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Interested committees:

Title: Draft BS EN 13383-1 Armourstone. Part 1: Characteristics.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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.

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.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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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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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 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 13383-1:2021 (E)

- 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:
<i>CP</i>	Particle size distribution of coarse gradings
<i>CS</i>	Resistance to breakage
<i>DS</i>	Disintegration of steel slag
<i>FT</i>	Resistance to freezing and thawing
<i>HM</i>	Mass distribution of heavy gradings
<i>HMA</i>	Average mass (excluding fragments) and mass distribution of category A heavy gradings
<i>HMB</i>	Mass distribution of category B heavy gradings
<i>LM</i>	Mass distribution of light gradings
<i>LMA</i>	Average mass (excluding fragments) and mass distribution of category A light gradings
<i>LMB</i>	Mass distribution of category B light gradings
<i>LT</i>	Shape
M_{DE}	Micro-Deval coefficient
<i>MS</i>	Salt crystallization
<i>RO</i>	Crushed or broken surfaces
<i>SB</i>	Sonnenbrand value
<i>Was</i>	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.