BS EN 15746-3:2020

BSI Standards Publication

Railway applications — Track — Road-rail machines and associated equipment

Part 3: Technical requirements for running

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National foreword

This British Standard is the UK implementation of EN 15746-3:2020.

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 committee manager.

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

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association and is intended to support essential requirements of the EU legislation detailed in the European foreword. Annex ZA/ZZ describes how the publication relates to the legislation.

For the Great Britain market (England, Scotland and Wales), if the UK Government has designated this publication for conformity with UKCA marking legislation and has not amended the essential requirements of that legislation, Annex ZA/ZZ and any references to EU law in the publication should be read in accordance with the designation as applying to UK legislation in the same way as to EU law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. References to EU legislation are therefore still valid.

More information on legislation can be found at www.gov.uk.

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European foreword

This document (EN 15746-3:2020) 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of an identical text or by endorsement, at the latest by June 2021, and conflicting national standards shall be withdrawn at the latest by June 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN 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.

EN 15746, *Railway applications — Track — Road-rail machines and associated equipment*, is currently composed with the following parts:

— *Part 1: Technical requirements for travelling and working*;

— *Part 2: General safety requirements*;

— *Part 3: Technical requirements for running*;

— *Part 4: Technical requirements for running, travelling and working on urban rail*.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

This European Standard was prepared to meet the essential requirements of EU Directives to facilitate an open market for goods and services.

This document is the third of a series of four parts of the European Standard, *Railway applications — Track — Road-rail machines and associated equipment*, dealing with railway specific risks of the road-rail machines when running, travelling and working on railway infrastructures:

— Part 1 covers the technical requirements for the machines in travelling and working modes, and is applicable for all machines.

— Part 2 covers the safety requirements for the machines in travelling and working modes; this is a document harmonized with the European Machinery Directive 2006/42/EC.

— Part 3 covers the essential requirements for the machines that have a running mode and run on tracks within the scope of the Railway Directive 2007/58/EC; this is a document harmonized with the Railway Interoperability Directive 2008/57/EC and its associated Technical Specifications for Interoperability (TSI).

— Part 4 covers the technical requirements for the machines intended to have running, travelling and/or working mode on urban rail.

Part 1 defines requirements for approval of the machine for use on the railway. Depending on the decision of the Infrastructure Manager or National rules the assessment of conformance could be by the Infrastructure Manager concerned, by a third party assessor or declaration of conformity by the manufacturer.

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.

Part 3 defines requirements for running on the European railway network. Assessment of conformity is by a notified body as prescribed in the Railway Interoperability Directive.

Part 4 defines requirements for approval of the machine for use on urban rail. Depending on the decision of the controller of the network or National rules the assessment of conformance could be by the Urban Rail Manager concerned, by a third party assessor or declaration of conformity by the manufacturer.

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. Where necessary, references are made to appropriate standards of this type.

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1 Scope

1.1 General

This document deals with the technical requirements to minimize the specific railway hazards of self-propelled road-rail machines, as defined in EN 15746-1:2020, 3.1, henceforward referred to as machines, when designed and intended for running on European railways within the scope of European Directive 2007/58/EC.

The running mode is an option designed by the manufacturer which permits the use of the machine on a specified railway infrastructure without the need for special operational rules.

NOTE 1 The use of special track safety equipment (i.e. part of automatic train protection systems) does not necessarily mean that the machine has a running mode; some Infrastructure Managers use such equipment as means of protection for machines in travelling and/or working modes.

NOTE 2 This document is written for 1 435 mm nominal track gauge; special requirements can apply for running on infrastructures with narrow gauge or broad gauge lines.

Urban rail and railways utilizing other than adhesion between the rail and wheels are not included in this document.

This document does not apply to the following:

— 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;

— travelling and working both on and off rails;

— running on urban rail.

For a road-rail machine it is assumed that an EU road permissible host vehicle will offer an accepted safety level for its designed basic functions before conversion. Unless explicitly stated otherwise in a particular clause this specific aspect is not dealt with in this European Standard.

