SLOVENSKI STANDARD
oSIST prEN 13383-1:2021

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

Armourstone - Part 1:Characteristics

Wasserbausteine - Teil 1: Produktnorm

Enrochements - Partie 1 : Caractéristiques

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English Version

Armourstone - Part 1:Characteristics

Enrochements - Partie 1 : Caractéristiques

Wasserbausteine - Teil 1: Produktnorm

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

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European foreword

This document (prEN 13383-1:2021) 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 13383-1:2002 and EN 13383-1:2002/AC:2004.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Regulation(s).

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

In comparison with the previous edition, the following technical modifications have been made:

a) harmonization of vocabulary and Annex ZA to be consistent with Regulation (EU) No 305/2011 on construction products (CPR);

b) description of Assessment and Verification Constancy of Performance (AVCP) — type testing and factory production control;

c) the removal of the previous minimum density requirement and a change in the method of declaring density;

d) 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;

e) inclusion of a new category CS 105 CS 130 for resistance to breakage and fragmentation/ crushing;

f) inclusion of a new category for resistance to wear MDE 15, to take account of the fact that very few armourstone sources meet the highest quality category MDE 10;

g) removal of procedures for sample preparation for the Micro-Deval test (now found in prEN 13383-2);

h) removal of informative Annexes for Guidance on gradings, Guidance on block integrity, Guidance on the resistance of armourstone to freezing and thawing and to salt crystallization and Additional explanatory information (now found in prEN 13383-2);

i) inclusion of new Clause 7 “Marking, labelling and packaging”.

The prEN 13383 *Armourstone* series consists of the following parts:

— *Part 1: Characteristics*;

— *Part 2: Complementary information and test methods*.

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

— prEN 13055:2021, *Lightweight aggregates*;

— prEN 13450-1:2021, *Aggregates for railway ballast — Part 1: Characteristics*;

— prEN 17555-1:2021, *Aggregates for construction works — Part 1: Characteristics*.

1 Scope

This document specifies the characteristics of armourstone for uses, either with or without high safety requirements, in hydraulic structures and other civil engineering works.

This document specifies procedures for assessment and verification of constancy (AVCP) of performances of characteristics of the armourstone as well as marking and labelling of these products.

Armourstone covered in this document are aggregates, obtained by processing natural, manufactured or recycled materials and mixtures of these aggregates.

With regard to the material source and production technique, this document covers natural armourstone (see 3.1.2), manufactured armourstone (see 3.1.3) or recycled armourstone (see 3.1.4). Furthermore, manufactured armourstone are manufactured air-cooled blast furnace slags and manufactured steel slags.

With regard to the size of the armourstone, this document covers armourstone with the following gradings:

(1) coarse grading (see 3.1.8)

(2) light grading (see 3.1.9)

(3) heavy grading (see 3.1.10)

This document does not cover

— aggregates for railway ballast, as these are specified in prEN 13450-1:2021,

— aggregates for construction works, as these are specified in prEN 17555-1:2021.

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 932-3:2020, *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 1744-1:2009+A1:2012, *Tests for chemical properties of aggregates — Part 1: Chemical analysis*

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

prEN 13383-2:2021, *Armourstone — Part 2: Test methods*

3 Terms, definitions, symbols and abbreviations

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

3.1 Terms and definitions

3.1.1
armourstone
coarse aggregates used in hydraulic structures and other civil engineering works

3.1.2
natural armourstone
armourstone from mineral sources which has been subjected to nothing more than mechanical processing

Note 1 to entry: Natural armourstone includes unaltered porous basalt.

3.1.3
manufactured armourstone
armourstone of mineral origin resulting from an industrial process involving thermal or other modification excluding concrete armour units

Note 1 to entry: Manufactured armourstone are of different types, including those, namely air-cooled blast furnace slags and steel slags for which this document defines application of specific test methods to cover some essential characteristics.

3.1.4
recycled armourstone
armourstone resulting from the processing of inorganic or mineral material previously used in construction

3.1.5
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.

3.1.6
nominal lower limit
mass or sieve size in a grading below which the armourstone pieces are considered to be undersized

3.1.7
nominal upper limit
mass or sieve size in a grading above which the armourstone pieces are considered to be oversized

3.1.8
coarse grading
designation of grading with a nominal upper limit defined by a sieve size ≥ 90 mm and ≤ 250 mm

3.1.9
light grading
designation of grading with a nominal upper limit defined by a mass ≥ 40 and ≤ 300 kg

3.1.10
heavy grading
designation of grading with a nominal upper limit defined by a mass > 300 kg

3.1.11
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 applies

Note 1 to entry: Fragments are all armourstone pieces falling below the extreme lower limit (see prEN 13383-2:2021, Annex H1).

