

STN	Železnice. Koľaj. Betónové podvaly v koľaji a vo výhybkách s podvalovými podložkami.	STN EN 16730 73 6314
------------	---	--

Railway applications - Track - Concrete sleepers and bearers with under sleeper pads

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 10/16

Obsahuje: EN 16730:2016

123720

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2016
Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

EUROPEAN STANDARD

EN 16730

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2016

ICS 93.100

English Version

Railway applications - Track - Concrete sleepers and bearers with under sleeper pads

Applications ferroviaires - Voie - Traverses et supports
en béton avec semelles sous traverse

Bahnanwendungen - Oberbau - Gleis- und
Weichenschwellen aus Beton mit Schwellensohlen

This European Standard was approved by CEN on 12 March 2016.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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: Avenue Marnix 17, B-1000 Brussels

Contents	Page
European foreword.....	5
Introduction	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	8
4 Symbols.....	11
5 Design approval tests and routine tests	12
5.1 General.....	12
5.2 Summary of design approval tests and routine tests.....	12
5.3 Tests of USP alone and of USP on concrete block	14
5.3.1 Tensile strength of USP material.....	14
5.3.2 Static and low frequency dynamic bedding modulus of USP on concrete block with GBP	14
5.3.3 Static and low frequency dynamic bedding modulus of USP alone with GBP	15
5.3.4 Higher frequency dynamic bedding modulus of USP on concrete block	15
5.3.5 Fatigue test of USP on concrete block.....	16
5.3.6 Fatigue test of USP on concrete block with GBP.....	16
5.3.7 Capability for stacked stocking of sleepers with USP, testing by USP on a concrete block.....	17
5.3.8 Effect of severe environmental conditions on USP on concrete block.....	17
5.3.9 Resistance to other environmental parameters.....	18
5.4 Tests of concrete sleepers and bearers without USP	18
5.5 Tests of USP on concrete sleepers and bearers.....	18
5.5.1 Dimensions and masses of sleepers and bearers with USP	18
5.5.2 Bond strength by pull-out of USP on sleeper and bearer	19
5.5.3 Fatigue test of USP on sleeper.....	19
5.5.4 Environment and end of life.....	20
6 Data to be supplied.....	20
6.1 General.....	20
6.2 Data supplied by the purchaser	20
6.3 Data supplied by the supplier of sleeper with USP	21
6.3.1 General.....	21
6.3.2 Before the design approval tests.....	21
6.3.3 After the design approval tests	22
6.3.4 Prior to first start-up of production	22
7 Rules for use of sleepers and bearers with USP	22
8 Quality control	22
9 Marking, labelling and packaging	23
Annex A (normative) Geometric Ballast Plate (GBP)	24
A.1 Design of the GBP	24
A.2 Material of GBP	24
Annex B (normative) USP on concrete block.....	27

B.1	Design of the USP on concrete block.....	27
B.2	Tolerances of USP on concrete block.....	27
Annex C (normative) Static and low frequency dynamic bedding modulus of USP on concrete block or of USP alone with GBP		
C.1	General	29
C.2	Static test procedure.....	29
C.2.1	Principle.....	29
C.2.2	Apparatus	29
C.2.3	Procedure	30
C.2.4	Test report	32
C.3	Low frequency dynamic test procedure	32
C.3.1	Principle.....	32
C.3.2	Apparatus	33
C.3.3	Procedure	33
C.3.4	Test report	35
Annex D (normative) Fatigue test of USP on concrete block.....		
D.1	Principle.....	36
D.2	Apparatus	36
D.3	Procedure	37
D.4	Test report	39
Annex E (normative) Bond strength by pull-out of USP on sleeper and bearer.....		
E.1	Principle.....	40
E.2	Apparatus	40
E.3	Procedure	40
E.4	Test report	41
Annex F (normative) Data sheet.....		
F.1	Data Sheet 1 (for USP Materials).....	43
F.2	Data Sheet 2 (for sleepers and bearers with USP)	44
Annex G (informative) General design approval tests and the routine tests for the USP and the sleeper with USP		
Annex H (informative) Higher frequency dynamic vertical bedding modulus of USP on concrete block.....		
H.1	Principle.....	46
H.2	Test arrangement	46
H.2.1	Test arrangement for the direct method	46
H.2.2	USP on concrete block.....	48
H.2.3	Ambient Test temperature.....	48
H.2.4	Vibration test velocity.....	48
H.3	Test procedure and evaluation.....	48
H.3.1	General	48
H.3.2	Loss factor η	48
H.3.3	Higher frequency dynamic stiffening ratio κ_H (80 Hz).....	49
H.4	Test report	49
Annex I (informative) Fatigue test of USP on concrete block with GBP		
I.1	Principle.....	50
I.2	Apparatus	50
I.3	Procedure	51
I.4	Test report	52
Annex J (informative) Capability of stacked storage of sleepers with USP		
54		

