



SLOVENSKI STANDARD

SIST EN 15955-2:2014

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Železniške naprave - Zgornji ustroj proge - Motorna vozila za posebne namene in pripadajoča oprema - 2. del: Splošne varnostne zahteve

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

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

Applications ferroviaires - Voie - Machines dérailables et éléments associés - Partie 2 : Prescriptions générales de sécurité

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

Applications ferroviaires - Voie - Machines dérailables et éléments associés - Partie 2 : Prescriptions générales de sécurité

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

This European Standard was approved by CEN on 10 February 2013.

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EN 15955-2:2013 (E)**Foreword**

This document (EN 15955-2:2013) 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of an identical text or by endorsement, at the latest by October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

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.

EN 15955, *Railway applications — Track — Demountable machines and associated equipment*, consists of the following parts:

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

— *Part 2: General safety requirements* (the present document).

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey 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.

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EN 15955-2:2013 (E)**1 Scope**

This European Standard specifies the technical requirements to deal with the significant hazards, hazardous situations and events, common to demountable machines, as defined in EN 15955-1:2013, intended for construction, maintenance inspection of the railway infrastructure, shunting and emergency rescue vehicles.

This European Standard specifies the technical requirements to deal with the common hazards during transport, assembly and installation, commissioning, running on track, use including setting, programming, and process changeover, operation, cleaning, fault finding, maintenance and de-commissioning of the machines when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer; see Clause 4.

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

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

- excavation;
- ballast tamping, ballast cleaning, ballast regulating, ballast consolidating;
- track renewal;
- rail maintenance;
- craning;
- catenary renewal / maintenance;
- maintenance of the components of the infrastructure;
- inspection and measurement of the components of the infrastructure;
- tunnel inspection / ventilation;
- shunting;
- emergency rescue and recovery;

during commissioning, use, maintenance and servicing.

This European Standard applies to self-propelled machines that are not intended to operate signalling and control systems. Other similar machines are dealt with in other European Standards; see Annex D.

It is assumed that a finished standard automotive chassis used as a host for a demountable machine will offer an acceptable safety level for its designed functions before conversion. This specific aspect is not dealt with in this European Standard.

This European Standard does not deal with:

- a) requirements with regard to the quality of work and the performance of the machine;
- b) machines that utilise the catenary for traction purposes;
- c) specific requirements established by a railway infrastructure manager;

- d) negotiations between the manufacturer and the machine operator for additional or alternative requirements;
- e) hazards due to air pressure caused by the passing of high-speed trains at more than 200 km/h;
- f) requirements which could be necessary in case of use in extreme conditions, such as:
 - 1) extreme ambient temperatures (below $-20\text{ }^{\circ}\text{C}$ or above $+40\text{ }^{\circ}\text{C}$);
 - 2) highly corrosive or contaminating environment, e.g. due to the presence of chemicals;
 - 3) potentially explosive atmospheres.

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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 474-1:2006+A1:2009, *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 842, *Safety of machinery — Visual danger signals — General requirements, design and testing*

EN 894-1, *Safety of machinery — Ergonomic 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*

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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 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+A1:2010, *Cranes — Equipment — Part 1: Electrotechnical equipment*

EN 13135-2:2004+A1:2010, *Cranes — Equipment — Part 2: Non-electrotechnical equipment*

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

EN 13557, *Cranes — Controls and control stations*

EN 14033-1:2011, *Railway applications — Track — Railbound construction and maintenance machines — Part 1: Technical requirements for running*

EN 14033-2:2008+A1:2011, *Railway applications — Track — Railbound construction and maintenance machines — Part 2: Technical requirements for working*

EN 15955-1:2013, *Railway applications — Track — Demountable 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)*

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

EN 50239, *Railway applications — Radio remote control system of traction vehicle for freight traffic*

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

1) This document is impacted by the amendment EN 60204-1:2006/A1:2009.

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

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

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

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

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

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

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

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

EN ISO 2867, *Earth-moving machinery — Access systems (ISO 2867)*

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

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

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EN ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413)*

EN ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414)*

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)*

EN ISO 6682, *Earth-moving machinery — Zones of comfort and reach for controls (ISO 6682)*

EN ISO 7096:2008, ²⁾ *Earth-moving machinery — Laboratory evaluation of operator seat vibration (ISO 7096:2000)*

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

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

2) This document is impacted by the corrigendum EN ISO 7096:2008/AC:2009.

