SLOVENSKI STANDARD
SIST EN 13230-2:2009

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Železniške naprave - Zgornji ustroj - Betonski pragi in kretniški betonski pragi - 2. del: Enodelni prednapeti betonski pragi

Railway applications - Track - Concrete sleepers and bearers - Part 2: Prestressed monoblock sleepers

Bahnanwendungen - Oberbau - Gleis- und Weichenschwellen aus Beton - Teil 2: Spannbeton-Monoblockschwellen

Applications ferroviaires - Voie - Traverses et supports en béton - Partie 2 : Traverses monoblocs précontraintes

Ta slovenski standard je istoveten z: **EN 13230-2:2009**

ICS:

45.080	Traģ nice in ģeleznigki deli	Rails and railway components
91.100.30	Beton in betonski izdelki	Concrete and concrete products

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English Version

Railway applications - Track - Concrete sleepers and bearers - Part 2: Prestressed monoblock sleepers

Applications ferroviaires - Voie - Traverses et supports en béton - Partie 2 : Traverses monoblocs précontraintes

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Foreword

This document (EN 13230-2:2009) 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of an identical text or by endorsement, at the latest by December 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

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 13230-2:2002.

This European Standard is one of the series EN 13230 "Railway applications – Track – Concrete sleepers and bearers", which consist of the following parts:

Part 1: General requirements

Part 2: Prestressed monoblock sleepers

Part 3: Twin-block reinforced sleepers

Part 4: Prestressed bearers for switches and crossings

Part 5: Special elements

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

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

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, 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 and the United Kingdom.

Introduction

This part of EN 13230 defines the specific requirements dedicated to prestressed monoblock sleepers.

These are additional requirements to EN 13230-1 and are necessary to have a complete standard dealing with prestressed monoblock sleepers.

1 Scope

This part of EN 13230 defines additional technical criteria and control procedures related to designing and manufacturing prestressed monoblock sleepers.

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.

EN 206-1, *Concrete – Part 1: Specification, performance, production and conformity*

EN 13230-1:2009, *Railway applications – Track – Concrete sleepers and bearers – Part 1: General requirements*

3 Terms and definitions

For the purposes of this part 2 of EN 13230, the terms and definitions given in EN 13230-1:2009 and the following apply:

3.1
pretensioned monoblock sleeper
sleeper manufactured using pre-tensioned tendons

3.2
post-tensioned monoblock sleeper
sleeper manufactured using post-tensioned tendons

4 Product testing

4.1 General

This section defines the testing regime and rules for the acceptance of concrete sleepers.

4.2 Test arrangements

4.2.1 Symbols

The symbols used in this European Standard are listed in Table 1.

