



SLOVENSKI STANDARD

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SIST EN 13139:2002

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Agregati za malte

Aggregates for mortar

Gesteinskörnungen für Mörtel

Granulats pour mortiers

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ICS:

91.100.15	Mineralni materiali in izdelki	Mineral materials and products
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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Aggregates for mortar

Granulats pour mortiers

Gesteinskörnungen für Mörtel

This European Standard was approved by CEN on 5 September 2011.

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This European Standard exists 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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Foreword

This document (EN 13139:2013) has been prepared by Technical Committee CEN/TC 154 "Aggregates", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2013, and conflicting national standards shall be withdrawn at the latest by February 2015.

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 supersedes EN 13139:2002.

The main changes compared to the previous edition are:

- In line with EN 12620, EN 13043, and EN 13242 Annex A has been introduced in EN 13139 to indicate which type of materials could fall in the scope of this standard. The content of this annex is the same for each of those standards. However, using gray shading part of the materials mentioned in Annex A are excluded for being used as aggregate for mortars;
- The content of EN 12620, EN 13043, EN 13139 and EN 13242 have been brought in line with each other as much as possible. Parts that are not relevant for mortars are grey shaded;
- Editorial errors present in the previous standard have been removed;
- An explanation concerning the grading categories is now given in 3.7;
- The definition for "added filler" and others not present in the previous standard are introduced;
- The chapter concerning requirements for initial type testing and factory production control has been changed. These items are now mentioned in a separate standard (EN 16236).

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 EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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 for concrete, mortar, grout, bituminous mixtures, surface treatments and for unbound and bound applications*;
- 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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— EN 13450, *Aggregates for railway ballast*.

Requirements for evaluation of conformity are specified in EN 16236, Evaluation of Conformity.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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1 Scope

This European Standard specifies the properties of aggregates obtained by processing natural, manufactured or recycled materials and mixtures of these aggregates for use in mortars, renders and screeds, e.g.

- a) masonry mortar,
- b) floor/screed mortar,
- c) surfacing of internal walls (plastering mortar),
- d) rendering of external walls,
- e) special bedding materials,
- f) repair mortar,
- g) grouts,

for buildings, roads and civil engineering works.

It covers aggregates having an oven dried particle density greater than $2,00 \text{ Mg/m}^3$ ($2\,000 \text{ kg/m}^3$). It also covers recycled aggregate with densities between $1,50 \text{ Mg/m}^3$ ($1\,500 \text{ kg/m}^3$) and $2,00 \text{ Mg/m}^3$ ($2\,000 \text{ kg/m}^3$).

A list of the source materials that have been considered and indicating those which are within the scope of this standard is given in Annex A (normative)

Requirements for the evaluation of conformity of the products to this European Standard are given in EN 16236.

It incorporates a general requirement that aggregates will 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.

The tables in this standard include categories that are common across the four main aggregate standards: EN 12620, EN 13043, EN 13139 and EN 13242. Not all of these categories are appropriate for aggregates for use in mortars, renders and screeds.

Categories, notes, comments etc., which are **grey shaded**, should not be used for mortars.

Aggregates used in construction should comply with all the relevant requirements of the appropriate European Standards for aggregates. These standards include comprehensive and specific requirements for natural aggregates, iron and steel making slag and recycled aggregates, dealing with, for example, the stability of certain basalts, the expansion of certain slags and the constitution of recycled aggregates.

For materials from some other secondary sources, however, work is on-going and the requirements are incomplete. In the meantime such materials, when placed on the market as aggregates, will comply fully with this standard but may also be required to comply with specific relevant additional requirements at the place of use. Additional characteristics and requirements may be specified on a case-by-case basis depending upon experience of use of the product, and defined in specific contractual documents.

NOTE Requirements for lightweight aggregates are specified in prEN 13055.

Requirements for the declaration of the potential of aggregates to release regulated dangerous substances are currently under development. Until such time as these are finalized, attention should be paid to requirements at the place of use.

