



# SLOVENSKI STANDARD

## SIST EN 13146-2:2004

01-marec-2004

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### Železniške naprave – Zgornji ustroj – Preskušanje pritrdilnih sistemov – 2. del: Ugotavljanje torzijskega odpora

Railway applications - Track - Test methods for fastening systems - Part 2:  
Determination of torsional resistance

Bahnanwendungen - Oberbau - Prüfverfahren für Schienenbefestigungssysteme - Teil 2:  
Ermittlung des Verdrehwiderstandes

Applications ferroviaires - Voie - Méthodes d'essai pour les systèmes de fixation - Partie  
2: Détermination du couple d'encastrement

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Ta slovenski standard je istoveten z: EN 13146-2:2002

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#### **ICS:**

93.100            Gradnja železnic            Construction of railways

**SIST EN 13146-2:2004**            en

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 13146-2**

November 2002

ICS 93.100

English version

## Railway applications - Track - Test methods for fastening systems - Part 2: Determination of torsional resistance

Applications ferroviaires - Voie - Méthodes d'essai pour les systèmes de fixation - Partie 2: Détermination du couple d'encastrement

Bahnanwendungen - Oberbau - Prüfverfahren für Schienenbefestigungssysteme - Teil 2: Ermittlung des Verdrehwiderstandes

This European Standard was approved by CEN on 2 October 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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN 13146-2:2002) 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 May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.

This document has been prepared under mandates (M/024<sup>1</sup>), M/275<sup>2</sup>) given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s). No existing European Standard is superseded.

In this European Standard the annex A is informative.

This series of European Standards EN 13146 "Railway applications — Track — Test methods for fastening systems" consists of the following Parts:

- *Part 1 : Determination of longitudinal rail restraint.*
- *Part 2 : Determination of torsional resistance.*
- *Part 3 : Determination of attenuation of impact loads.*
- *Part 4 : Effect of repeated loading.*
- *Part 5 : Determination of electrical resistance.*
- *Part 6 : Effect of severe environmental conditions.*
- *Part 7 : Determination of clamping force.*
- *Part 8 : In service testing.*

These support the requirements in the series EN 13481 Railway applications — Track — Performance requirements for fastening systems — Parts 1 to 7.

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.

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<sup>1</sup>) Railway equipment.

<sup>2</sup>) Standardization in the field of Railway Equipment on the Interoperability of the Trans-European High-Speed Rail System.

**EN 13146-2:2002 (E)****1 Scope**

This Part of this European Standard specifies a laboratory test procedure to determine the moment necessary to rotate a rail, secured to a sleeper by a rail fastening assembly, through  $1^\circ$  in a plane parallel to the base of the sleeper. The value obtained can be used in track stability calculations.

This test procedure applies to a complete fastening assembly.

**2 Normative references**

This European Standard incorporates by dated or undated reference, 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 publication referred to applies (including amendments).

EN 13481-1:2002, *Railway applications — Track — Performance requirements for fastening systems — Part 1: Definitions*.

**3 Terms and definitions**

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For the purposes of this European Standard, the terms and definitions given in EN 13481-1:2002 apply.

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**4 Principle**

A transverse load is applied to the foot of a rail fixed to a single rail seat of a sleeper whilst the sleeper is restrained. Movement of the rail relative to the sleeper is recorded and the load increased until the rail has rotated through  $1,5^\circ$ . The moment to cause a displacement of  $1^\circ$  is then determined from a plot of moment of load against displacement.

**5 Apparatus****5.1 Rail**

A short length of rail of the section for which the fastening assembly under test is designed. The rail shall be unlaminated and have no loose rust on the surface nor be polished on the foot by repeated testing.

**5.2 Loading device**

A device to apply a load to the edge of the foot of the rail, parallel to the centre line of the sleeper and the plane of the foot of the rail, at a controlled rate of 10 kN/min.

## 5.3 Load and displacement measuring and recording instruments

### 5.3.1 General

Instruments which continuously measure the applied load to  $\pm 0,1$  kN and angular displacement of the rail to  $\pm 0,01^\circ$  relative to the sleeper. The recording instruments shall be capable of plotting load/deflection curves.

NOTE Linear measurement of displacement can be used.

### 5.3.2 Verification of calibration

The calibration of actuators and measuring instruments shall be verified using equipment having certified traceability to European or International Standards using the International System of Units (SI).

