



SLOVENSKI STANDARD

SIST EN 933-3:2012

01-maj-2012

Nadomešča:

SIST EN 933-3:1999

SIST EN 933-3:1999/A1:2004

Preskusi geometričnih lastnosti agregatov - 3. del: Določevanje oblike zrn - Modul ploščatosti

Tests for geometrical properties of aggregates - Part 3: Determination of particle shape - Flakiness index

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Prüfverfahren für geometrische Eigenschaften von Gesteinskörnungen - Teil 3: Bestimmung der Kornform - Plattigkeitskennzahl

SIST EN 933-3:2012

Essais pour déterminer les caractéristiques géométriques des granulats - Partie 3: Détermination de la forme des granulats - Coefficient d'aplatissement

Ta slovenski standard je istoveten z: EN 933-3:2012

ICS:

91.100.15 Mineralni materiali in izdelki Mineral materials and products

SIST EN 933-3:2012

en,fr,de

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English Version

**Tests for geometrical properties of aggregates - Part 3:
Determination of particle shape - Flakiness index**

Essais pour déterminer les caractéristiques géométriques
des granulats - Partie 3: Détermination de la forme des
granulats - Coefficient d'aplatissement

Prüfverfahren für geometrische Eigenschaften von
Gesteinskörnungen - Teil 3: Bestimmung der Kornform -
Plattigkeitskennzahl

This European Standard was approved by CEN on 29 October 2011.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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Foreword

This document (EN 933-3:2012) 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 July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.

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 933-3:1997.

The following changes have been made to the previous edition:

- a) the CEN Technical Specification has been adopted as European Standard;
- b) the document has been editorially revised.

This standard forms part of a series of tests for geometrical properties of aggregates. Test methods for other properties are covered by the following European Standards:

EN 932 *Tests for general properties of aggregates;*

EN 1097 *Tests for mechanical and physical properties of aggregates;*

EN 1367 *Tests for thermal and weathering properties of aggregates;*

EN 1744 *Tests for chemical properties of aggregates;*

EN 13179 *Tests for filler aggregate used in bituminous mixtures.*

EN 933, *Tests for geometrical properties of aggregates*, consists of the following parts:

- *Part 1: Determination of particle size distribution — Sieving method;*
- *Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures;*
- *Part 3: Determination of particle shape — Flakiness index;*
- *Part 4: Determination of particle shape — Shape index;*
- *Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregate particles;*
- *Part 6: Assessment of surface characteristics — Flow coefficient of aggregates;*
- *Part 7: Determination of shell content — Percentage of shells for coarse aggregates;*
- *Part 8: Assessment of fines — Sand equivalent test;*

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- *Part 9: Assessment of fines — Methylene blue test;*
- *Part 10: Assessment of fines — Grading of filler aggregates (air jet sieving);*
- *Part 11: Classification test for the constituents of coarse recycled aggregate.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, 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 describes the reference method, used for type testing and in case of dispute, for determination of the flakiness index of aggregates. For other purposes, in particular production control, other methods may be used, provided that an appropriate working relationship with the reference method has been established.

This European Standard applies to natural, manufactured or recycled aggregates.

The test procedure specified in this part of this European Standard is not applicable to particle sizes less than 4 mm or greater than 100 mm.

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 932-2, *Tests for general properties of aggregates — Part 2: Methods for reducing laboratory samples*

EN 932-5, *Tests for general properties of aggregates — Part 5: Common equipment and calibration*

EN 933-1, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 933-2, *Tests for geometrical properties of aggregates — Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures*

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3 Terms and definitions

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

3.1

constant mass

mass determined by successive weighings performed at least 1 h apart and not differing by more than 0,1 %

Note 1 to entry: In many cases, constant mass can be achieved after a test portion has been dried for a pre-determined period in a specified oven (see 5.4) at (110 ± 5) °C. Test laboratories can determine the time required to achieve constant mass for specific types and sizes of sample dependent upon the drying capacity of the oven used.

3.2

laboratory sample

sample intended for laboratory testing

3.3

particle size fraction(d_i/D_i)

fraction of an aggregate passing the larger (D_i) of two sieves and retained on the smaller (d_i)

Note 1 to entry: The lower limit for d_i may be zero.

3.4

test portion

sample used as a whole in a single test

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4 Principle

The test consists of two sieving operations. First, using test sieves, the sample is separated into various particle size fractions d_i/D_i , as given in Table 1. Each of the particle size fractions d_i/D_i is then sieved using bar sieves which have parallel slots of width $D_i/2$.

