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Railway applications — Concrete sleepers and bearers for track —

Part 2:
Prestressed monoblock sleepers

Applications ferroviaires — Traverses et supports en béton pour la voie —

Partie 2: Traverses monoblocs précontraintes

ICS: 45.080

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Introduction

This part of the ISO 22480 series defines the specific requirements dedicated to prestressed monoblock sleepers.

These are additional requirements to ISO 22480-1 that are necessary to have a complete standard dealing with prestressed monoblock sleepers.

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Railway applications — Concrete sleepers and bearers for track —

Part 2: Prestressed monoblock sleepers

1 Scope

This part of the ISO 22480 series defines additional technical criteria and control procedures related to the manufacturing and testing of prestressed monoblock sleepers.

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.

ISO 22480-1, *Railway applications — Concrete sleepers and bearers for track — Part 1: General requirements*

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3 Terms and definitions

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For the purposes of this document, the terms and definitions given in ISO 22480-1 and the following apply.

4 Symbols and abbreviated terms

For the purpose of this document, the symbols listed in Table 1 apply.

Table 1 — Symbols

Symbol	Description	Unit
Fc	Load applied at the centre of the sleeper for positive bending test at the centre section	kN
Fc_B	Maximum test load which cannot be increased during positive bending test at the centre section	kN
Fc_{Bn}	Maximum test load which cannot be increased during negative bending test at the centre section	kN
Fc_n	Load applied at the centre of the sleeper for negative bending test at the centre section	kN
Fr	Load applied at the centre line of the rail seat for positive bending test at the rail seat section	kN
$Fr_{min,cyc}$	Minimum cyclic test load for the rail seat section cyclic test; $Fr_{min,cyc}$ = min (50 kN; 0,4 * Fr_0) unless specified otherwise by the purchaser.	kN
$Fr_{min,fat}$	Minimum cyclic test load for the rail seat section fatigue test; $Fr_{min,fat}$ = 20 % of the maximum cyclic load	kN
L_c	Design distance between centre lines of the rail seat	m
L_p	Design distance between the centre line of the rail seat to the edge of the sleeper at the bottom	m
L_r	Design distance between the articulated supports centre lines for the test arrangement at the rail seat section	m

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5 Bending tests

5.1 General

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

Quality control plan shall define relevant dimensions and tolerances to be checked prior to carrying out bending tests, in accordance with ISO 22480-1, Table 2. The sleepers and bearers for bending tests shall have a surface finish that allows correct execution of the tests.

A summary of tests to be carried out is given in Table 2.

Table 2 — Summary of tests

Product testing	Method A		Method B	
	Design approval tests	Routine tests	Design approval tests	Routine tests
Static positive bending test at the rail seat section	M acording to Figure 5	M acording to Figure 5	M acording to Figure 4	M acording to Figure 5
Static negative bending test at the centre section	M acording to Figure 6	O acording to Figure 6	M acording to Figure 7	O acording to Figure 6 or Figure 7
Static positive bending at the centre section	NA	NA	O acording to Figure 8	NA
Cyclic test	NA	NA	M acording to Figure 9	NA
Fatigue test	O acording to Figure 10	NA	O acording to Figure 10	NA
M: mandatory tests O: optional tests NA: non-applicable				

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5.2 Test arrangements

5.2.1 Rail seat section

The arrangement for the positive bending test at the rail seat section is shown in Figure 1.

The value of L_r in relation to L_p is detailed in Table 3.

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.