Table 1 — Symbols

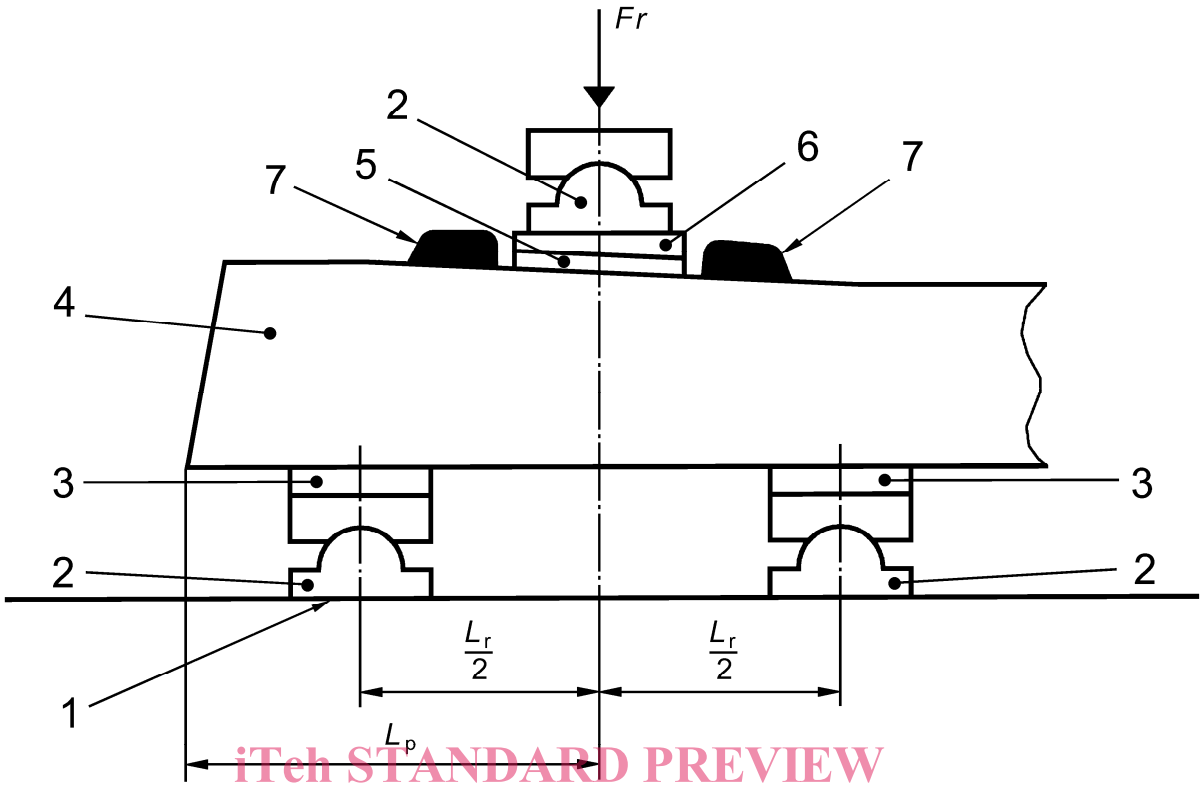
Symbol	Designation
Fr_0	Positive initial reference test load for the rail seat section in kN
Fr_r	Positive test load which produces first crack formation at the bottom of the rail seat section in kN
$Fr_{0,05}$	Maximum test load for which a crack width of 0,05 mm at the bottom of rail seat section persists after removal of the load in kN
$Fr_{0,5}$	Maximum test load for which a crack width of 0,5 mm at the bottom of the rail seat section persists after removal of the load in kN
Fr_B	Maximum positive test load at the rail seat section which cannot be increased in kN
Fr_u	lower test load for the rail seat section dynamic test; Fr_u = 50 kN
Fc_0	Positive initial reference test load at the centre section of the sleeper in kN
Fc_{0n}	Negative initial reference test load at the centre section of the sleeper in kN
Fc_r	Positive test load which produces first crack formation at the centre of the sleeper in kN
Fc_{rn}	Negative test load which produces first crack formation at the centre of the sleeper in kN
Fc_B	Maximum positive test load at the centre section which cannot be increased in kN
Fc_{Bn}	Maximum negative test load at the centre section which cannot be increased in kN
L_p	Design distance between the centre line of the rail seat to the edge of the sleeper at the bottom, in m
L_r	Design distance between the articulated supports centre lines for the test arrangement at the rail seat section, in m
L_c	Design distance between centre lines of the rail seat, in m
Mdr	Positive design bending moment at rail seat, in kNm
Mdc_n	Negative design bending moment at centre section, in kNm
k_{1s}	Static coefficient to be used for calculation of $Fr_{0,05}$ test load
k_{2s}	Static coefficient to be used for calculation of $Fr_{0,5}$ or Fr_B test load
k_{1d}	Dynamic coefficient to be used for calculation of $Fr_{0,05}$ test load
k_{2d}	Dynamic coefficient to be used for calculation of $Fr_{0,5}$ or Fr_B test load
k_3	Static coefficient to be used for calculation of Fr_B at the end of fatigue test

4.2.2 Rail seat section

The arrangement for the rail seat positive load test is shown in Figure 1, the value of L_r in relation to L_p is detailed in Table 2.

The load Fr is applied perpendicularly to the base of the sleeper.

The end of the sleeper opposite to the end being tested shall be unsupported.



