
**Železniške naprave – Zgornji ustroj – Zahteve za izdelavo pritrdilnih sistemov – 3.
del: Pritrdilni sistemi za lesene prage**

Railway applications - Track - Performance requirements for fastening systems - Part 3:
Fastening systems for wood sleepers

Bahnanwendungen - Oberbau - Leistungsanforderungen für
Schienenbefestigungssysteme - Teil 3: Befestigungssysteme für Holzschwellen

Applications ferroviaires - Voie - Prescriptions de performance pour les systemes de
fixation - Partie 3: Systemes de fixation des traverses en bois

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93.100 Gradnja železnic Construction of railways

SIST EN 13481-3:2004 **en**

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EUROPEAN STANDARD
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Railway applications - Track - Performance requirements for fastening systems - Part 3: Fastening systems for wood sleepers

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This European Standard was approved by CEN on 6 March 2002.

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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 Management Centre has the same status as the official versions.

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Foreword

This document EN 13481-3:2002 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of an identical text or by endorsement, at the latest by December 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

This document has been prepared under Mandate M/024¹ given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

No existing European Standard is superseded.

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;
- Part: 3 Fastening systems for wood sleepers;
- Part: 4 Fastening systems for steel sleepers;
- Part: 5 Fastening systems for slab track;
- Part: 6 Special fastening systems for attenuation of vibration;
- Part: 7 Special fastening systems for switches and crossings and check rails.

These are supported by the test methods in the series EN 13146 "Railway applications — Track — Test methods for fastening systems".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1) Railway equipment

EN 13481-3:2002 (E)**Introduction**

A requirement for longitudinal rail restraint is included to control rail creep and pull apart in the event of a broken rail.

Measurement of torsional resistance is included for use in assessing the risk of track buckling.

The laboratory test for the effect of repeated loading is the means of assessing potential long-term performance of the fastening in track.

The test for clamping force is only suitable for laboratory use.

1 Scope

This European Standard is applicable to fastening systems for use on wood sleepers in ballasted track as follows:

- main lines having a radius of curvature greater than 150 m and subject to a maximum design axle load of 260kN;
- light rail systems having a radius of curvature greater than 80 m and subject to a maximum design axle load of 130 kN.

The requirements apply to:

- direct fastening systems and systems which incorporate a baseplate;
- fastening systems for the rail sections in prEN 13674-1 and prEN 13674-4.

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

This standard is for type approval of a complete fastening assembly only.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publications referred to applies (including amendments).

EN 13145, *Railway applications — Track — Wood sleepers and bearers.*

prEN 13146-1, *Railway applications — Track — Test methods for fastening systems — Part 1: Determination of longitudinal rail restraint.*

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

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

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

prEN 13146-7, *Railway applications — Track — Test methods for fastening systems — Part 7: Determination of clamping force.*

EN 13146-8, *Railway applications — Track — Test methods for fastening systems — Part 8: In-service testing.*

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

EN 13481-2:2002, *Railway applications — Track — Performance requirements for fastening systems — Part 2: Fastening systems for concrete sleepers.*

prEN 13674-1, *Railway applications — Track — Rail — Part 1: Flat bottom symmetrical railway rails 46 kg/m and above.*

prEN 13674-4²⁾, *Railway applications — Track — Rail — Part 4: Flat bottom symmetrical railway rails from 27 to 46 kg/m.*

3 Terms and definitions

For the purposes of this European Standard the terms and definitions in EN 13481-1 apply.

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4 Symbols

L lateral component of force transmitted by the wheel to the rail head as shown in Figure 1, in kN;

P_L component of load parallel to the base of the sleeper, in kN;

P_V component of load normal to the base of the sleeper, in kN;

V vertical component of force transmitted by the wheel to the rail head as shown in Figure 1, in kN;

X distance of the line of application of L 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 base of the sleeper, in degrees.

NOTE
$$\frac{L}{V} = \frac{P_L}{P_V} = \tan \alpha$$

²⁾ In preparation.

