SLOVENSKI STANDARD
SIST EN 196-3:2017

01-januar-2017

Nadomešča:
SIST EN 196-3:2005+A1:2009

Metode preskušanja cementa - 3. del: Določanje časa vezanja in prostorninske obstojnosti

Methods of testing cement - Part 3: Determination of setting times and soundness

Prüfverfahren für Zement - Teil 3: Bestimmung der Erstarrungszeiten und der Raumbeständigkeit

Méthodes d'essai des ciments - Partie 3 : Détermination du temps de prise et de la stabilité

Ta slovenski standard je istoveten z: **EN 196-3:2016**

ICS:

91.100.10	Cement. Mavec. Apno. Malta	Cement. Gypsum. Lime. Mortar

SIST EN 196-3:2017 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 196-3

November 2016

ICS 91.100.10

Supersedes EN 196-3:2005+A1:2008

English Version

Methods of testing cement - Part 3: Determination of setting times and soundness

Méthodes d'essai des ciments - Partie 3 : Détermination du temps de prise et de la stabilité

Prüfverfahren für Zement - Teil 3: Bestimmung der Erstarrungszeiten und der Raumbeständigkeit

This European Standard was approved by CEN on 5 September 2016.

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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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 196-3:2016) has been prepared by Technical Committee CEN/TC 51 “Cement and building limes”, the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by May 2017, and conflicting national standards shall be withdrawn at the latest by May 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 196-3:2005+A1:2008.

In comparison to EN 196-3:2005+A1:2008, the following changes have been made:

— In Clause 2, the normative references have been updated.

— In 6.2.2, data of repeatability and reproducibility have been added as a note.

— In 6.3.2, the elapsed time in minutes has been approximated to the nearest 5 min.

— The standard has been editorially revised.

EN 196 consists of the following parts, under the general title “*Methods of testing cement*”:

— EN 196-1, *Methods of testing cement — Part 1: Determination of strength*;

— EN 196-2, *Method of testing cement — Part 2: Chemical analysis of cement*;

— EN 196-3, *Methods of testing cement — Part 3: Determination of setting times and soundness*;

— CEN/TR 196-4, *Methods of testing cement — Part 4: Quantitative determination of constituents*;

— EN 196-5, *Methods of testing cement — Part 5: Pozzolanicity test for pozzolanic cement*;

— EN 196-6, *Methods of testing cement — Part 6: Determination of fineness*;

— EN 196-7, *Methods of testing cement — Part 7: Methods of taking and preparing samples of cement*;

— EN 196-8, *Methods of testing cement — Part 8: Heat of hydration - Solution method*;

— EN 196-9, *Methods of testing cement — Part 9: Heat of hydration - Semi-adiabatic method*;

— EN 196-10, *Methods of testing cement — Part 10: Determination of the water-soluble chromium (VI) content of cement.*

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.

1 Scope

This European Standard specifies the methods for determining standard consistence, setting times and soundness of cements.

The method applies to common cements and to other cements and materials, the standards for which call up this method. It may not apply to other cement types that have, for example, a very short initial setting time. The method is used for assessing whether the setting time and soundness of a cement is in conformity with its specification.

This part of EN 196 describes the reference methods and allows the use of alternative procedures and equipment, as indicated in notes, provided that they have been calibrated against the reference methods. In the event of a dispute, only the reference equipment and procedures are used.

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 196-1, *Methods of testing cement - Part 1: Determination of strength*

3 Principles

Cement paste of standard consistence has a specified resistance to penetration by a standard plunger. The water required for such a paste is determined by trial penetrations of pastes with different water contents.

The setting time is determined by observing the penetration of a needle into cement paste of standard consistence until it reaches a specified value.

The soundness is determined by observing the volume expansion of cement paste of standard consistence as indicated by the relative movement of two needles.

4 Laboratory, equipment and materials

4.1 Laboratory

The laboratory in which specimens are prepared and tested shall be maintained at a temperature of (20 ± 2) °C and a relative humidity of not less than 50 %.

The temperature and relative humidity of the air in the laboratory and the temperature of the water in the storage containers shall be recorded at least once per day during testing.

Cement, water and apparatus used to make and test specimens shall be at a temperature of (20 ± 2) °C.

NOTE See Annex A for storage conditions to be applied when testing setting times by alternative method.

Where temperature ranges are given, the target temperature at which the controls are set shall be the middle value of the range.

4.2 Equipment and materials

The tolerances shown in Figures 1 and 2 are important for correct operation of the equipment in the testing procedure. When regular control measurements show that the tolerances are not met, the equipment shall be rejected, adjusted or repaired. Records of control measurements shall be kept.

Acceptance measurements on new equipment shall cover mass, volume, and dimensions to the extent that these are indicated in this document paying particular attention to those critical dimensions for which tolerances are specified.

In those cases where the material of the equipment can influence the results, the material is specified and shall be used.

The approximate dimensions shown in the figures are provided as guidance to equipment manufacturers or operators. Dimensions which include tolerances are obligatory.

4.2.1 Balance, capable of weighing to an accuracy of ± 1 g.

4.2.2 Graduated cylinder or burette, capable of dispensing to an accuracy of ± 1 ml.

4.2.3 Mixer, conforming to EN 196-1.

NOTE A more homogeneous paste is produced at the lower limit of tolerance for the clearance between the blade and the bowl.

4.2.4 Water, distilled or deionized water shall be used for making the specimens.

Drinking water may be used for storing and boiling specimens.

