



**SLOVENSKI STANDARD**  
**SIST EN 13481-8:2006**  
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**Železniške naprave – Zgornji ustroj – Zahteve za izdelavo pritrdilnih sistemov – 8.  
del: Pritrdilni sistemi za proge z visokimi osnimi obremenitvami**

Railway applications - Track - Performance requirements for fastening systems - Part 8:  
Fastening systems for track with heavy axle loads

Bahnanwendungen - Oberbau - Leistungsanforderungen für  
Schienenbefestigungssysteme - Teil 8: Befestigungssysteme für Strecken mit hohen  
Radsatzlasten

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Applications ferroviaires - Voie - Prescriptions de performance pour les systemes de  
fixation - Partie 8: Systemes de fixation des voies pour des charges a l'essieu lourdes

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English Version

Railway applications - Track - Performance requirements for  
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This European Standard was approved by CEN on 6 February 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, 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.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This European Standard (EN 13481-8:2006) 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 October 2006, and conflicting national standards shall be withdrawn at the latest by October 2006.

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*
- *Part 8: Fastening systems for track with heavy axle loads*

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, 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.

## Introduction

Axle loads of up to 310 kN are in use on some European railways but the scope of EN 13481 Parts 2 to 7 has a maximum of 260 kN axle loads. This European Standard includes requirements for fastening systems for use on concrete, wood and steel sleepers in ballasted track carrying axle loads up to 350 kN and in track where the minimum radius of curvature on main lines is less than the minimum in EN 13481 Parts 2 to 4. Tracks with high axle loads and small radius curves require heavy duty fastening systems complying with the requirements of this European Standard. Heavy duty fastening systems are also recommended for use in the following conditions.

- tracks carrying a high proportion of axle loads in the range 225 kN to 260 kN;
- main line tracks with fastening systems incorporating medium or hard pads with minimum curve radii in the range 80 m to 150 m;
- main line tracks with fastening systems incorporating soft pads, where a significant proportion of trains with axle loads in the range 200 kN to 260 kN travel with high cant excess.

A class of high attenuation of dynamic loading is included for use when it is necessary to protect concrete sleepers from vehicle induced impacts.

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.

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## 1 Scope

This European Standard is applicable to fastening systems for use on concrete, wood and steel sleepers in main line ballasted track having a radius of curvature greater than 80 m and subject to a maximum design axle load of 350 kN.

The requirements apply to:

- direct and indirect fastening systems;
- fastening systems for the rail sections in EN 13674-1 and EN 13674-4.

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

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

## 2 Normative references

The following referenced documents are indispensable for the application of this European Standard. 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, *Railway applications — Track — Test methods for fastening systems — Part 1: Determination of longitudinal rail restraint*

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

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

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

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

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

EN 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 13481-1:2002, *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*

EN 13481-3:2002, *Railway applications — Track — Performance requirements for fastening systems — Part 3: Fastening systems for wood sleepers*

## EN 13481-8:2006 (E)

EN 13481-4:2002, *Railway applications — Track — Performance requirements for fastening systems — Part 4: Fastening systems for steel sleepers*

EN 13481-5:2002, *Railway applications — Track — Performance requirements for fastening systems — Part 5: Fastening systems for slab track*

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

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

### 3 Terms and definitions

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

### 4 Symbols and abbreviations

For the purposes of this European Standard, the symbols given in EN 13481-2:2002 apply.

### 5 Requirements

#### 5.1 Longitudinal rail restraint

The longitudinal rail restraint shall be not less than 9 kN when measured by the procedure in EN 13146-1.

When necessitated by the design of the supporting structure and subject to agreement between the purchaser and manufacturer, the minimum requirement for longitudinal restraint may be reduced.

#### 5.2 Torsional resistance

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

#### 5.3 Attenuation of impact loads

For fastening systems for concrete sleepers described as having medium or high attenuation of dynamic loads this shall be measured by the procedure in EN 13146-3 using the type of sleeper (monoblock or two block) on which the fastening is to be used. The result shall comply with the following limits:

- medium attenuation  $\geq 15\% \leq 30\%$ ;
- high attenuation  $> 30\%$ .

#### 5.4 Effect of repeated loading

This shall be determined by the procedure in EN 13146-4. Test loads for the track type 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 class shown in Table 1.



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

|  |      |
|--|------|
| Rail section   | 60E1 |
| Axle load in kN  | 300  |
| Curve radius in m  | 200  |
| NOTE The values in this table are reference values only. See Clause 7. |      |

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  $\geq$  100 MN/m < 200 MN/m;
- Hard          dynamic stiffness  $\geq$  200 MN/m.

**Table 2 — Test loads and positions**

| Pad/assembly dynamic stiffness <sup>a</sup> in MN/m   | < 100 | $\geq$ 100 < 200 | $\geq$ 200 |
|---|-------|------------------|------------|
| Maximum load <sup>b</sup> $P_V/\cos \alpha$ in kN   | 100   | 100              | 108        |
| $L/V$   | 0,85  | 0,85             | 0,85       |
| $\alpha^p$  | 40    | 40               | 40         |
| Load position X in Figure 1 in mm   | 75    | 75               | 75         |
| <p><sup>a</sup> The pad dynamic stiffness shall be measured in accordance with EN 13481-2:2002, Annex B. Assembly dynamic stiffness shall be measured in accordance with EN 13481-5:2002, Annex B.</p> <p><sup>b</sup> The test loads apply only to rail sections included in EN 13674-1 and EN 13674-4 excluding 49E4.</p> |       |                  |            |