SLOVENSKI STANDARD
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Železniške naprave - Zgornji ustroj - Varnostne zahteve za prenosne stroje in lahko tirno mehanizacijo, ki se uporabljajo pri gradnji in vzdrževanju

Railway applications - Track - Safety requirements for portable machines and trolleys for construction and maintenance

Bahnanwendungen - Oberbau - Sicherheitsanforderungen an tragbare Maschinen und Rollwagen für Bau und Instandhaltung

Applications ferroviaires - Voie - Prescriptions de sécurité pour machines portables et lorries pour la construction et la maintenance

Ta slovenski standard je istoveten z: **EN 13977:2011**

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45.120	Oprema za gradnjo in vzdrževanje železnic oz. žičnic	Equipment for railway/cableway construction and maintenance

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English Version

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Foreword

This document (EN 13977:2011) 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of an identical text or by endorsement, at the latest by August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.

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 supersedes EN 13977:2005+A1:2007.

The main changes compared to the previous version are:

— change of scope;

— change of definition;

— addition of 5.20, Vibration;

— addition of 5.21, Environmental conditions;

— editorial modification of Annex ZA.

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.

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 document 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 situations and events are covered are indicated in the scope of this document.

When the provisions of this type C standard are different from those which are stated in type A or 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.

Technical characteristics, deviations or special national conditions may be the subject of special requirements of the infrastructure manager controller and/or negotiation between the user and the manufacturer, see Annex F.

1 Scope

1.1 General

This European Standard deals with the technical requirements to minimise the railway specific significant hazards of portable machines and trolleys intended for work on tracks as listed in Clause 4 which can arise during the commissioning, operation and maintenance of portable machines and trolleys when used as intended and under the conditions foreseen by the manufacturer. It does not deal with the performance of the machines, e.g. cutting, drilling, grinding.

This European Standard applies to portable machines and trolleys with rail wheels or rollers designed for work whilst on the track with nominal track gauges of 1 435 mm and 1 668 mm and clearance gauge as defined in Annex B[1)] including, e.g. cutting and drilling machines.

This European Standard does not apply to the additional hazards that may exist due to:

— the coupling together of trolleys;

— the towing or pushing of trolleys by other vehicles;

— the use of trolleys for the transportation of persons;

— self propelled rail wheeled machines, trolleys coupled to another towing vehicle;

— hazards due to laser systems.

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

This European Standard does not apply to the following:

— requirements for quality of the work or performance of the machine;

— regulations defined by each infrastructure controller for portable machine and trolley operation which shall be the subject of negotiation between the user and the manufacturer;

— portable machines used from railway vehicles.

This European Standard establishes the additional requirements for electromagnetic compatibility due to e.g. electronic components as well as for hazards due to vibration.

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

— operation in severe conditions, e.g. extreme environmental conditions such as: high temperatures, corrosive environment, tropical environment, contaminating environments, strong magnetic fields;

— operation subject to special rules such as potentially explosive atmospheres;

— hazards occurring during decommissioning and/or recycling;

— hazards due to wind speed;

— hazards due to natural causes, e.g. earthquake, lightning, flooding, etc.

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1) For portable machines and trolleys used on railway lines with a different clearance gauge to that defined in Annex B, special requirements concerning the clearance gauge are permitted to be applied.

1.2 Validity of this document

This European Standard applies to portable machines and trolleys that are ordered after the date of publication of this 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 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 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 1032, *Mechanical vibration — Testing of mobile machinery in order to determine the vibration emission value*

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

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

EN 13674-1:2003+A1:2007, *Railway applications — Track — Rail — Part 1: Vignole railway rails 46 kg/m and above*

EN 13715, *Railway applications — Wheelsets and bogies — Wheels — Tread profile*

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

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

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 3746:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995, including Cor 1:1995)*

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

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

EN ISO 9614-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996)*

EN ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections (ISO 11202:2010)*

EN ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO 11204:2010)*

EN ISO 11688-1:2009, *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 14121-1:2007, *Safety of machinery — Risk assessment — Part 1: Principles (ISO 14121-1:2007)*

EN ISO 15744:2008, *Hand-held non-electric power tools — Noise measurement code — Engineering method (grade 2) (ISO 15744:2002)*

ISO 3864-1, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas*

ISO 3864-2, *Graphical symbols — Safety colours and safety signs — Part 2: Design principles for product safety labels*

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

ISO 6405-2, *Earth-moving machinery — Symbols for operator controls and other displays — Part 2: Specific symbols for machines, equipment and accessories*

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
portable machine
machine designed or adapted to be manually propelled along the track with wheels or rollers which is not designed to operate track signalling systems

3.2
trolley
equipment for transport along the track of materials, tools and/or various equipment moving on wheels or runners and operated by human force only. It is designed so that it can be manually placed on or off the track

3.3
type verification
procedure for verification of the conformity of the type of portable machine or trolley to the requirements of this standard

3.4
declaration of type verification
document issued after tests, which certifies suitability of the technical design for the operation of a portable machine or trolley

3.5
conformity to type
procedure for verification of the conformity of the individual portable machine or trolley to the machine or trolley which underwent type verification

3.6
stability coefficient
ratio of restoring moment to overturning moment

4 List of significant hazard

The risks referred to in this document are listed in Annex A.

5 Safety requirements and/or safety measures

5.1 General

In addition to the other requirements of this standard, portable machines and trolleys shall be designed according to the principles of series EN ISO 12100 for hazards relevant but not significant which are not dealt with by this document, e.g. sharp edges.

