

# SLOVENSKI STANDARD

## SIST EN 14033-1:2011

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**Železniške naprave - Zgornji ustroj - Težka tirna mehanizacija za gradnjo in vzdrževanje - 1. del: Tehnične zahteve, ki se nanašajo na vožnjo**

Railway applications - Track - Railbound construction and maintenance machines - Part 1: Technical requirements for running

Bahnanwendungen - Oberbau - Schienengebundene Bau- und Instandhaltungsmaschinen - Teil 1: Technische Anforderungen an das Fahren  
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Applications ferroviaires - Voie - Machines de construction et de maintenance empruntant exclusivement les voies ferrées - Partie 1: Prescriptions techniques pour la circulation  
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**ICS:**

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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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**SIST EN 14033-1:2011**

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NORME EUROPÉENNE  
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**EN 14033-1**

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## Railway applications - Track - Railbound construction and maintenance machines - Part 1: Technical requirements for running

Applications ferroviaires - Voies - Machines de construction et de maintenance empruntant exclusivement les voies ferrées - Partie 1: Prescriptions techniques pour la circulation

Bahnanwendungen - Oberbau - Schienengebundene Bau- und Instandhaltungsmaschinen - Teil 1: Technische Anforderungen an das Fahren

This European Standard was approved by CEN on 8 January 2011.

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## EN 14033-1:2011 (E)

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## Foreword

This document (EN 14033-1:2011) 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of an identical text or by endorsement, at the latest by August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.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 14033-1:2008.

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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

This series of standards EN 14033 "Railway applications — Track — Railbound construction and maintenance machines" consists of the following parts:

- Part 1: Technical requirements for running
- Part 2: Technical requirements for working [SIST EN 14033-1:2011](https://standards.iteh.ai/catalog/standards/sist/b034431f-a5d0-4704-a92f-9d509c92cb83/sist-en-14033-1-2011)
- Part 3: General safety requirements [9d509c92cb83/sist-en-14033-1-2011](https://standards.iteh.ai/catalog/standards/sist/b034431f-a5d0-4704-a92f-9d509c92cb83/sist-en-14033-1-2011)

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 United Kingdom.

**EN 14033-1:2011 (E)****Introduction**

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

The railway specific particulars of the machines for construction and maintenance form the objective of this European Standard.

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 and the interoperability of the rail system within the Community.

**1 Scope****1.1 General**

This European Standard defines the specific technical railway requirements for running of machines and other vehicles used for construction, maintenance and inspection of track, structures, track formation and fixed electric traction equipment.

This European Standard applies to all railbound machines and other vehicles – referred to as machines – running exclusively on the railway (utilising adhesion between the rail and wheels) and used for construction, maintenance and inspection of track, structures, infrastructure and fixed electric traction equipment. This European Standard applies to machines that are intended to operate signalling and control systems. Other machines are dealt with in other European Standards, see Annex K.

Special requirements can apply for running on infrastructures with narrow gauge or broad gauge lines, lines of tramways, railways utilising other than adhesion between the rail and wheels, road-rail machines and underground infrastructures.

This European Standard covers the requirements for safety and access of railway traffic, railway specific requirements for running on different infrastructures in relation to necessary movements of the machine as a train and movements to reach work sites.

**1.2 Validity of the European Standard**

This European Standard applies to new designs taking into consideration the recommendations given in Annex L on the application of the standard (migration rule).

**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 286-3, *Simple unfired pressure vessels designed to contain air or nitrogen – Part 3: Steel pressure vessels designed for air braking equipment and auxiliary pneumatic equipment for railway rolling stock*

EN 286-4, *Simple unfired pressure vessels designed to contain air or nitrogen – Part 4: Aluminium alloy pressure vessels designed for air braking equipment and auxiliary pneumatic equipment for railway rolling stock*



