5.10.1	General .....	28
5.10.2	Distribution of the wheelset forces in running configuration.....	28
5.10.3	Machine rail wheel base.....	29
5.10.4	Rail wheel, wheel profile .....	29
5.10.5	Rail wheel arrangements .....	31
5.10.6	Load on rail wheels .....	31
5.10.7	Load on rail wheels in working condition.....	32
5.10.8	Operation of spring loaded points.....	34
5.10.9	Ratio of wheel load on guiding wheels to road axle load .....	34
5.11	Rail wheel suspension .....	35
5.11.1	Rail wheel suspension systems .....	35
5.11.2	Positively locked suspension .....	36
5.11.3	Active suspension.....	36
5.11.4	All suspension systems.....	36
5.12	Braking .....	36
5.12.1	General braking requirements .....	36
5.12.2	Specific requirements for Category 9 machines with continuous air brake system .....	36
5.13	Driving and working cabs and places .....	38
5.14	Controls .....	38
5.15	Visibility and audibility of the machine .....	38
5.15.1	Lighting in running configuration – marker lights .....	38
5.15.2	Lighting with failed engine .....	39
5.15.3	Lamp brackets .....	39
5.15.4	Light switching arrangements .....	41
5.15.5	Additional lighting requirements for Category 8 machines .....	41
5.15.6	Head lights .....	42
5.15.7	Lighting in working configuration .....	42
5.15.8	Horns in running configuration .....	42
5.15.9	Colour of the machine.....	42
5.16	Warning systems for personnel of traffic on adjacent lines in working configuration.....	43
5.16.1	General .....	43
5.16.2	Acoustic warning systems .....	43
5.16.3	Optical warning devices .....	43
5.16.4	Platform to set up a warning unit .....	43
5.17	Electrical equipment and earth bonding.....	44
5.17.1	Equipotential bonding.....	44
5.17.2	Antennae .....	44
5.17.3	Pantograph.....	44
5.18	Electromagnetic compatibility .....	44
5.18.1	Emissions from machines .....	44
5.18.2	Immunity of machines from railway environment .....	45
5.19	Operation of track equipment by Category 8 machines.....	45
5.19.1	Operation of track circuits.....	45
5.19.2	Operation of axle-counters and treadles .....	45
5.19.3	Operation of treadles associated with level crossings .....	45
5.19.4	Operation of hot axlebox and unreleased brake detectors.....	45
5.20	Power supply .....	46
5.21	Failure recovery conditions.....	46
5.21.1	Towing devices.....	46
5.21.2	Emergency device .....	46
5.22	On and off tracking.....	46
5.22.1	General .....	46
5.22.2	Use of turntables .....	46
5.23	Setting up and packing away .....	47
5.23.1	General .....	47
5.23.2	Emergency recovery of equipment .....	47
5.24	Mobile elevating work platform (MEWP) and excavators/loaders used as MEWPs.....	47
5.25	General and railway specific attachments.....	47
5.25.1	General .....	47

