



SLOVENSKI STANDARD
oSIST prEN 13383-1:2015
01-julij-2015

**Kamen za obloge pri vodnih zgradbah in drugih gradbenih delih - 1. del:
Specifikacija**

Armourstone - Part 1: Specification

Wasserbausteine - Teil 1: Anforderungen

Enrochements - Partie 1: Specifications

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Armourstone - Part 1: Specification

Wasserbausteine - Teil 1: Anforderungen

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

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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

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prEN 13383-1:2015 (E)**Foreword**

This document (prEN 13383-1:2015) 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 13381-1:2002.

This European Standard 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.

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.

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

- a) Harmonization of vocabulary and Annex ZA to be consistent with Construction Products Regulations
- b) 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;
- c) Inclusion of general sentences on dangerous substances and adding a new normative Annex A dealing with all source materials considered;
- d) The removal of the previous minimum density requirement and a change in the method of declaring density;
- e) Inclusion of a new coarse grading (32/90 mm) and a new light grading (15 kg to 120 kg) and guidance on the declaration of non-standard heavy gradings;
- f) Inclusion of a new category for resistance to wear MDE15, to take account of the fact that very few armourstone sources meet the highest quality category MDE10;
- g) Removal of procedures for sample preparation for the Micro-Deval test (now found in EN 13383-2);

In this document the terms '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.

EN 13383 Armourstone consists of the following parts:

- Part 1: *Specifications*
- Part 2: *Test methods*

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 dressings 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 13450, *Aggregates for railway ballast*

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prEN 13383-1:2015 (E)**1 Scope**

This European Standard specifies the properties of aggregates obtained by processing natural, manufactured or recycled materials and mixtures of these materials for use as armourstone.

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).

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

Armourstone used in construction should conform with all the requirements of this European Standard. The standard includes specific requirements for natural armourstone, ferrous and steel making slag and recycled armourstone.

Finer aggregates than specified in this European Standard are used in hydraulic structures. For such aggregates European Standards for other end uses of aggregates should be applied.

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

EN 1097-1:2011, *Tests for mechanical and physical properties of aggregates - Part 1: Determination of the resistance to wear (micro-Deval)*

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

EN 1744-1:2009+A1:2012, *Tests for chemical properties of aggregates - Part 1: Chemical analysis*

EN 1744-3, *Tests for chemical properties of aggregates - Part 3: Preparation of eluates by leaching of aggregates*

EN 1926:2006, *Natural stone test methods - Determination of uniaxial compressive strength*

prEN 13383-2, *Armourstone - Part 2: Test methods*

prEN 16236, *Assessment and Verification of the Constancy of Performance (AVCP) of aggregates —Type Testing and Factory Production Control*

3 Terms and definitions

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

3.1**armourstone**

coarse aggregates used in hydraulic structures and other civil engineering works

Note 1 to entry: Armourstone can be natural, manufactured or recycled.

3.2**natural armourstone**

armourstone from mineral sources which has been subjected to nothing more than mechanical processing

3.3**manufactured armourstone**

armourstone of mineral origin resulting from an industrial process involving thermal or other modification excluding concrete armour units

3.4**recycled armourstone**

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

3.5**armourstone grading**

armourstone designation with a nominal lower and upper limit

Note 1 to entry: This designation accepts the presence of undersize and oversize pieces of armourstone.

3.6**nominal lower limit**

mass or sieve size in a grading below which the armourstone pieces are considered to be undersized

3.7**nominal upper limit**

mass or sieve size in a grading above which the armourstone pieces are considered to be oversized

3.8**coarse grading**

designation of grading with a nominal upper limit defined by a sieve size between and including 90 mm and 250 mm

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3.9**light grading**

designation of grading with a nominal upper limit defined by a mass between and including 25 kg and 500 kg

3.10**heavy grading**

designation of grading with a nominal upper limit defined by a mass of more than 500 kg

3.11**fragment**

armourstone piece in the finest fraction of coarse gradings or the lightest fraction of light and heavy gradings for which the particle size distribution or mass distribution requirements apply

Note 1 to entry: Fragments are all armourstone pieces falling below the extreme lower limit (see Annex B.1)

3.12**effective mean mass**

M_{em}

average mass of armourstone, excluding fragments

3.13**level**

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

EXAMPLE $M_{DE\text{ Declared}} = 32$

prEN 13383-1:2015 (E)**3.14****class**

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

EXAMPLE CP 45/125

3.15**category**

level or class of a property of an armourstone expressed as a range of values (class) or a limiting value (level for individual value or declared category)

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

EXAMPLES LMA 60/300, MS 25, MS 28 (Declared category)

3.16**declared value**

level of a property declared by the manufacturer

EXAMPLE CS Declared 50 (Declared value)

4 General requirements

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).

