SLOVENSKI STANDARD
SIST EN 13481-2:2022

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Nadomešča:
SIST EN 13481-2:2012+A1:2017

Železniške naprave - Zgornji ustroj proge - Zahteve za izdelavo pritrdilnih sistemov - 2. del: Pritrdilni sistemi za betonske prage v tirni gredi

Railway Applications - Track - Performance Requirements for Fastening Systems - Part 2: Fastening systems for concrete sleepers in ballast

Bahnanwendungen - Oberbau - Leistungsanforderungen für Schienenbefestigungssysteme - Teil 2: Befestigungssysteme für Betonschwellen

Applications ferroviaires - Voie - Exigences de performance pour les systèmes de fixation - Partie 2 : Systèmes de fixation pour traverses en béton en voie ballastée

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ICS:

93.100	Gradnja železnic	Construction of railways

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English Version

Railway applications - Track - Performance requirements for fastening systems - Part 2: Fastening systems for concrete sleepers in ballast

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This European Standard was approved by CEN on 8 May 2022.

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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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 13481-2:2022) 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of an identical text or by endorsement, at the latest by January 2023, and conflicting national standards shall be withdrawn at the latest by January 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13481-2:2012+A1:2017.

The main changes compared to the previous edition are as follows:

a) inclusion of tests for fastenings with very low stiffness;

b) changes to the loading conditions for Category B fastenings;

c) inclusion of details of in-service testing, replacing the reference to EN 13146-8, which is to be withdrawn;

d) editorial changes to make clear which requirements are based on laboratory testing.

This European Standard is one of the series EN 13481 “*Railway applications — Track — Performance requirements for fastening systems*”, which consists of the following parts:

— *Part 1: Definitions*

— *Part 2: Fastening systems for concrete sleepers in ballast*

— *Part 3: Fastening systems for wood and polymeric composite sleepers*

— *Part 4: Fastening systems for steel sleepers*

— *Part 5: Fastening systems for ballastless tracks*

— *Part 7: Fastening systems for switches and crossings, check rails, insulated rail joints and rail expansion devices*

NOTE Part 6 does not exist in this series.

These European Standards are supported by the test methods in the series EN 13146 “*Railway applications — Track — Test methods for fastening systems*”.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

A series of tests is used to assess the suitability of fastening systems for use in railway track, i.e. for type approval of complete fastening systems. This document only sets requirements considered relevant to ensure the safe, long-term operation of the track system. The test methods are described in other associated standards.

The various Categories of rail fastenings used in this document are defined in EN 13481-1:2012.

1 Scope

This document is applicable to fastening systems in Categories A – E as specified in EN 13481-1:2012, 3.1 for use on concrete sleepers in ballasted track with maximum axle loads and minimum curve radii as shown in Table 1.

Table 1 — Fastening category criteria

Category	Maximum design axle load kN	Minimum curve radius m
A	130	40
B	180	80
C	260	150
D	260	400
E	350	150
NOTE The maximum axle load for Categories A and B does not apply to maintenance vehicles.		

The requirements apply to:

— fastening systems which act on the foot and/or web of the rail including direct fastening systems and indirect fastening systems;

— fastening systems for rail sections included in EN 13674-1 (excluding 49E4) or EN 13674-4.

This document is not applicable to fastening systems for other rail sections, rigid fastening systems or special fastening systems used at bolted joints or glued joints.

This document is for the type approval of complete fastening systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 13146-1:2019, *Railway applications — Track — Test methods for fastening systems — Part 1: Determination of longitudinal rail restraint*

EN 13146-2:2012, *Railway applications — Track — Test methods for fastening systems — Part 2: Determination of torsional resistance*

EN 13146-3:2012, *Railway applications — Track — Test methods for fastening systems — Part 3: Determination of attenuation of impact loads*

EN 13146-4:2020, *Railway applications — Track — Test methods for fastening systems — Part 4: Effect of repeated loading*

EN 13146-5:2012[1], *Railway applications — Track — Test methods for fastening systems — Part 5: Determination of electrical resistance*

EN 13146-6:2012, *Railway applications — Track — Test methods for fastening systems — Part 6: Effect of severe environmental conditions*

EN 13146-7:2019, *Railway applications — Track — Test methods for fastening systems — Part 7: Determination of clamping force and uplift stiffness*

EN 13146-9:2020, *Railway applications — Track — Test methods for fastening systems — Part 9: Determination of stiffness*

EN 13146-10:2017, *Railway applications — Track — Test methods for fastening systems — Part 10: Proof load test for pull-out resistance*

EN 13230-1:2016, *Railway applications — Track — Concrete sleepers and bearers — Part 1: General requirements*

EN 13481-1:2012, *Railway applications — Track — Performance requirements for fastening systems — Part 1: Definitions*

EN 13674-1:2011+A1:2017, *Railway applications — Track — Rail — Part 1: Vignole railway rails 46 kg/m and above*

EN 13674-4:2019, *Railway applications — Track — Rail — Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m*

EN 17343:2020, *Railway applications — General terms and definitions*

3 Terms and definitions

For the purposes of this document, the following terms and definitions given in EN 13481-1:2012, EN 17343:2020 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

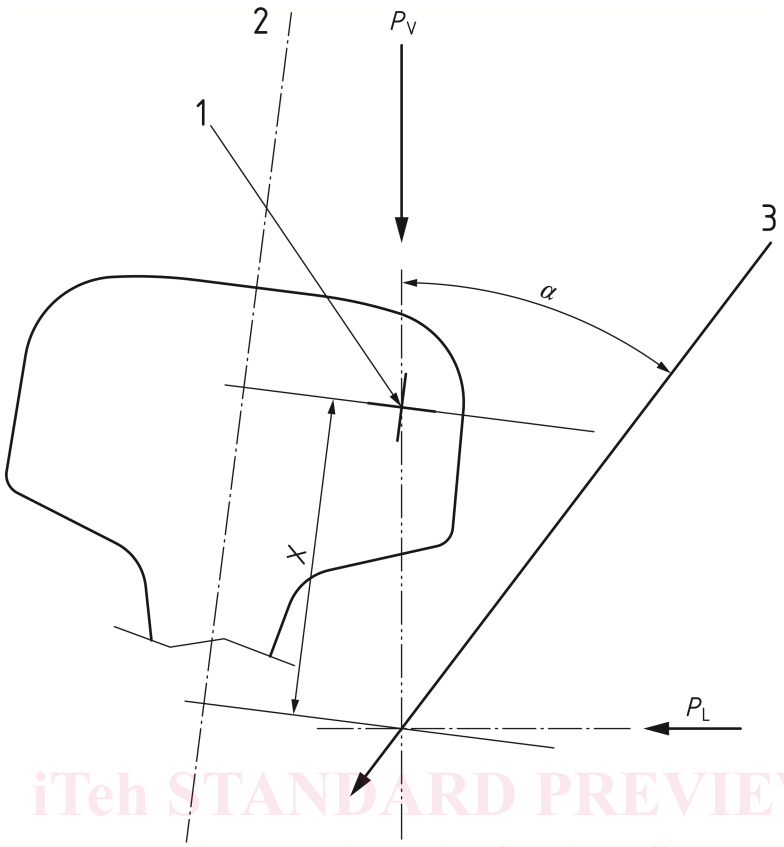
— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
datum for applied test loads
flat bottom surface of a conventional concrete sleeper used as a datum plane to define the orientation of the applied test loads

Note 1 to entry: For fastenings on sleepers which do not have a flat bottom surface, the orientation of the test loads is defined relative to “running surface of the rails” which is defined in EN 13848-1:2019. See Figure 1.

[1] As impacted by EN 13146-5:2012/AC:2017.



Key

1 centre of gauge corner radius
2 centre line of the rail profile
3 line of load application

Figure 1 — Load application position

3.2
purchaser
operator, owner or user of the rail fastening system

3.3
supplier
body responsible for the use of this European Standard

Note 1 to entry: Sometimes the manufacturer is also the supplier.

4 Symbols

For the purposes of this document, the following symbols apply.

F_{LFA1}	minimum force applied in measurement of low frequency dynamic stiffness of assembly, in kN;
F_{LFAmax}	reference force for measurement of low frequency dynamic stiffness of assembly, in kN;
F_{LFP1}	notional fastening clip force assumed for measurement of low frequency dynamic stiffness of pad, in kN;
F_{LFPmax}	reference force for measurement of low frequency dynamic stiffness of pad, in kN;
F_{max}	axial load at which gross slip occurs in the longitudinal rail restraint test (EN 13146-1:2019), in kN;
F_{SA1}	minimum force applied in measurement of static stiffness of assembly, in kN;
F_{SAmax}	force applied to assembly in measurement of static stiffness of assembly, in kN;
F_{SP1}	notional fastening clip force assumed for measurement of static stiffness of pad, in kN;
F_{SPmax}	force applied to pad in measurement of static stiffness of pad, in kN;
k_{LFA}	low frequency dynamic stiffness of assembly, in MN/m;
P_L	component of load parallel to the datum for applied test loads, in kN;
P_V	component of load normal to the datum for applied test loads, in kN;
X	distance between the line of application of P_L and the centre of the gauge corner radius of the rail head measured parallel to the centre line of the rail as shown in Figure 1, in mm;
α	angle between the load line and a line normal to the datum for applied loads.

5 Requirements determined by laboratory testing

5.1 Specimens used for laboratory testing

The laboratory tests described in 5.2 to 5.7 shall be carried out using a concrete sleeper or a concrete block which has a rail seat inclination no greater than the inclination to be used on the sleeper for which the type of fastening will be used. If a concrete block is used it does not need to be pre-stressed.

For example, a fastening tested successfully on a sleeper with 1:40 inclination does not need to be re-tested at 1:20 inclination. Similarly a fastening tested successfully on a reinforced concrete block does not need to be re-tested on a pre-stressed sleeper, etc.

If it is used for a fastening for a monobloc sleeper, the test described in 5.8 shall be carried out on a monobloc sleeper. If it is used for a fastening for a twin-block sleeper, the test described in 5.8 shall be carried out on a twin-block sleeper.

For the laboratory tests described in 5.9 and 5.10, the supplier shall carry out tests on concrete sleepers as for 5.2 to 5.7. However, the purchaser may request further tests to be carried out using other sleepers.