1.2 Validity of this document

This document applies to all machines which are within the scope of the Commission Regulation (EU) No 1302/2014 for locomotives and passenger rolling stock.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12663-1:2010+A1:2014, *Railway applications — Structural requirements of railway vehicle bodies — Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)*

EN 12663-2:2010, *Railway applications — Structural requirements of railway vehicle bodies — Part 2: Freight wagons*

EN 14033-1:2017, *Railway applications — Track — Railbound construction and maintenance machines — Part 1: Technical requirements for running*

EN 14033-2:2017, *Railway applications — Track — Railbound construction and maintenance machines — Part 2: Technical requirements for travelling and working*

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EN 14363:2016+A1:2018, *Railway applications — Testing and Simulation for the acceptance of running characteristics of railway vehicles — Running Behaviour and stationary tests*

EN 15153-1:2020, *Railway applications — External visible and audible warning devices for trains — Part 1: Head, marker and tail lamps*

EN 15273-2:2013+A1:2016, *Railway applications — Gauges — Part 2: Rolling stock gauge*

EN 15437-1:2009, *Railway applications — Axlebox condition monitoring — Interface and design requirements — Part 1: Trackside equipment and rolling stock axlebox*

EN 15437-2:2012, *Railway applications — Axlebox condition monitoring — Interface and design requirements— Part 2: Performance and design requirements of on-board systems for temperature monitoring*

EN 15528:2015, *Railway applications — Line categories for managing the interface between load limits of vehicles and infrastructure*

EN 15746-1:2020, *Railway applications — Track — Road-rail machines and associated equipment — Part 1: Technical requirements for travelling and working*

EN 15746-2:2020, *Railway applications — Track — Road-rail machines and associated equipment — Part 2: General safety requirements*

EN 50617-2:2015, [1] *Railway applications — Technical parameters of train detection systems for the interoperability of the trans-European railway system — Part 2: Axle counters*

EN 62625-1:2013,[2] *Electronic railway equipment — On board driving data recording system — Part 1: System specification (IEC 62625-1:2013)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 15746-1:2020 and EN 15746-2:2020 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

[1] As impacted by EN 50617-2:2015/AC:2016.

[2] As impacted by EN 62625-1:2013/A11:2017.

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4 Machine categorization

4.1 Categories

The machines are divided into four categories as shown in EN 15746-1:2020, Clause 4.

4.2 Type qualification for being in a train

4.2.1 Category 8 machine in running mode

Machines of Category 8 may be part of a train, but only under the conditions prescribed by the railway undertaking of such a train and/or by the Infrastructure Manager.

4.2.2 Category 9 machine in running mode

The machine cannot be incorporated within a train but shall be designed and intended to operate signalling and control systems, and shall comply with this standard.

NOTE The acceptance procedures for access to the railway infrastructure are likely to differ between running mode and travelling/working modes

A compatibility assessment will need to be undertaken to ensure the signalling command and control system fitted on the machine is compatible with the line to be run upon.

5 Railway specific safety requirements and/or measures

5.1 General

Machines shall comply with the safety requirements and/or protective measures in accordance with EN 15746-1:2020, Clauses 5 and 6, and this standard.

5.2 Rolling stock gauge

5.2.1 Running gauge

Except in the lower area, machines in running mode shall meet the dimensional requirements of EN 15273-2. The critical points near the limits of the permissible kinematic gauge, see EN 14033-1:2017, Annex C, shall be recorded in the technical documentation as shown in Clause 7, b), 3), i).

In the lower area deviations could be permitted by the Infrastructure Manager for machines according to Category 9 B and Category 9 C and equivalent machines belonging to Category 8 to accommodate road wheels, as shown in EN 15746-1:2020, Figure 5. The requirement is that the machine does not damage the infrastructure.

NOTE 1 The G1 Profile in EN 15273-2:2013+A1:2016, Figure A.4 meets the cross acceptance gauging requirements for the majority of mainland European countries.

NOTE 2 National conditions may apply to this exceedance amount, see Annex A.

Machines intended to run on infrastructures with more restrictive gauges shall conform to the specific rules of those infrastructures and the corresponding restrictions shall be indicated in the instruction handbook.

No metallic part of the vehicle shall be permitted, under any circumstance of predictable use and wear, to encroach into the area outside the lower vehicle gauge shown in EN 15273-2:2013+A1:2016, Figure A.6.