- EN 10220, *Seamless and welded steel tubes – Dimensions and masses per unit length*
- EN 10305-4, *Steel tubes for precision applications – Technical delivery conditions – Part 4: Seamless cold drawn tubes for hydraulic and pneumatic power systems*
- EN 10305-6, *Steel tubes for precision applications – Technical delivery conditions – Part 6: Welded cold drawn tubes for hydraulic and pneumatic power systems*
- EN 12080, *Railway applications – Axleboxes – Rolling bearings*
- EN 12663-1:2010, *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 13103, *Railway applications – Wheelsets and bogies – Non-powered axles – Design method*
- EN 13104, *Railway applications – Wheelsets and bogies – Powered axles – Design method*
- EN 13260, *Railway applications – Wheelsets and bogies – Wheelsets – Product requirements*
- EN 13261, *Railway applications – Wheelsets and bogies – Axles – Product requirements*
- EN 13262, *Railway applications – Wheelsets and bogies – Wheels – Product requirements*
- EN 13715, *Railway applications – Wheelsets and bogies – Wheels – Wheels tread*
- EN 13979-1, *Railway applications – Wheelsets and bogies – Monobloc wheels – Technical approval procedure – Part 1: Forged and rolled wheels*
- EN 14033-2, *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 14198:2004, *Railway applications – Braking – Requirements for the brake system of trains hauled by a locomotive*
- EN 14363:2005, *Railway applications – Testing for the acceptance of running characteristics of railway vehicles – Testing of running behaviour and stationary tests*
- EN 14531-6, *Railway applications – Methods for calculation of stopping and slowing distances and immobilisation braking – Part 6: Step by step calculations for train sets or single vehicles*
- EN 14535-1, *Railway applications – Brake discs for railway rolling stock – Part 1: Brake discs pressed or shrunk onto the axle or drive shaft, dimensions and quality requirements*
- prEN 14535-2:2007, *Railway applications – Brake discs for railway rolling stock – Part 2: Brake discs mounted onto the wheel –, Dimensions and quality requirements*
- EN 14601, *Railway applications – Straight and angled end cocks for brake pipe and main reservoir pipe*
- EN 15152, *Railway applications – Front windscreens for train cabs*
- EN 15153-1, *Railway applications – External visible and audible warning devices for high speed trains – Part 1: Head, marker and tail lamps*

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EN 15153-2, *Railway applications – External visible and audible warning devices for high speed trains – Part 2: Warning horns*

EN 15179, *Railway applications – Braking – Requirements for the brake system of coaches*

EN 15220-1, *Railway applications – Brake indicators – Part 1: Pneumatically operated brake indicators*

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

EN 15355, *Railway applications – Braking – Distributor valves and distributor-isolating devices*

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

EN 15551, *Railway applications – Railway rolling stock – Buffers*

EN 15566, *Railway applications – Railway rolling stock – Draw gear and screw coupling*

EN 15611, *Railway applications – Braking – Relay valves*

EN 15624, *Railway applications – Braking – Empty-loaded changeover devices*

EN 15625, *Railway applications – Braking – Automatic variable load sensing devices*

prEN 15807:2008, *Railway applications – Pneumatic half couplings*

prEN 15839, *Railway applications – Testing for the acceptance of running characteristics of railway vehicles – Freight wagons – Testing of running safety under longitudinal compressive forces*

prEN 15877-1:2009, *Railway applications – Marking on railway vehicles – Part 1: Freight wagons*

EN 50121-3-1, *Railway applications – Electromagnetic compatibility – Part 3-1: Rolling stock – Train and complete vehicle*

EN 50121-3-2, *Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus*

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

EN 50238:2003, *Railway applications – Compatibility between rolling stock and train detection systems*

ISO 8573-1, *Compressed air – Part 1: Contaminants and purity classes*

ISO 11112, *Earth-moving machinery – Operator's seat – Dimensions and requirements*

NF F11-100:2005, *Railway rolling stock – Quality of compressed air for pneumatic apparatuses and circuits use*

UIC 438-1:2004, *Identification marking for passenger rolling stock*<sup>1)</sup>

UIC 520:2003, *Wagons, coaches and vans – Draw gear – Standardisation*

UIC 527-1:2005, *Coaches, vans and wagons – Dimensions of buffer heads – Track layout on S-curves*

UIC 530-2:2008, *Wagons – Running safety*

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<sup>1)</sup> Railway Technical Publications (ETF), 16 rue Jean Rey, F-75015 Paris