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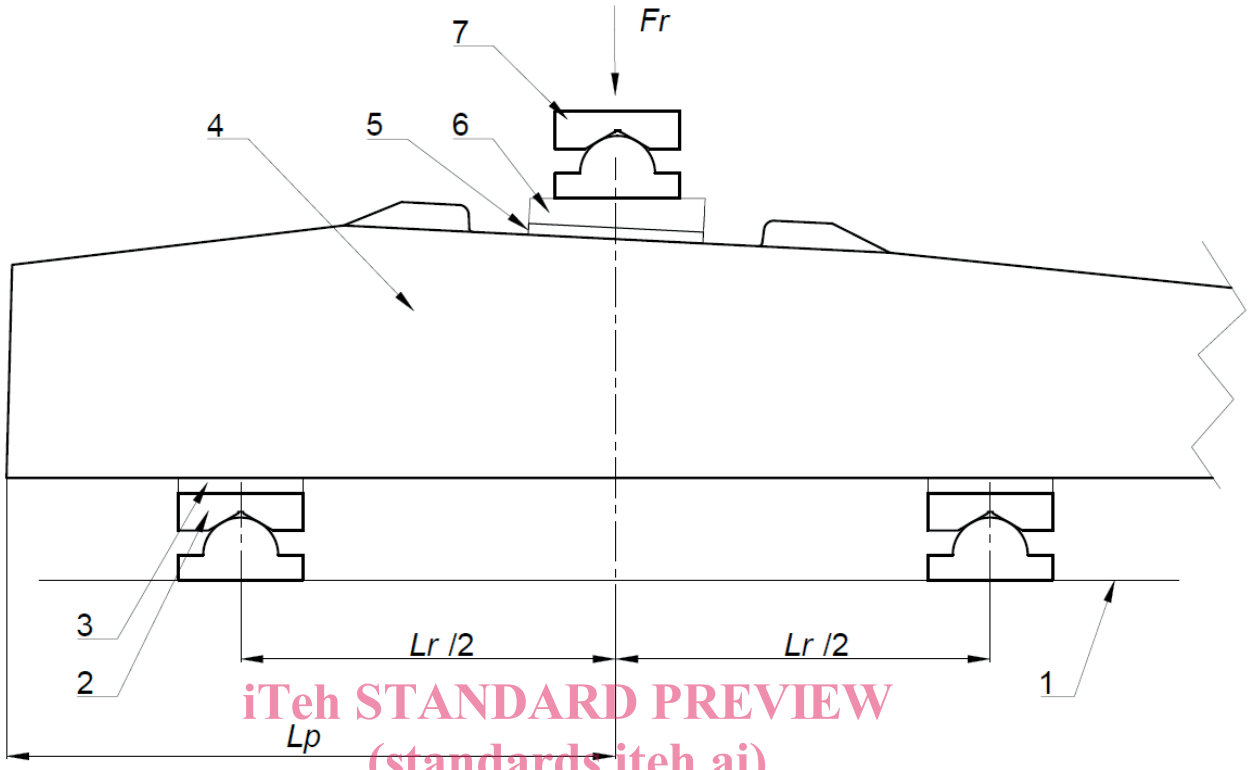

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Key

1 rigid support
2 articulated support (see Annex A for details)
3 resilient pad (see Annex A for details)
4 prestressed monoblock sleeper
5 resilient rail pad (defined by the purchaser)
6 tapered packing (see Annex A for details)
7 articulated load point (see Annex A, necesseray if the jack is not articulated)

NOTE In the cyclic and fatigue test, lateral displacement of element "6" may occur. In this case, lateral stops and/or a stiffer element "5" may be used. This amendment should be agreed with the purchaser.

Figure 1 — Test arrangement for positive bending moment at the rail seat section

Table 3 — 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

5.2.2 Centre section

The arrangement for the negative bending test at the centre section is shown in Figure 2.