4.2.5 Timer, capable of measuring to an accuracy of ± 1 s.

4.2.6 Measuring device, capable of measuring to an accuracy of ± 0,5 mm.

5 Standard consistence test

5.1 Apparatus

Use the manual Vicat apparatus as shown in Figure 1a) and b) with the plunger shown in Figure 1c). The plunger shall be of non-corrodible metal in the form of a right cylinder of at least 45 mm effective length and of (10,00 ± 0,05) mm diameter. The total mass of moving parts shall be (300 ± 1) g. Their movement shall be truly vertical and without appreciable friction, and their axis shall coincide with that of the plunger.

The Vicat mould (see Figure 1a)) to contain the paste under test shall be of hard rubber, plastics or brass. It shall be of cylindrical or preferably truncated conical form (40,0 ± 0,2) mm deep and shall have an internal diameter of (75 ± 10) mm. It shall be adequately rigid and shall be provided with a base-plate larger than the mould and at least 2,5 mm thick, constructed of impermeable material resistant to attack by cement paste, e.g. plane glass.

Moulds of other metal may be used provided that they are of the specified depth and that their use has been calibrated against the specified mould.

It is recommended that a laboratory uses base plates of equal thickness in order that the scale of the Vicat apparatus has only to be adjusted once for several determinations.

5.2 Procedure

5.2.1 Mixing the cement paste

Weigh, to an accuracy of ± 1 g, by means of the balance (4.2.1), 500 g of cement and a quantity of water, e.g. 125 g. When water is measured by volume using the graduated cylinder or burette (4.2.2) it shall be dispensed to an accuracy of ± 1 ml. Mix each batch of paste mechanically using the mixer (4.2.3). The timing of the various mixing stages refers to the times at which mixer power is switched on/off and shall be maintained within ± 2 s.

With the mixer in the operating condition:

a) place the water and cement into the bowl taking care to avoid loss of water or cement; complete the addition within 10 s;

b) immediately start the mixer at low speed while starting the timing of the mixing stages. In addition, record the time to the nearest minute as ‘zero time’;

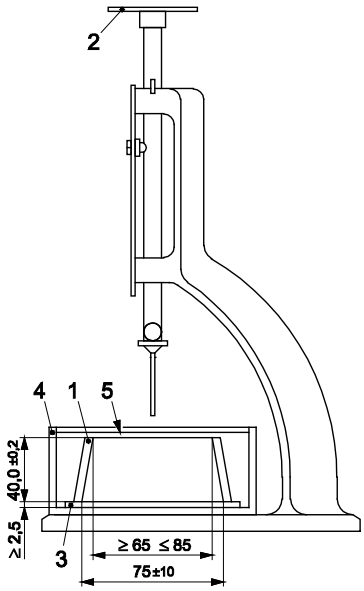
NOTE ‘Zero time’ is the point from which the initial (see 6.2) and final (see 6.3) setting times are calculated.

c) stop the mixer after 90 s for 30 s during which remove by means of a suitable rubber or plastics scraper all the paste adhering to the wall and bottom part of the bowl and place it in the middle of the bowl;

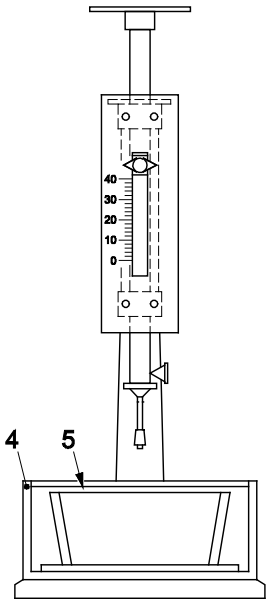
d) restart the mixer and run at low speed for a further 90 s. The total mixer running time shall be 3 min.

Any other mixing method may be used provided that it has been calibrated against the reference method.

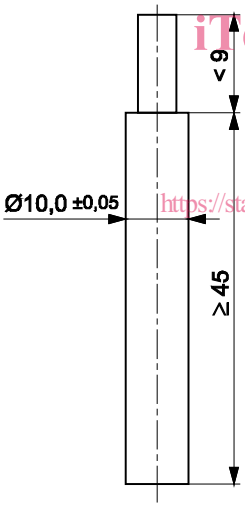
Dimensions in millimetres



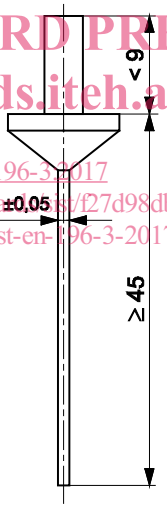
a) Side view with mould in upright position for initial setting time determination



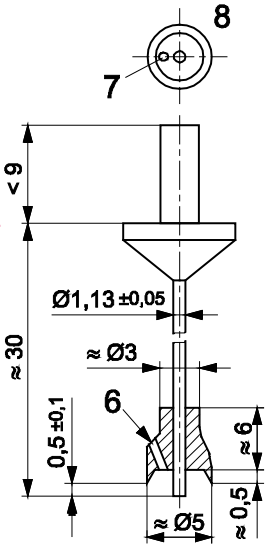
b) Front view with mould inverted for final setting time determination



c) Plunger for standard consistence



d) Needle for initial set



e) Needle with attachment for final set

Key

1 mould
2 correcting weights
3 base plate
4 container
5 water
6 air vent (Ø approximately 1,5)
7 air vent
8 view from below needle with attachment for determining final setting time

Figure 1 — Typical manual Vicat apparatus for detemination of standard consistence and setting time