Key

1 Rigid support
2 Articulated support (see Annex A for details)
3 Resilient pad (see Annex A for details)
4 Prestressed monoblock sleeper
5 Standard rail pad as defined by the purchaser
6 Tapered packing (see Annex A for details)
7 Lateral stop and base plate, only when required by the purchaser

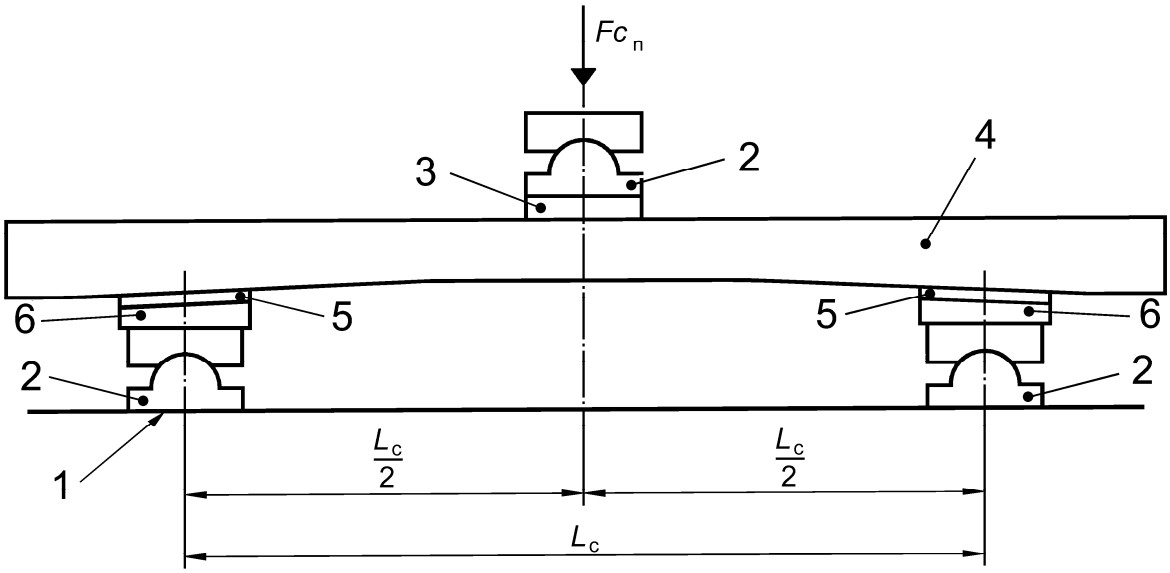
Figure 1 — Test arrangement at the rail seat section for the positive load test

Table 2 — Value of L_r in relation to L_p

L_p in m	L_r in m
$L_p < 0{,}349$	0,3
$0{,}350 \leq L_p < 0{,}399$	0,4
$0{,}400 \leq L_p < 0{,}449$	0,5
$L_p \geq 0{,}450$	0,6

4.2.3 Centre section

The arrangement for the negative centre load test is shown in Figure 2.

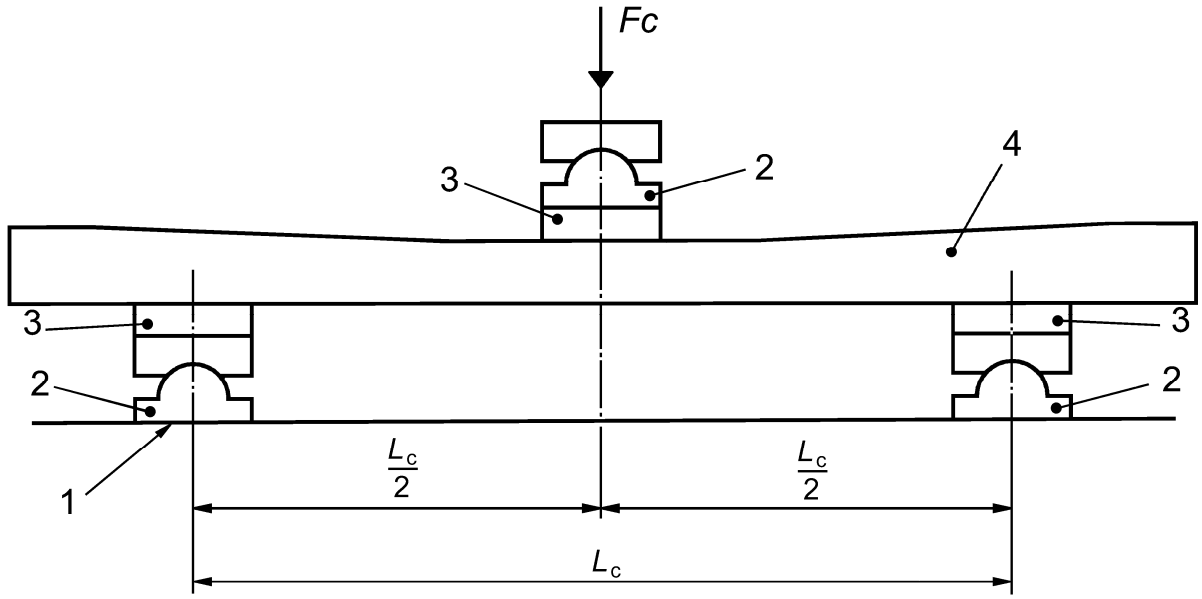


Key

1 Rigid support
2 Articulated support (see Annex A for details)
3 Resilient pad (see Annex A for details)
4 Prestressed monoblock sleeper
5 Standard rail pad as defined by the purchaser
6 Tapered packing (see Annex A for details)

