SLOVENSKI STANDARD
SIST EN 17319:2020

01-september-2020

Železniške naprave - Infrastruktura - Zahtevane lastnosti sistemov za pritrjevanje tirnic za tramvaje

Railway applications - Infrastructure - Performance requirements of rail fastening systems for tramways

Bahnanwendungen - Infrastruktur - Leistungsanforderungen für Schienenbefestigungssysteme für Straßenbahnen

Applications ferroviaires - Infrastructure - Exigences de performance relatives aux systèmes de fixation de rail pour tramways

Ta slovenski standard je istoveten z: **EN 17319:2020**

ICS:

45.140	Oprema za podzemne vlake, tramvaje in lahka tirna vozila	Metro, tram and light rail equipment
93.100	Gradnja železnic	Construction of railways

SIST EN 17319:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 17319

May 2020

ICS 45.140; 93.100

English Version

Railway applications - Infrastructure - Performance requirements of rail fastening systems for tramways

Applications ferroviaires - Infrastructure - Exigences de performance relatives aux systèmes de fixation de rail pour tramways

Bahnanwendungen - Infrastruktur - Leistungsanforderungen für Schienenbefestigungssysteme für Straßenbahnen

This European Standard was approved by CEN on 20 April 2020.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

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

Ref. No. EN 17319:2020 E

Contents

Page

European foreword

This document (EN 17319:2020) 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 2020, and conflicting national standards shall be withdrawn at the latest by November 2020.

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 is supported by the test methods in the series EN 13146 “*Railway applications – Track – Test methods 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document is applicable to fastening systems used with grooved rails for tram, urban rail and industrial tracks, with maximum design axle loads and minimum curve radii in accordance with Table 1.

This document is for type approval of a complete fastening assembly only.

Table 1 — Fastening category criteria

Fastening category	Maximum design axle load kN	Minimum curve radius m
A+	130	18
A	130	40
B	180	80
NOTE The maximum axle load limit does not apply to maintenance vehicles		

The requirements apply to fastening systems for the grooved rail profiles in EN 14811 which act on the foot and/or web of the rail.

This document is not applicable to fastening systems for other rail sections or special fastening systems used at bolted joints or glued joints or in switches and crossings for grooved rails.

NOTE Requirements for fastenings for use with Vignole rails are included in the EN 13481 series of standards.

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 13146-1:2017, *Railway applications – Track – Test methods for fastening systems – Part 1: Determination of longitudinal restraint*

EN 13146-4:2012+A1:2014, *Railway applications - Track - Test methods for fastening systems - Part 4: Effect of repeated loading*

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 and uplift stiffness*

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

EN 13146-10, *Railway applications - Track - Test methods for fastening systems - Part 10: Proof load test for pull-out resistance*

EN ISO 7500-1, *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)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 https://www.iso.org/obp

3.1
grooved rail
rail which has a grooved head that provides the space for the wheel flange

Note 1 to entry: For examples and further information see EN 14811

3.2
fastening system
assembly of components which secures a rail to the supporting structure and retains it in the required position whilst permitting any necessary vertical, lateral and longitudinal movement

Note 1 to entry: Such an assembly includes components to distribute the loads from the rail into the supporting structure, and where necessary to prevent wear of the contact surfaces on the supporting structure and to electrically insulate the rail from the supporting structure.

[SOURCE: EN 13481-1:2012, 3.16]

3.3
fastening assembly
single unit of a (rail) fastening system mounted according the specifications to be used as a test specimen

3.4
embedded track
track which is under a closed surface (e.g. a road surface, so that other vehicles can be driven across it), with no more than the head of the rails exposed

3.5
embedded rails
rails, usually applied in embedded track, which are continuously supported with elastic and/or rigid elements under the rail foot as well as elements on both sides of the rail that provide lateral support

Note 1 to entry: Fastening systems for embedded track with elements on both sides of the rail web that do not provide lateral support are considered – for the purpose of this standard – as fastening systems for slab track with rails on the surface.

Note 2 to entry: Embedded rails may be laid in a constructed channel (thus with rigid sides and a base) separating the fastening system from the surrounding structure. Alternatively, embedded rails may be laid directly in road surfaces such that the fastening system is in direct contact with the road surface construction materials.

3.6
adhesive fastening system for embedded rails
system used to fasten embedded rails in which the principal means is an adhesive bond between the rail and the channel or the road surface construction materials

3.7
mechanical fastening system for embedded rails
system used to fasten embedded rails in which the principal means is a mechanical connection between the rail and the channel or the road surface construction materials

Note 1 to entry: A waterproof seal applied between the rail and the channel or the road surface construction materials in mechanical fastening systems for embedded rails, is not considered to be a part of the fastening system. However, if the supplier claims that the fastening system itself incorporates waterproofing elements, those elements are considered to be a part of the fastening.

3.8
grass track
track which has a surface that is covered with vegetation in such a way that is does not impair rail traffic operation

Note 1 to entry: The underlying track structure can be ballasted track or ballastless track.

3.9
category A+ fastening system
fastening system designed for tramways, urban rail or industrial tracks with a typical axle load of 100 kN, a typical curve radius of 30 m and, in applications with discrete supports, a typical support spacing of 800 mm

Note 1 to entry: This definition includes typical values of parameters. Limiting values are given in Table 1. Further information is included in CEN/TR 17320.

3.10
category A fastening system
fastening system designed for tramways, urban rail or industrial tracks with a typical axle load of 100 kN, a typical curve radius of 80 m and, in applications with discrete supports, a typical support spacing of 800 mm

Note 1 to entry: This definition includes typical values of parameters. Limiting values are given in Table 1. Further information is included in CEN/TR 17320.