3.2 Symbols and abbreviations

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

Symbol/Acronym	Meaning
AVCP	Assessment and Verification of Constancy of Performance
ELL	Extreme Lower Limit
EUL	Extreme Upper Limit
NLL	Nominal Lower Limit
NUL	Nominal Upper Limit
Class symbols	**Classes for:**
CP	Particle size distribution of coarse gradings
CS	Resistance to breakage
DS	Disintegration of steel slag
FT	Resistance to freezing and thawing
HM	Mass distribution of heavy gradings
HMA	Average mass (excluding fragments) and mass distribution of category A heavy gradings
HMB	Mass distribution of category B heavy gradings
LM	Mass distribution of light gradings
LMA	Average mass (excluding fragments) and mass distribution of category A light gradings
LMB	Mass distribution of category B light gradings
LT	Shape
M_{DE}	Micro-Deval coefficient
MS	Salt crystallization
RO	Crushed or broken surfaces
SB	Sonnenbrand value
Was	Water absorption

4 Characteristics

4.1 Particle shape, size and density

4.1.1 Particle size

4.1.1.1 Coarse gradings

The particle size distribution of coarse gradings shall be determined in accordance with prEN 13383-2:2021, Clause 6.

The results obtained shall be evaluated against the classification criteria for the relevant grading in Table 1.

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

Table 1 — Classes for the particle size distribution of coarse gradings

Grading designation mm	**32/90**	**45/125**	**45/180**	**63/180**	**90/180**	**90/250**
Class	***CP* 32/90**	***CP* 45/125**	***CP* 45/180**	***CP* 63/180**	***CP* 90/180**	***CP* 90/250**
Sieve size mm	**Cumulative percentage passing (by mass)**					
500	—	—	—	—	—	100
360	—	—	100	100	100	98 to 100
250	—	100	98 to 100	98 to 100	98 to 100	90 to 100
180	100	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 20	0 to 15
63	—	0 to 50	0 to 50	0 to 15	—	—
45	0 to 50	0 to 15	0 to 15	—	0 to 5 [b]	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.

4.1.1.2 Light gradings

The mass distribution of light gradings shall be determined in accordance with prEN 13383-2:2021, Clause 7.

The results obtained shall be evaluated against the classification criteria for the relevant grading in Table 2 or 3.

The performance shall be expressed as a grading class in accordance with the provisions of Table 2 or 3.

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

Grading designation kg	**5 to 40**	**10 to 60**	**15 to 120**	**40 to 200**	**60 to 300**	**15 to 300**	**X to Y**
Class	***LMA* 5/40**	***LMA* 10/60**	***LMA* 15/120**	***LMA* 40/200**	***LMA* 60/300**	***LMA* 15/300**	**LMA_{Stated} X/Y**
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	0,6 × (NLL + NUL)/2 to (NLL + NUL)/2
EUL (extreme upper limit – 97 % to 100 % lighter by mass) kg	80	120	200	300	450	450	If NUL > 60, 1,5Y Otherwise, 2,0Y
NUL (nominal upper limit – 70 % to 100 % lighter by mass) kg	40	60	120	200	300	300	Y
NLL (nominal lower limit – 0 % to 10 % lighter by mass)	5	10	15	40	60	15	X
ELL (extreme lower limit – 0 % to 2 % lighter by mass)	1,5	2	5	15	30	3	If NLL > 40, 0,5X Otherwise, 0,3X
Note: The part of the grading below the ELL is defined as ‘fragments’.							

Table 3 — Class type B for mass distribution of standard light gradings

Grading designation kg	**5 to 40**	**10 to 60**	**15 to 120**	**40 to 200**	**60 to 300**	**15 to 300**	**X to Y**
Class	***LMB* 5/40**	***LMB* 10/60**	***LMB* 15/120**	***LMB* 40/200**	***LMB* 60/300**	***LMB* 15/300**	**LMB_{Stated} X/Y**
EUL (extreme upper limit – 97 % to 100 % lighter by mass) kg	80	120	200	300	450	450	If NUL > 60, 1,5Y Otherwise, 2,0Y
NUL (nominal upper limit – 70 % to 100 % lighter by mass) kg	40	60	120	200	300	300	Y
NLL (nominal lower limit – 0 % to 10 % lighter by mass)	5	10	15	40	60	15	X
ELL (extreme lower limit – 0 % to 2 % lighter by mass)	1,5	2	5	15	30	3	If NLL > 40, 0,5X Otherwise, 0,3X
Note: The part of the grading below the ELL is defined as ‘fragments’.							

4.1.1.3 Heavy gradings

The mass distribution of heavy gradings shall be determined in accordance with prEN 13383-2:2021, Clause 7.

The results obtained shall be evaluated against the classification criteria for the relevant grading in Table 4 or 5.

The performance shall be expressed as a class in accordance with the provisions of Table 4 or 5.