Figure 2 — Test arrangement at the centre section for the negative load test

The test arrangement for the positive centre load test 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 Prestressed monoblock sleeper

Figure 3 — Test arrangement at the centre section for the positive load test

4.3 Test procedures

4.3.1 Test loads

Fr_0 is calculated from the geometry given in Figure 1 and values from Table 3 using the following equation:

$$Fr_0 = \frac{4\,Mdr}{L_r - 0,1} \text{ in kN} \quad (1)$$

Table 1 — Value of Fr_0 in relation to L_r

L_r in m	0,3	0,4	0,5	0,6
Fr_0 in kN	20 *Mdr*	13 *Mdr*	10 *Mdr*	8 *Mdr*

Fc_0 and Fc_{0n} are calculated from the geometry given in Figures 2 and 3 using the following equations:

$$Fc_0 = \frac{4\,Mdc}{L_c - 0,1} \text{ in kN} \quad (2)$$

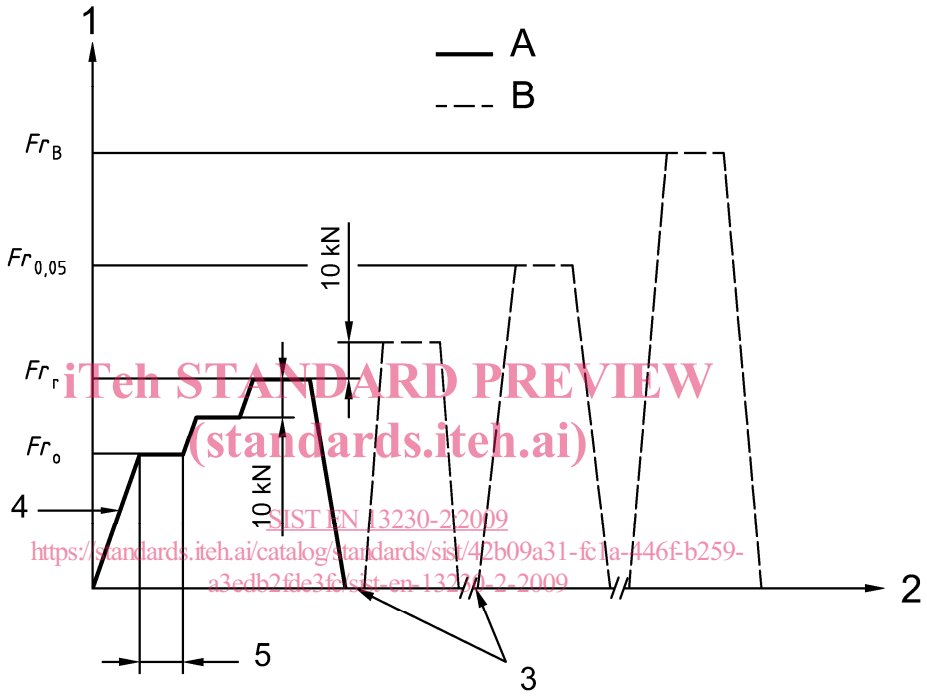
$$Fc_{0n} = \frac{4\,Mdc_n}{L_c - 0{,}1} \text{ in kN} \qquad (3)$$

For the definitions of Mdr, Mdc_n and Mdc, see EN 13230-1:2009, Clause 3.

4.3.2 Static test

4.3.2.1 Rail seat section

The static test procedure at the rail seat section for design approval test and routine test is shown in Figures 4 and 5.



Key

1 Load
2 Time
3 Crack checking (maximum duration: 5 min)
4 120 kN/min maximum
5 From 10 s minimum to 5 min maximum
A Required part of test
B Optional part of test

Figure 4 — Static test procedure at the rail section for positive design approval test