

Methods of testing cement —

Part 1: Determination of strength

The European Standard EN 196-1:1994 has the status of a
British Standard

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This British Standard, having been prepared under the direction of the Technical Committee B/516, was published under the authority of the Standards Board and comes into effect on 15 March 1995

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The following BSI references relate to the work on this standard:
Committee reference B/516
Special announcement in *BSI News* December 1992

ISBN 0 580 21485 0

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Cooperating organizations	Inside front cover
National foreword	ii
Foreword	2
Text of EN 196-1	5
National annex NA (normative) CEN Standard sand	21
National annex NB (normative) Alternative compaction procedure	21
National annex NC (normative) Verification of the mass requirements for the jolting table	22
National annex ND (informative) Recommendations for carrying out the test procedure in the UK	22
National annex NE (informative) Committees responsible	Inside back cover
National annex NF (informative) Cross-references	Inside back cover

National foreword

This British Standard has been prepared under the direction of the Technical Committee B/516, Cement and lime. It is the English language version of EN 196-1:1994 *Methods of testing cement — Part 1: Determination of strength* published by the European Committee for Standardization (CEN). EN 196-1 was drawn up by CEN Technical Committee 51, Cement and building limes, as Part 1 of a series on testing cement which was originally accepted by CEN on 15 November 1985 and made available on 12 May 1987. The UK gave a negative vote at the final voting stage and, under the CEN Rules then in force, was not obliged to implement this Part. A second formal vote was taken in November 1992 when the UK again gave a negative vote but, under the CEN Rules now in force, is obliged to implement this Part.

The method described in this standard is that referred to as the ISO mortar prism test in the foreword to BS 4550-3.1:1978. Prisms of 40 mm square cross section are cast from a 1 : 3 mortar and broken in flexure after 28 days curing. The two halves are then tested for compressive strength. This method has been referred to for the determination of strength in the 1991 revisions of the specifications for cement in BS 12, BS 146, BS 4027, BS 4246, BS 6588 and BS 6610 and in the 1992 first edition of BS 7583, all of which are based on the European Prestandard ENV 197-1. However, BS 4550-3.4:1978 on the determination of cement strength using concrete or mortar cubes will not be withdrawn until November 1994 to allow these methods to be used in support of the specifications in BS 915, BS 1370 and BS 4248 until these are also revised.

EN 196-1 specifies the reference procedure for the preparation and testing of mortar prisms made with CEN Standard sands from various sources and compacted by a standard jolting apparatus but permits the use of alternative compaction equipment and procedures in well defined cases; National annex NA, National annex NB and National annex NC give the requirements for UK purposes for CEN Standard sand, for the alternative compaction procedure and for the verification of the mass requirements for the jolting table, respectively.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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.

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CEN

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

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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.

Contents

	Page
Foreword	2
1 Scope	5
2 Normative references	5
3 Principle	5
4 Laboratory and equipment	5
4.1 Laboratory	5
4.2 General requirements for the equipment	6
4.3 Test sieves	6
4.4 Mixer	6
4.5 Moulds	6
4.6 Jolting apparatus	11
4.7 Flexural strength testing machine	11
4.8 Compressive strength testing machine	12
4.9 Jig for compressive strength testing machine	13
5 Mortar constituents	13
5.1 Sand	13
5.2 Cement	14
5.3 Water	14
6 Preparation of mortar	14
6.1 Composition of the mortar	14
6.2 Batching of mortar	15
6.3 Mixing of mortar	15
7 Preparation of test specimens	15
7.1 Size of specimens	15
7.2 Moulding of test specimens	15
8 Curing of test specimens	15
8.1 Handling and storage before demoulding	15
8.2 Demoulding of specimens	15
8.3 Curing of specimens in water	15
8.4 Age of specimens for strength tests	16
9 Testing the specimens	16
9.1 The testing procedures	16
9.2 Flexural strength	16
9.3 Compressive strength	16
10 Conformity testing of cement	16
10.1 General	16
10.2 Definition of test result	17
10.3 Calculation of test result	17
10.4 Reporting of results	17
10.5 Measures of the precision of the method	17
10.6 Reproducibility	17

	Page
11 Acceptance testing of sand and of alternative equipment	17
11.1 General	17
11.2 Definition of test result	17
11.3 Calculation of test result	17
11.4 Precision of the test method	17
11.5 Repeatability	18
11.6 CEN Standard sands	18
11.7 Acceptance testing of alternative compaction equipment	19
Figure 1 — Bowl and blade	7
Figure 2 — Typical mould	8
Figure 3 — Typical spreaders and metal straightedge	9
Figure 4 — Typical jolting apparatus	10
Figure 5 — Arrangement of loading for determination of flexural strength	12
Figure 6 — Typical jig for compressive strength testing	14
Table 1 — Aperture of test sieves	6
Table 2 — Speeds of mixer blade	6
Table 3 — Particle size distribution of the CEN Reference sand	13

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 $(20 \pm 2) ^\circ\text{C}$ 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 $(20 \pm 1) ^\circ\text{C}$ and a relative humidity of not less than 90 %.

The temperature of the water in the storage containers shall be maintained at $(20 \pm 1) ^\circ\text{C}$.

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.