

SLOVENSKI STANDARD oSIST prEN 13481-3:2021

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Železniške naprave - Zgornji ustroj proge - Zahteve za izdelavo pritrdilnih sistemov - 3. del: Pritrdilni sistemi za lesene in polimerne kompozitne prage

Railway Applications - Track - Performance Requirements for Fastening Systems - Part 3: Fastening Systems for wood and polymeric composite sleepers

Bahnanwendungen - Oberbau - Leistungsanforderungen für Schienenbefestigungssysteme - Teil 3: Befestigungssysteme für Holz- und Polymerverbundschwellen

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Applications ferroviaires - Voie - Exigences de performance pour les systèmes de fixation - Partie 3 : Systèmes de fixation pour traverses en bois et en composite à matrice polymère Polymère Matrice polymère Polymère

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ICS:

93.100 Gradnja železnic

Construction of railways

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Railway Applications - Track - Performance Requirements for Fastening Systems - Part 3: Fastening Systems for wood and polymeric composite sleepers

Bahnanwendungen - Oberbau -Leistungsanforderungen für Schienenbefestigungssysteme - Teil 3: Befestigungssysteme für Holz- und Polymerverbundschwellen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

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

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European foreword

This document (prEN 13481-3:2021) has been prepared by Technical Committee CEN/TC 256 "Railway Applications", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13481-3:2012.

The main changes in this revision are as follows:

- a) The introduction of the application for fastenings on polymeric composite sleepers.
- b) Changes to the loading conditions for Category B fastenings.
- c) The inclusion of details of in service testing, replacing the reference to EN 13146-8, which is to be withdrawn.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 document is one of the series EN 13481 "*Railway applications – Track – Performance requirements for fastening systems*" which consists of the following parts:

- Part 1: Definitions iTeh STANDARD PREVIEW
- Part 2: Fastening systems for concrete sleepers in ballast
- Part 3: Fastening systems for wood and polymeric composite sleepers https://standards.iteh.ai/catalog/standards/sist/2af3897d-b755-4af4-9628-
- Part 4: Fastening systems for steel sleepers
- Part 5: Fastening systems for ballastless track
- Part 7: Fastening systems for switches and crossings, check rails, rail expansion devices and insulated rail joints

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 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, see informative Annex ZA, which is an integral part of this document.

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 systems. The test methods are described on other associated standards.

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

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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 wood or polymeric composite sleepers in ballasted or ballastless track, including track on open deck bridges, with respective maximum axle loads, and minimum curve radii as shown in Table 1.

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

Table 1 — Fastening category criteria

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 13674-1:2011+A1:2017 (excluding 49E4) or EN 13674-4:2019. (standards.iteh.ai)

This document is not applicable to fastening systems for other rail sections, rigid fastening systems, special fastening systems used at bolted joints or glued joints or special low clamping force fastenings used to mitigate track-bridge interaction effects pren-13481-3-2021

This document is for 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 13145:2001+A1:2011, Railway applications - Track - Wood sleepers and bearers

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

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

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

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

ISO 12856 (series), Polymeric composite railway sleepers

3 Terms and definitions

datum for applied test loads

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

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

• IEC Electropedia: available at http://www.electropedia.org/

• ISO Online browsing platform: available at http://www.iso.org/obp iTeh STANDARD PREVIEW

3.1

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flat bottom surface of a conventional wood or polymeric composite sleeper used as a datum plane to define the orientation of the applied test loads <u>SIST prEN 13481-3:2021</u>

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Note 1 to entry: For fastenings on sleeper 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.



Кеу

- 1
- centre line of the rail profiletalog/standards/sist/2af3897d-b755-4af4-9628-2
- ff80b20ff874/osist-pren-13481-3-2021 line of load application
- 3

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.

