SLOVENSKI STANDARD
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Železniške naprave - Zgornji ustroj - Preskušanje pritrdilnih sistemov - 7. del: Ugotavljanje pritisne sile vzmeti

Railway applications - Track - Test methods for fastening systems - Part 7: Determination of clamping force

Bahnanwendungen - Oberbau - Prüfverfahren für Schienenbefestigungssysteme - Teil 7: Bestimmung der Spannkraft

Applications ferroviaires - Voie - Méthodes d'essai pour les systèmes de fixation - Partie 7: Détermination de l'effort d'application au patin du rail

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ICS:

93.100	Gradnja železnic	Construction of railways

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Railway applications - Track - Test methods for fastening systems - Part 7: Determination of clamping force

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

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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
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Foreword

This document (EN 13146-7:2012) 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of an identical text or by endorsement, at the latest by October 2012, and conflicting national standards shall be withdrawn at the latest by October 2012.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 13146-7:2002.

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

In this revision of EN 13146-7:2002, the alternative test procedure has been omitted. No other major changes have been made.

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.

1 Scope

This European Standard specifies a laboratory test procedure for determining the clamping force exerted by the fastening system on the foot of a rail by measuring the force to separate the rail foot from its immediate support. It is applicable to systems with and without baseplates on all types of sleepers, bearers and elements of slab track. The test does not determine the security of fastening components fixed into the sleeper or other fastening system support.

This test procedure applies to a complete fastening assembly. It is not applicable to fastening systems for embedded rail.

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 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)*

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	for direct fastening systems - vertical displacement of the rail relative to the sleeper, in mm; for indirect fastening systems – vertical displacement of the rail relative to the baseplate, in mm;
m_S	mass of sleeper or part sleeper and fastening components fixed to it, used in the test, in kg;
m_f	mass of loading frame supported by the sleeper, in kg;
P	vertical load applied to the rail, in kN;
P_0	vertical load at zero rail displacement which just counteracts the clamping force, in kN.

4 Principle

The clamping force for a complete rail fastening assembly is determined by measuring the force necessary to separate the rail from the surface on which it is supported.

5 Apparatus

5.1 Rail

A short length (approximately 0,5 m or the length of the test specimen for embedded rail) of rail, 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.

5.2 Loading device

A device to apply a vertical load to the rail at a controlled rate of approximately 10 kN/m.

5.3 Measuring and recording instruments

Instruments which measure the vertical displacement of the rail support (baseplate or sleeper) relative to the rail with an accuracy of ± 0,1 mm and instruments conforming to EN ISO 7500-1:2004, Class 1 which measure the applied force. The recording instruments shall be capable of plotting load-displacement diagrams.

5.4 Calibration

The calibration of actuators and measuring instruments shall be verified periodically with equipment having certified traceability to European or International Standards using the International System of Units (SI).

5.5 Steel shims

Steel shims 25 mm × 25 mm × 0,25 mm, maximum thickness 0,30 mm.

6 Test specimens

6.1 Sleeper, bearer or concrete block

A portion of a sleeper, bearer or a concrete block whose centroid is approximately at the centre line of the rail seat or baseplate support area. This is described as a sleeper in the test procedure.

6.2 Fastening components

All fastening components, as used in track, including baseplates where incorporated.

7 Test procedure

7.1 Preparation for test

Fix the rail to the sleeper, with the baseplate if part of the assembly, using the fastening components assembled as in track. If the test is to be conducted on an indirect fastening system, the clamps may be fixed over the baseplate providing that movement of the rail relative to the baseplate is not constrained.

NOTE 1 If a rail pad is used which is shaped to provide positive location in the assembly, the edges of the pad can be cut off to simplify removal of the pad as described in 7.2. The portion of the pad under the rail should not be cut.

NOTE 2 For fastening assemblies for switches and crossings which incorporate long baseplates additional fixings may be made into the supporting bearer or slab to minimize bending of the baseplate during this test.

Clamp the portion of sleeper to the base of the test fixture. Set up the test arrangement as shown in Figure 1 to permit a load *P* to be applied to the rail normal to the rail seat. Locate one displacement transducer at each of the four corners of the rail seat to measure *d*. Zero the displacement transducers.