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5.2.2 Machine in running mode

5.2.2.1 Stowing of moveable machine parts in running mode

When the machine is in the running mode any movable equipment which has the capacity to go outside the gauge shall be capable of being stowed in a manner which prevents accidental or unintended movement out of the gauge. All such moveable parts and assemblies forming part of the machine that are unpacked in order to allow the machine to work in rail and non-rail mode shall, in their stowed state, be secured by devices capable of resisting the foreseeable forces encountered during running, which shall not rely upon a power source to retain the locking function. Moveable parts shall be held by either:

— efficient locks. The visible positive locking components in running mode shall be painted in red. If the locking mechanism is powered, the control of locking should preferably be possible from inside the machine gauge;

  or

— check valves on hydraulic systems, which shall prevent movement and be fail safe.

It shall be obvious to anyone checking the machine that these parts of the machine are locked in their stowed position. Furthermore, for locking devices operable from the cab, either a red warning light shall illuminate on the driver's desk to indicate if any moveable part of the machine is not locked, or a green light shall indicate on the driver's desk that all moveable parts of the machine are locked.

5.2.2.2 Operating controls in running mode

When in running mode, all operating controls not related to running, including locking devices, shall be deactivated.

5.2.3 Limits in lower area in running mode

Machines, where permitted by the Infrastructure Manager to exceed the lower gauge area (see EN 14033-2:2017, Annex D) as shown in EN 15746-1:2020, 5.2.1, shall have any operating restrictions stated on the type approval certificate.

5.3 Running safety equipment

5.3.1 Indication equipment

Machines with a running mode shall be fitted with special equipment specific for running safety on specific infrastructures, see EN 14033-1:2017, Annex J.

The controls for this equipment shall be located in each driving cab.

5.3.2 Data recorder

Machines with a running mode shall carry at least one data recorder compliant with EN 62625-1:2013 [2], 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.3.1.3, 4.3.1.4 and 4.3.1.6, where required by the specific national safety authority; see Annex A.

5.4 Safety against derailment

5.4.1 General

The aim of the following requirements is to provide the same level of confidence for safety against derailment on the operating track as given by the acceptance procedures defined in EN 14363:2016+A1:2018, 6.1 and Clause 7.

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5.4.2 Safety against derailment for machines

First type approved machines shall follow the acceptance procedure according to EN 14363:2016+A1:2018:

— Subclause 6.1: the most adversely loaded condition when moving along the track in running mode shall be investigated;

— Clause 7 in running mode: when using EN 14363 the machine is described as a "special vehicle" due to the low numbers of these machines, as defined in EN 14363:2016+A1:2018, 3.15. In some cases EN 14363 does not have specific requirements for "special vehicles", in such case the machines shall be assigned to a vehicle type most applicable to their design.

The running characteristics of a machine or a machine type are permitted to be determined by running tests or by reference to a similar type approved machine.

A "similar type approved machine" is a machine with similar configuration and running under similar conditions, which can be used as a reference for the test exemption of a new machine, according to the requirements of EN 14363:2016+A1:2018, 5.3.1 and Table U.1.

When running tests are required, they should be carried out by an authorized body or by the manufacturer of the machine, if the manufacturer is recognized as a testing body by the accreditation body.

5.4.3 Dynamic tests on track for first type approved machines

After the tests shown in 5.4.2 have been successfully undertaken the first type approved machine shall have actual dynamic tests on track undertaken in the most adversely loaded condition in the running mode when moving along the track at its maximum speed. Where the maximum speed is limited for specific track conditions this shall be recorded in the instruction handbook, see Clause 7, a), 3), iii) to x) and detailed on the identification plate EN 14033-1:2017, Annex F. These tests shall be carried out on track shown in a) to d):

a) the suspension is not detrimentally excited by a representative range of track conditions;

b) the machine is able to run over raised check rails and guard rails, the height of these being specified by the Infrastructure Manager;

c) where the machine is stated to run in areas of retarders (track mounted braking system) the machine is able to run over these devices without derailing

d) the machine does not derail while going through switches, crossings and curves.

NOTE One possible method to prove safety against derailment in switches and crossing for machines with small wheels is given in EN 14363:2016+A1:2018, Annex E.

These tests should be carried out by an authorized body or by the manufacturer of the machine if the manufacturer is recognized as a testing body by the authorized body.

When doing $\Delta Q/Q$ test the Q is the mean wheel load of the axle and the ΔQ is the maximum wheel unloading due to the test conditions applied.

5.4.4 Railhead clearing devices

Machines shall be equipped with devices as described in EN 15746-2:2020, 5.10.2 and/or 5.10.3.

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