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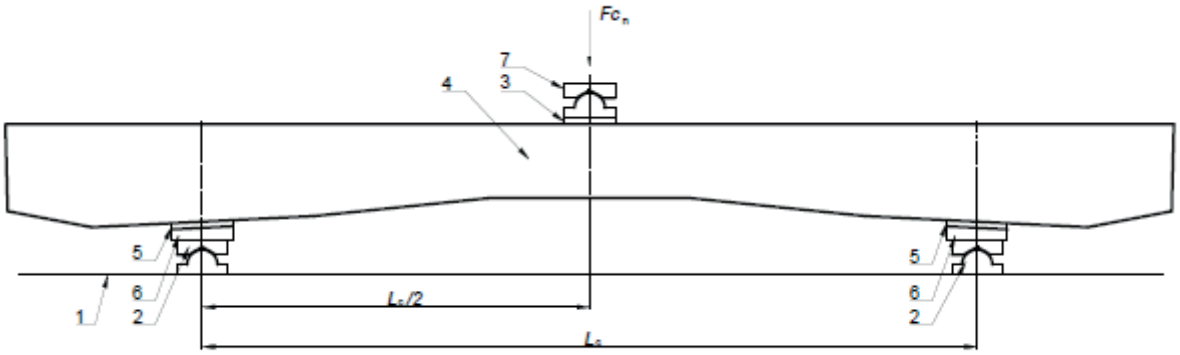

Key

1 rigid support
2 articulated support (see Annex A for details)
3 resilient pad (see Annex A for details)
4 prestressed monoblock sleeper
5 resilient rail pad (defined by the purchaser)
6 tapered packing (see Annex A for details)
7 articulated load point (see Annex A, necesseray if the jack is not articulated)

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Figure 2 — Test arrangement for negative bending moment at the centre section

The test arrangement for the positive bending test at the centre section is shown in Figure 3.

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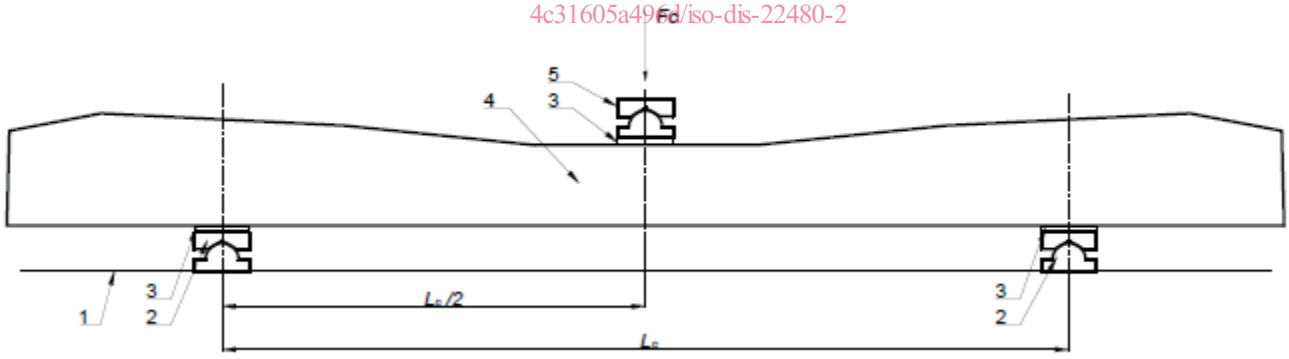

Key

1 rigid support
2 articulated support (see Annex A for details)
3 resilient pad (see Annex A for details)
4 prestressed monoblock sleeper
5 articulated load point (see Annex A, necesseray if the jack is not articulated)

Figure 3 — Test arrangement for positive bending moment at the centre section

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5.3 Test procedures

5.3.1 Test loads

Fr_0 is calculated from the geometry given in Figure 1 and values from Table 3 using Formula (1):

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

Fc_0 and Fc_{0n} are calculated from the geometry given in Figures 2 and 3 using Formula (2) and Formula (3):

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

$$Fc_{0n} = \frac{4M_{0,c,neg}}{Lc - 0,1} \text{ in kN} \quad (3)$$

5.3.2 Static tests

5.3.2.1 Rail seat section

The static test procedures at the rail seat section with and without control of the residual cracks are shown in Figures 4 and 5.

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