UIC 535-2:2006, *Standardisation and positioning on wagons of steps, end platforms, gangways, handrails, tow hooks, automatic coupler (AC), automatic draw-on coupling and brake valve controls on the UIC member RUs and OSJD member Rus*

UIC 541-03:1984, *Brakes – Regulations concerning manufacture of the different brake parts – Driver's brake valve*

UIC 541-4:2007, *Brakes – Brakes with composition brake blocks – General conditions for certification of composite brake blocks*

UIC 543:2007, *Brakes – Regulations governing the equipment of trailing stock*

UIC 544-1:2004, *Brakes – Braking power*

UIC 545:2007, *Brakes – Inscriptions, marks and signs*

UIC 640:2003, *Motive power units – Inscriptions, marks and signs*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions and the terms listed in the relevant railway specific documents and in the UIC leaflets apply.

#### 3.1

##### **railbound machine (on-track machines, OTM)**

vehicle specially designed for construction and maintenance of the track and infrastructure and used in different modes: working configuration, running configuration as a self-propelling vehicle, running configuration as a hauled vehicle, when:

- it is running on its own rail wheels,
- it is designed to have characteristics necessary for the operation of track based train detection systems

#### 3.2

##### **demountable machine**

self propelled machine that can run and work on rail and which is not intended to operate signalling and control systems

NOTE 1 Such a machine is designed to get on and off track by its own means or with other lifting equipment. In the case of demounting by its own means these are not intended for running on the ground.

NOTE 2 Such a machine is permitted to work on the railway only under special operating conditions granted by the infrastructure manager and run under special conditions granted by the authorised body and/or the infrastructure manager.

#### 3.3

##### **trailer**

non-self propelled machine that can be hauled on rail wheels

NOTE 1 Trailers are not designed and intended to operate signalling and control systems and are not designed to be transported between work areas on their rail wheels.

NOTE 2 This includes attachments with rail wheels.

#### 3.4

##### **railway infrastructure**

all installations required for the running of railway vehicles

EXAMPLE Tracks, crossings, catenaries and signals.

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### 3.5

#### type examination certificate

document issued after the checking of documents and/or testing of vehicles in which the agreement of the running of the machine in the railway infrastructure is confirmed

### 3.6

#### train

operational formation consisting of one or more machines/vehicles

### 3.7

#### portable machines

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

### 3.8

#### trolleys

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

## 4 Machine categorisation

### 4.1 Categories

The application of all requirements of this European Standard is not possible in every case because of the differences in the design of machines.

The machines are therefore divided into seven categories as shown in Table 1.

**Table 1 — Machine categories by maximum travelling speed**

|  |              | Self-propelled machine travelling speed (v) |            | Non-self-propelled machine <sup>b</sup> |
|--|--------------|---|------------|---|
|  |              | ≥ 100 km/h                                  | < 100 km/h |   |
| Can be incorporated into a train <sup>a</sup> with a speed of:   | v ≥ 100 km/h | Category 1                                  | Category 2 | Category 3                              |
|  | v < 100 km/h | ---   | Category 4 | Category 5                              |
| Cannot be incorporated into a train  |              | ---   | Category 6 | Category 7                              |
| <sup>a</sup> These machines could have restrictions for their position in a train.                                   |              |   |            |   |
| <sup>b</sup> These types of machines are permitted to have a self propelling function in working configuration only. |              |   |            |   |

### 4.2 Type examination and categories

In order to use this European Standard, it is necessary to establish in which category the machine belongs. The corresponding requirements for the categories are defined in Annex A.

Machines meeting the requirements for their category, receive running approval for this category only.

## 5 Gauge

### 5.1 General rules

Machines shall meet the dimensional requirements of EN 15273-2 in all respects except where stated otherwise in special national conditions, see Annex B. The critical points near the limits of the permissible kinematic gauge shall be shown in the documentation according to Annex C.

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 shown in the documentation.

