



SLOVENSKI STANDARD
oSIST prEN 13450-1:2021
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Agregati za grede železniških prog - 1. del: Značilnosti

Aggregates for railway ballast - Part 1: Characteristics

Gesteinskörnungen für Gleisschotter - Teil 1: Produktstandard

Granulats pour ballasts de voies ferrées - Partie 1: Caractéristiques

Ta slovenski standard je istoveten z: prEN 13450-1

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EUROPEAN STANDARD
NORME EUROPÉENNE
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English Version

Aggregates for railway ballast - Part 1: Characteristics

Granulats pour ballasts de voies ferrées - Partie 1:
Caractéristiques

Gesteinskörnungen für Gleisschotter - Teil 1:
Produktstandard

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 154.

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 13450-1:2021) has been prepared by Technical Committee CEN/TC 154 “Aggregates”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13450:2002 and EN 13450:2002/AC:2004.

The most significant technical changes compared to EN 13450:2002 include:

- a) Complete structural and editorial revision;
- b) Harmonization of vocabulary and Annex ZA to be consistent with Regulation (EU) 305/2011 on construction products (CPR);
- c) Improvement of the consistency with the aggregate standard EN 17555-1;
- d) Unification of definitions which were common across aggregate standard EN 17555-1;
- e) Updating and improving references to supporting test methods;
- a) Modification of the definition of “recycled railway ballast”;
- f) Modification of classes for grading;
- g) Modification of Tables 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, due to changes in the class names and due to the introduction of new classes for flakiness index, percentage of crushed particles, Los Angeles coefficient, resistance to impact and micro Deval coefficient;
- h) Addition of new Clauses 4.1.2.4 “Percentage of crushed particles”, 4.5.4 “Freeze-thaw resistance”;
- i) Addition of new Tables 11, 12, 13, 14, and 15;
- j) Revision of Clause 4.5.5 “Sonnenbrand”;
- k) Removal of clauses referring to dangerous substances;
- l) Removal of simple petrographic description from the characteristics and inclusion instead under the marking, labelling and packaging clause;
- m) Removal of Annex A (informative) “Sampling railway ballast at the construction site either from a railway wagon or from the track”, Annex B (informative) “Guidance on interpretation of results when samples of railway ballast have been taken from railway wagon or from track”, Annex C (normative) “Conditions to be applied to the test procedure specified in EN 1097-2:2010 for testing the Los Angeles coefficient of railway ballast”, Annex D (normative) “Conditions to be applied to the test procedure specified in EN 1097-2:2010 for testing the Impact value of railway ballast”, Annex E (normative) “Conditions to be applied to the test procedure specified in EN 1097-1:2011 for determination of the resistance to wear (micro-Deval) of railway ballast”; Annex F (normative) “Conditions to be applied to the test procedure specified in EN 1367-1 for determination of the resistance to freezing and thawing of railway ballast”, Annex G (normative) “Conditions to be applied to the test procedure specified in EN 1367-2 for the determination of the resistance of railway ballast to the magnesium sulfate test”, Annex H (informative) “Guidance on the freezing and thawing resistance of railway ballast” and Annex I (normative) “Factory production control”;

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- n) Modification of the clauses on Designation and description and on Marking, labelling and packaging;
- o) Restructuring of all clauses to be in line with the requirements of the Construction Product Regulation;
- p) Introduction of revised AVCP clauses and tables, although minimum test frequencies are almost unchanged.

Provisions for other types of aggregates and their intended uses are specified in the following European Standards:

- prEN 17555-1:2021, *Aggregates for construction works — Part 1: Characteristics*
- prEN 13055:2021, *Lightweight aggregates*
- prEN 13383-1:2021, *Armourstone — Part 1: Characteristics*

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

For relationship with Regulation (EU) No. 305/2011 on construction products (CPR), see informative Annex ZA, which is an integral part of this document.

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1 Scope

This document specifies the characteristics of aggregates for use in the construction of the upper layer (superstructure) of railway track.

With regard to the material source and production process, this document covers natural aggregate (see 3.1.3), manufactured aggregate (see 3.1.4), recycled aggregates (see 3.1.5), and mixtures of these materials.

Aggregates covered in this document are railway ballast (see 3.1.2).

