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Railway applications - Track - Road-rail machines and associated equipment - Part 2: General safety requirements

Bahnanwendungen - Oberbau - Zwei-Wege-Maschinen und zugehörige Ausstattung - Teil 2: Allgemeine Sicherheitsanforderungen

Applications ferroviaires - Voie - Machines rail-route et équipements associés - Partie 2 : Prescriptions générales de sécurité

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 15746-2:2010) 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of an identical text or by endorsement, at the latest by October 2010, and conflicting national standards shall be withdrawn at the latest by October 2010.

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 Annexes ZA, ZB and ZC, which are integral parts of this document.

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

— *Part 1: Technical requirements for running and working*

— *Part 2: General safety requirements*

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

This European Standard is a type C standard as stated in EN ISO 12100.

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

When provisions of this type C standard are different from those which are stated in type B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

1 Scope

This European Standard specifies the significant hazards, hazardous situations and events, common to self-propelled road-rail machines and attachments as defined in 3.5 and 3.6 of EN 15746-1:2010 and arising due to the adaptation for their use on rail intended for construction, maintenance inspection of the railway infrastructure, shunting and emergency rescue vehicles, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer, see Clause 4.

This European Standard deals with the common hazards during running, assembly and installation, commissioning, travelling on and off track, use including setting, programming, and process changeover, operation, cleaning, fault finding, maintenance and de-commissioning of the machines.

NOTE 1 Specific measures for exceptional circumstances are not dealt with in this European Standard. They can be subject to negotiation between manufacturer and the machine operator.

The common hazards dealt with include the general hazards presented by the machines, and also the hazards presented by the following specific machine functions:

a) excavation;

b) ballast tamping, ballast cleaning, ballast regulating, ballast consolidating;

c) track renewal;

d) rail grinding;

e) craning;

f) catenary renewal / maintenance;

g) maintenance of the components of the infrastructure;

h) inspection and measurement of the components of the infrastructure;

i) tunnel inspection / ventilation;

j) shunting;

k) emergency rescue and recovery

during commissioning, use, maintenance and servicing.

It is assumed that a finished standard automotive chassis used as a host for a road-rail machine will offer an acceptable safety level for its designed functions before conversion. Unless explicitly stated otherwise in a particular clause this specific aspect is not dealt with in this European Standard.

NOTE 2 A manufacturer should carry out an appropriate risk assessment for the complete machine. Irrespective of whether a harmonised standard exists for the machine in road configuration, this should identify any additional hazards arising from the particular application of the chassis and the protective measures required to adequately deal with them.

This European Standard does not deal with:

l) requirements with regard to the quality of work and the performance of the machine;

m) machines that utilise the catenary for traction purposes;

n) specific requirements established by a railway infrastructure manager;

o) negotiations between the manufacturer and the machine operator for additional or alternative requirements;

p) requirements for use and travel of the machine on public highway;

q) hazards due to air pressure caused by the passing of high-speed trains at more than 190 km/h;

r) requirements which could be necessary in case of use in extreme conditions, such as:

1) extreme ambient temperatures (tropical or polar);

2) highly corrosive or contaminating environment, e.g. due to the presence of chemicals;

3) potentially explosive atmospheres.

Other special vehicles used on railway tracks are dealt with in other European Standards, see Annex D.

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

2 Normative references

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

EN 2, *Classification of fires*

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

EN 294, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs*

EN 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 474-1:2006, *Earth-moving machinery — Safety — Part 1: General requirements*

EN 547-1, *Safety of machinery — Human body measurements — Part 1: Principles for determining the dimensions required for openings for whole body access into machinery*

EN 547-2, *Safety of machinery — Human body measurements — Part 2: Principles for determining the dimensions required for access openings*

EN 547-3, *Safety of machinery — Human body measurements — Part 3: Anthropometric data*

EN 614-1, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 614-2, *Safety of machinery — Ergonomic design principles — Part 2: Interactions between the design of machinery and work tasks*