J.1	Principle	54
J.2	Apparatus.....	54
J.3	Procedure.....	55
J.4	Test report.....	56
Annex K (informative) Static and low frequency dynamic bedding modulus of USP on concrete sleeper or bearer with GBP		
		57
K.1	General.....	57
K.2	Static test procedure	57
K.2.1	Principle	57
K.2.2	Apparatus.....	57
K.2.3	Procedure.....	58
K.2.4	Test report.....	60
K.3	Low frequency dynamic test procedure	61
K.3.1	Principle	61
K.3.2	Apparatus.....	61
K.3.3	Procedure.....	61
K.3.4	Test report.....	63
Annex L (informative) Fatigue test on USP on sleeper		
		64
L.1	Principle	64
L.2	Apparatus.....	64
L.3	Procedure.....	65
L.4	Test report.....	67
Annex M (informative) Alternative fatigue test on USP on sleeper		
		69
M.1	Principle	69
M.2	Apparatus.....	69
M.3	Procedure.....	70
M.4	Test report.....	71
Annex N (informative) Effect of severe environmental conditions on USP on concrete block		
		73
N.1	Principle	73
N.2	Apparatus.....	73
N.3	Procedure.....	73
N.4	Test report.....	75
Bibliography.....		76

European foreword

This document (EN 16730:2016) 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 2016, and conflicting national standards shall be withdrawn at the latest by December 2016.

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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard relates to the EN 13230 series when the sleepers or bearers are manufactured with Under Sleeper Pad (USP). The USP is an elastic layer fixed to the bottom surface of the sleepers or bearers. This standard applies to the system constituted of the concrete sleepers or bearers and the Under Sleeper Pad.

1 Scope

This European Standard is applicable to concrete sleepers or bearers with Under Sleeper Pads (USP) physically bonded to concrete used in ballast track and define the test procedures and their evaluation criteria. This standard provides particular information in the following areas:

- test methods, test arrangements and evaluation criteria of Under Sleeper Pads;
- test methods, test arrangements and evaluation criteria of concrete sleepers and bearers with Under Sleeper Pads;
- data supplied by the purchaser and by the supplier;
- definition of general process of design approval tests;
- definition of routine tests.

This standard defines the specific test procedures for design approval tests, routine tests and tests concerning the determination of relevant properties of Under Sleeper Pad with or without concrete sleepers and bearers:

- fatigue tests;
- tests of capability for stacked stocking of concrete sleepers or bearers fitted with USP;
- pull-out test;
- severe environmental condition test.

This standard also sets out procedures for testing fitness for purpose and provides information on quality monitoring as part of quality assurance procedures. This standard does not, however, contain requirements pertaining to the properties of Under Sleeper Pads. It is the responsibility of the purchaser to define these requirements

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.

EN 206, *Concrete - Specification, performance, production and conformity*

EN 1542, *Products and systems for the protection and repair of concrete structures - Test methods - Measurement of bond strength by pull-off*

EN 10027 (all parts), *Designation systems for steels*

EN 13230-1:2016, *Railway applications - Track - Concrete sleepers and bearers - Part 1: General requirements*

EN 13230-2:2016, *Railway applications - Track - Concrete sleepers and bearers - Part 2: Prestressed monoblock sleepers*

EN 13230-3:2016, *Railway applications - Track - Concrete sleepers and bearers - Part 3: Twin-block reinforced sleepers*

EN 16730:2016 (E)

EN 13230-4:2016, *Railway applications - Track - Concrete sleepers and bearers - Part 4: Prestressed bearers for switches and crossings*

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

EN 13450, *Aggregates for railway ballast*

EN ISO 527 (all parts), *Plastics — Determination of tensile properties (ISO 527, all parts)*

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)*

EN ISO 9513:2012, *Metallic materials - Calibration of extensometer systems used in uniaxial testing (ISO 9513:2012)*

EN ISO 22768 (all parts), *Permissible machining variations in dimensions without tolerance indication (ISO 2768, all parts)*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN