SLOVENSKI STANDARD

SIST EN 196-1

prva izdaja
september 1995

Metode preskušanja cementa - 1. del: Določanje trdnosti (prevzet standard EN 196-1:1994 z metodo platnice)

Methods of testing cement - Part 1: Determination of strength

Méthodes d'essais des ciments - Partie 1: Détermination des résistances mécaniques

Prüfverfahren für Zement - Teil 1: Bestimmung der Festigkeit

Deskriptorji: cement, malta, sestava, preskus, tlačna trdnost, upogibna trdnost, preskus usklajenosti, lastnosti preskušancev, aparature, potrjevanje

ICS 91.100.10

Referenčna številka
SIST EN 196-1:1995 (en)

Nadaljevanje na straneh od II do V in 1 do 17

UVOD

Standard SIST EN 196-1 (en), Metode preskušanja cementa - 1. del: Določanje trdnosti, prva izdaja, 1995, ima status slovenskega standarda in je z metodo platnice prevzet evropski standard EN 196-1, Methods of testing cement - Part 1: Determination of strength, 1994, v angleškem jeziku.

NACIONALNI PREDGOVOR

Evropski standard EN 196-1:1994 je pripravil tehnični odbor Evropske organizacije za standardizacijo CEN/TC 51 Cement in apno.

Odločitev za prevzem tega standarda po metodi platnice je sprejela delovna skupina USM/TC CAA/WG 1 Cement, potrdil pa tehnični odbor USM/TC CAA Cement, apno in vlaknatocementni izdelki.

Ta slovenski standard je dne 1995-08-29 odobril direktor USM.

SLOVENSKI STANDARD SIST EN 196 ZA PRESKUŠANJE CEMENTA OBSEGA NASLEDNJE DELE:

SIST EN 196-1:1995 (en)	Metode preskušanja cementa - 1. del: Določanje trdnosti
SIST EN 196-2:1995 (en)	Metode preskušanja cementa - 2. del: Kemijska analiza cementa
SIST EN 196-3:1995 (en)	Metode preskušanja cementa - 3. del: Določanje časa vezanja in prostorninske obstojnosti
SIST ENV 196-4:1995 (en)	Metode preskušanja cementa - 4. del: Kvantitativno določanje sestavin
SIST EN 196-5:1995 (en)	Metode preskušanja cementa - 5. del: Določanje pucolanske aktivnosti za pucolanske cemente
SIST EN 196-6:1995 (en)	Metode preskušanja cementa - 6. del: Določanje finosti
SIST EN 196-7:1995 (en)	Metode preskušanja cementa - 7. del: Metode odvzemanja in priprave vzorcev cementa
SIST EN 196-21:1995 (en)	Metode preskušanja cementa - 21. del: Določanje količine kloridov, ogljikovega dioksida in alkalij v cementu

PREDHODNI IZDAJI

- JUS B.C8. 022:1976 (sh) Cement - Ispitivanje čvrstoće cementa
- JUS B.C1.001:1976 (sh) Ispitivanje cementa - Standardni pesak

OSNOVA ZA IZDAJO STANDARDA

- Prevzem standarda EN 196-1:1994

OPOMBI

- Povsod, kjer se v besedilu standarda uporablja izraz "evropski standard", v SIST EN 196-1:1995 to pomeni "slovenski standard".

- Uvod in nacionalni predgovor nista sestavni del standarda.

VSEBINA **stran**

Po mnenju Ministrstva za informiranje Republike Slovenije z dne 18. februarja 1992, štev. 23/96-92, spada ta publikacija med proizvode informativne narave iz 13. točke tarifne številke 3, za katere se plačuje 5-odstotni prometni davek.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 196-1

December 1994

ICS 91.100.10

Supersedes EN 196-1:1987

Descriptors: Cements, mortars (materials), composition: property, tests, compressive strength, flexural strength, conformity tests, specimen preparation, test equipment, certification

English version

Methods of testing cement - Part 1: Determination of strength

Méthodes d'essais des ciments - Partie 1: Détermination des résistances mécaniques

Prüfverfahren für Zement - Teil 1: Bestimmung der Festigkeit

This European Standard was approved by CEN on 1994-12-12. 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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Contents

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Foreword

This European Standard was drawn up by the Technical Committee CEN/TC 51 'Cement and building limes' the Secretariat of which is held by IBN.

The standard EN 196 on methods of testing cement consists of the following Parts:

EN 196-1	Methods of testing cement — Part 1: Determination of strength
EN 196-2	Methods of testing cement — Part 2: Chemical analysis of cement
EN 196-3	Methods of testing cement — Part 3: Determination of setting time and soundness
ENV 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 cements
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 196-21	Methods of testing cement — Part 21: Determination of the chloride, carbon dioxide and alkali content of cement

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 June 1995, and conflicting national standards shall be withdrawn at the latest by June 1995.

This European standard supersedes EN 196-1:1987.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

1 Scope

This European Standard describes a method of determining the compressive and flexural strengths of cement mortar.

