



SLOVENSKI STANDARD
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Železniške naprave - Infrastruktura - Plastični pragi in kretniški plastični pragi - 3.
del: Lastnosti materiala

Railway applications - Infrastructure - Plastic sleepers and bearers - Part 3: Material characteristics

Bahnanwendungen - Infrastruktur - Gleis- und Weichenschwellen aus Kunststoff - Teil 3: Materialeigenschaften

Applications ferroviaires - Infrastructure - Traverses et supports en plastique - Partie 3 : Caractéristiques des matériaux

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45.080	Tračnice in železniški deli	Rails and railway components
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Railway applications - Infrastructure - Plastic sleepers and bearers - Part 3: Material characteristics

Applications ferroviaires - Infrastructure - Traverses et supports en plastique - Partie 3 : Caractéristiques des matériaux

Bahnanwendungen - Infrastruktur - Gleis- und Weichenschwellen aus Kunststoff - Teil 3: Materialeigenschaften

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17318-3:2018) 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 European Standard is one of the series EN 17318 “*Railway applications – Infrastructure – Plastic sleepers and bearers*”, which consist of the following parts:

- *Part 1: General requirements;*
- *Part 2: Product testing;*
- *Part 3: Material characteristics.*

This European Standard is used as the technical basis for transaction between corresponding parties (purchaser – supplier).

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prEN 17318-3:2018 (E)

Introduction

This part of the standard describes the material characteristics and test methods for mechanical properties for plastic sleepers and bearers and is used in conjunction with the following parts:

- Part 1: General requirements;
- Part 2: Product testing.

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1 Scope

This document specifies the characteristics of sleepers and bearers made from plastic or reinforced plastic materials. It applies to sleepers or bearers for railway infrastructure.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 17318-1:2018, *Railway applications - Infrastructure - Plastic sleepers and bearers - Part 1: General requirements*

EN ISO 62, *Plastics - Determination of water absorption (ISO 62)*

EN ISO 178, *Plastics - Determination of flexural properties (ISO 178)*

EN ISO 179-1, *Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test (ISO 179-1)*

EN ISO 306, *Plastics - Thermoplastic materials - Determination of Vicat softening temperature (VST) (ISO 306)*

EN ISO 527-2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

EN ISO 527-4, *Plastics - Determination of tensile properties - Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites (ISO 527-4)*

EN ISO 604, *Plastics - Determination of compressive properties (ISO 604)*

ISO 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to glass-filtered solar radiation, natural weathering or laboratory radiation sources*

EN ISO 4892-2:2013, *Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2:2013)*

EN ISO 14125, *Fibre-reinforced plastic composites - Determination of flexural properties (ISO 14125)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 17318-1:2018 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

prEN 17318-3:2018 (E)**4 Required material characteristics****4.1 Resistance****4.1.1 Chemical compatibility**

The material of the plastic sleepers shall be resistant against all those chemicals that can regularly contaminate the sleepers in conventional railway traffic.

These are e.g.: oils / grease / hydrocarbons (media dripping from railway vehicles), possibly de-icing salts and herbicides / fungicides from weed control on the railway track.

The manufacturer has to prove the resistance to chemical media in suitable form, if necessary through studies and demonstration of transferable knowledge from other application cases.

If customers want a high resistance to specific chemicals (e.g. for use in loading and unloading areas of chemical factories, oil and chemical transshipment ports etc.), the customers have to define these requirements and the sleeper manufacturer has to prove this if necessary.

The user can specify tests if the manufacturer's proofs are not satisfactory according to the generally recognized state of scientific and technical knowledge, or are not plausible.

4.1.2 Environmental resistance**4.1.2.1 Weathering resistance**

The load bearing capacities of the sleepers at the end of its service life shall remain sufficient for service regardless of weathering effect.

The requirements for the weathering resistance of the materials shall be agreed on between the interested parties.

The weathering resistance shall be demonstrated either:

- by a documented and substantially proven experience;
- or by assessing the changes of properties according to ISO 4582 after an exposure to xenon-arc lamps in accordance with EN ISO 4892-2:2013, Method A, Cycle 1.

4.1.2.2 Frost in connection with water

The material shall not be affected by any penetrating and freezing water.

The manufacturer can prove the basic non-water absorbing capacity of his material in suitable form if necessary through studies and demonstration of transferable knowledge from other application cases.

The user can specify tests if the manufacturer's proofs are not satisfactory according to the generally recognized state of scientific and technical knowledge, or are not plausible.