<b>5.25.2</b>	<b>General attachments for raising and lowering personnel .....</b>	<b>47</b>
<b>5.25.3</b>	<b>Railway specific attachments with rail guidance wheels .....</b>	<b>47</b>
<b>5.26</b>	<b>Exhaust .....</b>	<b>47</b>
<b>6</b>	<b>Marking and numbering of the machines .....</b>	<b>48</b>
<b>6.1</b>	<b>Warning signs and pictograms .....</b>	<b>48</b>
<b>6.2</b>	<b>Machine identification number .....</b>	<b>48</b>
<b>6.3</b>	<b>Details of the railway infrastructure where the machine is allowed to work .....</b>	<b>48</b>
<b>7</b>	<b>User information .....</b>	<b>48</b>
<b>8</b>	<b>Verification of the conformity to the requirements and/or particular safety measures .....</b>	<b>51</b>
<b>Annex A</b>	<b>(informative) Special national conditions .....</b>	<b>52</b>
<b>Annex B</b>	<b>(normative) Application of technical requirements to machine categories – Category of machine .....</b>	<b>60</b>
<b>Annex C</b>	<b>(normative) Check list for conformity .....</b>	<b>64</b>
<b>Annex D</b>	<b>(normative) Certificates .....</b>	<b>69</b>
<b>D.1</b>	<b>Certificate of type approval to EN 15746-1:2010 .....</b>	<b>69</b>
<b>D.2</b>	<b>Conformance control document for the technical requirements of EN 15746-1:2010 .....</b>	<b>70</b>
<b>D.2.1</b>	<b>Machine identification .....</b>	<b>70</b>
<b>D.2.2</b>	<b>General characteristics .....</b>	<b>71</b>
<b>Annex E</b>	<b>(normative) Machine numbering structure for Category 9 machines not designed to operate track signalling and control systems .....</b>	<b>72</b>
<b>E.1</b>	<b>General .....</b>	<b>72</b>
<b>E.2</b>	<b>Examples .....</b>	<b>74</b>
<b>Annex F</b>	<b>(normative) Machine identification plate for Category 9 machines not designed to operate track signalling and control systems .....</b>	<b>75</b>
<b>Annex G</b>	<b>(informative)  Structure of European Standards for track construction and maintenance machines  .....</b>	<b>76</b>
<b>Annex ZA</b>	<b>(informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC .....</b>	<b>78</b>
<b>Bibliography</b>	<b>.....</b>	<b>79</b>

## Foreword

This document (EN 15746-1:2010+A1:2011) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

This document includes Amendment 1, approved by CEN on 2011-08-22.

This document supersedes EN 15746-1:2010.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

**A1** EN 15746, *Railway applications — Track — Road-rail machines and associated equipment*, consists of the following parts:

- *Part 1: Technical requirements for running and working*
- *Part 2: General safety requirements* **A1**

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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 the United Kingdom.

## Introduction

 *deleted text* 

This European Standard is a type C standard as stated in EN ISO 12100-1:2003 and EN ISO 12100-2:2003.

The machinery concerned and the extent to which hazards, hazardous situation and events are covered are indicated in the scope of this European Standard.

Road-rail machines as specified in 3.1 form the object of this European Standard.

This European Standard deals with railway specific risks of the road-rail machines, defined in Clause 4 when running and working on railway infrastructures.

The safety requirements in relation to the Machinery Directive are dealt with in EN 15746-2:2010 of this series of standards.

The risks which exist in all mechanical, electrical, hydraulic, pneumatic and other components of machines and which are dealt with in the relevant European Standards are not within the scope of this European Standard. If necessary, references are made to appropriate standards of this type.



# 1 Scope

## 1.1 General

This European Standard deals with the technical requirements to minimize the specific railway hazards of self propelled road-rail machines – henceforward referred to as machines – and associated equipment, which can arise during the commissioning, the operation and the maintenance of machines when carried out in accordance with the specification given by the manufacturer or his authorised representative.

Part 1 of EN 15746 defines requirements for approval of the machine by an authorised body; Part 2 defines requirements for the machine to be declared conformant by the manufacturer, except in the case of machines classified under Annex 4 of the Machinery Directive, which require a conformity check in conjunction with a notified body.

Additional requirements can apply for running on infrastructures with narrow gauge or broad gauge lines, lines of tramways, railways utilizing other than adhesion between the rail and rail wheels and underground infrastructures.

This European Standard is also applicable for machines and associated equipment that in working configuration are partly supported on the ballast or the formation.

This European Standard does not apply to the following:

- the requirements for quality of the work or performance of the machine;
- the specific requirements established by the machine operator for the use of machines, which will be the subject of negotiation between the manufacturer and the infrastructure manager;
- running and working whilst not on rails;
- separate machines temporarily mounted on machines and associated equipment;
- demountable machines as defined in 3.2;
- trailers as defined in 3.3, including road-rail trailers.

This European Standard does not establish the additional requirements for the following:

- operation subject to special rules, e.g. potentially explosive atmospheres;
- hazards due to natural causes, e.g. earthquake, lightning, flooding;
- working methods;
- operation in severe working conditions requiring special measures, e.g. work in tunnels or in cuttings, extreme environmental conditions such as: freezing temperatures, high temperatures, corrosive environments, tropical environments, contaminating environments, strong magnetic fields;
- hazards due to errors in software;
- hazards occurring when used to handle suspended loads which may swing freely.