This standard describes the reference procedure; it allows the use of alternative procedures only in well defined cases provided that they do not affect the results significantly as specified in clause 11. In the event of a dispute, only the reference procedure described in this standard is used, excluding any alternatives.

The method applies to the cement types defined in ENV 197-1. It may not be applicable to other cement types, for instance on account of their initial setting time.

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.

ENV 197-1 : 1992	*Cement — Composition, specifications and conformity criteria —* *Part 1: Common cements*
ISO 409-1 : 1982	*Metallic materials — Hardness test — Tables of Vickers hardness values for use in tests made on flat surfaces —* *Part 1: HV 5 to HV 100*
ISO 565 : 1990	*Test sieves — Woven metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*
ISO 1101 : 1983	*Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings*
ISO 1302 : 1992	*Technical drawings — Method of indicating surface texture*
ISO 2591-1 : 1988	*Test sieving —* *Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*
ISO 3310-1 : 1990	*Test sieves — Technical requirements and testing —* *Part 1: Test sieves of metal wire cloth*
ISO 4200 : 1991	*Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length*
ISO 6507-1 : 1982	*Metallic materials — Hardness test — Vickers test —* *Part 1 : HV 5 to HV 100*

3 Principle

The method comprises the determination of the compressive, and optionally the flexural, strength of prismatic test specimens 40 mm × 40 mm × 160 mm in size.

These specimens are cast from a batch of plastic mortar containing one part by mass of cement and three parts by mass of standard sand with a water/cement ratio of 0,50. Standard sands from various sources and countries may be used provided that they have been shown to give cement strength results which do not differ significantly from those obtained using the CEN Reference sand (see clause 11).

The mortar is prepared by mechanical mixing and is compacted in a mould using a standard jolting apparatus. Alternative compaction equipment and techniques may be used provided that they have been shown to give cement strength results which do not differ significantly from those obtained using the standard jolting apparatus (see clause 11).

The specimens in the mould are stored in a moist atmosphere for 24 h and then the demoulded specimens are stored under water until strength testing.

At the required age, the specimens are taken from their wet storage, broken in flexure into two halves and each half tested for strength in compression.

4 Laboratory and equipment

4.1 Laboratory

The laboratory where preparation of specimens takes place shall be maintained at a temperature of (20 ± 2) °C and a relative humidity of not less than 50 %.

The moist air room or the large cabinet for storage of the specimens in the mould shall be continuously maintained at a temperature of (20 ± 1) °C and a relative humidity of not less than 90 %.

The temperature of the water in the storage containers shall be maintained at (20 ± 1) °C.

The temperature and relative humidity of the air in the laboratory and the temperature of the storage containers shall be recorded at least once a day during working hours.

The temperature and relative humidity of the moist air room or cabinet shall be recorded at least every 4 h. Where temperature ranges are given, the target temperature at which the controls are set shall be the middle value of the range.

4.2 General requirements for the equipment

The tolerances shown on the drawings (figures 1 to 3) 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 or adjusted or repaired where possible. 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 European Standard 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.

4.3 Test sieves

Wire cloth test sieves conforming to the requirements of ISO 2591-1 and ISO 3310-1 shall be of the sizes from ISO 565 given in table 1 (series R 20).

Table 1. Aperture of test sieves

Square mesh size mm
2,00
1,60
1,00
0,50
0,16
0,08

4.4 Mixer

The mixer shall consist essentially of:

a) a stainless steel bowl with a capacity of about 5 l and of the general shape and size shown in figure 1, and provided with means by which it can be fixed securely to the mixer frame during mixing and by which the height of the bowl in relation to the blade and, to some extent, the gap between blade and bowl can be finely adjusted and fixed;

b) a stainless steel blade of the general shape, size and tolerances shown in figure 1, revolving about its own axis as it is driven in a planetary movement around the axis of the bowl by an electric motor at controlled speeds. The two directions of rotation shall be opposite and the ratio between the two speeds shall not be a whole number.

Where more than one mixer is used, blades and bowls shall form sets which are always used together.

The gap between blade and bowl shown in figure 1 shall be checked every month. The gap of (3 ± 1) mm refers to the situation when the blade in the empty bowl is brought as close as possible to the wall. Simple tolerance gauges ('feeler gauges') are useful where direct measurement is difficult.

The mixer shall operate at the speeds given in table 2.