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

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

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)*

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

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

EN ISO 13855, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body (ISO 13855)*

EN ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857)*

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

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 5006:2006,³⁾ *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 — Registered symbols*

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 11112:1995,⁴⁾ *Earth-moving machinery — Operator's seat — Dimensions and requirements*

3) This document is impacted by the corrigendum ISO 5006:2006/Cor 1:2008.

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 15955-1:2013 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 1 to entry: Rail configuration does not include the transient state during getting on and off the track.

3.2

working place

driving cabs, working cabs, combined working and driving cabs, operator positions situated outside cabs and places situated at control or maintenance locations including areas for conveyance of personnel

3.3

continuous brake

brake used in dynamic conditions, for which the brake force can be infinitely varied, or stepped, by the operator using a control to simultaneously apply brakes on all connected vehicles

3.4

parking brake

brake capable of operation and function without power from 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

Note 1 to entry: For rated capacity, see EN 12077-2.

3.6

machine operator

private or public undertaking who operates machines for the construction and maintenance of the infrastructure

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.

4) This document is impacted by the amendment ISO 11112:1995/Amd 1:2001.

EN 15955-2:2013 (E)**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 for relevant but not significant hazards, which are not dealt with by this European Standard.

This standard gives the general/common requirements for demountable machines. Specific machines, such as cranes, shall comply with relevant standards for these specific machines as modified by the requirements of this standard.

When a standard for the specific machinery is not available or does not fully cover the significant hazards, the manufacturer should carry out a complete risk assessment to identify the specific hazards for the particular machine and the corresponding protective measures that may be required. These additional hazards and requirements will be outside the scope of this standard.

Requirements for specific machinery functions are given in 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 another European Standard, then this standard shall take precedence.

Where this European Standard requires the application of type B standards (e.g. EN 60204-1, EN ISO 4413, EN ISO 4414) but the applicable specific requirements are not identified, the manufacturer shall carry out a risk assessment to determine which requirements apply.

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 standard automotive chassis used as a host for a demountable machine will offer an acceptable safety level for its designed functions before conversion. This specific aspect is not dealt with in this European Standard and in this case the manufacturer shall carry out an appropriate risk assessment.

5.2 Access and egress to and from working places**5.2.1 Cabs**

Except as shown below where a demountable machine is fitted with driving cabs, working cabs and/or combined working and driving cabs access and egress, when on the track, this 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 this requirement 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 (26).

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

A device for restricting egress from the side of the demountable machine open to rail traffic shall be provided to prevent people leaving the machine on the side open to traffic by mistake e.g. a door with a latch, a chain and hook. Where possible this shall require the operator to carry out an intentional action to leave the machine.

Where doors are fitted as an addition to the host vehicle they shall:

- be maintained in the fully open and closed positions by automatic latches suitable for the foreseen forces. It shall be possible to lift the latches by means of the inside and outside handles;
- not project beyond the loading gauge when open;
- make opening quickly and easily possible by the design and position of the door handles, but the design should prevent unintentional opening of the door. The door handles shall be easily accessible and ergonomically shaped and safe;
- be possible, without difficulty, to open and close from both outside and inside the cab. A lock and a handle shall be arranged on the outside of the doors at a height of 1 250 mm to 1 500 mm above rail level or step level where this is provided to gain access. An additional handle shall be provided at a height of 700 mm to 1 100 mm above the cab floor level;
- the door opening shall comply with the requirements of EN ISO 2867.

Where doors which are part of the host vehicle do not comply with the clause above, a note shall be made in the instruction manual; see 8.2.1 (25). [SIST EN 15955-2:2014](https://standards.iteh.ai/catalog/standards/sist/1a89d8d0-ee81-40b8-9a08-)

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5.2.2 Working places, places for control and maintenance outside of cabs

Where reasonably practical, working places shall be positioned within the machine running gauge, as defined in EN 14033-1:2011, Annex C.

Where it is not reasonably practical to position work places within the running gauge, the manufacturer shall inform the user, in the instruction handbook, of the inherent risks with regard to working places located outside the running gauge; see 8.2.1 (25). In addition, a fixed warning notice according to the requirements of 8.3 shall be displayed adjacent to each such working place.

Except as shown below, access and egress from all working places outside of 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 (26).

5.2.3 Walkways on the machine

Where fitted, the walkways on the machine shall have a minimum width of 500 mm and a headroom of 2 000 mm free of obstacles. Floors shall not present a tripping hazard and their coverings shall be anti-slip in conformance with the requirements of EN ISO 14122-2.

Guard rails shall be provided in accordance with the requirements of EN ISO 2867.

5.3 Ergonomics

Machines shall be designed according to the principles of EN 614-1 and EN 614-2.