



# SLOVENSKI STANDARD

## SIST EN 13230-4:2004

01-marec-2004

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### Železniške naprave – Zgornji ustroj – Betonski pragi in kretniški betonski pragi – 4. del: Prednapeti betonski pragi za kretnice in križišča

Railway applications - Track - Concrete sleepers and bearers - Part 4 : Prestressed bearers for switches and crossings

Bahnanwendungen - Oberbau - Gleis- und Weichenschwellen aus Beton - Teil 4 : Spannbetonschwellen für Weichen und Kreuzungen

Applications ferroviaires - Voie - Traverses et supports en béton - Partie 4 : Supports précontraints pour appareil de voie

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Ta slovenski standard je istoveten z: **EN 13230-4:2002**

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#### **ICS:**

45.080	Tračnice in železniški deli	Rails and railway components
91.100.30	Beton in betonski izdelki	Concrete and concrete products

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**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 13230-4**

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English version

## Railway applications - Track - Concrete sleepers and bearers - Part 4 : Prestressed bearers for switches and crossings

Applications ferroviaires - Voie - Traverses et supports en  
béton - Partie 4 : Supports précontraints pour appareil de  
voie

Bahnanwendungen - Oberbau - Gleis- und  
Weichenschwellen aus Beton - Teil 4 :  
Spannbetonschwellen für Weichen und Kreuzungen

This European Standard was approved by CEN on 9 October 2002.

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 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 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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This document EN 13230-4:2002 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 June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

This European Standard is one of the series EN 13230 "Railway applications - Track — Concrete sleepers and bearers" which consists of the following parts:

- Part 1: *General requirements*;
- Part 2: *Prestressed monobloc sleepers*;
- Part 3: *Twin-block reinforced sleepers*;
- Part 4: *Prestressed bearers for switches and crossings*;
- Part 5: *Special elements*.

Annexe A is normative.

This document contains bibliographical references.

No other European Standard is superseded or replaced by this European Standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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**EN 13230-4:2002 (E)****Introduction**

This part of the standard defines the specific requirements relating to prestressed bearers for switches and crossings.

These are additional requirements to EN 13230-1 and are necessary to have a complete standard dealing with prestressed concrete bearers for switches and crossings.

**1 Scope**

This part of the European Standard defines additional technical criteria and control procedures as well as specific tolerance limits relating to the design and manufacture of prestressed bearers for switches and crossings with a maximum length of 5,5 m.

Bearers longer than 5,5 m are considered as special elements and it is essential that they comply with EN 13230-5.

**2 Normative references**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 206-1, *Concrete – Part 1: Performance, production and conformity*.

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

EN 13230-1:2002, *Railway applications - Track – Concrete sleepers and bearers – Part 1: General requirements*.

EN 13230-5, *Railway applications - Track - Concrete sleepers and bearers – Part 5: Special elements*.

**3 Special requirements****3.1 Design bending moments**

The bearers shall be designed with positive and negative design bending moment capacities with the objective of keeping them straight.

**3.2 Positioning of fastening components**

An area of the concrete section shall be specified by the purchaser to be free from pre-tensioned tendons for the location of fastening components.

If required by the purchaser, the design of the bearer shall allow the repair or replacement of the cast-in fastening components.

### 3.3 Tolerances

The maximum tolerances specified in EN 13230-1:2002 - 6.1, apply to the concrete bearers.

Measurement of tolerances shall not be checked until 48 hours after the transfer of the prestressing forces.

#### 3.3.1 Tolerance on flatness

The maximum deviations of the total rail seat or base plate area are as follows:

- flatness: 1 mm;
- gradient: 0,5 mm per 150 mm.

#### 3.3.2 Tolerances on fastening positioning

The tolerances on the cast-in fastening components positioning shall be measured in accordance with Figure 1.

