

**norm****NEN-EN 13481-4**

Railway applications - Track -  
Performance requirements for fastening  
systems - Part 4: Fastening systems for  
steel sleepers

Publicatie uitsluitend voor commentaar

juli 2010  
ICS 45.080; 93.100

Commentaar vóór 2010-10-03

Zal vervangen NEN-EN 13481-4:2002; NEN-EN 13481-4:2002/A1:2006; NEN-EN 13481-4:2002/C1:2006

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 13481-4**

June 2010

ICS 93.100

Will supersede EN 13481-4:2002

English Version

## Railway applications - Track - Performance requirements for fastening systems - Part 4: Fastening systems for steel sleepers

Bahnanwendungen - Oberbau - Leistungsanforderungen für Schienenbefestigungssysteme - Teil 4: Befestigungssysteme für Stahlschwellen

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## Foreword

This document (prEN 13481-4:2010) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13481-4:2002.

This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

This European Standard is one of the series EN 13481 "Railway applications – Track – Performance requirements for fastening systems" which consists of the following parts:

- Part 1: Definitions
- Part 2: Fastening systems for concrete sleepers
- Part 3: Fastening systems for wood sleepers
- Part 4: Fastening systems for steel sleepers
- Part 5: Fastening systems for slab track with rail on the surface or rail embedded in a channel
- Part 7: Special fastening systems for switches and crossings and check rails

NOTE Part 6 does not exist in this series.

These are supported by the test methods in the series EN 13146 "Railway applications – Track – Test methods for fastening systems".

## Introduction

A requirement for longitudinal rail restraint is included to control rail creep and pull apart in the event of a broken rail.

Measurement of torsional resistance is included for use in assessing the risk of track buckling.

The laboratory test for the effect of repeated loading is the means of assessing potential long term performance of the fastening in track.

The test for clamping force is only suitable for laboratory use.

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## 1 Scope

This European Standard is applicable to fastening systems, in categories A – E (prEN 13481-1:2010, 3.1), for use on rectilinear steel sleepers in ballasted track with maximum axle loads and minimum curve radii in accordance with Table 1.

Table 1 — Fastening category criteria

Category	Maximum design axle load kN	Minimum curve radius m
A	130	40
B	180	80
C	260	150
D	260	400
E	350	150

NOTE The maximum axle load for categories A and B does not apply to maintenance vehicles.

The requirements apply to:

- fastening systems which act on the foot and/or web of the rail including direct fastening systems and systems which incorporate a baseplate;
- fastening systems for the rail sections in EN 13674-1 and EN 13674-4.

This standard is not applicable to fastening systems for other rail sections, rigid fastening systems or special fastening systems used at bolted joints.

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

## 2 Normative references

The following referenced documents are indispensable for the application 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.

prEN 13146-1:2009, *Railway applications – Track – Test methods for fastening systems – Part 1: Determination of longitudinal rail restraint*

prEN 13146-2:2009, *Railway applications – Track – Test methods for fastening systems – Part 2: Determination of torsional resistance*

prEN 13146-4:2009, *Railway applications – Track – Test methods for fastening systems – Part 4: Effect of repeated loading*

prEN 13146-5:2009, *Railway applications – Track – Test methods for fastening systems – Part 5: Determination of electrical resistance*

**prEN 13481-4:2010 (E)**

prEN 13146-6:2009, *Railway applications – Track – Test methods for fastening systems – Part 6: Effect of severe environmental conditions*

prEN 13146-7:2009, *Railway applications – Track – Test methods for fastening systems – Part 7: Determination of clamping force*

prEN 13146-8:2009, *Railway applications – Track – Test methods for fastening systems – Part 8: In service testing*

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

prEN 13481-1:2010, *Railway applications – Track – Performance requirements for fastening systems – Part 1: Definitions*

EN 13674-1, *Railway applications – Track – Rail – Part 1: Vignole railway rails 46 kg/m and above*

EN 13674-4, *Railway applications – Track – Rail – Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m*

**3 Terms and definitions**

For the purposes of this standard the definitions in prEN 13481-1:2010 apply.

**4 Symbols**

For the purposes of this European Standard the following symbols apply.