The overall flakiness index is calculated as the total mass of particles passing the bar sieves expressed as a percentage of the total dry mass of particles tested.

If required, the flakiness index of each particle size fraction d_i/D_i is calculated as the mass of particles passing the corresponding bar sieve, expressed as a percentage by mass of that particle size fraction.

5 Apparatus

All apparatus shall conform to the general requirements of EN 932-5.

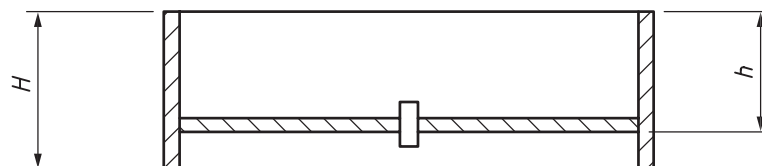
5.1 Test sieves, with square apertures, conforming to EN 933-2 with the following aperture sizes: 100 mm; 80 mm; 63 mm; 50 mm; 40 mm; 31,5 mm; 25 mm; 20 mm; 16 mm; 12,5 mm; 10 mm; 8 mm, 6,3 mm; 5 mm and 4 mm.

5.2 Corresponding bar sieves, comprising parallel cylindrical bars conforming to the requirements in Table 1. The tolerances on the width of slot shall apply to the entire length of each slot. An example of a bar sieve is shown in Figure 1.

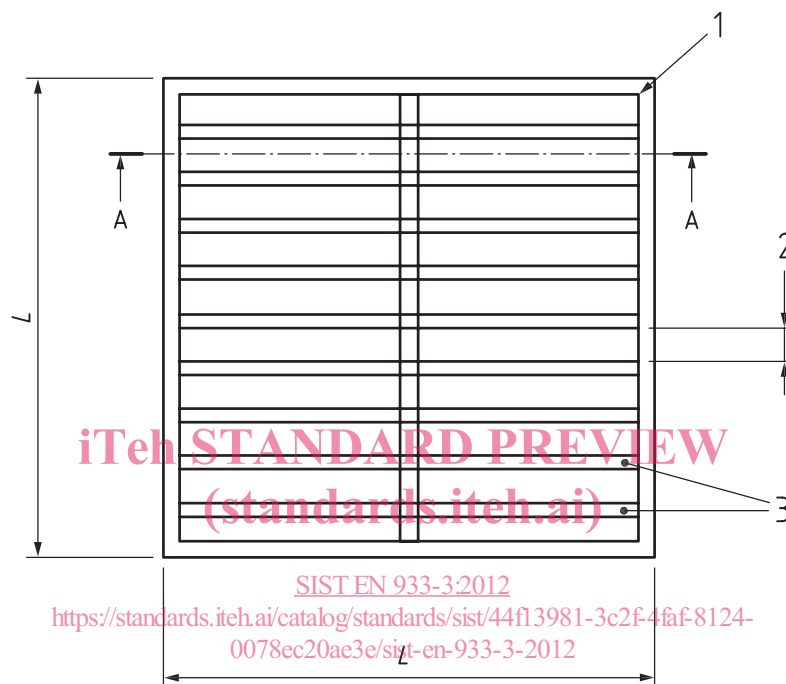
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Table 1 — Bar sieves

Particle size fraction d_i/D_i mm	Width of slot in bar sieve mm
80/100	50 ± 0,5
63/80	40 ± 0,5
50/63	31,5 ± 0,5
40/50	25 ± 0,4
31,5/40	20 ± 0,4
25/31,5	16 ± 0,4
20/25	12,5 ± 0,4
16/20	10 ± 0,2
12,5/16	8 ± 0,2
10/12,5	6,3 ± 0,2
8/10	5 ± 0,2
6,3/8	4 ± 0,15
5/6,3	3,15 ± 0,15
4/5	2,5 ± 0,15



A - A

**Key**

- 1 metal frame (outside wooden frame optional)
- 2 width of slot as specified in Table 1
- 3 cylindrical steel bars (usual diameter range from 5 to 15 mm depending on width of slot)

L = 250 mm to 300 mm

H = 75 mm

h = 55 mm to 65 mm

NOTE L being constant for all range of bar sieves, the width of the last slot cannot be equal to the nominal value. In all cases, it should be smaller than the nominal value.

Figure 1 — Example of a bar sieve

5.3 *Balance or scale*, accurate to $\pm 0,1$ % of the mass of the test portion.

5.4 *Ventilated oven*, thermostatically controlled to maintain a temperature of (110 ± 5) °C or other suitable equipment for drying the aggregates, without causing any particle size breakdown.