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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 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 933-7, *Tests for geometrical properties of aggregates — Part 7: Determination of shell content — Percentage of shells in coarse aggregates*

EN 933-8, *Tests for geometrical properties of aggregates — Part 8: Assessment of fines — Sand equivalent test*

EN 933-9, *Tests for geometrical properties of aggregates — Part 9: Assessment of fines — Methylene-blue test*

EN 933-10, *Tests for geometrical properties of aggregates — Part 10: Assessment of fines — Grading of filler aggregates (air jet sieving)*

EN 1097-6, *Tests for mechanical and physical properties of aggregates — Part 6: Determination of particle density and water absorption*

EN 1367-1, *Tests for thermal and weathering properties of aggregates — Part 1: Determination of resistance to freezing and thawing*

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

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

EN 16236:2013, *Evaluation of conformity of aggregates — Initial Type Testing and Factory Production Control*

ISO 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

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

natural aggregate

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

3.3**manufactured aggregate**

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

3.4**recycled aggregate**

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

3.5**category**

level of a property of an aggregate expressed as a range of values or a limiting value

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

3.6**aggregate size**

designation of aggregate 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).

3.7**grading**

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

Note 1 to entry: In this standard grading categories are used and expressed as G_nX/Y in which:

n : type of grading

where: C = coarse;

CA = coarse for asphalt only;

G = grit ($D < 4$ and $d > 1$);

F = fine;

NG = natural graded;

A = all-in

X : lower limit passing D

Y : upper limit passing d

3.8**fines**

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

3.9**coarse aggregate**

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

Note 1 to entry: Aggregates that do not fit the definitions for fine or coarse (like 1/3, 1/4 or 2/4mm) are treated as coarse aggregate.

3.10**fine aggregate**

designation given to the smaller aggregate sizes with D less than or equal to 4 mm and $d = 0$

Note 1 to entry: Fine aggregate can be produced from natural disintegration of rock or gravel and/or by the crushing of rock or gravel or processing of manufactured aggregates.

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3.11

all-in aggregate

aggregate consisting of a mixture of coarse and fine aggregates with D greater than 4 mm and $d = 0$

Note 1 to entry: It can be produced without separating into coarse and fine fractions or it can be produced by combining coarse and fine aggregates.

3.12

filler aggregate

aggregate, most of which passes a 0,063 mm sieve, which can be added to construction materials to provide certain properties

3.13

added filler

filler aggregate of mineral origin, which has been produced separately

3.14

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.

3.15

oversize

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

3.16

undersize

that part of the aggregate passing the smaller of the limiting sieves used in aggregate size description

3.17

batch

production quantity, a delivery quantity, a partial delivery quantity (railway wagon, load, lorry-load, ship's cargo) or a stockpile produced at one time under conditions that are presumed uniform

Note 1 to entry: With a continuous process the quantity produced during a specified period should be treated as a batch.

4 Geometrical requirements

4.1 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 aggregate. When required, the aggregates shall be tested as specified in Clause 4 to determine the relevant geometrical properties.

When the value of a property is required but not defined by specified limits the value should be declared as an XX Declared category.

NOTE 1 When a property is not required, a "No requirement" category can be used.

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

NOTE 3 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).

The tables in this standard include categories which are common across the four main aggregate standards: EN 12620, EN 13043, EN 13139 and EN 13242. Categories, notes, comments, etc., which are shown grey shaded should not be used for mortars.

4.2 Aggregate sizes

All aggregates shall be described in terms of aggregate sizes using the designations d/D except for aggregates added as fillers, which shall be described as filler aggregate and shall conform to the grading requirements specified in 4.3.

Aggregate sizes shall be described by the pair of sieve sizes in millimetres selected from the basic set or the basic set plus set 1 or the basic set plus set 2 in Table 1 with d as the lower limit designation and D as 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.). Aggregates according to this standard are limited in their grading to $D \leq 8$ mm.

