



SLOVENSKI STANDARD

SIST EN 933-8:2012

01-maj-2012

Nadomešča:
SIST EN 933-8:2000

Preskusi geometričnih lastnosti agregatov - 8. del: Ugotavljanje finih delcev - Ekvivalent peska

Tests for geometrical properties of aggregates - Part 8: Assessment of fines - Sand equivalent test

Prüfverfahren für geometrische Eigenschaften von Gesteinskörnungen - Teil 8: Beurteilung von Feinanteilen - Sandäquivalent-Verfahren

Essais pour déterminer les caractéristiques géométriques des granulats - Partie 8 : Evaluation des fines - Ekvivalent de sable

Ta slovenski standard je istoveten z: **EN 933-8:2012**

ICS:

91.100.15 Mineralni materiali in izdelki Mineral materials and products

SIST EN 933-8:2012

en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 933-8

January 2012

ICS 91.100.15

Supersedes EN 933-8:1999

English Version

Tests for geometrical properties of aggregates - Part 8: Assessment of fines - Sand equivalent test

Essais pour déterminer les caractéristiques géométriques
des granulats - Partie 8 : Evaluation des fines - Equivalent
de sable

Prüfverfahren für geometrische Eigenschaften von
Gesteinskörnungen - Teil 8: Beurteilung von Feinanteilen -
Sandäquivalent-Verfahren

This European Standard was approved by CEN on 6 November 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 933-8:2012) 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 933-8:1999.

This revised standard differs from EN 933-8:1999 for 0/2 mm size aggregates where the fines content was not limited to 10 %.

This European Standard is one of a series of standards for tests for geometrical properties of aggregates. Test methods for other properties of aggregates are covered by the following European Standards:

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- 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.

The other parts of EN 933, Tests for geometrical properties of aggregates, will be:

- 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 in coarse aggregates;
- 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.

EN 933-8:2012 (E)

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 the determination of the sand equivalent value of 0/2 mm fraction (for 0/4 mm, see Annex A) in fine aggregates or all-in aggregates. For other purposes, in particular factory production control, other methods may be used provided that an appropriate working relationship with the reference method has been established.

2 Normative references

The following referenced documents are indispensable for the application 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.

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*

EN 1097-5, *Tests for mechanical and physical properties of aggregates — Part 5: Determination of the water content by drying in a ventilated oven*

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3 Terms and definitions

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

3.1

finer

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

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 The lower limit d_i may be zero.

3.4

subsample

sample obtained by means of a sample reduction procedure

3.5

test portion

sample used as a whole in a single test

EN 933-8:2012 (E)**3.6****test specimen**

sample used in a single determination when a test method requires more than one determination of a property

4 Principle

A 0/2 mm test specimen of aggregate with a maximum fines content of 10 % (either natural or obtained after grading curve adjustment) and a small quantity of washing and flocculating solution are poured into a graduated cylinder and are agitated to loosen the clay coatings from the coarser particles in the test portion. The aggregate is then 'irrigated' using additional washing and flocculating solution forcing the fine particles into suspension. After a fixed time, the sand equivalent value ($SE(10)$) is calculated as the height of sediment expressed as a percentage of the total height of sediment and suspension in the cylinder.

5 Reagents**5.1 Concentrated solution**, made up of:

- a) crystalline calcium chloride, $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ or anhydrous calcium chloride, CaCl_2 ;
- b) glycerine, 99 % glycerol, laboratory reagent quality;
- c) formaldehyde solution, 40 % by volume, laboratory reagent quality;
- d) distilled or demineralised water.

Dissolve (219 ± 2) g of crystalline calcium chloride in (350 ± 50) ml of distilled or demineralised water, cool to room temperature and if necessary filter through a medium or coarse grade filter paper. Add (480 ± 5) g of glycerine and $(12,5 \pm 0,5)$ g of formaldehyde solution and dilute to 1 l of solution with distilled or demineralised water and mix thoroughly.

NOTE 1 219 g $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ is equivalent to 111 g anhydrous calcium chloride CaCl_2 .

NOTE 2 It is recommended that the concentrated solution is stored protected from light in glass or plastics flasks containing (125 ± 1) ml.

NOTE 3 Sodium hypochlorite (bleach) with 2,6 % active chloride can be used instead of formaldehyde. In case of dispute, use formaldehyde.

5.2 Washing and flocculating solution, prepared by diluting (125 ± 1) ml concentrated solution (5.1) to $(5,00 \pm 0,01)$ l using distilled or demineralised water.

NOTE In preparing the washing solution, the concentrated solution should first be vigorously shaken and subsequently its container should be rinsed several times using distilled or demineralised water, pouring the rinsing water into the 5 l flask before diluting to 5 l.

Washing solution shall not be used more than 28 days after preparation or if it is cloudy or contains any precipitate or mould.

6 Apparatus

6.1 All apparatus, unless otherwise stated, shall conform to the general requirements of EN 932-5.

6.2 Two graduated cylinders, of glass or clear plastic (see Figure 1) complete with rubber bungs and with the following dimensions:

- a) wall thickness, about 3 mm;
- b) inside diameter ($32,0 \pm 0,5$) mm;
- c) height ($430,00 \pm 0,25$) mm.

