

# SVENSK STANDARD

## SS-EN 13146-1:2019



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### **Järnvägar – Spår – Provningsmetoder för befästningssystem – Del 1: Bestämning av längsgående inspänning av räler**

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

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Europastandarden EN 13146-1:2019 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 13146-1:2019.

Denna standard ersätter SS-EN 13146-1:2012+A1:2014, utgåva 1.

The European Standard EN 13146-1:2019 has the status of a Swedish Standard. This document contains the official version of EN 13146-1:2019.

This standard supersedes the SS-EN 13146-1:2012+A1:2014, edition 1.

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EUROPEAN STANDARD

EN 13146-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2019

ICS 93.100

Supersedes EN 13146-1:2012+A1:2014

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

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

This European Standard was approved by CEN on 19 November 2018.

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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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**SS-EN 13146-1:2019 (E)**

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## European foreword

This document (EN 13146-1:2019) 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 month year of July 2019, and conflicting national standards shall be withdrawn at the latest by month year of July 2019.

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

This document supersedes EN 13146-1:2012+A1:2014.

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.

Compared with EN 13146-1:2012+A1:2014, the following changes have been made:

- a) update of the European foreword;
- b) extension of the scope to embedded rails;
- c) adaptation of normative references;
- d) adaptation of the terms;
- e) considers the requirements of EN 13146-9 for static and dynamic stiffnesses;
- f) Clause 7 revised and calculation of the interaction between superstructures newly added;
- g) editorially revised.

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 and uplift stiffness;*

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- *Part 8: In service testing;*
- *Part 9: Determination of stiffness;*
- *Part 10: Proof load test for pull-out resistance.*

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



## **Introduction**

For fastening systems that hold the rail mechanically (whether at discrete intervals or continuously) the test procedure measures the longitudinal rail restraint. For an embedded rail with an adhesive fastening system the test procedure measures the longitudinal stiffness.

## SS-EN 13146-1:2019 (E)

### 1 Scope

This document specifies the 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 the longitudinal stiffness at a specified longitudinal displacement of a specimen of embedded rail with an adhesive fastening system, and, for any type of fastening,
- b) the shear displacement and slip data required for track-bridge interaction calculations.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. 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 7500-1:2018, *Metallic materials - Calibration and verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Calibration and verification of the force-measuring system (ISO 7500-1:2018)*

EN ISO 9513:2012, *Metallic materials - Calibration of extensometer systems used in uniaxial testing (ISO 9513:2012)*

### 3 Terms, definitions and symbols

#### 3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

## 3.2 Symbols

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

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.

### 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

#### 5.3.1 Contacting displacement measuring instruments

If contacting displacement measuring instruments are used they shall comply with EN ISO 9513:2012, Table 2, class 2.

#### 5.3.2 Non-contacting displacement measuring instruments

If non-contacting displacement measuring instruments are used they shall be calibrated to ensure that they are capable of measuring the longitudinal displacement of the rail within  $\pm 0,02$  mm.