Railway ballast refers to aggregates where 100 % of the surface of the particles can be described as totally crushed (see 3.1.2) and that are obtained by processing natural, manufactured materials or recycled crushed unbound aggregates.

Aggregates covered in this document are coarse aggregates (see 3.1.10).

Railway ballast resulting of previously used railway ballast on site and without putting it on the market (reused railway ballast) is not covered by this document.

This document does not cover:

- natural and manufactured aggregates, having oven-dried particle density less than or equal to 2,00 Mg/m³, as they are already specified in prEN 13055:2021,
- recycled aggregates, with particle densities less than 1,50 Mg/m³,
- aggregates with a nominal upper size greater than 90 mm,
- armourstone, as this is specified in prEN 13383-1:2021,
- aggregates for construction works, as these are specified in prEN 17555-1:2021,
- use of aggregates contained within reclaimed bituminous mixtures, as the reclaimed asphalt for use as a constituent of bituminous mixtures is already specified in EN 13108-8:2016,
- use of aggregates as soil,
- use of aggregates in earthworks, as these are specified in EN 16907:2018, Parts 1 to 6.

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 932-3:2021, *Tests for general properties of aggregates — Part 3: Procedure and terminology for simplified petrographic description*

prEN 933-1:2021, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution - Sieving method*

EN 933-3:2012, *Tests for geometrical properties of aggregates - Part 3: Determination of particle shape - Flakiness index*

EN 933-4:2008, *Tests for geometrical properties of aggregates - Part 4: Determination of particle shape - Shape index*

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prEN 933-5:2021, *Tests for geometrical properties of aggregates — Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregate particles*

prEN 1097-1:2021, *Tests for mechanical and physical properties of aggregates — Part 1: Determination of the resistance to wear (micro-Deval)*

EN 1097-2:2020, *Tests for mechanical and physical properties of aggregates - Part 2: Methods for the determination of resistance to fragmentation*

prEN 1097-6:2021, *Tests for mechanical and physical properties of aggregates — Part 6: Determination of particle density and water absorption*

EN 1367-1:2007, *Tests for thermal and weathering properties of aggregates - Part 1: Determination of resistance to freezing and thawing*

EN 1367-2:2009, *Tests for thermal and weathering properties of aggregates — Part 2: Magnesium sulfate test*

EN 1367-3:2001,¹ *Tests for thermal and weathering properties of aggregates — Part 3: Boiling test for “Sonnenbrand basalt”*

EN 1367-6:2008, *Tests for thermal and weathering properties of aggregates - Part 6: Determination of resistance to freezing and thawing in the presence of salt (NaCl)*

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3 Terms, definitions, symbols, and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

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

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

3.1 Terms and definitions**3.1.1****aggregate**

granular material of natural, manufactured or recycled origin used in construction

3.1.2**railway ballast**

aggregate where 100 % of the surface of the particles can be described as totally crushed used in the construction of the upper layer (superstructure) of railway track

3.1.3**natural railway ballast**

aggregate for railway ballast from mineral sources that has been subjected to nothing more than mechanical processing

¹ As impacted by EN 1367-3:2001/AC:2004.

3.1.4**manufactured railway ballast**

railway ballast of mineral origin resulting from an industrial process involving thermal or other modification

Note 1 to entry: Manufactured aggregates (not including added filler) are of different types, including those, namely air-cooled blast furnace slags, steel slags and foundry cupola furnace slags, for which this standard defines application of specific test methods to cover some essential characteristics.

3.1.5**recycled railway ballast**

railway ballast resulting from the processing of inorganic mineral material previously used as railway ballast in the upper layer (superstructure) of the railway track

Note 1 to entry: Railway ballast resulting of previously used railway ballast on site and without putting it on the market (reused railway ballast) is not covered by this document.

3.1.6**railway ballast size**

designation of railway ballast in terms of lower (d) and upper (D) sieve sizes expressed as d/D

Note 1 to entry: Sieve sizes are selected from those in EN 933-2:2020.

Note 2 to entry: This designation accepts the presence of some particles which are retained on the upper sieve (oversize) and some which pass the lower sieve (undersize).

3.1.7**grading**

particle size distribution expressed as the percentages by mass passing a specified set of sieves

3.1.8**fine particles**

particle size fraction of railway ballast which passes the 0,5 mm sieve

3.1.9**fines**

particle size fraction of an railway ballast that passes the 0,063 mm sieve

3.1.10**coarse aggregate**

designation given to the larger aggregate sizes with D greater than 4 mm and d greater than or equal to 1 mm

3.1.11**particle size fraction**

fraction of an aggregate passing the larger of two sieves and retained on the smaller

Note 1 to entry: The lower limit can be zero.

