SLOVENSKI STANDARD
SIST EN 13977:2005+A1:2007

01-september-2007

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 et lorries portables pour la construction et la maintenance

Ta slovenski standard je istoveten z: **EN 13977:2005+A1:2007**

ICS:

45.120	Oprema za gradnjo in vzdrġevanje ġeleznic oz. ġiļ nic	Equipment for railway/cableway construction and maintenance

SIST EN 13977:2005+A1:2007 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13977:2005+A1

July 2007

ICS 45.120

Remplace l'EN 13977:2005

English Version

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

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

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

This European Standard was approved by CEN on 20 August 2004 and includes Amendment 1 approved by CEN on 26 May 2007.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 13977:2005+A1:2007: E

Contents

Foreword

This document (EN 13977:2005+A1:2007) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2008 and conflicting national standards shall be withdrawn at the latest by January 2008.

This document includes Amendment 1 approved by CEN on 2007-05-26.

This document supersedes EN 13977:2005.

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

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.

For relationship with EU Directive, 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, 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.

0 Introduction

This document is a type C standard as stated in EN ISO 12100-1 and EN ISO 12100-2.

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.

Because the EU Directive “Machines” does not consider railway specific problems of construction and maintenance machines, additional requirements and verifications are necessary and these are dealt with in this document (see 6.2). Portable machines and trolleys for track construction and maintenance, which comply with these requirements, receive a special marking in accordance with 6.5.3, in addition to the CE mark.

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

1 Scope

1.1 General

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

This document applies to portable machines and portable trolleys designed for work on the track with nominal track gauges of 1 435 mm and 1 668 mm and clearance gauge as defined in annex B including cutting machines and those designed for working on wooden sleepers.

This document does not apply to portable trolleys coupled together, whether or not self propelled, and trolleys used for transporting personnel.

For portable machines and trolleys used on railway lines with a different clearance gauge to that defined in annex B specific requirements concerning the clearance gauge may apply[1)].

This document 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 document does not establish the additional requirements for the following:

- operation in severe conditions (e.g. extreme environmental conditions such as: freezing applications, high temperatures, corrosive environment, tropical environment, contaminating environments, strong magnetic fields);
- operation subject to special rules as potentially explosive atmospheres;
- electromagnetic compatibility, due to e.g. electronic components;
- hazards occurring during decommissioning and/or recycling;
- hazards due to vibration;
- hazards due to wind speed greater than 35 m/s;
- hazards due to natural causes e.g. earthquake, lightning, flooding etc.
- noise.

NOTE Noise of machines which are dealt with by this document is regarded as a significant hazard. Noiseis not covered by this document but will be dealt with in an Amendment to the first edition of this standard. This Amendment will give:

- clauses dealing with noise emission according to EN 1746.
- a noise test code using as a basis for preparation the designation of noise-emission according to the requirements of the Machinery-Directive 98/37/EC, annex I, clause 1.7.4f.

1.2 Validity of this document

This document applies to portable machines and trolleys that are ordered after the date of publication of this standard.

1) E.g. the specific rules of the infrastructure manager.

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 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 1050:1996, *Safety of machinery — Principles for risk assessment*

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

[A1] EN 13674-1, *Railway applications – Track – Rail – Part 1: Vignole railway rails 46 kg/m and above* [A1]

EN 60204-1, [A1] *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005, modified)* [A1]

[A1] EN ISO 3744:1995, *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 3746:1995, *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)*

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

[A1] EN ISO 7731, *Ergonomics - Danger signals for public and work areas - Auditory danger signals (ISO 7731:2003)* [A1]

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 11202:1995, *Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Survey method in situ (ISO 11202:1995)*

EN ISO 11204:1995, *Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Method requiring environmental corrections (ISO 11204:1995)*

EN ISO 11688-1:1998, *Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12001:1996, *Acoustics – Noise emitted by machinery and equipment – Rules for the drafting and presentation of a noise test code (ISO 12001:1996)* [A1]

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)*

[A1] EN ISO 15744:2002, *Hand-held non-electric power tools – Noise measurement code – Engineering method (grade 2) (ISO 15744:2002)* [A1]

ISO 3864-1:2002, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas*

[A1] ISO 3864-2 [A1], 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*

UIC 505-1:1997, *Railway transport stock — Rolling stock construction gauge*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003, EN ISO 12100-2:2003 and the following apply.

3.1
portable machine
machine designed or adapted to be worked on the track, transportable by hand with or without trolleys or separate supports for movement on rail(s), and be operated by internal combustion, electrical, mechanical, hydraulic, pneumatic energy sources or from an external supply. It is designed so that the machine and/or its separate component parts may be manually placed on or off the track

3.2
portable trolley
equipment for transport of materials, tools and/or various equipment moving on wheels or runners and operated either by human force or by an energy source. 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 hazards

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

5 Safety requirements and/or safety measures

5.1 General

Portable machines and trolleys shall conform to the requirements and/or safety measures of this clause.