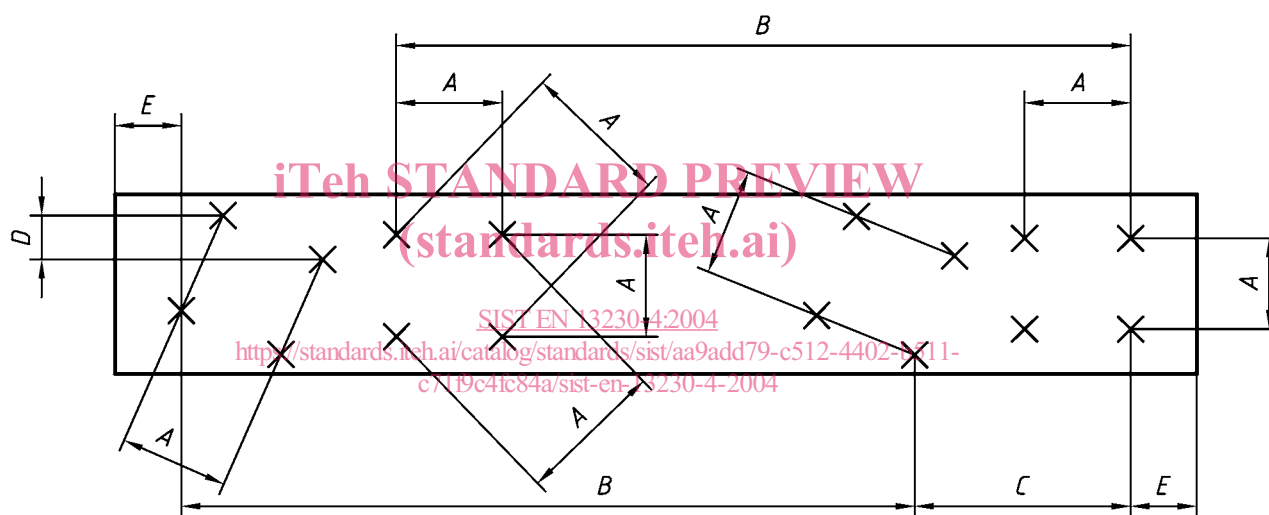


Figure 1 — Measurement of tolerances on fastening components positioning

Tolerance on dimensions A and D (on the same support area):  $\pm 1,0$  mm

Tolerance on dimensions B and C (between two separate supports areas):  $\pm 1,5$  mm

Tolerance on distance between the last cast-in component and the end of the bearer (E):  $\pm 10$  mm

The tolerances specified above may be varied by the purchaser in case of special requirements and shall be defined on the drawings submitted by the purchaser.

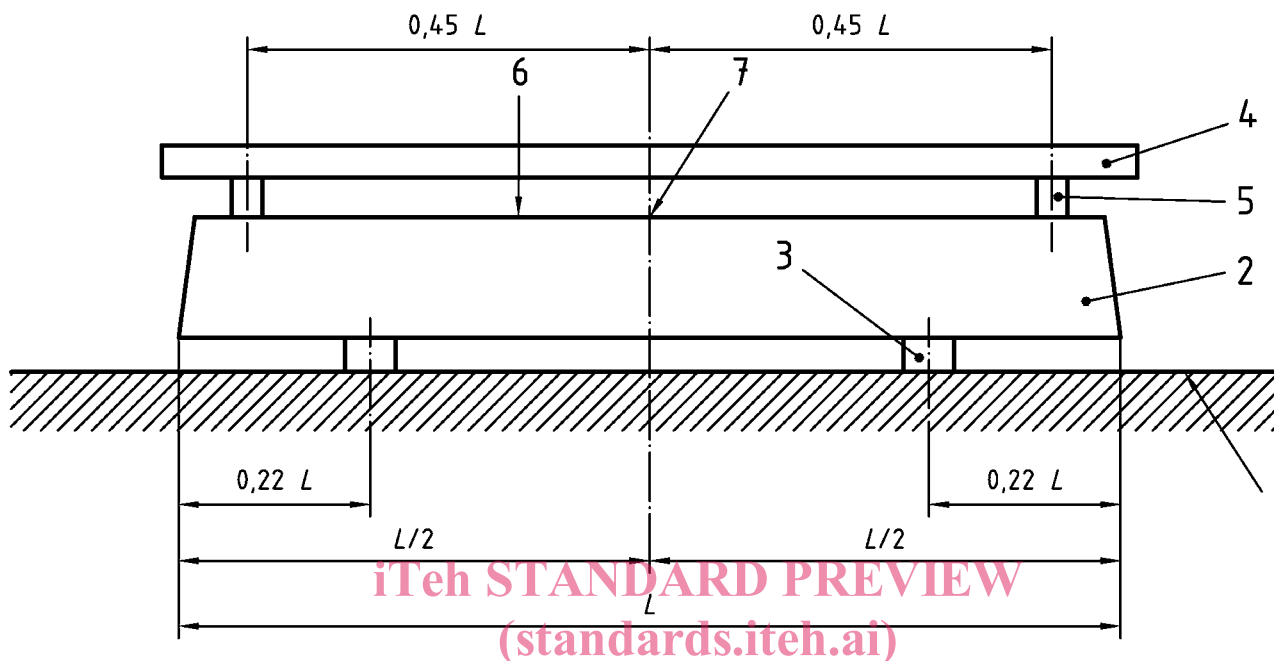
These tolerances shall apply to all cast-in components with either a direct or indirect fastening system.

