SLOVENSKI STANDARD
oSIST prEN 933-8:2009

01-februar-2009

Preskusi geometrijskih 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 - Equivalent de sable

Ta slovenski standard je istoveten z: **prEN 933-8**

ICS:

91.100.15	Mineralni materiali in izdelki	Mineral materials and products

oSIST prEN 933-8:2009 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 933-8

December 2008

ICS 91.100.15

Will supersede EN 933-8:1999

English Version

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

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. prEN 933-8:2008: E

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Foreword

This document (prEN 933-8:2008) 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 933-8:1999.

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 Parts of 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*

The other parts of EN 933 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 for 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 aggregates

1 Scope

This Standard describes the reference method used for type testing and in cases 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. It applies to natural aggregates.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

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

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

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

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

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1
laboratory sample
sample intended for laboratory testing

3.2
test portion
sample used as a whole in a single test

3.3
test specimen
sample used in a single determination when a test method requires more than one determination of a property

3.4
fines
particle size fraction of an aggregate which passes the 0,063 mm sieve

3.5
particle size fraction
fraction of an aggregate passing the larger of two sieves and retained on the smaller; the lower limit can be zero

4 Principle

A test portion 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*) 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 from:

a) crystalline calcium chloride, $CaCl_2.6H_2O$ 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 ± 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 $CaCl_2.6H_20$ 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 of concentrated solution (5.1) to (5,00 ± 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 ± 0,5) mm;

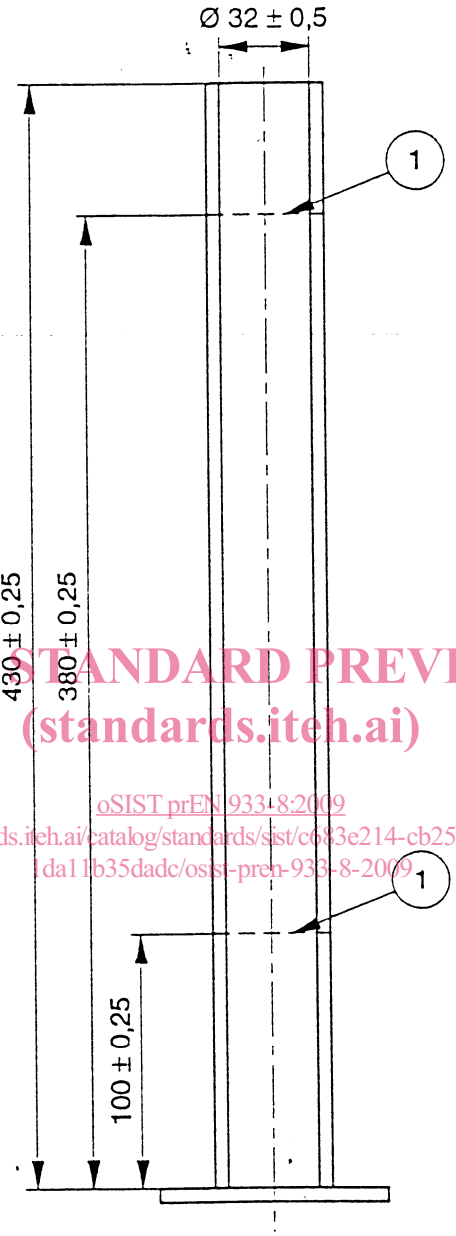
c) height (430,00 ± 0,25) mm.

Each cylinder shall be clearly marked in two positions:

1) at (100,00 ± 0,25) mm from the base; and

2) at (380,00 ± 0,25) mm from the base.

Dimensions in millimetres



1 Circle mark

Figure 1 — Graduated cylinder

6.3 *Test plunger assembly*, (see Figure 2) comprising:

a) a rod (440,00 ± 0,25) mm long;

b) an end piece (25,0 ± 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;

c) a collar, (10,0 ± 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 ± 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 0,5mm 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 *Stopclock(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 ± 0,5) mm;

b) inside diameter (4,0 ± 0,2) mm;

c) length about 500 mm.

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 ± 0,1) mm diameter shall be made diametrically in each angled face.

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).