EN 13481-3:2002 (E)

5 Requirements

5.1 General

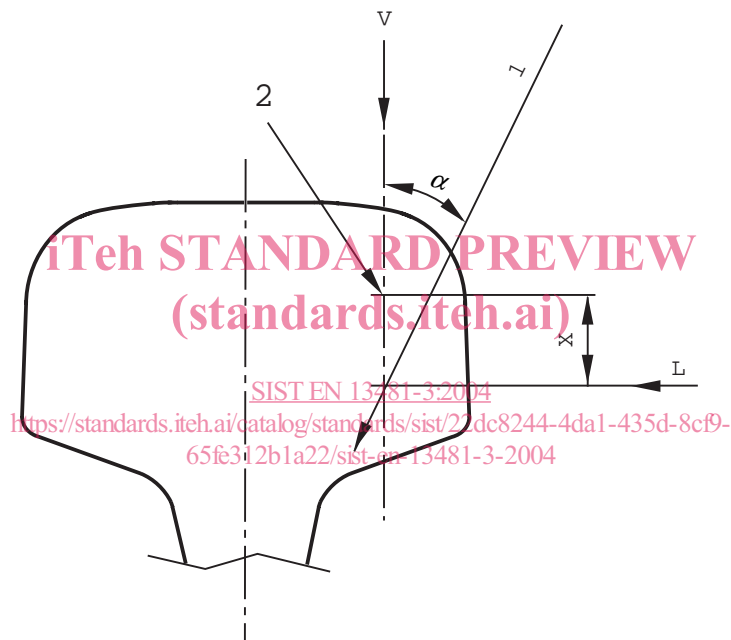
The following requirements apply to the fastening system when tested in conjunction with hardwood sleepers, with no free preservative on the surface, complying with EN 13145. Sleepers used for testing shall have parallel top and bottom surfaces.

5.2 Longitudinal rail restraint

The longitudinal rail restraint shall be not less than 7 kN when measured by the procedure in prEN 13146-1.

5.3 Torsional resistance

The torsional resistance shall be measured by the procedure in prEN 13146-2 and the result reported.



Key

- 1 Line of load application
- 2 Centre of gauge corner radius

Figure 1 — Load application position

5.4 Effect of repeated loading

This shall be determined by the procedure in prEN 13146-4. Test loads for the track types specified in Table 1 shall be in accordance with Table 2. The value of $P_v/\cos\alpha$ shall be obtained from Table 2 for the assembly design under test. The values in Table 2 have been derived for the track classes shown in Table 1. For assemblies with no pad the test load and position for pad stiffness > 200 MN/m shall be used.

Table 1 — Reference values for testing the effect of repeated loading

Type of track	Main line	Light rail
Rail section	60 E1	40 E1
Axle load ¹⁾ in kN	225	100
Curve radius in m	> 400 (soft pads) ²⁾ > 150 ≤ 400 (med/hard pads)	> 80 (any pad)

¹⁾ The axle loads in this table are reference values only.

²⁾ The dynamic stiffness of pads is stated for test purposes only. It should not be taken as a recommendation for the dynamic stiffness of pads to be used in track.

Pads shall be classified as follows when the dynamic stiffness is measured in accordance with EN 13481-2:2002, annex B.

— Soft - dynamic stiffness < 100 MN/m;

— Medium - dynamic stiffness ≥ 100 < 200 MN/m;

— Hard - dynamic stiffness ≥ 200 MN/m.

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The following measurements shall be performed before and after repeated loading. The change in performance shall not exceed the values shown.

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- Longitudinal rail restraint (prEN 13146-1) change ≤ 20 %;
 - Vertical stiffness (prEN 13146-4) change ≤ 25 %;
 - Clamping force (prEN 13146-7) change ≤ 20 %.

Table 2 — Test loads and positions

Type of track	Main line			Light rail
Pad dynamic stiffness ¹⁾ in MN/m	< 100	100 - 200	> 200	Any
Maximum load ²⁾ $P_V/\cos \alpha$ in kN	70	75	83	55
L/V	0,50	0,65	0,65	0,80
α^0	26	33	33	38,6
Load position X in Figure 1 in mm	15	15	15	25

¹⁾ The pad dynamic stiffness is measured in accordance with EN 13481-2:2002, annex B.

²⁾ The test loads apply only to rail sections included in prEN 13674-1 and prEN 13674-4 excluding 49 E4.