- $F_{HFAmax}$  reference force for measurement of dynamic high frequency stiffness of assembly, in kN;
- $F_{LFA1}$  minimum force applied in measurement of dynamic low frequency stiffness of assembly, in kN;
- $F_{LFAmax}$  reference force for measurement of dynamic low frequency stiffness of assembly, in kN;
- $F_{LFP}$  notional fastening clip force assumed for measurement of dynamic low frequency stiffness of pad, in kN;
- $F_{LFPmax}$  reference force for measurement of dynamic low frequency stiffness of pad, in kN;
- $F_{max}$  axial load at which gross slip occurs in the longitudinal rail restraint test (prEN 13481-1:2010), in kN;
- $F_{SAmax}$  force applied to assembly in measurement of static stiffness of assembly, in kN;
- $F_{SP1}$  notional fastening clip force assumed for measurement of static stiffness of pad, in kN;
- $F_{Spmax}$  force applied to pad in measurement of static stiffness of pad, in kN;
- $k_{HFAD}$  transfer stiffness in measurement of high frequency stiffness of assembly, in N/m;
- $k_{LFA}$  low frequency dynamic stiffness of assembly, in MN/m;
- $L$  lateral component of force transmitted by the wheel to the rail head as shown in Figure 1, in kN;
- $P_L$  component of load parallel to the running plane as shown in Figure 1, in kN;



- $P_V$  component of load normal to the running plane as shown in Figure 1, in kN;
- $V$  vertical component of force transmitted by the wheel to the rail head as shown in Figure 1, in kN;
- $X$  distance of the line of application of  $P_L$  and the centre of the gauge corner radius of the rail head as shown in Figure 1, in mm;
- $\alpha$  angle between the load line and a line normal to the running surface of the rails, in degrees.

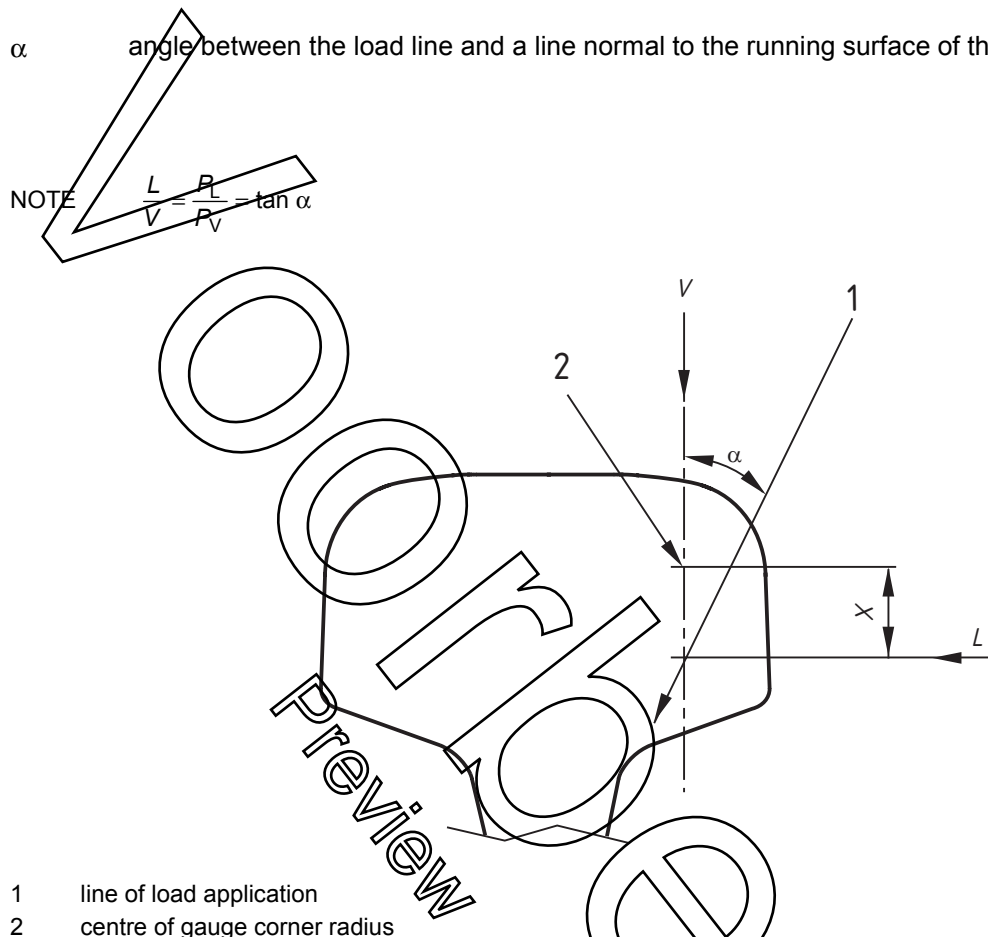


Figure 1 — Load application position

## 5 Requirements

### 5.1 Longitudinal rail restraint

The longitudinal rail restraint shall be not less than 7 kN when measured by the procedure in prEN 13146-1:2009.

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 prEN 13146-1:2009 may be used in the calculation. In such cases, and subject to agreement between the purchaser and manufacturer, the minimum requirement for longitudinal restraint may be reduced.

### 5.2 Torsional resistance

When required by the purchaser, the torsional resistance shall be measured by the procedure in prEN 13146-2:2009 and the result reported.

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