[SOURCE: EN 13481-1:2012, 3.1.1]

3.11
category B fastening system
fastening system designed for tramways, urban rail or industrial tracks with a typical axle load of 160 kN, a typical curve radius of 100 m and, in applications with discrete supports, a typical support spacing of 600 mm

Note 1 to entry: This definition includes typical values of parameters. Limiting values are given in Table 1. Further information is included in CEN/TR 17320.

[SOURCE: EN 13481-1:2012, 3.1.2]

3.12
purchaser
entity approving the use of the fastening system, usually the operator, owner or user

3.13
supplier
entity responsible for applying this standard, which may also be the manufacturer

4 Symbols and abbreviations

D_L	minimum displacement in uplift stiffness test, in MN/m/m
D_r	maximum longitudinal displacement of embedded rail with adhesive fastening system, in mm
D_u	maximum displacement in uplift stiffness test, in MN/m/m
F	maximum axial load on the rail without non-elastic displacement occurring, during a longitudinal restraint test, in kN
F_L	proof load applied in an uplift restraint test, in kN
F_{LFA1}	minimum force applied in measurement of dynamic low frequency stiffness of assembly, in kN
F_{LFAmax}	maximum force applied in measurement of dynamic low frequency stiffness of assembly, in kN
F_{LFP1}	notional fastening clip force assumed for measurement of low frequency dynamic stiffness of pad defined in EN 13146-9, in kN
F_{LFPmax}	force applied to pad in measurement of low frequency dynamic stiffness of pad defined in EN 13146-9, in kN
F_{max}	maximum force applied in longitudinal restraint test defined in EN 13146-1, in kN
F_{SA1}	minimum force applied in measurement of static stiffness of assembly, in kN
F_{SAmax}	maximum force applied in measurement of static stiffness of assembly, in kN
F_{SP1}	notional fastening clip force assumed for measurement of static stiffness of pad defined in EN 13146-9, in kN
F_{SPmax}	force applied to pad in measurement of static stiffness of pad defined in EN 13146-9, in kN
k_L	longitudinal stiffness of embedded rail with adhesive fastening system, in MN/m/m
k_{LFA}	low frequency dynamic stiffness of assembly, in MN/m or in MN/m/m
k_{SA}	static stiffness of assembly, in MN/m or MN/m/m
k_U	uplift stiffness of fastening system, in MN/m or MN/m/m
P_L	component of load parallel to the running surface of the rails, defined in EN 13146-4, in kN
P_V	component of load normal to the running surface of the rails, defined in EN 13146-4, in kN
X	distance between the line of application of P_L and the centre of the gauge corner radius of the rail head, defined in EN 13146-4, in mm
α	angle between the load line and a line normal to the running surface of the rails defined in EN 13146-4, in °

5 Requirements for fastening systems for embedded track

5.1 Test specimens

For category A+ and category A fastenings, tests shall be carried out on a specimen with an embedded rail with a supported length of (0,8 ± 0,01) m.

For category B fastenings, tests shall be carried out on a specimen with an embedded rail with a supported length of (0,6 ± 0,01) m.

5.2 Longitudinal rail restraint or longitudinal stiffness

The determination of longitudinal rail restraint or the longitudinal stiffness is necessary for the assessment of the transfer of longitudinal forces in the rail to the supporting structure. The measurements of the restraint or stiffness are part of the repeated loading test as described in 5.4.

For a mechanical fastening system for embedded rails, the requirement for the mean longitudinal rail restraint of the system shall be a minimum of 7 kN, determined using the method set out in EN 13146-1.

For an adhesive fastening system for embedded rails, the longitudinal stiffness k_L shall be measured in accordance with EN 13146-1, between 0 mm and D_r mm relative displacement per equivalent length of support without visible damage. The requirement for D_r shall be agreed between the supplier and the purchaser and the minimum longitudinal force shall be 7kN. If no other value is agreed, then D_r shall be 7 mm.

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 supplier, the minimum requirement for longitudinal rail restraint F, or the longitudinal force F at D_r, may be reduced.

If the rail fastening system is claimed to be designed to provide a waterproof seal between the rail and the road surface or channel, there shall be no visible damage on the top surface during or after the test.

5.3 Vertical assembly stiffness

The determination of vertical assembly stiffness is necessary for the assessment of the transfer of vertical forces in the rail to the supporting structure. The measurements of the vertical assembly stiffness are required within the repeated load test procedures in 5.4.

Fixtures shall be used to ensure that the applied load acts through the centre line of the rail web.

Values of test loads for measurement of stiffness are given in Table 2.

Table 2 — Loads for measurement of stiffness

Fastening category	F_{SA1} and F_{LFA1} kN	F_{SAmax} and F_{LFAmax} kN
A and A+	1	32
B	1	43
NOTE These test loads apply to a specimen with the rail embedded for 0,8 m in Category A+ and A, and 0,6 m in Category B. In case of a shorter specimen, the test load and the load speed shall be reduced proportionally.		

Measured stiffnesses k_{SA} and k_{LFA} shall be reported as stiffness per unit length l [MN/m/m].

When required by the purchaser, any further vertical stiffness measurements shall be made using the appropriate procedure in EN 13146-9.

5.4 Effect of repeated loading

The effect of repeated loading for embedded rails shall be determined by the procedure in EN 13146-4, except that the clamping force shall not be measured.