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## 3.3.3 Vertical deviation

A maximum vertical deviation of 2 mm in both directions is allowed on a 4 m long base measured as shown in Figure 2; longer or shorter bearers shall be checked to ensure that they do not exceed an equivalent curvature.

Bearers shorter than 3,5 m need not be checked.



## Key

- 1 Rigid support
- 2 Bearer
- 3 Support (50 x 50 mm section) across width of bearer
- 4 Straight datum (laser, wire, etc)
- 5 Support across width of bearer
- 6 Top surface of bearer
- 7 Measurement point

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Figure 2 — Vertical deviation measurement

## 3.4 Distance from the end of the bearer to the nearest cast-in component

If a cast-in component is to be positioned less than 200 mm from the end of the bearer, additional reinforcement may be required and its installation is the responsibility of the supplier.

Additional reinforcement shall enable the bearer to comply with the requirements of the fastening systems in accordance with EN 13146-4.



## 4 Product testing

The test arrangements are defined in this clause.

### 4.1 Symbols

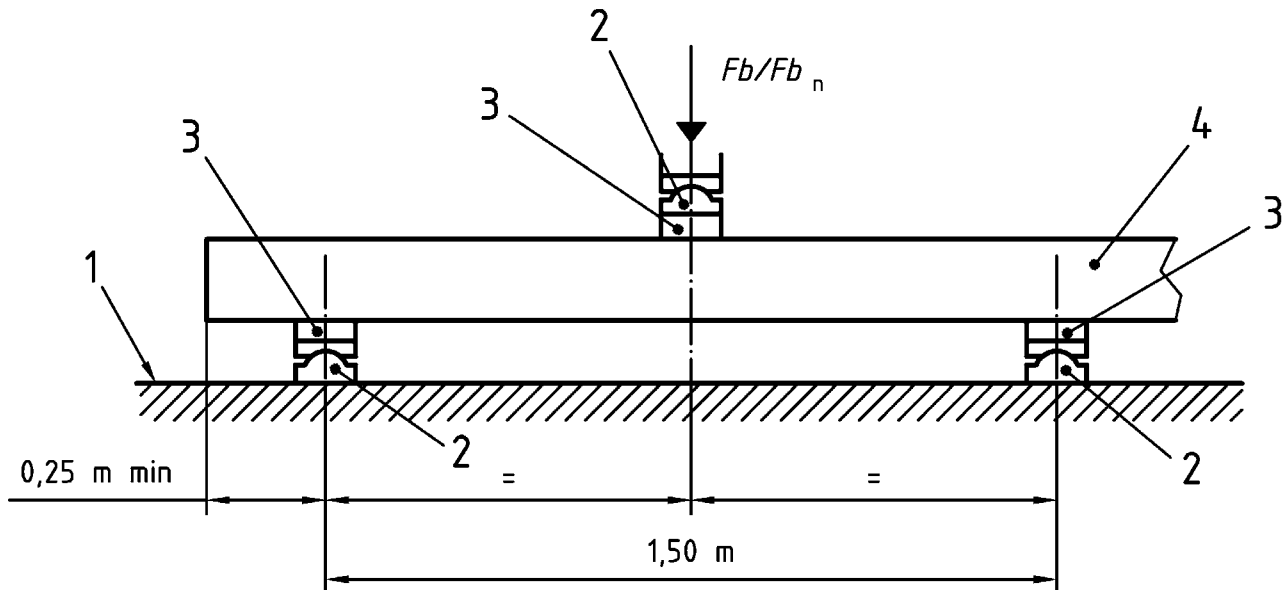
The following symbols are used:

$M$	positive design bending moment, in kN.m;
$Mn$	negative design bending moment, in kN.m;
$Fb_0$	positive initial reference test load, in kN;
$Fb_{0n}$	negative initial reference test load, in kN;
$Fb_r$	test load which produces first crack at the bottom of the bearer, in kN;
$Fb_m$	test load which produces first crack at the top of the bearer, in kN;
$Fb_{0,05}$	test load for which a crack width of 0,05 mm persists at the bottom of the bearer after removal of the load, in kN;
$Fb_{0,05n}$	test load for which a crack width of 0,05 mm persists at the top of the bearer after removal of the load, in kN;
$Fb_B$	test load which cannot be increased when the bottom of the bearer is cracked, in kN;
$Fb_{Bn}$	test load which cannot be increased when the top of the bearer is cracked, in kN;
$Fb_u$	lower test load for the fatigue test: $Fb_u = 0,25 \times Fb_0$ , in kN;
$k_b$	impact coefficient for positive static test;
$K_{bn}$	impact coefficient for negative static test;
$k_{bB}$	impact coefficient for fatigue test.