In addition the portable machine and trolley shall be designed according to the principles of 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, ⟨A1⟩ EN ISO 7731 ⟨A1⟩ the manufacturer shall carry out a risk assessment thereof 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

The handles used for handling and/or control shall be sufficient for the mass of the portable machine or the trolley and to allow removal of the portable machine or the trolley from the track.

The handles are to be positioned to ensure the sharing of the weight equally. The weight on each handle shall not exceed 25 kg.

The handles shall be positioned at least 400 mm above the standing level of the operator and shall be freely reached in the vertical direction.

If one of the above requirements cannot be fulfilled the mass per handle shall not exceed 10 kg.

Handles shall be designed as encircling handles, the diameter of material of the grip shall be between 20 mm and 30 mm and the grip opening shall have a minimum length of 250 mm and a minimum width of 50 mm.

The handles shall be positioned so that they are inside the vertical limits of the gauge indicated in annex B with the operator in the work position intended by the manufacturer (see 7.4.10).

When such 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 machine or trolley on or off the track the number of people necessary shall be indicated on the portable machine or trolley as appropriate (see 7.6).

5.2.2 Additional handle, lifting points and securing points

If the portable machine or portable trolley weighs more than 25 kg, or it is not designed to be lifted by one person, then an additional handle and a lifting point shall be provided suitable for the weight, for maintaining the equilibrium of the machine and for preventing spillage of liquids (e.g. fuel, lubricants). For transport in vehicles points to secure the machine shall be provided.

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 in sufficient numbers to ensure the stability of the machine on the track (see 5.15);
- be shaped and of the correct width to ensure good guidance on the rails and to take account of gauges between 1 430 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;
- not damage the electrical connections to the rails (see annex G);
- not damage signalling equipment (see annex G);
- allow the free running on rail through switches and crossings, level crossings and other installations. Where this is not achievable the handbook (see 7.2) shall make an indication of this limitation.

5.4 Immobilisation device

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 automatic transmission brake or by design effective on a gradient as steep as 40 ‰.

Trolleys shall also 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. This applies also to portable machines that can roll away when working.

Table 1 — Braking distances

Gradient *i* ‰	Maximum braking distance m			
	Machines		Trolleys	
	Dry rail	Damp rail	Dry rail	Damp rail
$0 < i \leq 15$	3	5	6	10
$15 < i \leq 25$	4	6	8	12
$25 < i \leq 40$	5	7	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.

They shall not cause:

— permanent deformation of these devices;

— reduction of the stability of the track;

— damage to the rails, sleepers, or track fastenings.

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 750 V DC.

In order to avoid shorting 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 shorting of track circuits, the flexible pipes shall not be covered by metallic protection.

5.7 Tools

The release of a machine from its tools, when jammed or failed, shall be possible in order to clear the track during the time indicated in 5.17.

5.8 Interlocking device

Machines which are hand held and/or guided by hand and which may present a danger in their use without a guiding mechanism shall have an interlocking device that will ensure that the machine can be started only if the guiding mechanism is in place.

Cutting off machines which are used for making a cut to the rail before welding shall be guided by a device which is fixed to the rail.

5.9 Location of control devices

The location of control devices, in the conditions for work foreseen by the constructor, shall allow the operator in control of the machine to remain within the zone delineated within the vertical limits of the gauge (position 1) and below the horizontal limits (position 2) of the gauge defined in annex B.

5.10 Warning devices

Warning devices fitted to the machine shall be constructed according to [A1] EN ISO 7731 [A1] and be clearly distinguishable from other railway specific signals.

5.11 Isolation from external electrical voltages

5.11.1 Shorting track circuits

Portable machines and trolleys having contact with both rails (rollers, clamps etc.), or on the same line of rail shall always have an electrical resistance between the points of contact of $\geq$ 1 MΩ. The resistance measurement shall be taken under a 500 V DC tension.

5.11.2 Catenaries

Portable machines and trolleys in working configuration shall not have parts above the higher limit of the gauge (position 2) shown in annex B.

5.12 Lighting

The machine lighting is to be adapted to the required visual task at the tool and shall ensure a luminance level of at least 50 lx and meet the requirements of EN 1837.

Dazzling of for example train drivers or workers on the site shall be prevented by appropriate measures.

The position of the lights shall not cause confusion with railway signalling.

5.13 Prevention of emission of pollutants

Effective measures to prohibit or reduce leak or development of dust, smoke, steam, gas and other particles shall be taken, if there is a danger to safety or health.

Machine design shall take into account the use of biodegradable lubricants.