



SLOVENSKI STANDARD

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**Železniške naprave - Zgornji ustroj - Zahteve za izdelavo pritrdilnih sistemov - 7.
del: Posebni pritrdilni sistemi za kretnice, križišča in vodilne tirnice**

Railway applications - Track - Performance requirements for fastening systems - Part 7:
Special fastening systems for switches and crossings and check rails

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Bahnanwendungen - Oberbau - Leistungsanforderungen für
Schienenbefestigungssysteme - Teil 7: Spezielle Befestigungssysteme für Weichen und
Kreuzungen sowie Führungsschienen

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Applications ferroviaires - Voie - Exigences de performance pour les systèmes de
fixation - Partie 7: Systèmes de fixation spéciaux pour appareils de voie et contre-rails

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ICS:

93.100

Gradnja železnic

Construction of railways

SIST EN 13481-7:2012

en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13481-7

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English Version

**Railway applications - Track - Performance requirements for
fastening systems - Part 7: Special fastening systems for
switches and crossings and check rails**

Applications ferroviaires - Voie - Exigences de performance
pour les systèmes de fixation - Partie 7: Systèmes de
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Schienenbefestigungssysteme - Teil 7: Spezielle
Befestigungssysteme für Weichen und Kreuzungen sowie
Führungsschienen

This European Standard was approved by CEN on 27 April 2012.

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

CEN members are the national standards bodies of 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 13481-7:2012) 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 November 2012, and conflicting national standards shall be withdrawn at the latest by November 2012.

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

This document supersedes EN 13481-7:2003.

The main changes in this revision of EN 13481-7:2003 are as follows:

- a) new categories of fastening systems have been introduced (Clause 1, Table 1);
- b) the ranges of test loads have been extended to cover the new categories of fastening systems (5.4);
- c) advice on attenuation of noise and vibration has been added in a new annex (Annex A).

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 with rail on the surface or rail embedded in a channel*
- *Part 7: Special fastening systems for switches and crossings and check rails*

NOTE Part 6 does not exist in this series.

These 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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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,

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Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

Various tests are necessary to assess the performance for fastening systems of railway tracks. In this European Standard, a requirement for longitudinal rail restraint is included to control rail creep.

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. The measurement of clamping force in track can be used to monitor long term performance. The method of measurement used should be suitable for the design of the particular fastening system.

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1 Scope

This European Standard specifies performance requirements for special fastening systems, in categories A – E as specified in EN 13481-1:2012, 3.1, for switches and crossings and check rails secured within the overall fastening system (not independently fixed to the bearers) on wood, concrete and steel bearers, in ballasted track and on slab track and which have maximum axle loads and minimum curve radii in divergent track in accordance with Table 1.

Table 1 — Fastening category criteria

Category	Maximum design axle load	Minimum curve radius
	kN	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 incorporate a resilient element and act on the foot and/or web of the rail and which are intended for use with stock rail sections in EN 13674-1 (excluding 49E4) and EN 13674-4+A1.

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This standard is not applicable to rigid fastening systems.

This standard is for type approval of a complete fastening assembly only. Requirements for quality control are included in the standards applicable to individual components.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13146-1:2012, *Railway applications – Track – Test methods for fastening systems – Part 1: Determination of longitudinal 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 13146-4:2012, *Railway applications – Track – Test methods for fastening systems – Part 4: Effect of repeated loading*

EN 13146-5:2012, *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 13146-7:2012, *Railway applications – Track – Test methods for fastening systems – Part 7: Determination of clamping force*

EN 13146-8:2012, *Railway applications – Track – Test methods for fastening systems – Part 8: In service testing*

EN 13146-9:2009+A1:2011, *Railway applications – Track – Test methods for fastening systems – Part 9: Determination of stiffness*

EN 13232-1:2003, *Railway applications – Track – Switches and crossings – Part 1: Definitions*

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

EN 13481-2:2012, *Railway applications – Track – Performance requirements for fastening systems – Part 2: Fastening systems for concrete sleepers*

EN 13481-3:2012, *Railway applications – Track – Performance requirements for fastening systems – Part 3: Fastening systems for wood sleepers*

EN 13481-4:2012, *Railway applications – Track – Performance requirements for fastening systems – Part 4: Fastening systems for steel sleepers*

EN 13481-5:2012, *Railway applications – Track – Performance requirements for fastening systems – Part 5: Fastening systems for slab track with rail on the surface or rail embedded in a channel*

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

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13232-1:2003 and EN 13481-1:2012 apply.

