



SLOVENSKI STANDARD

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**Železniške naprave - Zgornji ustroj - Preskušanje pritrdilnih sistemov - 1. del:
Ugotavljanje vzdolžnega odpora**

Railway applications - Track - Test methods for fastening systems - Part 1:
Determination of longitudinal rail restraint

Bahnanwendungen - Oberbau - Prüfverfahren für Schienenbefestigungssysteme - Teil 1:
Ermittlung des Durchschubwiderstandes in Längsrichtung

Applications ferroviaires - Voie - Méthodes d'essai pour les systèmes de fixation - Partie
1 : Détermination de la résistance longitudinale au glissement

Ta slovenski standard je istoveten z: EN 13146-1:2012

ICS:

93.100 Gradnja železnic Construction of railways

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EUROPEAN STANDARD
NORME EUROPÉENNE
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English Version

Railway applications - Track - Test methods for fastening systems - Part 1: Determination of longitudinal rail restraint

Applications ferroviaires - Voie - Méthodes d'essai pour les systèmes de fixation - Partie 1: Détermination de la résistance longitudinale au glissement

Bahnwendungen - Oberbau - Prüfverfahren für Schienenbefestigungssysteme - Teil 1: Ermittlung des Durchschubwiderstandes in Längsrichtung

This European Standard was approved by CEN on 26 November 2011.

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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Foreword

This document (EN 13146-1:2012) 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 October 2012, and conflicting national standards shall be withdrawn at the latest by October 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 13146-1:2002.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

In this European Standard, the test procedure has been adapted to be applicable to embedded rail as well as surface mounted rail. For embedded rail with an adhesive fastening system the test result is expressed as longitudinal stiffness.

This European Standard is one of the series EN 13146 "Railway applications — Track — Test methods for fastening systems" which 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;*
- *Part 9: Determination of stiffness.*

These support the requirements in the series EN 13481 "Railway applications — Track — Performance requirements 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, 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 the United Kingdom.

EN 13146-1:2012 (E)

Introduction

For fastening systems that clamp the rail at discrete intervals the test procedure measures the longitudinal rail restraint. For an embedded rail with an adhesive fastening system the test procedure measures the longitudinal stiffness.

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1 Scope

This European Standard specifies a laboratory test procedure to determine:

- a) the maximum longitudinal force that can be applied to a rail, secured to a sleeper, bearer or element of slab track by a rail fastening assembly, without non-elastic displacement of the rail occurring, or
- b) the longitudinal stiffness at a specified longitudinal displacement of a specimen of embedded rail with an adhesive fastening system.

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 13146-9, *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 ISO 7500-1:2004, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*

EN ISO 9513:2002, *Metallic materials — Calibration of extensometers used in uniaxial testing (ISO 9513:1999)* <https://standards.iteh.ai/catalog/standards/sist/afc0566b-3684-4ab4-b9f2-4c41412c120c/sist-en-13146-1-2012>

3 Terms and definitions, symbols and abbreviations

3.1 Terms and definitions

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

3.2 Symbols and abbreviations

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

D_1	maximum longitudinal displacement of rail during each cycle of loading, in mm;
D_2	residual longitudinal displacement of rail after removal of load, in mm;
D_3	elastic longitudinal displacement of rail prior to slip, in mm;
D_r	maximum longitudinal displacement of embedded rail with adhesive fastening system, in mm;
F	maximum axial load on the rail without non-elastic displacement occurring, in kN;
F_{\max}	axial load at which gross slip occurs, in kN;
k_L	longitudinal stiffness of embedded rail with adhesive fastening system, in kN/mm per m;
L_T	sample length of embedded rail, in m.

EN 13146-1:2012 (E)**4 Principle**

A longitudinal load is applied by pulling a rail fixed to a sleeper, bearer or element of slab track by one or two rail fastening assemblies or by an embedded rail fastening system whilst the support is restrained. Movement of the rail relative to the support is recorded and the load removed when the rail slips or the specified longitudinal displacement occurs.

Longitudinal rail restraint or longitudinal stiffness are obtained from a plot of load versus displacement.

5 Apparatus**5.1 Rail**

A short length of rail (approximately 0,5 m per rail seat) of the section for which the fastening assembly under test is designed. The rail shall be unlaminated and have neither loose rust on the surface nor be polished on the foot by repeated testing.

For an embedded rail, the rail is part of the test specimen.

5.2 Actuator

Actuator capable of applying a tensile force of at least 40 kN to the longitudinal axis of the rail as shown in Figure 1.

5.3 Displacement measuring instruments

Instruments conforming to EN ISO 9513:2002, Table 2, Class 2. The instruments shall be capable of measuring the longitudinal displacement of the rail relative to the rail support with an accuracy of $\pm 0,02$ mm. Non-contact instruments may be used providing a procedure for verifying their calibration is used and recorded.

NOTE Non-contact instruments are outside the scope of EN ISO 9513.

5.4 Force measuring instruments

Instruments conforming to EN ISO 7500-1:2004, class 1 over the required range of force.

5.5 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 Rail support**

A sleeper, half sleeper, bearer or element of slab track, incorporating embedded rail where appropriate, complete with cast-in fastening components or holes, and rail seats, as made without modification for this test.

For fastening systems incorporating continuous support of surface mounted rail, the test shall be performed using a length of pad equal in length to the design spacing of the fastening along the rail. The piece of rail used for the test shall be at least as long as the piece of pad.

For surface mounted fastening systems which have low frequency dynamic stiffness ≤ 50 MN/m, when tested in accordance with EN 13146-9, it may be necessary to carry out the test over two rail seats to provide greater stability.

For mechanically fastened embedded rail, the test length shall be the typical spacing of the fastenings. For an adhesive fastened embedded rail the test length shall be (500 to 750) mm.

6.2 Fastening

The complete fastening assembly includes all components and baseplate, where appropriate.

7 Procedure

7.1 Test temperature

The test shall be carried out in a room or enclosure maintained at (23 ± 5) °C. All components used in the test shall be kept at this temperature for no less than 4 h prior to the commencement of the test.

7.2 Preparation for test

If not already in place, fix the short length of rail to one or two rail seats as necessary using the fastening components as assembled in track. Place the rail support on a rigid base and restrict any movement parallel to the rail as shown in Figure 1.

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