Other track construction and maintenance machines used on railway tracks are dealt with in other European Standards, see Annex G.

## 1.2 Validity of this European Standard

This European Standard applies to all machines which are ordered one year after the publication date by CEN of this European Standard.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 280, *Mobile elevating work platforms — Design calculations — Stability criteria — Construction — Safety — Examinations and tests*

EN 286-3, *Simple unfired pressure vessels designed to contain air or nitrogen — Part 3: Steel pressure vessels designed for air braking equipment and auxiliary pneumatic equipment for railway rolling stock*

EN 286-4, *Simple unfired pressure vessels designed to contain air or nitrogen — Part 4: Aluminium alloy pressure vessels designed for air braking equipment and auxiliary pneumatic equipment for railway rolling stock*

EN 791, *Drill rigs — Safety*

EN 12663:2000, *Railway applications — Structural requirements of railway vehicle bodies*

EN 13309, *Construction machinery — Electromagnetic compatibility of machines with internal electrical power supply*

EN 13715, *Railway applications — Wheelsets and bogies — Wheels — Wheels tread*

EN 14033-1:2008, *Railway applications — Track — Railbound construction and maintenance machines — Part 1: Technical requirements for running*

EN 14033-2:2008, *Railway applications — Track — Railbound construction and maintenance machines — Part 2: Technical requirements for working*

EN 14363:2005, *Railway applications — Testing for the acceptance of running characteristics of railway vehicles — Testing of running behaviour and stationary tests*

EN 14601, *Railway applications — Straight and angled end cocks for brake pipe and main reservoir pipe*

EN 15153-1, *Railway applications — External visible and audible warning devices for high speed trains — Part 1: Head, marker and tail lamps*

EN 15153-2, *Railway Applications — External visible and audible warning devices for high speed trains — Part 2: Warning horns*

EN 15273-2:2009, *Railway applications — Gauges — Part 2: Rolling stock gauge*

EN 15437 (all parts), *Railway applications — Axlebox condition monitoring — Interface and design requirements*

EN 15528, *Railway applications — Line categories for managing the interface between load limits of vehicles and infrastructure*

EN 15746-2:2010, *Railway applications — Track — Road-rail machines and associated equipment — Part 2: General safety requirements*

prEN 15954-1:2009, *Railway applications — Track — Trailers and associated equipment — Part 1: Technical requirements for running and working*

prEN 15954-2:2009, *Railway applications — Track — Trailers and associated equipment — Part 2: General safety requirements*

EN 50121-3-1:2006, *Railway applications — Electromagnetic compatibility — Part 3-1: Rolling stock — Train and complete vehicle*

EN 50121-3-2:2006, *Railway applications — Electromagnetic compatibility — Part 3-2: Rolling stock — Apparatus*

EN 50122-1, *Railway applications — Fixed installations — Part 1: Protective provisions relating to electrical safety and earthing*

EN 50238:2003, *Railway applications — Compatibility between rolling stock and train detection systems*

EN 60947 (all parts), *Low-voltage switchgear and controlgear*

EN ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

UIC 545, *Brakes — Inscriptions, marks and signs* <sup>1)</sup>

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

#### 3.1

##### **road-rail machine**

self propelled machine that can run on rails and ground

NOTE 1 It is normally a road vehicle adapted for running on rail also, but can be a specially designed rail vehicle for running on the ground also.

NOTE 2 It does not imply that the machine is suitable for use on the public road.

#### 3.2

##### **demountable machine**

machine that can run and work on rail and which is not intended to operate track signalling and control systems

NOTE 1 Such a machine is designed to get on and off track by its own means or with other lifting equipment. In the case of demounting by its own means these are not intended for running on the ground.

NOTE 2 Such a machine is permitted to work on the railway only under special operating conditions granted by the infrastructure manager and run under special conditions granted by the authorised body and/or the infrastructure manager.

#### 3.3

##### **trailer**

non-self propelled machine that can be hauled on rail wheels

---

1) May be purchased from: Railway Technical Publications (ETF), 16 Rue Jean Rey, F-75015 Paris.