3.1.12**oversize**

part of the aggregate retained on the upper of the limiting sieves used in aggregate size description

prEN 13450-1:2021 (E)**3.1.13****undersize**

part of the aggregate passing the lower of the limiting sieves used in aggregate size description

3.1.14**product family**

group of products produced by one manufacturer for which the assessment results for one or more characteristics from any one product within the range are valid for all other products within this range

3.2 Symbols and abbreviated terms

For the purposes of this document, the following symbols and abbreviations apply:

Symbol/Acronym	Meaning
AVCP	Assessment and Verification of Constancy of Performance
<i>C</i>	(Percentage of) Crushed particles
DoP	Declaration of performance
<i>d</i>	lower sieve size designation in mm
<i>D</i>	upper sieve size designation in mm
<i>d/D</i>	Aggregate size designation
<i>D/d</i>	Ratio of upper to lower sieve size
<i>f</i>	Fines content (standards.iteh.ai)
<i>F_{RB}</i>	Freeze thaw resistance
<i>F_{EC}</i>	Freeze thaw resistance in the presence of salt (extreme conditions)
<i>FI</i>	Flakiness Index
<i>G_{CRB}</i>	Grading
<i>G_{FRB}</i>	Content of fine particles
<i>L_{RB}</i>	Length
<i>LA_{RB}</i>	Los Angeles coefficient
<i>M_{DERB}</i>	Micro-Deval coefficient
<i>MS_{RB}</i>	Magnesium Sulfate soundness
NaCl	Sodium Chloride
<i>SI</i>	Shape Index
<i>SZ_{RB}</i>	Impact value

NOTE The subindex RB stands for Railway Ballast and is used when the general test method is particularised for it. Subindex CRB stands for Coarse Railway Ballast and subindex FRB stands for Fine Railway Ballast.

4 Characteristics

4.1 Particle size, shape and density

4.1.1 Particle size

4.1.1.1 General

The characteristic that describes particle size of railway ballast is the particle size distribution (or grading).

4.1.1.2 Grading

The grading of the railway ballast shall be determined by sieving in accordance with prEN 933-1:2021.

The performance shall be expressed as a grading class in accordance with the provisions of Table 1.

Table 1 — Grading classes for railway ballast

Sieve size mm	Percentage passing by mass							
	Designation							
	31,5 mm to 50 mm	31,5 mm to 63 mm			22,4 mm to 40 mm	16 mm to 31,5 mm	11,2 mm to 31,5 mm	X mm to Y mm
	Grading class G_{CRB}							
	G_{CRB} A	G_{CRB} B	G_{CRB} C	G_{CRB} D	G_{CRB} E	G_{CRB} F	G_{CRB} G	G_{CRB} Stated X/Y
80	-	100	100	100	-	-	-	100
63	100	95 to 100	95 to 100	93 to 100	-	-	-	X to 100
50	70 to 99	65 to 99	55 to 99	45 to 70	100	100	-	-
40	30 to 65	30 to 65	25 to 75	15 to 40	90 to 100	97 to 100	100	-
31,5	1 to 25	1 to 25	1 to 25	0 to 7	60 to 98	70 to 100	90 to 100	-
22,4	0 to 3	0 to 3	0 to 3	0 to 7	15 to 60	0 to 40	-	-
16	-	-	-	-	0 to 15	0 to 3	-	-
11,2	-	-	-	-	-	-	0 to 4	-
8	-	-	-	-	0 to 2	-	-	-
4	-	-	-	-	-	-	0 to 1	0 to Y
31,5 to 50	50 to 100	-	-	-	-	-	-	-
31,5 to 63	-	70 to 100	70 to 100	86 to 100	-	-	-	-

NOTE 1 The provision for passing the 22,4 mm sieve applies to railway ballast sampled at the place of production. This characteristic may change due to transportation and handling.

NOTE 2 For classes G_{CRB} A to G_{CRB} D a 25 mm sieve may be used as an alternative to the 22,4 mm sieve, then a tolerance of 0 to 5 would apply (0 to 7 for class D).