For the application of type B standards EN 60204-1, EN 982, EN 983 and EN ISO 7731, the manufacturer shall carry out a risk assessment where choice is necessary. This specific risk assessment is part of the general risk assessment relating to the hazards not covered by the present document.

5.2 Handling devices

5.2.1 Handles used for handling and/or control

Portable machines and trolleys shall be ergonomically designed according to the requirements of EN 614-1 and EN 614-2 so that they are able to be lifted. Where practicable this shall be by manual handling.

Where fitted handles used for handling and/or control shall be sufficient for the weight of the portable machine or trolley and allow removal of the portable machine or trolley from the track.

Handles for lifting are to be positioned to ensure reasonable sharing of the weight. The weight permitted per person shall not exceed 20 kg when the load is shared by more than one person or 25 kg for a single person lift.

Handles for control shall be ergonomically designed and located at a reasonable height for the operating position.

The handles shall either be positioned so that they are inside the limits of the gauge indicated in Annex B with the operator in the work position intended by the manufacturer or the amount of exceedance declared in the instruction handbook.

When lifting handles are also used for control purposes they shall, when used for handling, be in the stop position.

If more than one person is recommended for putting the portable machine or trolley on or off the track the number of people necessary shall be indicated on the portable machine or trolley.

5.2.2 Lifting points and securing points

If the portable machine or trolley is not designed to be lifted manually, then lifting points shall be provided that are suitable for the weight, for maintaining the equilibrium of the machine and for preventing spillage of liquids, e.g. fuel, lubricants.

Securing points or other methods shall be provided so that a portable machine or trolley is able to be safely transported by road vehicles. This shall be described in the instruction handbook, see 7.2.

5.3 Wheels and rollers

The wheels and rollers used for moving and guidance of machines or trolleys on rail(s) shall:

— be arranged and be in sufficient numbers to ensure the stability of the machine on the track, see 5.16;

— be shaped and of the correct width to ensure good guidance on the rails and to take account of gauges between 1 425 mm and 1 470 mm with a 1 435 mm nominal gauge, and gauges 1 665 mm and 1 698 mm with a 1 668 mm nominal gauge, as well as gauges between 1 510 mm and 1 545 mm with 1 520 mm and 1 524 mm nominal gauges;

— be within the gauge or where this is not possible the instruction handbook, see 7.2, shall clearly state the limitation;

— allow free running on rail through switches and crossings, level crossings and other installations; where this is not achievable the instruction handbook, see 7.2, shall indicate this limitation;

— unless the portable machine or trolley is specifically designed to bend rails, the stresses exerted on the rails by the rail wheels of the manually propelled portable machine and trolley when working shall not exceed 350 N/mm^2;

— where the wheel profile, as shown in EN 13715, is not utilised (this could include double flanged, flat rollers etc) the manufacturer shall state the exact profile used and all wear limits in the instruction handbook, see 7.2.

5.4 Brake and immobilisation system

To avoid the risk of running away, each portable machine (considered as an assembly) and trolley fitted with rail wheels or rollers shall be capable of being immobilised either by an automatic brake or by design. All such systems shall be effective on a gradient of 40 ‰ in the fully laden condition or worst case operating condition whichever is the most unfavourable. Where this is not achievable the instruction handbook, see 7.2, shall indicate this limitation.

Portable machines and trolleys that can roll away shall be equipped with a braking device and release control (dead-man type) that can assure, at full load and at a reference speed of 6 km/h, that the braking distance will not exceed the values indicated in Table 1. The tests shall be carried out on dry rails with dry braking equipment and repeated with the brake gear wet and the head of the rail sprayed with water.

Table 1 — Braking distances

Gradient ‰	Maximum braking distance m	
	Dry rail	Wet rail
40	10	14

5.5 Clamping and/or supporting devices

If portable machines and trolleys are fitted with clamping and/or supporting devices they shall:

— be able to resist vibrations and forces generated by the work of the machine;

— be fit for purpose and not suffer permanent deformation during use.

They shall be designed not to cause:

— reduction of the stability of the track;

— damage to the infrastructure.

5.6 Power generation and transmission equipment

5.6.1 Electrical equipment

Electrical equipment and the degree of electrical protection shall meet the requirements of EN 60204-1.

Portable machines shall use voltages less than 500 V AC or less than 750 V DC.

In order to avoid inadvertent operation or damage to track circuits, any flexible cables shall not have external metallic covering.

5.6.2 Hydraulic, pneumatic and mechanical power transmission

If a portable machine is fed by exterior hydraulic, pneumatic or mechanical power transmission, risks according to EN 982 and EN 983 shall be taken into consideration. In order to avoid inadvertent operation or damage to track circuits, flexible pipes shall not be covered by metallic protection.

5.7 Electromagnetic compatibility

5.7.1 Emissions from portable machines and trolleys

Portable machines and trolleys shall meet the requirements of EN 13309 or EN 50121-3-1:2006, Clause 6.

Any electrical component that is added to a machine that has already been tested and a certificate of emissions provided shall either be assessed as an additional component for its potential to affect railway signals, or the whole machine shall be reassessed.

5.7.2 Immunity of portable machines and trolleys from railway environment

Manufacturers shall assess the component parts of portable machines and trolleys for their susceptibility and immunity to electro-magnetic induced currents. Each electrical or electronic circuit box shall be assessed for the effect they would have if the currents were induced. Any electrical or electronic circuit which the manufacturer considers vulnerable to electro-magnetic compatibility shall comply with the requirements according to EN 50121-3-2:2006, Clause 8, Tables 7, 8 and 9, or equivalent.