Table 2. Speeds of mixer blade

	Rotation min^{-1}	Planetary movement min^{-1}
Low speed	140 ± 5	62 ± 5
High speed	285 ± 10	125 ± 10

4.5 Moulds

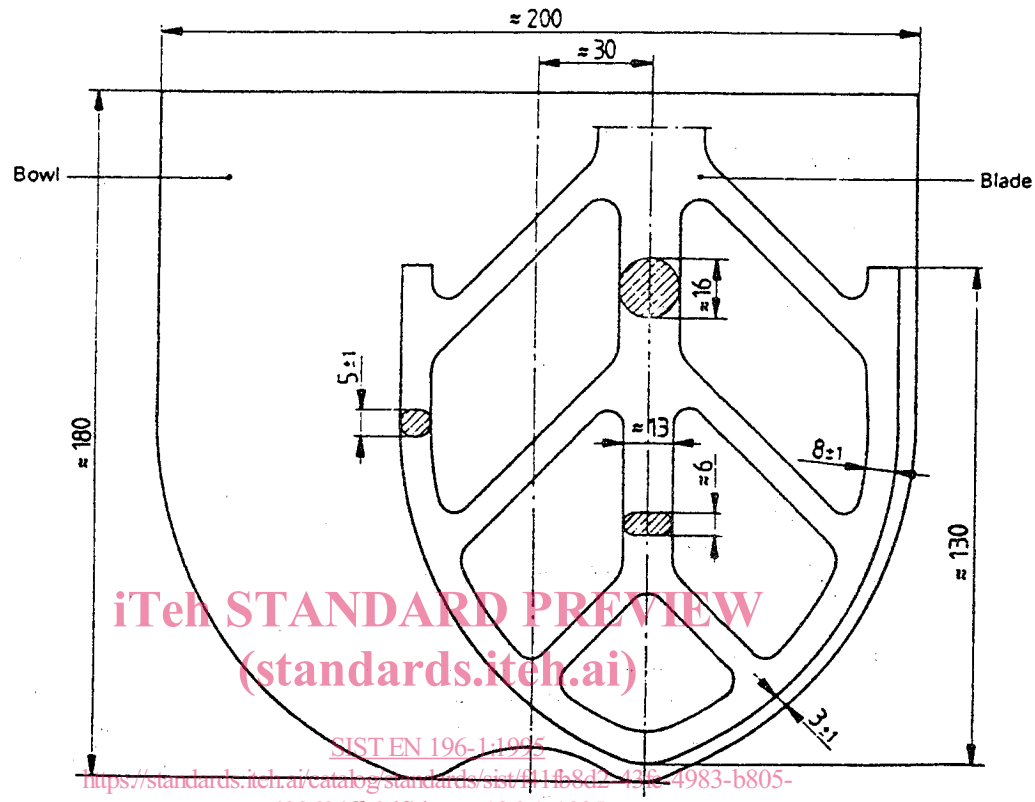
The mould shall consist of three horizontal compartments so that three prismatic specimens 40 mm x 40 mm in cross section and 160 mm in length can be prepared simultaneously.

A typical design is shown in figure 2.

The mould shall be made of steel with walls at least 10 mm thick. The surface Vickers hardness of each internal side face shall be at least HV 200 (see ISO 409-1 and ISO 6507-1).

NOTE 1. A minimum Vickers hardness value of HV 400 is recommended.

The mould shall be constructed in such a manner as to facilitate the removal of moulded specimens without damage. Each mould shall be provided with a machined steel or cast iron baseplate. The mould, when assembled, shall be positively and rigidly held together and fixed to the baseplate.



Dimensions in millimetres.

Figure 1. Bowl and blade

The assembly shall be such that there is no distortion or leakage. The baseplate shall make adequate contact with the table of the compacting apparatus and be rigid enough not to induce secondary vibrations.

NOTE 2. Moulds and jolting tables from different manufacturers may have unrelated external dimensions and masses, so their compatibility needs to be ensured by the purchaser.

Each part of the mould shall be stamped with identifying marks to facilitate assembly and to ensure compliance with the specified tolerances. Similar parts of separate mould assemblies shall not be interchanged.

The assembled mould shall comply with the following requirements.

a) The internal dimensions and tolerances of each mould compartment, based on four symmetrically-placed measurements, shall be as follows:

length: (160,0 ± 0,8) mm;

width: (40,0 ± 0,2) mm;

depth: (40,1 ± 0,1) mm.

b) The flatness tolerance (see ISO 1101, 14.2) over the whole of each internal side face shall be 0,03 mm.

c) The perpendicularity tolerance (see ISO 1101, 14.8) for each internal face with respect to the bottom surface of the mould and the adjacent internal face as datum faces shall be 0,2 mm.

d) The surface texture (see ISO 1302) of each internal side face shall be not rougher than N8.

Moulds shall be replaced when any one of the specified tolerances is exceeded. The mass of the mould shall accord with the requirement for the combined mass in 4.6.

In assembling the cleaned mould ready for use, a suitable sealing material shall be used to coat the outer joints of the mould. A thin film of mould oil shall be applied to the internal faces of the mould.

To facilitate the filling of the mould a tightly fitting metal hopper with vertical walls 20 mm to 40 mm in height shall be provided. When viewed in plan, the hopper walls shall overlap the internal walls of the mould by not more than 1 mm. The outer walls of the hopper shall be provided with a means of location to ensure correct positioning over the mould.

For spreading and striking off the mortar two spreaders and a metal straightedge of the type shown in figure 3 shall be provided.