



SLOVENSKI STANDARD
oSIST prEN 13450:2015
01-julij-2015

Agregati za grede železniških prog

Aggregates for railway ballast

Gesteinskörnungen für Gleisschotter

Granulats pour ballasts de voies ferrées

Ta slovenski standard je istoveten z: prEN 13450

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Aggregates for railway ballast

Gesteinskörnungen für Gleisschotter

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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Foreword

This document (prEN 13450:2015) 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.

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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of Construction Products Regulation (EU) No. 305/2001.

For relationship with EU Regulation, see informative Annex ZA, which is an integral part of this document.

The most significant technical changes compared to the previous edition include:

- a) Harmonisation of vocabulary and Annex ZA to be consistent with Construction Product Regulations.
- b) Unification of categories which are common across the four main aggregate standards: EN 12620, EN 13043, EN 13139 and EN 13242.
- c) Description of assessment and verification of conformity of performance of aggregates (AVCP) - type testing and factory production control in a separate new standard prEN 16236.
- d) Implementing general sentences on dangerous substances and adding a new normative Annex A dealing with all source materials considered.
- e) Unification of definitions which are common across the four main aggregate standards: EN 12620, EN 13043, EN 13139 and EN 13242.
- f) Insertion of a new clause "General Requirements".
- g) Update of the normative references.
- h) Modification of the definition to "recycled railway ballast".
- i) Modification of categories for grading.
- j) Modification of Tables 1, 2, 3, 4, 5, 6, 7, 8 and 9 due to changes in the category names and due to the introduction of new categories.
- k) Addition of new clauses 5.8 "Percentage of crushed particles", 7. "Chemical requirements", 7.2 "Petrographic description", 8.3 "Freeze-thaw resistance" and 8.4 "Electrical conductivity".
- l) Addition of new Tables 10, 11, 12 and 13.
- m) Modification of sub-clause 8.5 "Sonnenbrand".
- n) Removal of Annex C (normative) "Conditions to be applied to the test procedure specified in EN 1097-2 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 for testing the Impact value of railway ballast" and Annex E

(normative) “Conditions to be applied to the test procedure specified in EN 1097-1 for determination of the resistance to wear (micro-Deval) of railway ballast”.

In this document the wording ‘property’ and ‘characteristic’ have the same meaning.

Requirements for assessment and verification of constancy of performance are given in prEN 16236: on *Evaluation of conformity of aggregates*.

Requirements for other end uses of aggregates are specified in the following European Standards:

- EN 12620, *Aggregates for concrete*.
- EN 13043, *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*.
- EN 13055, *Lightweight aggregates*.
- EN 13139, *Aggregates for mortar*.
- EN 13242, *Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction*.
- EN 13383-1, *Armourstone — Part 1: Specification*.

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1 Scope

This European Standard specifies the properties of aggregates obtained by processing natural, manufactured or recycled crushed unbound aggregates for use in construction of the upper layer of railway track. For the purposes of this standard, the aggregate is referred to as railway ballast.

A list of the source materials that have been considered and are within the scope of this European Standard is given in Annex A (normative).

NOTE 1 Reused railway ballast: railway ballast resulting of previously used railway ballast on site and without putting it on the market is not covered by this European Standard.

Requirements for the Assessment and Verification of the Constancy of Performance (AVCP) of railway balast to this European Standard are given in prEN 16236.

It incorporates a general requirement that railway ballast shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the Member State of destination.

Railway ballast used in construction shall conform with all the requirements of this European Standard. The standard includes comprehensive and specific requirements for natural aggregates and recycled ballast, dealing with, for example, the stability of certain basalts.

NOTE 2 Guidance on selection of appropriate categories for specific applications can be found in national provisions in the place of use of the railway ballast.

2 Normative references

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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 932-1:1996, *Tests for general properties of aggregates - Part 1: Methods for sampling*

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

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

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

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

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

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

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

EN 1097-6, *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, *Tests for thermal and weathering properties of aggregates - Part 3 : Boiling test for "Sonnenbrand basalt"*

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

prEN 16236, *Evaluation of conformity of aggregates — Initial Type Testing and Factory Production Control*

3 Terms and definitions

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

3.1

aggregate

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

3.2

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 of railway track, with sizes e.g. 22/40 mm, 31,5/50 mm or 31,5/63 mm

3.3

natural railway ballast

aggregate for railway ballast from mineral sources which have been subjected to nothing more than mechanical processing

Note 1 to entry: Natural railway ballast should be produced without blending material from different geological sources.