### 5.2 Stowing of moveable machine parts in transport positions

Except for pantographs all moveable parts of the machine that can encroach on the gauge defined in 5.1, including those parts that are prevented from abnormal movement by their operating mechanism safety features, shall be stowed and held by efficient red painted locks. It is not permitted to paint the machine red in the areas of the locks. The locks shall be designed so that foreign objects such as pieces of ballast cannot prevent their locking function. The control devices shall be designed as fail safe concept.

NOTE It is preferable that the control of locking should be possible from inside the machine.

Only where a moveable part is able to fall on to the track or to exceed the gauge, locks shall be doubled by slings, chains or similar devices in order to prevent them from falling onto the track in case of a failure of the locking mechanism.

It shall be obvious to anyone checking the machine that these parts of the machine are locked in their stowed position. This check shall be possible either by direct sight from one side of the track or by other means. Furthermore, for self-propelled machines a warning light shall illuminate on the driver's desk to indicate if a moveable part of the machine is not locked.

When travelling, all control circuits not related to travelling, including locking devices, shall be deactivated.

## 6 Frame

### 6.1 Principal dimensions

Except as shown below, the total length over the buffers and the distance between axles or bogies centres shall be in accordance to UIC 530-2.

### 6.2 Design of the machine frame

The machine frame shall be able to withstand either the static loads of EN 12663-1:2010, subclauses 6.1 to 6.5 or the static loads according to EN 12663-2:2010, subclauses 5.2.1 to 5.2.4, without exceeding the permissible values given therein.

The corresponding structural category of EN 12663-2 is as follows:

- for machines not permitted to be loose shunted or hump shunted: F-II;
- for all other machines: F-I.

The acceleration in x-direction according to EN 12663-1:2010, Table 13 or EN 12663-2:2010, Table 10 shall be  $\pm 3$  g.

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## 6.3 Lifting and jacking points

The machine frame shall incorporate lifting points by which the whole machine is capable of being safely lifted or jacked. The location of the lifting and jacking points shall be defined.

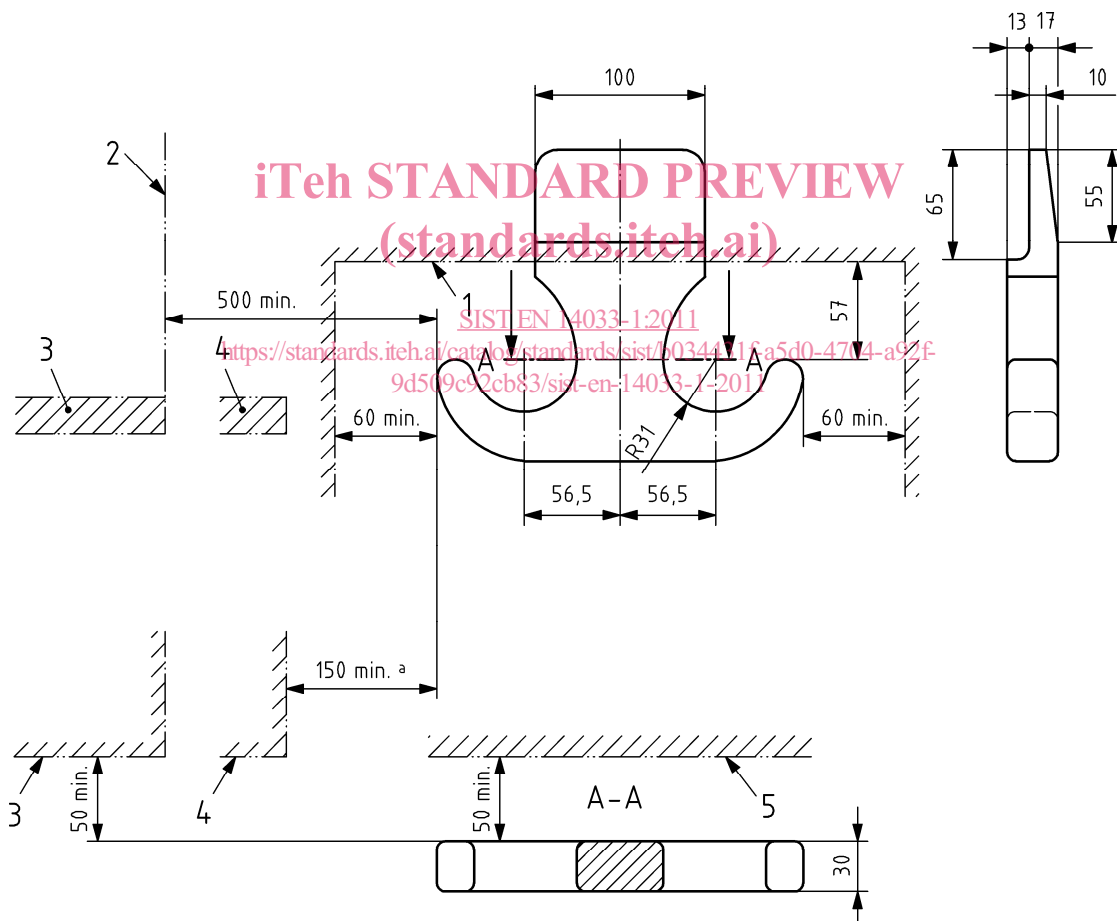
To facilitate the work during repair or inspection or when on-tracking the machine, the machine shall be provided on both long sides with at least two lifting points, at which the machine can be lifted in empty or laden condition. These lifting points shall be identified according to 17.1.