## EN 13230-4:2002 (E)

## 4.2 Test arrangements

The arrangement for the static and fatigue tests is shown in Figure 3.



## Key

- 1 Rigid support
- 2 Articulated support (see annex A for details)
- 3 Resilient pad (see annex A for details)
- 4 Bearer

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Figure 3 — Test arrangement

For the static test, the bearer shall be arranged as shown in Figure 3.

For the fatigue test, the load  $F_b$  shall be applied at the centre section of the bearer.

## 4.3 Test procedures

## 4.3.1 Test loads

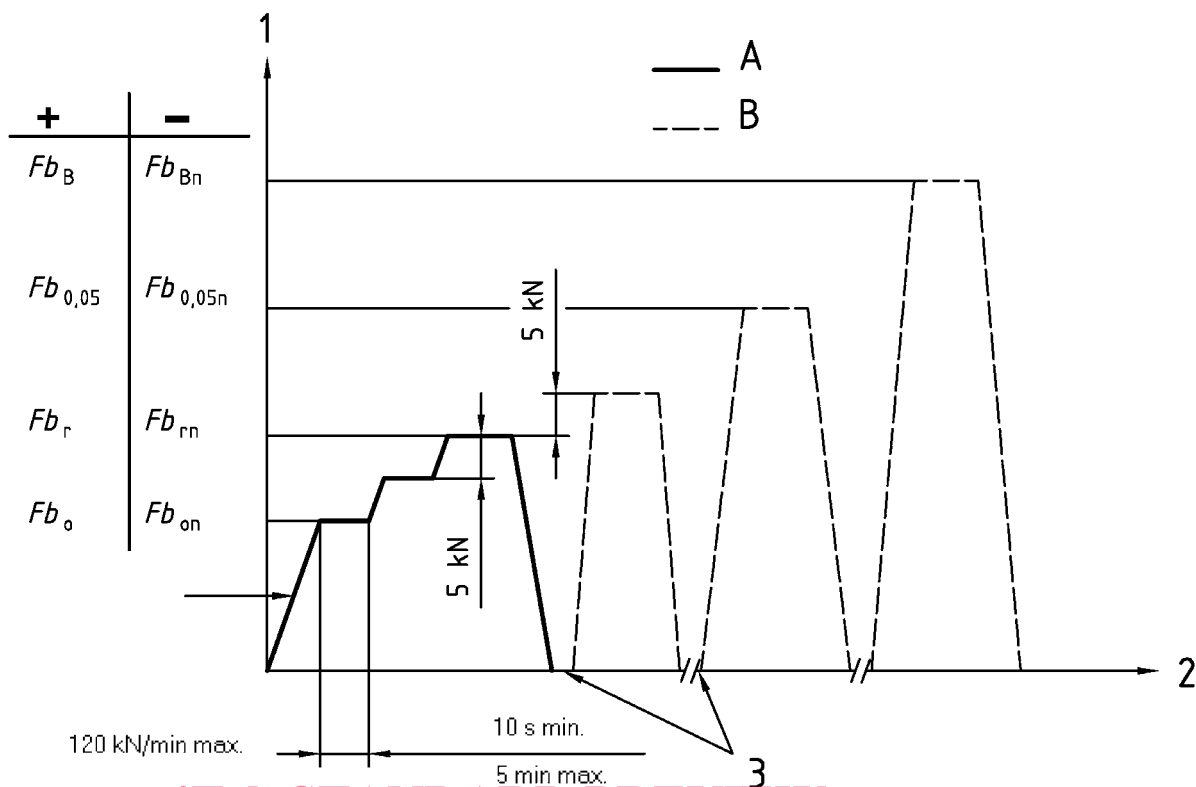
$F_{b0}$  is calculated from the geometry given in Figure 3 using the following equations:

$$F_{b0} = \frac{M}{0,35} \text{ in kN}; \quad F_{b0n} = \frac{Mn}{0,35} \text{ in kN.}$$

## 4.3.2 Static test

The static test procedure is shown in Figures 4.1 and 4.2 for the positive and negative bending moments.

The maximum load applied is  $F_{b0,05}$  or  $F_{bB}$  whichever is reached first.



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**Key**

- 1 Load
- 2 Time
- 3 Crack checking
- A Required part of test
- B Optional part of test

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**Figure 4.1 — Static test procedure for design approval test**