3.4

manufactured railway ballast

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

3.5

recycled railway ballast

railway ballast resulting from the processing of inorganic or mineral material previously used in construction

3.6

level

result of the assessment of the performance of an aggregate in relation to its essential characteristics, expressed as a numerical value

EXAMPLE WA24_{Declared} = 0,5 %

3.7

class

range of levels, delimited by a minimum and a maximum value, of performance of an aggregate

EXAMPLE G_c 85/15

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3.8 category
level or class of a property of railway ballast expressed as a range of values (class) or a limiting value (level for individual value of declared category)

Note 1 to entry: There is no relationship between the categories of different properties.

EXAMPLE $F_{I\ 50}$, $f_{\text{Declared}\ 25}$ (Declared Category)

3.9 declared value
level of a property declared by the manufacturer

EXAMPLE $\rho_{\text{rd Declared}\ 1,5}$ (Declared value)

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

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

3.12 fines
particle size fraction of railway ballast which passes the 0,063 mm sieve

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4 General requirements

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The tables in this standard include categories which are common across the four main aggregates standard: EN 12620, EN 13043, EN 13139 and EN 13242. Categories, NOTES, comments etc, which are grey shaded, are not used for railway ballast.

Where conformity with a category is based on a value of a property being less than or equal to a given value, conformity with a more severe category (lower value) automatically confers conformity with all less severe categories (higher values). Similarly for categories based on the value of a property being greater than or equal to a given value, conformity with a more severe (higher value) automatically confers conformity with all less severe categories (lower values).

When the value of a property is required but not defined by specified limits the value should be declared as an XX_{Declared} category, e.g. in Table 4 a value of say 40 for the flakiness index corresponds to $F_{I_{\text{RBDeclared}}\ 40}$ (Declared category).

When a property is not required, a "No requirement" category may be used.

5 Geometrical requirements

5.1 General

The necessity for testing and declaring all properties specified in this Clause shall be limited according to the particular application at end use or origin of the railway ballast. When required, the railway ballast shall be tested as specified in Clause 5 to determine the relevant geometrical properties.

Sampling shall be carried out in accordance with EN 932-1.

NOTE 1 Advice on sampling from a wagon or the track at the laying site is given in Annex B.

NOTE 2 Guidance on interpretation of results when samples of railway ballast have been taken from railway wagon or out of track is given in Annex C.

5.2 Railway ballast sizes

All aggregates shall be described in terms of aggregate sizes using the designations d/D , and shall comply with the grading requirements specified in 5.3.

Railway ballast sizes shall be described by the pair of sieve sizes in millimetres with d as the lower limit designation sieve and D as the upper limit designation sieve between which most of the particle size distribution lies.

5.3 Grading

The grading of the railway ballast shall be determined in accordance with EN 933-1 and the results declared in accordance with the relevant category specified in Table 1.

Table 1 — Categories for grading

Sieve size mm	Railway ballast size 31,5 mm to 50 mm	Railway ballast size 31,5 mm to 63 mm			Railway ballast size 22 mm to 40 mm
	Percentage passing by mass				
	Grading category G_{CRB}				
	G_{CRB} A	G_{CRB} B	G_{CRB} C	G_{CRB} D	G_{CRB} E
80	100	100	100	100	-
63	100	95 to 100	95 to 100	93 to 100	-
50	70 to 99	65 to 99	55 to 99	45 to 70	100
40	30 to 65	30 to 65	25 to 75	15 to 40	90 to 100
31,5	1 to 25	1 to 25	1 to 25	0 to 7	60 to 98
22,4	0 to 3	0 to 3	0 to 3	0 to 7	15 to 60
16	-	-	-	-	0 to 15
8	-	-	-	-	0 to 2
31,5 to 50	≥ 50	-	-	-	-
31,5 to 63	-	≥ 50	≥ 50	≥ 85	-

NOTE 1 The requirement for passing the 22,4 mm sieve applies to railway ballast sampled at the place of production.