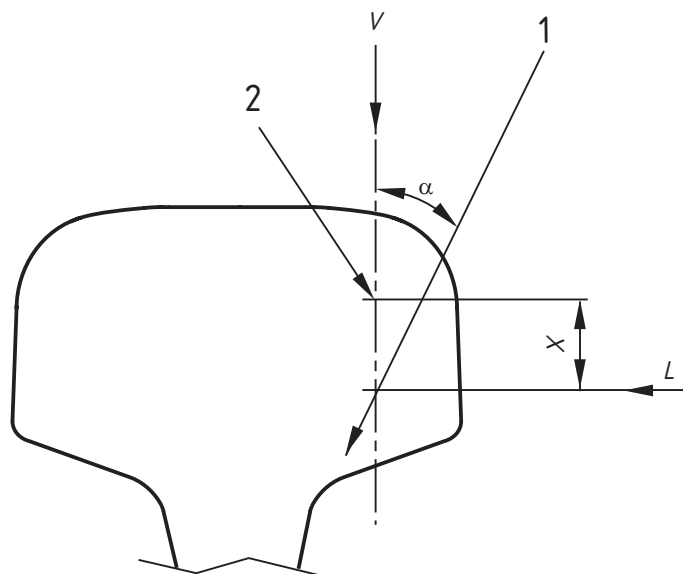
4 Symbols

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

F_{\max}	axial load at which gross slip occurs in the longitudinal rail restraint test (EN 13146-1:2012), in kN;
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 running surface of the rails, in kN;
P_V	component of load normal to the running surface of the rails, in kN;
V	vertical component of load transmitted by the wheels to the running surface at the rail head as shown in Figure 1, in kN;
X	distance between the line of application of P_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 running surface of the rails as shown in Figure 1, in °.

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

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**Key**

- 1 line of load application
- 2 centre of gauge corner radius

Figure 1 — Load application position
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5 Requirements

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5.1 General

The fastening systems used for the following parts of switches and crossings shall comply with the requirements for fastening systems for plain line track in EN 13481-2, EN 13481-3, EN 13481-4 and EN 13481-5, as appropriate to the type of support:

- closure rails;
- rails supporting check rails;
- crossings;
- switch heels.

When required by the purchaser, torsional resistance shall be measured for closure rail systems only.

5.2 Longitudinal rail restraint

When measured by the procedure in EN 13146-1, the longitudinal rail restraint shall be not less than 7 kN when anti-creep pads are used under stock rails. When no pads are used, the longitudinal rail restraint shall be not less than 5 kN.

On structures such as long bridges, the longitudinal force transmitted between the track and the structure may be calculated by the method in EN 1991-2. The value of F_{\max} measured in accordance

with EN 13146-1 may be used in the calculation. In such cases, and subject to agreement between the purchaser and manufacturer, the minimum requirement for longitudinal restraint may be reduced.

5.3 Torsional resistance

When required by the purchaser, the torsional resistance of closure rails shall be measured by the procedure in EN 13146-2 and the result reported.

5.4 Assembly and pad stiffness

As required by EN 13146-4, the assembly static stiffness and assembly low frequency dynamic stiffness shall be measured in accordance with EN 13146-9+A1. Measurement of the rail pad static stiffness is required at the purchaser's discretion in accordance with EN 13146-8. If the purchaser requires any of the following it shall be measured in accordance with EN 13146-9+A1:

- pad low frequency dynamic stiffness;
- assembly high frequency dynamic stiffness.

Test loads are given in EN 13481-2, EN 13481-3, EN 13481-4 or EN 13481-5, as appropriate.

NOTE Guidance on the measurement of pad high frequency dynamic stiffness is given in EN 13146-9:2009+A1:2011, Annex A. For the measurement of assembly properties at acoustic frequency see EN 15461+A1.

5.5 Effect of repeated loading

5.5.1 General

For check rail assemblies, this shall be determined by the procedure in EN 13146-4, but with a vertical load applied to the crown of the running rail and a horizontal load applied through the centre of the load bearing face of the check rail (see Figures 2 to 4). To permit loading of the check rail, the height of the running rail shall be reduced in accordance with EN 13146-4:2012, 7.6. Two actuators will be necessary to apply these loads. For slide chair assemblies (see Figure 5), the same procedure will apply but only one actuator will be necessary to apply the required load.

NOTE Support may have to be provided to ensure the load on the running rail remains central during the test.

5.5.2 Dynamic stiffness of assembly

The low frequency dynamic stiffness of the assembly shall be determined in accordance with EN 13146-9+A1.

5.5.3 Test loads

5.5.3.1 Check rail assemblies (see Figures 2 to 4)

The maximum load ($P_V/\cos \alpha$) kN for the appropriate assembly low frequency dynamic stiffness shall be determined from EN 13481-2:2012, Table 3. From this value, calculate P_V . The vertical load applied to the crown of the rail shall be 5 kN to P_V , applied in phase with the horizontal load.

For assemblies in categories C, D and E, the horizontal load shall be 5 kN to 50 kN, applied to the centre of the load bearing face of the check rail in phase with the vertical load. For assemblies in categories A and B, this horizontal load shall be 5 kN to 30 kN.