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When the value of a property is required but not defined by specified limits the value should be declared by the manufacturer as an XX_{Declared} category, e.g. in Table 7 the percentage by number of pieces of armourstone with less than 50 % crushed or broken surfaces of say 7 corresponds to RO_7 .

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

Sampling shall be carried out as specified in prEN 13383-2:2015, Clause 4.

5 Geometrical requirements**5.1 General**

The necessity for testing and declaring all properties in this clause is limited according to the particular application at end use or origin of the armourstone. When required, the tests specified in Clause 5 shall be carried out to determine appropriate geometrical properties.

5.2 Gradings**5.2.1 Coarse gradings**

The particle size distribution of coarse gradings shall be determined in accordance with prEN 13383-2:2015, Clause 5 and shall conform to:

a) Table 1 for categories CP 32/90, CP 45/125, CP 63/180, CP 90/250, CP 45/180, and CP 90/180 ; or

b) as declared by the manufacturer for category CP_{Declared} .

Table 1 — Requirements for the particle size distribution of standard coarse gradings

Grading mm	32/90	45/125	63/180	90/250	45/180	90/180 ^c
Category	<i>CP 32/90</i>	<i>CP 45/125</i>	<i>CP 63/180</i>	<i>CP 90/250</i>	<i>CP 45/180</i>	<i>CP 90/180</i>
Sieve size mm	Cumulative percentage passing (by mass)					
360	—	—	—	98 to 100	—	—
250	—	—	98 to 100	90 to 100	98 to 100	98 to 100
180	—	98 to 100	90 to 100	—	90 to 100	80 to 100 ^a
125	98 to 100	90 to 100	—	0 to 50	—	—
90	90 to 100	—	0 to 50	0 to 15	—	0 to 20 ^a
63	—	0 to 50	0 to 15	—	0 to 50	—
45	0 to 50	0 to 15	—	0 to 5 ^b	0 to 15	0 to 5 ^b
31,5	0 to 15	—	0 to 5 ^b	—	—	—
22,4	—	0 to 5 ^b	—	—	0 to 5 ^b	—
16	0 to 5 ^b	—	—	—	—	—

^a The fraction between the 90 mm and 180 mm sieves of the 90/180 mm grading shall be ≥ 80 % by mass.

^b Fragments.

^c See Annex F.

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5.2.2 Light gradings

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The mass distribution of light gradings shall be determined in accordance with prEN 13383-2:2015, Clause 6.

The mass distribution shall conform to:

- Table 2 for categories *LMA 15/120*, *LMA 5/40*, *LMA 10/60*, *LMA 40/200*, *LMA 60/300* and *LMA 15/300*; or
- Table 3 for categories *LMB 15/120*, *LMB 5/40*, *LMB 10/60*, *LMB 40/200*, *LMB 60/300* and *LMB 15/300*; or
- the mass distribution and, where appropriate, the average mass (excluding fragments) as declared by the manufacturer for category LM_{Declared} .

Table 2 — Requirements for average mass (excluding fragments) and mass distribution of category A standard light gradings

