



**SLOVENSKI STANDARD**  
**oSIST prEN 13450-2:2021**  
**01-september-2021**

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**Agregati za grede železniških prog - 2. del: Dopolnilni podatki**

Aggregates for railway ballast - Part 2: Complementary information

Gesteinskörnungen für Gleisschotter - Teil 2: Ergänzende Informationen

Granulats pour ballasts de voies ferrées - Partie 2: informations complémentaires

**Ta slovenski standard je istoveten z: prEN 13450-2**

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**ICS:**

91.100.15	Mineralni materiali in izdelki	Mineral materials and products
93.100	Gradnja železnic	Construction of railways

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## Aggregates for railway ballast - Part 2: Complementary information

Granulats pour ballasts de voies ferrées - Partie 2:  
informations complémentaires

Gesteinskörnungen für Gleisschotter - Teil 2:  
Ergänzende Informationen

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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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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 13450-2:2021) 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.

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**prEN 13450-2:2021 (E)****1 Scope**

This document provides non-contradictory complementary information that can be of use when producing or purchasing railway ballast according to the harmonized standard prEN 13450-1:2021.

NOTE prEN 13450-1:2021 is also required to be read in conjunction with the Construction Products Regulation.

Reused railway ballast is not covered by this document.

**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 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*

**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

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

**3.1.4****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.

**3.1.5****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).

**3.1.6****grading**

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

**3.1.7****fine particles**

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

**3.1.8****finer**

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

**3.1.9****coarse aggregate**

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

**3.1.10****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.

**3.1.11****oversize**

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

**3.1.12****undersize**

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

**3.1.13****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

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## prEN 13450-2:2021 (E)

## 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
$C$	(Percentage of) Crushed particles
DoP	Declaration of performance
$d$	lower sieve size designation in mm
$D$	upper sieve size designation in mm
$d/D$	Aggregate size designation
$D/d$	Ratio of upper to lower sieve size
$f$	Fines content
$F_{RB}$	Freeze thaw resistance
$F_{EC}$	Freeze thaw resistance in the presence of salt (extreme conditions)
$FI$	Flakiness Index
$G_{CRB}$	Grading
$G_{FRB}$	Content of fine particles
$L_{RB}$	Length
$LA_{RB}$	Los Angeles coefficient
$M_{DERB}$	Micro-Deval coefficient
$MS_{RB}$	Magnesium Sulfate soundness
NaCl	Sodium Chloride
$SI$	Shape Index
$SZ_{RB}$	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 Product characteristics – additional information

## 4.1 General

The testing and declaration of any characteristic included in prEN 13450-1:2021, Clause 4 is at the choice of the manufacturer of the railway ballast. In practice, the manufacturer will:

- test and declare those characteristics of relevance to the particular end use or to the origin of production of the railway ballast.
- identify classes for any given characteristic which may be more appropriate for specific end uses.

NOTE 1 Under the Construction Products Regulation, there is only a requirement to declare a single characteristic.



To complement the information given in prEN 13450-1:2021, Annex ZA, it is indicated in this clause which classes of characteristics may be applicable to each major group of end uses. However, it should be cautioned that not all of these classes will be suitable for every type of application or mixture/product in the end-use.

Where compliance with a class is based on a value of a characteristic being less than or equal to a given value, compliance with a more severe class (lower value) automatically confers compliance with all less severe classes (higher values). Similarly, for classes based on the value of a characteristic being greater than or equal to a given value, compliance with a more severe (higher value) automatically confers compliance with all less severe classes (lower values).

As an example, if railway ballast conforms to a requirement for *FI* 15, it therefore also complies with the category *FI* 20 and *FI* 25.

When the performance of a characteristic *XX* does not comply with even the least severe class in the class table, the manufacturer can state an appropriate limiting value in the *XX*<sub>Stated</sub> class.

NOTE 2 If e.g. the maximum value of the flakiness index (*FI*) is assessed to be 40, the corresponding designation of the *XX*<sub>Stated</sub> category will be *FI*<sub>Stated</sub> 40.

NOTE 3 For ease of cross-reference, the numbering of this clause corresponds to that of the equivalent clause in prEN 13450-1:2021.

It is intended that for compliance purposes railway ballast should be sampled only at the place of production. However, there will be occasions when it will be necessary to take a sample of railway ballast at the time of delivery or from the track, according to Annex A.

## 4.2 Particle size, shape and density

### 4.2.1 Particle size

#### 4.2.1.1 General

Railway ballast sizes (*d/D*) are described by the pair of sieve sizes in millimetres selected from from ISO 565 / R20, where *d* is the lower limit designation sieve and *D* is the upper limit designation sieve between which most of the particle size distribution lies, (e.g. 0/4 mm, 0/2 mm, 2/4 mm etc.).

When sieving according to prEN 933-1:2021 to determine *d* mm as the lower limit designation and *D* mm as the upper limit designation, it is recommended that sieve sizes normally selected from ISO 565:1990 / R20 series may be used.

The results shall be expressed in terms of a description *d/D*.