4.1.2.3 Resistance to water

The sleepers shall be resistant to waterlogging, precipitation water (rain, snow, dew, fog etc.). The user can limit the possible water absorption when reasonably necessary. The manufacturer can prove the basic non-water absorbing capacity of his material in suitable form if necessary through studies and demonstration of transferable knowledge from other application cases.

The user can specify tests if the manufacturer's proofs are not satisfactory according to the generally recognized state of scientific and technical knowledge, or are not plausible.

4.1.2.4 Temperature resistance

4.1.2.4.1 Deformation

The plastic material of the sleepers shall be selected so that, in the normally occurring, long-term temperatures in Central Europe, sleepers do not deform to any extent (bend, rotate, twist), or do not soften too much or do not solidify so that the specific values required by the infrastructure operator in Part 1 are not kept to any more. This limit values are specified e.g.: thermal-mechanical guiding characteristic values, to be measured on standard test specimens, such as for thermal deformability (e.g.: Vicat softening temperature), E-module (tensile testing / bending), and tested according to the relevant standards.

4.1.2.4.2 Embrittlement

The manufacturer shall ensure that, for the plastic material used, the influence of temperature (see above) during the minimum service life duration specified by the manufacturer does not lead to such embrittlement of the sleeper material that the specific values according to Part 1 are no longer kept.

The users specify how much % of the absolute values of the specific values (for the sum of all influences) according to Part 1 shall still be present after the end of the minimum service life specified by the manufacturer.

4.1.2.5 Resistance to biological media

The sleeper material shall be sufficiently inert against any microbiological and macrobiological attack that the product specific values according to Part 1 are not reduced during the service life by more than a rate to be defined by the user.

Microbiological attacks are here e.g.: attacks by fungi, algae, rotting and fermenting microbes.

Macrobiological attacks are here e.g.: through the roots of plants, animal gnawing damage (e.g.: beetles, ants / termites, rodents).

The manufacturer shall demonstrate the resistance to biological media in suitable form, if necessary through studies and demonstration of transferable knowledge from other application cases.

The user can specify tests if the manufacturer's proofs are not satisfactory according to the generally recognized state of scientific and technical knowledge, or are not plausible.

4.2 Environmental compatibility

The material may not contain any chemical, biological or physical environmental contaminants and/or no negative environmental impact may emanate from it.

The limit values for chemical and biological contaminants are to be defined.

Should raw materials be processed that, from their history, were in contact with chemical or biological substances harmful to the environment, the manufacturer has to prove the freedom from hazardous substances or the observance of the limit values allowed in the EU.

The European waste legislation is valid for the admissibility of using recycled raw materials as the raw materials for plastic sleepers.

If chemical or biological contamination of the sleeper raw materials cannot be excluded (e.g. unwashed, post-consumer, mixed plastic materials), then the use in plastic sleepers is forbidden in any case.

If sorting, washing or other cleaning processes are used in the raw material production, the manufacturer has to prove the freedom from hazardous substances or the observance of the limit values allowed in the EU.

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The use of raw materials with physically harmful substances, such as for example: radioactive substances, is forbidden in any concentration.

If the manufacturer can prove the observance of the aforementioned conditions during the use of his raw materials, e.g. through a QM system accepted by the infrastructure operator or through a certification of the production according to EN ISO 9001, a final inspection of the elution behaviour of finished sleepers is not necessary.

If the observance of the aforementioned conditions during the use of his raw materials is not provable by the manufacturer of the plastic sleepers, the elution behaviour of all possible environmental contaminants on the raw materials and in finished sleepers has to be tested according to the specifications of the infrastructure operator by a chemical laboratory that is independent of the manufacturer and is accredited for such measurements.

Proofs, certificates and analyses that originate at the manufacturer according to the aforementioned regulations are to be archived for the minimum service life of his plastic sleepers that is forecast by the manufacturer and are to be presented for tests by the infrastructure operator or environmental and regulatory authorities.

4.3 Mechanical properties

In order to characterize the mechanical properties of the plastic or reinforced plastic materials, the following tests should be undertaken (see Table 1). The conditions used, specific tests and processes used to obtain the samples shall be communicated with the results.

This list of tests is used to characterize the material used in the manufacturer of sleepers or bearers. For production quality some of these tests or others tests may be used.

The test should be done on plastic or reinforced plastic materials to be used for the product.

For reinforcement materials, a data sheet or equivalent should be provided.

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