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4 Symbols

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

 $F_{\rm HFAmax}$ static preload applied in the measurement of high frequency stiffness of assembly, in kN;

 F_{LFA1} minimum force applied in measurement of dynamic low frequency stiffness of assembly, in kN;

 F_{LFAmax} reference force for measurement of dynamic low frequency stiffness of assembly, in kN;

 F_{LFP1} notional fastening clip force assumed for measurement of low frequency stiffness of pad, in kN;

*F*_{LFPmax} reference force for measurement of dynamic low frequency 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_{HFAD} transfer stiffness in measurement of high frequency stiffness of assembly, in N/m;

 k_{LFA} low frequency dynamic stiffness of assembly, in MN/m;

 $P_{\rm L}$ component of load parallel to the datum for applied test loads, in kN;

 $P_{\rm V}$ component of load normal to the datum for applied test loads, in kN;

- X distance between the line of application of $P_{\rm H}$ and the centre of the gauge corner radius of the rail head as shown in Figure 1, in mm;
- α angle between the load line and a line normal to the datum for applied test loads

5 Requirements determined by laboratory testing

5.1 Specimens used for laboratory testing

For fastening systems to be approved for use on hardwood sleepers complying with EN 13145:2001+A1:2011, the laboratory tests described in 5.2 to 5.7 shall be carried out using any wood sleeper with no free preservative on the surface. Sleepers used for testing shall have parallel top and bottom surfaces with any rail inclination being provided within the fastening system.

For fastening systems to be approved for use with polymeric composite sleepers complying with ISO 12856, the laboratory tests described in 5.3 and 5.7 shall be carried out using any wood or polymer sleeper. The tests described in 5.2, 5.4, 5.5, 5.6 and 5.8 shall be carried out using a sleeper made from the same material as the sleeper for which the type of fastening will be approved.

For polymeric composite sleepers, if the rail inclination is provided in the sleeper, the laboratory tests described in 5.2 to 5.7 shall be carried out using a sleeper which has a rail seat inclination no greater than that for which the type of fastening will be used.

NOTE: On this basis a fastening tested successfully on a sleeper with 1:40 inclination does not need to be re-tested at 1:20 inclination.

5.2 Longitudinal rail restraint

The requirement for longitudinal rail restraint is included to control rail creep and pull apart in the event of a broken rail. The longitudinal rail restraint shall be not less than 7 kN when measured by the procedure in EN 13146-1:2019 before any repeated load test is carried out.

On structures such as long bridges, the longitudinal force transmitted between the track and the structure may be calculated by the method described in CEN/TR 17231:2018 and used in EN 1991-2:2003/AC:2010. The value of $F_{\rm max}$ measured in accordance with EN 13146-1:2019 may be used in the calculation. In such cases, and subject to agreement between the purchaser and supplier, the requirement for longitudinal restraint may be amended.

5.3 Torsional resistance

Measurement of torsional resistance is included for use in assessing the risk of track buckling. When required by the client the torsional resistance shall be measured by the procedure in EN 13146-2:2012 and the result reported.

5.4 Clamping force and uplift stiffness

This shall be determined by the procedure in EN 13146-7:2019. The result shall be reported.

If the rail fastening system is to be used on long bridge structures calculations of track-bridge interaction effects at bridge deck ends, such as those required in EN 1991-2:2003+A1:2010, may require values of uplift stiffness of the fastening system. If such information is required it shall be determined using the method set out in EN 13146-7:2019. A NDARD PREVIEW

This requirement is not applicable to web support fastening systems.

5.5 Vertical stiffness

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The assembly stiffness shall be measured to inform the purchaser of an important mechanical property of the fastening system and to determine the parameters for the repeated loading test (see 5.6). The assembly static stiffness and assembly low frequency dynamic stiffness at 5Hz shall be measured in accordance with EN 13146-9:2020.

Stiffness testing of pads is not a requirement for type approval of the fastening but may be used to provide guidance for other tests e.g. quality control. If required, pads shall be tested in accordance with EN 13146-9:2020.

If there is no elastic pad in the fastening assembly (i.e no rail pad or baseplate pad) it is not necessary to measure the stiffness. In such a case, for all of the following tests it shall be assumed that the static and low frequency dynamic assembly stiffnesses is more than 300 MN/m.

Loads are given in Table 2 for testing pads and for testing complete fastening assemblies.

NOTE Guidance on the measurement of pad high frequency dynamic stiffness is given in EN 13146-9:2020 Annex B. For the measurement of assembly properties at acoustic frequency see EN 15461.