Grading kg	5 to 40	10 to 60	15 to 120	40 to 200	60 to 300	15 to 300
Category	<i>LMA 5/40</i>	<i>LMA 10/60</i>	<i>LMA 15/120</i>	<i>LMA 40/200</i>	<i>LMA 60/300</i>	<i>LMA 15/300</i>
Average mass (excluding fragments), M_{em} kg	10 to 20	20 to 35	35 to 60	80 to 120	120 to 190	45 to 135
Reference mass kg	Cumulative percentage (by mass) of stones lighter than reference mass					
450	—	—	—	—	97 to 100	97 to 100
300	—	—	—	97 to 100	70 to 100	70 to 100
200	—	—	97 to 100	70 to 100	—	—
120	—	97 to 100	70 to 100	—	—	—
80	97 to 100	—	—	—	—	—
60	—	70 to 100	—	—	0 to 10	—
40	70 to 100	—	—	0 to 10	—	—
30	—	—	—	—	0 to 2 ^a	—
15	—	—	0 to 10	0 to 2 ^a	—	0 to 10
10	—	0 to 10	—	—	—	—
5	0 to 10	—	0 to 2 ^a	—	—	—
3	—	—	—	—	—	0 to 2 ^a
2	—	0 to 2 ^a	—	—	—	—
1,5	0 to 2 ^a	—	—	—	—	—

^a Fragments.

Table 3 — Requirements for mass distribution of category B standard light gradings

Grading kg	5 to 40	10 to 60	15 to 120	40 to 200	60 to 300	15 to 300
Category	<i>LMB 5/40</i>	<i>LMB 10/60</i>	<i>LMB 15/120</i>	<i>LMB 40/200</i>	<i>LMB 60/300</i>	<i>LMB 15/300</i>
Reference mass kg	Cumulative percentage (by mass) of stones lighter than reference mass					
450	—	—	—	—	97 to 100	97 to 100
300	—	—	—	97 to 100	70 to 100	70 to 100
200	—	—	97 to 100	70 to 100	—	—
120	—	97 to 100	70 to 100	—	—	—
80	97 to 100	—	—	—	—	—
60	—	70 to 100	—	—	0 to 10	—
40	70 to 100	—	—	0 to 10	—	—
30	—	—	—	—	0 to 2 ^a	—
15	—	—	0 to 10	0 to 2 ^a	—	0 to 10

10	—	0 to 10	—	—	—	—
5	0 to 10	—	0 to 2 ^a	—	—	—
3	—	—	—	—	—	0 to 2 ^a
2	—	0 to 2 ^a	—	—	—	—
1,5	0 to 2 ^a	—	—	—	—	—
^a Fragments.						

5.2.3 Heavy gradings

The mass distribution of heavy gradings shall be determined in accordance with prEN 13383-2:2015, Clause 6 and shall conform to:

- Table 4 for categories *HMA 300/1000*, *HMA 1000/3000*, *HMA 3000/6000*, *HMA 6000/10000*, and *HMA 10000/15000*; or
- Table 5 for categories *HMB 300/1000*, *HMB 1000/3000*, *HMB 3000/6000*, *HMB 6000/10000*, and *HMB 10000/15000*; or
- the mass distribution and, where appropriate, the average mass (excluding fragments) as declared by the manufacturer for category HM_{Declared} .

Table 4 — Requirements for average mass (excluding fragments) and mass distribution of category A standard heavy gradings

Grading kg	300 to 1 000	1 000 to 3 000	3 000 to 6 000	6 000 to 10 000	10 000 to 15 000
Category	<i>HMA 300/1000</i>	<i>HMA 1000/3000</i>	<i>HMA 3000/6000</i>	<i>HMA 6000/10000</i>	<i>HMA 10000/15000</i>
Average mass (excluding fragments), M_{em} kg	540 to 690	1 700 to 2 100	4 200 to 4 800	7 500 to 8 500	12 000 to 13 000
Reference mass kg	Cumulative percentage (by mass) of stones lighter than reference mass				
22 500	—	—	—	—	97 to 100
15 000	—	—	—	97 to 100	70 to 100
10 000	—	—	—	70 to 100	0 to 10
9 000	—	—	97 to 100	—	—
6 500	—	—	—	—	0 to 5 ^a
6 000	—	—	70 to 100	0 to 10	—
4 500	—	97 to 100	—	—	—
4 000	—	—	—	0 to 5 ^a	—
3 000	—	70 to 100	0 to 10	—	—
2 000	—	—	0 to 5 ^a	—	—
1 500	97 to 100	—	—	—	—
1 000	70 to 100	0 to 10	—	—	—
650	—	0 to 5 ^a	—	—	—
300	0 to 10	—	—	—	—
200	0 to 5 ^a	—	—	—	—
^a Fragments.					