EN 618, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of bulk materials except fixed belt conveyors*

EN 619, *Continuous handling equipment and systems — Safety and EMC requirements for equipment for mechanical handling of unit loads*

EN 620, *Continuous handling equipment and systems — Safety and EMC requirements for fixed belt conveyors for bulk materials*

EN 811, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

EN 842, *Safety of machinery — Visual danger signals — General requirements, design and testing*

EN 894-1, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

EN 894-2, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

EN 953, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 981, *Safety of machinery — System of auditory and visual danger and information signals*

EN 982, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

EN 983, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*

EN 999, *Safety of machinery — The positioning of protective equipment in respect of approach speeds of parts of the human body*

EN 1032, *Mechanical vibration — Testing of mobile machinery in order to determine the vibration emission value*

EN 1037:1995+A1:2008, *Safety of machinery — Prevention of unexpected start-up*

EN 1088, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1837, *Safety of machinery — Integral lighting of machines*

EN 12077-2:1998+A1:2008, *Cranes safety — Requirements for health and safety — Part 2: Limiting and indicating devices*

EN 12999, *Cranes — Loader cranes*

EN 13000, *Cranes — Mobile cranes*

EN 13001-1, *Cranes — General design — Part 1: General principles and requirements*

EN 13135-1:2003, *Cranes — Safety — Design — Requirements for equipment — Part 1: Electrotechnical equipment*

EN 13135-2:2004, *Cranes — Equipment — Part 2: Non-electrotechnical equipment*

EN 13478:2001+A1:2008, *Safety of machinery — Fire prevention and protection*

prEN 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 14033-3:2009, *Railway applications — Track — Railbound construction and maintenance machines — Part 3: General safety requirements*

EN 15746-1:2010, *Railway applications — Track — Road-rail machines and associated equipment — Part 1: Technical requirements for running and working*

EN 28662-1, *Hand-held portable power tools — Measurement of vibrations at the handle — Part 1: General (ISO 8662-1:1988)*

EN 50153:2002, *Railway applications — Rolling stock — Protective provisions relating to electrical hazards*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60204-32, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines (IEC 60204-32:2008)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 61310-1, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking (IEC 61310-2:2007)*

EN 61310-3, *Safety of machinery — Indication, marking and actuation — Part 3: Requirements for the location and operation of actuators (IEC 61310-3:2007)*

EN 61496-1, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2004, modified)*

EN 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

EN ISO 2860, *Earth-moving machinery — Minimum access dimensions (ISO 2860:1992)*

EN ISO 2867:2008, *Earth-moving machinery — Access systems (ISO 2867:2006, including Cor 1:2008)*

EN ISO 3411:2007, *Earth-moving machinery — Physical dimensions of operators and minimum operator space envelope (ISO 3411:2007)*

EN ISO 3744:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point (ISO 5353:1995)*

EN ISO 6682, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682:1986, including Amd 1:1989)*

EN ISO 7731:2008, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

EN ISO 11201:2009, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995, including Cor 1:1997)*

EN ISO 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12001:2009, *Acoustics — Noise emitted by machinery and equipment — Rules for the drafting and presentation of a noise test code (ISO 12001:1996)*

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

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13732-1, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 14122-2, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

ISO 3795, *Road vehicles, and tractors and machinery for agriculture and forestry — Determination of burning behaviour of interior materials*

ISO 3864 (all parts), *Graphical symbols — Safety colours and safety signs*

ISO 4305, *Mobile cranes — Determination of stability*

ISO 4310, *Cranes — Test code and procedures*

ISO 5006:2006, *Earth-moving machinery — Operator's field of view — Test method and performance criteria*

ISO 6405-1, *Earth-moving machinery — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

ISO 10263-2, *Earth-moving machinery — Operator enclosure environment — Part 2: Air filter element test method*

ISO 10263-3, *Earth-moving machinery — Operator enclosure environment — Part 3: Pressurization test method*