#### 4.2.1.2 Grading

The determination of grading as set out in prEN 13450-1:2021, 4.1.1.2 is applicable for end uses of railway ballast.

The selection of the grading for 31,5 mm to 63 mm will be depending on the national requirements.

### 4.2.2 Particle shape

#### 4.2.2.1 Flakiness index and shape index

##### 4.2.2.1.1 Flakiness index

The determination of Flakiness index as set out in prEN 13450-1:2021, 4.1.2.2.2 is applicable for end uses of railway ballast.

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Test results are only applicable to the grading of material for which they are carried out.

**4.2.2.1.2 Shape index**

The determination of Shape index as set out in prEN 13450-1:2021, 4.1.2.2.3 is applicable for end uses of railway ballast.

Test results are only applicable to the grading of material for which they are carried out.

**4.2.2.2 Particle length**

The determination of grading as set out in prEN 13450-1:2021, 4.1.2.3 is applicable for end uses of railway ballast.

Test results are only applicable to the grading of material for which they are carried out.

**4.2.2.3 Percentage of crushed particles**

The determination of Particle length as set out in prEN 13450-1:2021, 4.1.2.4 is applicable for end uses of railway ballast.

Railway ballast obtained from crushing of massive rock shall be expressed as class *C* 90/100/0 and do not require further testing.

Test results are only applicable to the grading of material for which they are carried out.

**4.2.3 Particle density****4.2.3.1 General**

The determination of Particle density as set out in prEN 13450-1:2021, 4.1.3 is applicable for end uses of railway ballast.

For Railway ballast, test results are applicable to any grading within the same product family.

It should be noted that prEN 1097-6:2021 allows the determination of 3 kinds of densities: oven-dried particle density, saturated and surface dried particle density and apparent particle density.

- prEN 1097-6:2021, Clause 7 applies to coarse aggregates 31,5/D mm; it may be used on coarse aggregates with  $d > 4$  mm and  $D \leq 63$  mm; in case of dispute the method in prEN 1097-6:2021, Clause 8 is the reference method. This method can also be used for single aggregate particle retained on the 63 mm sieve.
- prEN 1097-6:2021, Clause 8 applies to coarse aggregates with  $d > 4$  mm and  $D \leq 63$  mm.
- prEN 1097-6:2021, Clause 9 applies to fine aggregates with  $d > 0,063$  mm and  $D \leq 4$  mm.

It is also possible under prEN 1097-6:2021 to use three other methods for normal weight aggregates to determine the pre-dried particle density:

- prEN 1097-6:2021, Clause A.3 for aggregate particles with  $d > 31,5$  mm and  $D \leq 63$  mm;
- prEN 1097-6:2021, Clause A.4 for aggregate particles with  $d > 0,063$  mm and  $D \leq 31,5$  mm;
- prEN 1097-6:2021, Annex G for aggregates with  $d = 0$  and  $D \leq 31,5$  mm.

**4.2.3.2 Bulk density**

Bulk density is not one of the essential characteristics or proxy characteristics treated in prEN 13450-1:2021. When needed for assessment of mass for delivery or design purposes, the bulk density may be determined in accordance with EN 1097-3:1998.

Test results are only applicable to the grading of material for which they are carried out.

### 4.3 Resistance to fragmentation

#### 4.3.1 General

Test results are applicable to any grading within the same product family (coarse).

#### 4.3.2 Los Angeles coefficient

The determination of Los Angeles coefficient as set out in prEN 13450-1:2021, 4.2.2 is applicable for end uses of railway ballast.

No additional guidance beyond that in prEN 13450-1:2021.

#### 4.3.3 Impact value

The determination of Impact value as set out in prEN 13450-1:2021, 4.2.3 is applicable for end uses of railway ballast.

No additional guidance beyond that in prEN 13450-1:2021.

### 4.4 Resistance to attrition

The determination of Resistance to attrition as set out in prEN 13450-1:2021, 4.3 is applicable for end uses of railway ballast.

Test results are applicable to any grading within the same product family (coarse).

### 4.5 Cleanliness

#### 4.5.1 General

The determination of Cleanliness as set out in prEN 13450-1:2021, 4.4 is applicable for end uses of railway ballast.

All test results for cleanliness are only applicable to the grading of material for which they are carried out.

#### 4.5.2 Composition

The determination of Composition as set out in prEN 13450-1:2021, 4.4.2 is applicable for end uses of railway ballast.

No additional guidance beyond that in prEN 13450-1:2021.

#### 4.5.3 Content of fines particles

The determination of Content of fines particles as set out in prEN 13450-1:2021, 4.4.3 is applicable for end uses of railway ballast.

The provision applies to railway ballast sampled at the place of production. This characteristic may change due to transportation and handling.

#### 4.5.4 Fines content

The determination of Fines content as set out in prEN 13450-1:2021, 4.4.4 is applicable for end uses of railway ballast.

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

Fines shall be considered non-harmful for the performance of railway ballast if the total fines content is less than the relevant category  $f$  in prEN 13450-1:2021, in accordance with the provisions valid in the place of use of the aggregate.