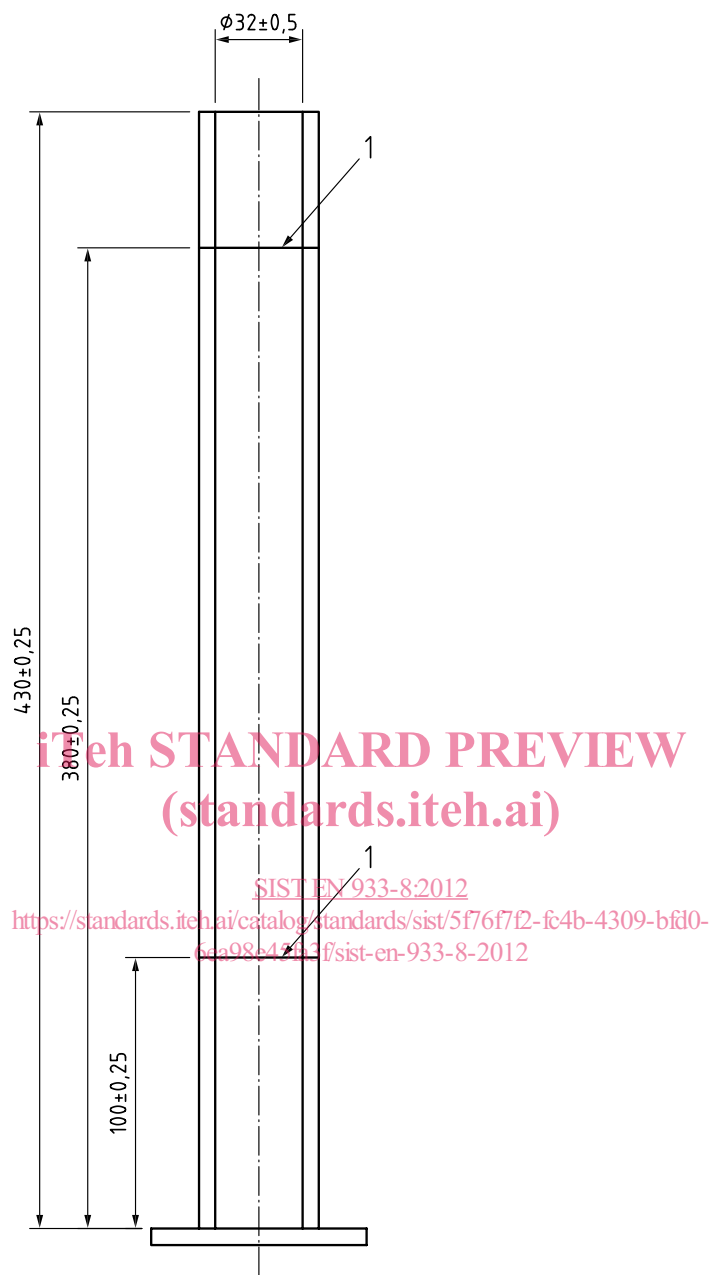
Each cylinder shall be clearly marked in two positions:

- d) at ($100,00 \pm 0,25$) mm from the base; and
- e) at ($380,00 \pm 0,25$) mm from the base.

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1 Circle mark

Figure 1 — Graduated cylinder

6.3 Test plunger assembly (see Figure 2) comprising:

- a rod ($440,00 \pm 0,25$) mm long;
- an end piece ($25,0 \pm 0,1$) mm diameter, its lower surface being flat, smooth and perpendicular to the rod axis and which includes three guides at the side for centring the plunger in the cylinder, leaving a small clearance;
- a collar, ($10,0 \pm 0,1$) mm thick, suitable for use with the graduated cylinder, acting as a guide for the rod and, at the same time, used to indicate the distance the test plunger is inserted inside the

cylinder; the collar shall include a screw which enables it to be locked onto the rod of the test plunger and the collar shall also have a slot for a rule;

- d) a plunger head, fixed to the upper end of the rod, to give the test plunger assembly, excluding the collar, a total mass of $(1,00 \pm 0,01)$ kg.

The immersed parts of the plunger assembly shall be made from non-corrodible metal.

NOTE Before first use of a test plunger or a graduated cylinder, the plunger assembly should be placed in the empty cylinder. With the collar resting on the rim of the cylinder, the distance between the upper face of the collar and the lower face of the plunger head should not exceed 0,5 mm. If this clearance exceeds 0,5 mm or if the end piece does not reach the bottom of the cylinder, this combination of test plunger and graduated cylinder should not be used.

6.4 Stop clock(s), readable to 1 s.

6.5 500 mm rule, graduated in millimetres.

6.6 Test sieves, 0,063 and 2 mm conforming to EN 933-2 with, if necessary, a guard sieve.

6.7 Sieve brush.

6.8 Spatula.

6.9 Washing tube (see Figure 3), comprising a rigid tube of non-corrodible metal with the following dimensions:

a) outside diameter $(6,0 \pm 0,5)$ mm;

b) inside diameter $(4,0 \pm 0,2)$ mm;

c) length about 500 mm.

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The washing tube shall be fitted with a tap at the top. The bottom end of the tube (see Figure 4) shall be conical or wedge-shaped, made from non-corrodible metal and have a threaded (screw) connection. A hole $(1 \pm 0,1)$ mm diameter shall be made diametrically in each angled face.

NOTE The tolerances on the washing tube are for manufacturing purposes.

6.10 Flask of glass or clear plastic of 5 l capacity fitted with a siphon system, its base being positioned about 1 m above the work bench.

6.11 Rubber or plastic tube, of length approximately 1,50 m, and inside diameter approximately 5 mm, connecting the washing tube to the siphon.

6.12 Funnel, for transferring the test portion into the graduated cylinder (see Figure 5).