ISO 10263-5, *Earth-moving machinery — Operator enclosure environment — Part 5: Windscreen defrosting system test method*

ISO 10567, *Earth-moving machinery — Hydraulic excavators — Lift capacity*

ISO 11112:1995, *Earth-moving machinery — Operator's seat — Dimensions and requirements*

ISO 12508, *Earth-moving machinery — Operator station and maintenance areas — Bluntness of edges*

ISO 16001, *Earth-moving machinery — Hazard detection systems and visual aids — Performance requirements and tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003, EN 15746-1:2010 and the following apply.

3.1
rail configuration
state of the machine when it is in place on the track ready to work or travel along the track

NOTE Rail configuration does not include the transient state during getting on and off the track.

3.2
road configuration
state of the machine when it is on the ground, i.e. not on the track

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

3.3
working place
driving cabs, working cabs, combined working and driving cabs, operators places situated outside cabs and places situated at control or maintenance locations

3.4
operating brake
braking system to bring machine (and any permitted towed load) to stand in specified distance during normal operation and running of the machine

3.5
rated capacity indicator
RCI
device which gives, within specified tolerance limits, at least a continuous indication that the rated capacity is exceeded, as shown in EN 12077-2

NOTE For rated capacity, see EN 12077-2.

4 List of significant hazards

Table A.1 contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

5 General safety requirements and/or measures

5.1 General

Machinery shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed according to the principles of EN ISO 12100 (all parts) for relevant but not significant hazards, which are not dealt with by this European Standard.

This standard formulates general / common requirements for the machines and associated equipment in the scope of this standard, and arising due to the adaptation for their use on rail.

The function(s) of road-rail machines which is (are) dealt with in another European Standard for machinery safety shall comply with that standard as far as applicable and taking account of the additional requirements and deviations of the present standard. This applies to both configurations "rail" and "road".

NOTE 1 As this standard is essentially restricted to specifying requirements related to adaptation for rail use and as a consequence relies on other standards, a manufacturer carries out a complete risk assessment to identify the specific hazards for the particular machine and the corresponding measures (including the measures additional to those of Clauses 5 and 6 that may be required).

NOTE 2 Relevant standards road-rail machine functions are for example:

— for road earth moving machinery: series EN 474;

— for cranes: EN 13001-1;

— for cranes on trucks: EN 12999;

— for mobile cranes EN 13000;

— for mobile elevating work platforms: EN 280.

Where there is a conflict between the requirements of this European Standard and the other above-mentioned European Standard(s), then this standard shall prevail.

When a choice is necessary for the application of type B standards referred to in this European Standard, e.g. EN 60204-1, EN 982, EN 983 the manufacturer shall carry out a risk assessment for making this choice.

If the machine is constructed on the basis of a host vehicle this host vehicle shall comply with one of the following:

— the European Standard for machinery safety relevant for that host vehicle (as far as not explicitly required otherwise in specific clauses of this European Standard);

or

— this European Standard.

It is assumed that a finished automotive chassis or a chassis complying with the same rules, used as a host for a road-rail machine will offer an acceptable safety level for its designed functions before conversion. Unless otherwise specified this specific aspect is not dealt with in this European Standard.

NOTE 3 Where modifications are made to the original standard automotive chassis the manufacturer should carry out an appropriate risk assessment and consult the chassis manufacturer to establish any detrimental effects resulting from the proposed modifications on the whole machine.

5.2 Access and egress to and from working places

5.2.1 Cabs

Except as shown below access and egress from all driving cabs, working cabs and combined working and driving cabs shall be from both sides of the machine or directly into the area between the rails of the working track.

If it is not possible to comply with the above, and access is only available from one side of the machine then the instruction handbook shall detail the restriction of use, see 8.2.1, z).

Signs, complying with the requirements of 8.3, shall be fixed at each egress point to warn personnel of the dangers from passing traffic.