NOTE 2 In certain circumstances a 25 mm sieve may be used as an alternative to the 22,4 mm sieve, when a tolerance of 0 to 5 would apply.

NOTE 3 When assessing production within a system of FPC, at least 90 % of gradings, taken on different batches within a maximum period of 6 months, shall fall within the limits specified in Table 1.

5.4 Content of fine particles

The content of fine particles shall be determined in accordance with EN 933-1 and the results declared in accordance with the relevant category specified in Table 2.

Table 2 — Categories for fine particles content

Sieve size	Maximum percentage passing by mass			
	G_{FRB}			
mm	Fine particle category			
	$G_{FRB A}$	$G_{FRB B}$	$G_{FRB Declared}$	$G_{FRB NR}$
0,5	0,6	1,0	> 1,0	No requirement

NOTE The requirement applies to railway ballast sampled at the place of production.

5.5 Fines content

The fines content shall be determined in accordance with EN 933-1 and the results declared in accordance with the relevant category specified in Table 3.

When required, cleanliness shall be assessed from the fines content. Fines shall be considered non-harmful if the total fines content is less than the relevant category specified in Table 3 in accordance with the provisions valid in the place of use of the aggregate.

Table 3 — Categories for fines content

Sieve size	Maximum percentage passing by mass				
	Fines content category				
mm	$f_{RB A}$	$f_{RB B}$	$f_{RB C}$	$f_{RB Declared}$	$f_{RB NR}$
0,063	0,5	1,0	1,5	> 1,5	No requirement

NOTE The requirement applies to railway ballast sampled at the place of production.

5.6 Particle shape - Flakiness index and shape index

When required, the shape of railway ballast shall be determined in accordance with EN 933-3 in terms of the flakiness index and the results declared in accordance with the relevant category specified in Table 4.

The flakiness index shall be the reference test for the determination of the shape.

Table 4 — Categories for maximum values of flakiness index

Flakiness Index	Category FI_{RB}
≤ 15	$FI_{RB 15}$
≤ 20	$FI_{RB 20}$
≤ 25	$FI_{RB 25}$
4 to 25	$FI_{RB 4/25}$
> 25	$FI_{RB Declared}$
No requirement	$FI_{RB NR}$

When required, the shape index of railway ballast shall be determined in accordance with EN 933-4 and the results declared in accordance with the relevant category specified in Table 5.

Table 5 — Categories for maximum values of shape index

Shape Index	Category S_{RB}
≤ 10	$S_{RB} 10$
≤ 20	$S_{RB} 20$
≤ 30	$S_{RB} 30$
5 to 30	$S_{RB} 5/30$
> 30	$S_{RB} \text{Declared}$
No requirement	$S_{RB} \text{NR}$

5.7 Particle length

Particle length of railway ballast shall be assessed by measuring with an appropriate gauge or callipers.

Limits should be selected from the specified range until such a time as there is more data available on railway ballast properties related to performance.

When required, the particle length of railway ballast shall be determined and the results declared in accordance with the relevant category specified in Table 6.

Table 6 — Categories for maximum values of particle length

Percentage by mass with length = 100 mm in a greater than 40 kg sample					
Particle length category					
$L_{RB} A$	$L_{RB} B$	$L_{RB} C$	$L_{RB} D$	$L_{RB} \text{Declared}$	$L_{RB} \text{NR}$
≤ 4	≤ 6	≤ 8	≤ 12	> 12	No requirement

5.8 Percentage of crushed particles

The percentage of crushed particles including totally crushed particles in accordance with EN 933-5 shall be 100 % for railway ballast.

Aggregates obtained from crushing rock shall be assumed to be category C 100/0 and do not require further testing.

6 Physical requirements

6.1 General

The necessity for testing and declaring all properties specified in this clause shall be limited according to the particular application at end use or origin of the railway ballast. When required, the railway ballast shall be tested as specified in Clause 6 to determine appropriate physical properties.

6.2 Resistance to fragmentation

6.2.1 Los Angeles

When required, the resistance to fragmentation of railway ballast shall be determined in terms of the Los Angeles coefficient as specified in EN 1097-2, using the conditions as specified in Annex A, and the results declared in accordance with the relevant category specified in Table 7.