NOTE It is recommended to provide these lifting points at a distance of 1 400 mm from the middle of the individual wheelsets.

To allow positioning of jacking devices, clearances shall be provided under the lifting points which shall not be blocked by the presence of non removable parts. The lifting and jacking load cases according to EN 12663-2 shall apply for lifting and jacking under workshop and servicing conditions.

## 6.4 Stowage points for transport on boats

Machines suitable for transport on boats shall be fitted with stowage hooks in accordance with the Figure 1.



## Key

- |   |  |   |  |
|---|--|---|--|
| 1 | Space required for projecting parts  | 4 | Gangway or end platform step board           |
| 2 | Buffer fixing plane  | 5 | Other projecting parts, e.g. control-handles |
| 3 | Step board   |   |  |
| a | If the dimension cannot be complied with, protective plates shall be mounted above the draw-hook |   |  |

Figure 1 — Stowage hook

## 7 Running gear

### 7.1 General

The requirements of this clause do not concern wheels or rollers used for specific working conditions and which are retracted during running.

The running gear shall be able to negotiate the horizontal and vertical radii given in Table B.1.

### 7.2 Wheel diameter

The nominal wheel diameter should preferably be between 920 mm and 1000 mm. However, wheels with a nominal diameter less than 920 mm may be used to meet particular design requirements. The minimum worn diameter shall not, however, be smaller than 330 mm.

### 7.3 Static axle loading

The maximum permissible static axle load depends on the wheel diameter. In the running condition, the limits shall comply with the values given in Table 2.

Table 2 — Static axle loading

| Wheel diameter $\varnothing$<br>$d^a$<br>mm                          | Maximum permissible static axle<br>load<br>t |
|--|--|
| $\varnothing \geq 840$   | 22,5   |
| $840 > \varnothing \geq 760$   | 20   |
| $760 > \varnothing \geq 680$   | 18,5   |
| $680 > \varnothing \geq 630$   | 17   |
| $630 > \varnothing \geq 550$   | 14,5   |
| $550 > \varnothing \geq 470$   | 12,5   |
| $470 > \varnothing \geq 390$   | 10,5   |
| $390 > \varnothing \geq 330$   | 9  |
| <sup>a</sup> $d$ = minimum worn diameter<br>$\varnothing$ = diameter |  |

### 7.4 Wheel profile

The wheel profile shall comply with the requirements of EN 13715 or another profile if satisfactory riding as required in Clause 8 can be achieved.

### 7.5 Shape and dimensions of the axles and wheelsets

The axles shall comply with the requirements of EN 13261, EN 13103 and EN 13104. The design of the axles shall additionally take into account the forces generated when working.

Except as shown below, the wheels shall comply with the requirements of EN 13262 and EN 13979-1.

Other types of wheels made of ferromagnetic steel may also be used, if verification can be provided of the ability to safely transmit horizontal, vertical and braking forces.