7.2 Loading and measurement for assemblies incorporating a rail pad

Apply an increasing tensile load *P* to the rail, ensuring that the rail base is kept parallel to the rail seat without tilting, until the pad can just be moved. Remove the pad and decrease the load until the average of the displacement transducers is zero. Record the load *P* and then reduce the load to approximately 0,9 *P*. Whilst recording *d* (the average of the four transducers) increase the load *P* at a rate not exceeding 10 kN/min until the load is 1,1 *P*. From the load-displacement diagram (Figure 2) read off the value of P_0 at $d = 0$ which is taken as the clamping force. Repeat the procedure twice more and calculate the mean clamping force.

7.3 Loading and measurement for assemblies not incorporating a rail pad

Apply an increasing tensile load *P* to the rail until there is a clear space under the rail which is just sufficient to allow insertion of four steel shims under the rail, one at each corner of the rail seat. Reduce the load *P* to zero and then reapply an increasing load until a value is reached at which it is just possible to move all the shims by hand. This load is P_0 which is taken as the clamping force. Repeat the procedure twice more and calculate the mean clamping force.

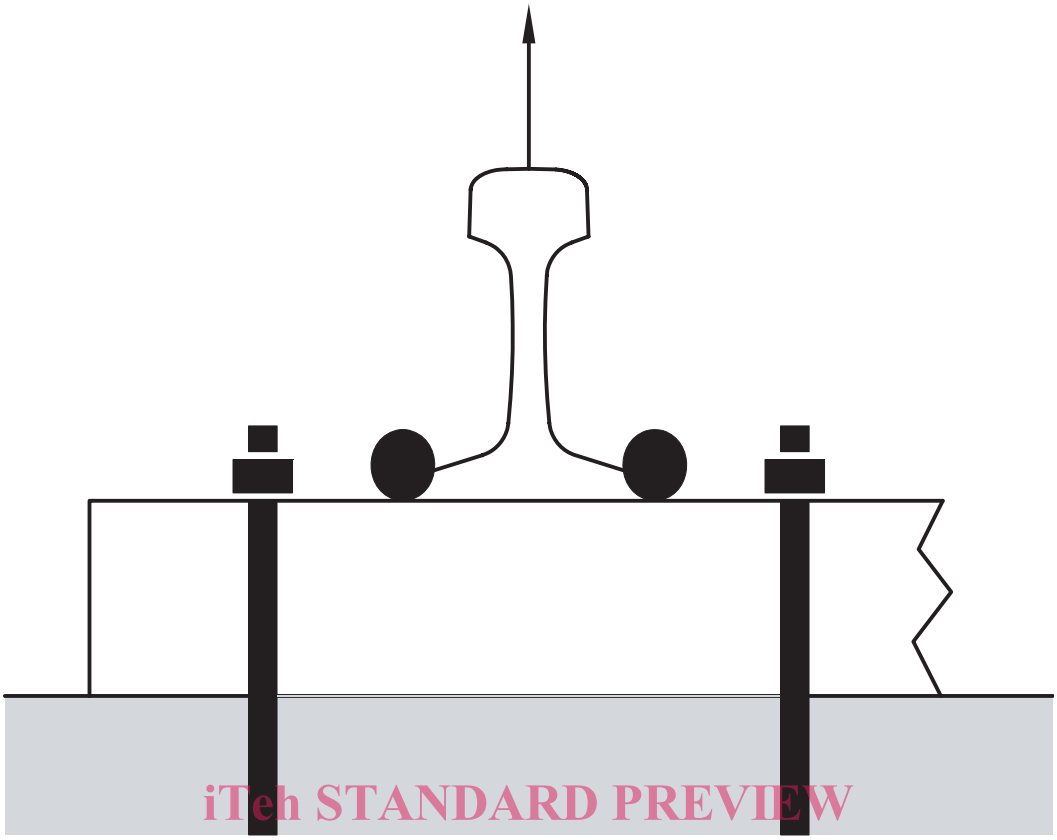

Figure 1 — Test arrangement