Table 1 — Sieve sizes for specifying aggregate sizes

Basic set mm	Basic set plus set 1 mm	Basic set plus set 2 mm
0	0	0
1	1	1
2	2	2
4	4	4
—	5,6 (5)	—
—	—	6,3 (6)
8	8	8
—	—	10
—	11,2 (11)	—
—	—	12,5 (12)
—	—	14
16	16	16
—	—	20
—	22,4 (22)	—
31,5 (32)	31,5 (32)	31,5 (32)
—	—	40
—	45	—
—	56	—
63	63	63
—	—	80
—	90	—
NOTE Rounded sizes shown in parentheses can be used as simplified descriptions of aggregate sizes.		

The following aggregate sizes are preferred: 0/1 mm, 0/2 mm, 0/4 mm, 0/8 mm, 2/4 mm, 2/8 mm.

EN 13139:2013 (E)**4.3 Grading****4.3.1 General**

The grading of the aggregate, when determined in accordance with EN 933-1, shall conform to the requirements of 4.3.2 to 4.3.5 as appropriate to its aggregate size d/D .

Aggregates may comprise single sizes, all-in aggregates or combinations of two or more than two sizes.

Aggregates supplied as a mixture of different sizes or types should be uniformly blended. When aggregates of significantly different density are blended, caution is necessary to avoid segregation.

When assessing aggregates within a system of factory production control, at least 90 % of gradings, taken on different batches within a maximum period of 6 months, shall fall within the limits specified in Tables 2 to 4 for tolerances on manufacturer declared typical gradings.

Where the specification requires the use of sieves which are a fraction or a multiple of the upper sieve size (e.g. $D/2$; $D/1,4$ or $1,4D$; $2D$) the sieve chosen shall be the nearest from basic set plus set 1 or basic set plus set 2.

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Table 2 — General grading requirements

Aggregate	Size [mm]	Percentage passing by mass					Category G
		2D ^a	1,4D	D ^b	d	d/2	
Coarse	D>4 d ≥ 1	100	100	90 to 99	0 to 10	0 to 2	G _C 90/10
		100	98 to 100	90 to 99	0 to 15	0 to 5	G _C 90/15
		100	98 to 100	85 to 99 ^c	0 to 15	0 to 5	G _C 85/15
		100	98 to 100	85 to 99^c	0 to 20	0 to 5	G_C85/20
		100	98 to 100	80 to 99	0 to 20	0 to 5	G _C 80/20
		100	98 to 100	85 to 99 ^c	0 to 15	0 to 2	G _{CA} 85/15
	D ≤ 4 d ≥ 1	100	95 to 100	85 to 99	0 to 15	--	G _G 85/15
		100	98 to 100	85 to 99	0 to 20	0 to 5	G_G 85/20
Fine	D ≤ 4 d = 0	100	95 to 100	85 to 99	-	-	G_F85
Natural graded 0/8 mm aggregate	D = 8 and d = 0	100	98 to 100	90 to 99	-	-	G_{NG}90
All-in	D > 4 d = 0	100	98 to 100	90 to 99	-	-	G_A90
		100	98 to 100	85 to 99	-	-	G _A 85
		100	98 to 100	80 to 99	-	-	G _A 80
		100	-	75 to 99	-	-	G _A 75

^a For aggregate sizes where D is greater than 63 mm (e.g. 80 mm and 90 mm) only the oversize requirements related to the 1,4 D sieve apply since there is no ISO 565/R20 series sieve above 125 mm.

^b If the percentage retained on D is < 1 % by mass the producer shall document and declare the typical grading including the sieves D , d , $d/2$ and sieves in the basic set plus set 1 or basic set plus 2 intermediate between d and D .

^c For single size coarse aggregates d/D , where $D/d < 2$, of the categories G_C85/15, G_C85/20 and G_{CA}85/15, the value of the percentage passing by mass at D may be lowered by 5 % according to the particular application or end use.

4.3.2 Coarse aggregates

Coarse aggregates shall conform to the general grading requirements specified in Table 2 appropriate to their size designation d/D and grading category G_CX/Y and G_GX/Y.

For graded aggregates, defined as those where $D/d ≥ 2$, all gradings shall conform to the overall limits in Table 3 appropriate to their grading category.

The typical grading passing the mid size sieve shall be declared and the tolerances selected from Table 3 appropriate to the grading category shall be applied.