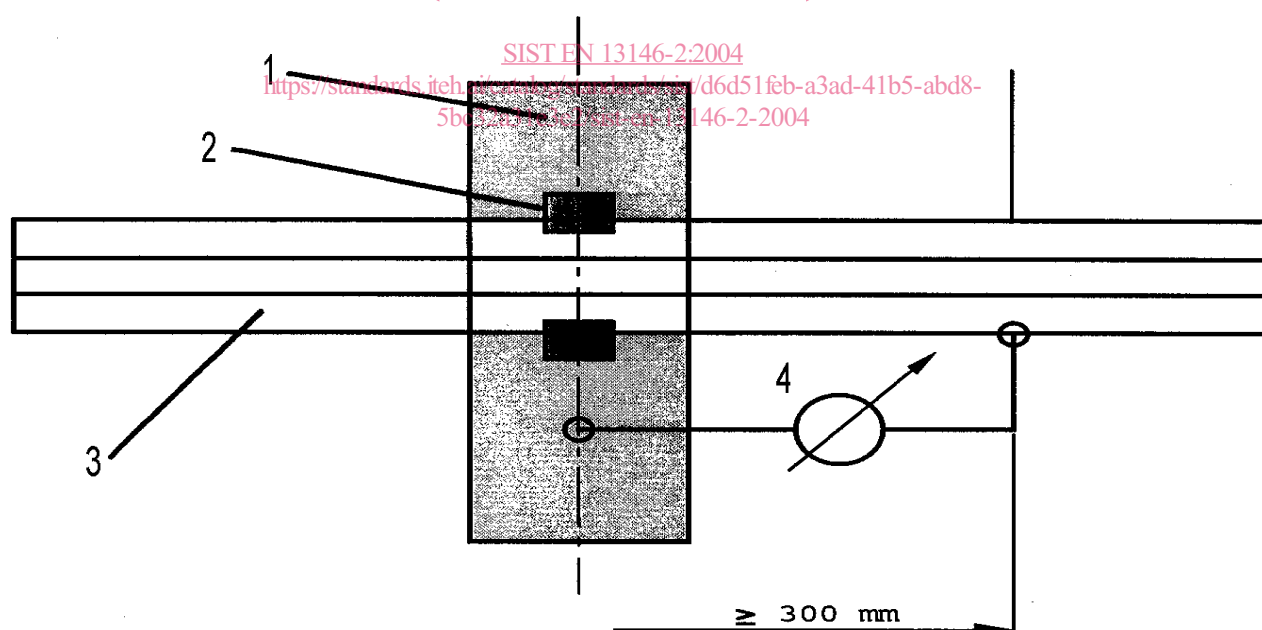
## 6 Test specimens

### 6.1 Sleeper

A sleeper, half sleeper or bearer with cast-in fastening components or holes and rail seats, as made without modification for this test.

### 6.2 Fastening

The complete fastening assembly including all components and baseplate where appropriate.



### Key

- 1 test sleeper
- 2 fastening assembly including pad
- 3 rail as described in 5.1
- 4 displacement measuring instrument

Figure 1 — Test arrangement with in-line fastenings

## EN 13146-2:2002 (E)

## 7 Procedure

## 7.1 Preparation for test

Fix the short length of rail to one rail seat of the sleeper using the fastening components as assembled in track. Support the sleeper on a rigid horizontal base and restrain from horizontal movement.

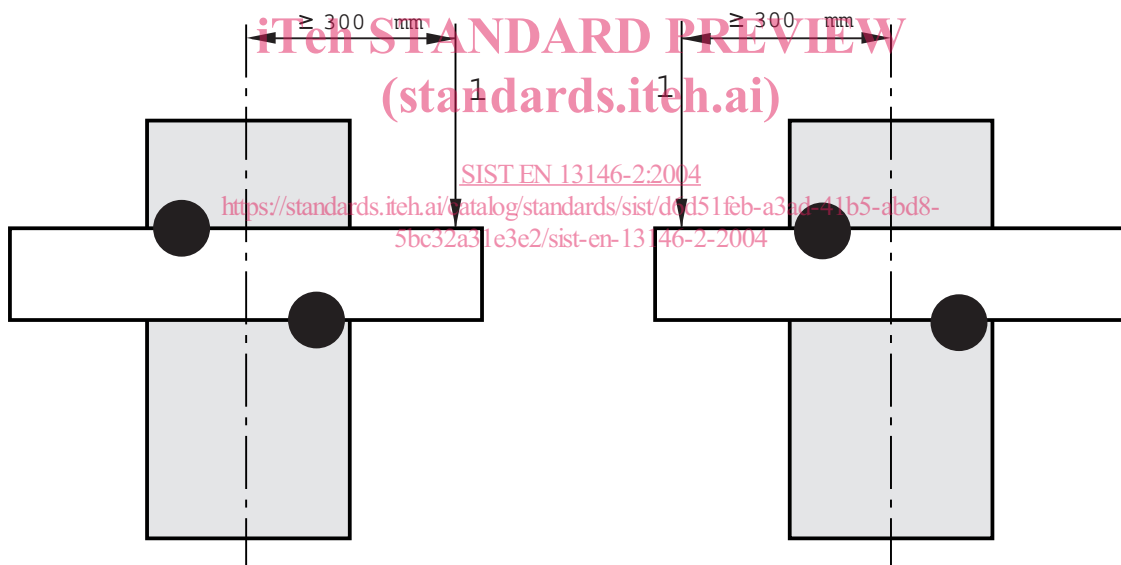
## 7.2 Loading and measurement

Using the arrangement shown in Figure 1, apply a load to the rail and push the rail to a position where the rail foot in the rail seat area diagonally contacts both fastening inserts or insulators or shoulders. Move the actuator to the opposite side of the rail. Apply an increasing load and continuously measure and record the moment of load to  $\pm 0,03$  kNm and the rail displacement relative to the sleeper to  $\pm 0,02^\circ$ . When the rail has displaced by  $1,5^\circ$  remove the load. After 3 min apply the load to the opposite side of the rail and repeat the same loading cycle.

Plot the moment of load against the angular displacement of the rail for each loading cycle .

## 7.3 Loading and measurement when fastenings offset

If the fastenings are offset from the sleeper centre line perform two tests on the same assembly with the arrangement shown in Figure 2. Plot the moment of load against the angular displacement of the rail for each loading cycle.



## Key

1 load

Figure 2 — Test arrangement with offset fastenings

## 7.4 Moment of load-displacement graph

A typical moment of load-displacement graph is shown in annex A. The data for track stability can be extracted from such graphs.



## 8 Test report

The test report shall include at least the following information :

- a) number, date of issue and title of this standard ;
- b) name and address of laboratory performing the test ;
- c) date test performed ;
- d) name, designation and description of fastening assembly, including individual components, tested ;
- e) origin of test specimens ;
- f) rail section used in test ;
- g) test arrangement ;
- h) graphs of moment of load versus rail angle for each direction of loading.

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