



SLOVENSKI STANDARD
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**Železniške naprave - Zgornji ustroj - Preskušanje pritrtilnih 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

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ICS:

93.100

Gradnja železnic

Construction of railways

SIST EN 13146-1:2012+A1:2015

en,fr,de

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EUROPEAN STANDARD

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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

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

This European Standard was approved by CEN on 26 November 2011 and includes Amendment 1 approved by CEN on 25 September 2014.

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

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

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Foreword

This document (EN 13146-1:2012+A1:2014) 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of an identical text or by endorsement, at the latest by May 2015, and conflicting national standards shall be withdrawn at the latest by May 2015.

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 A1 EN 13146-1:2012 A1.

This document includes Amendment 1 approved by CEN on 2014-09-25.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania,

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Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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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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EN 13146-1:2012+A1:2014 (E)**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)*

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.

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

A₁ A short length of rail of the section for which the fastening system under test has been designed. The rail shall be unlaminated and neither have loose rust on the surface nor be polished on the foot by repeated testing.

For surface mounted rail, the length of rail used for testing shall be approximately 0,5 m.

For embedded rail, the rail is part of the test specimen and its length is specified in 6.1. **A₁**

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.