BRITISH STANDARD

BS EN
679:2005

Determination of the compressive strength of autoclaved aerated concrete

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ICS 91.100.30

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee B/523, Prefabricated components of reinforced autoclaved aerated concrete and lightweight aggregate concrete with open structure, which has the responsibility to:

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 679

July 2005

ICS 91.100.30

Supersedes EN 679:1993

English version

Determination of the compressive strength of autoclaved aerated concrete

Détermination de la résistance à la compression du béton cellulaire autoclavé

Bestimmung der Druckfestigkeit von dampfgehärtetem Porenbeton

This European Standard was approved by CEN on 3 June 2005.

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Foreword

This European Standard (EN 679:2005) has been prepared by Technical Committee CEN/TC 177 “Prefabricated reinforced components of autoclaved aerated concrete or light-weight aggregate concrete with open structure”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by January 2006, and conflicting national standards shall be withdrawn at the latest by January 2006.

This document supersedes EN 679:1993.

In order to meet the performance requirements as laid down in the product standard for prefabricated components of autoclaved aerated concrete, a number of standardized test methods are necessary.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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1 Scope

This European Standard specifies the procedure for the determination of the compressive strength of autoclaved aerated concrete.

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 678, *Determination of the dry density of autoclaved aerated concrete*

EN 1353, *Determination of moisture content of autoclaved aerated concrete*

EN 12390-4, *Testing hardened concrete — Part 4: Compressive strength — Specification for testing machines*

3 Principle

The compressive strength is determined on test specimens as the ratio between the rupture load in axial compression and the cross-sectional area of the test specimen perpendicular to the loading direction.

4 Apparatus

a) saw for cutting test specimens;

b) compression testing machine, which meets the requirements of EN 12390-4, machine class 1 or 2;

c) calipers, capable of reading the dimensions of the test specimens to an accuracy of 0,1 mm;

d) ventilated drying oven, capable of maintaining a temperature of (105 ± 5) °C;

e) straight edge, at least 200 mm long, a 0,1 mm-feeler gauge, a 1 mm-feeler gauge, and a square;

f) balance, capable of determining the mass of the test specimens to an accuracy of 0,1 %.

5 Test specimens

5.1 Sample

The sample for the preparation of the test specimens shall be taken in such a manner that it is representative of the product to be investigated.

NOTE The test specimens may be prepared from prefabricated reinforced components. Alternatively, they may be taken from prefabricated unreinforced components of the same mould.

5.2 Shape and size of test specimens

The test specimens shall be cubes with an edge length of 100 mm. Test specimens of other shapes or sizes may be used, provided that the compressive strength determined on such test specimens can be directly related to the compressive strength determined on 100 mm cubes.

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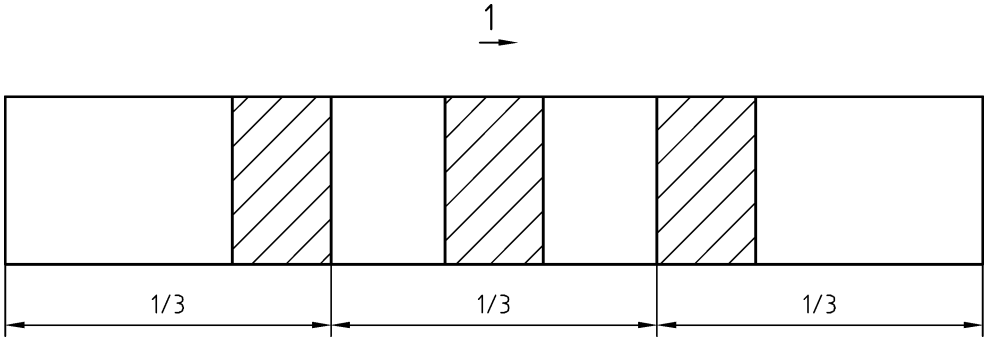
5.3 Number of test specimens

A test set shall consist of three test specimens.

Whenever possible, one test specimen shall be prepared from the upper third of the component, one from the middle and one from the lower third, in the direction of rise of the mass during manufacture (see Figure 1).

The position of the test specimens in the material relative to the rise of the mass shall be shown by the numbering, and the direction of rise shall be marked on the test specimens.



Key

1 Direction of rise

Figure 1— Sampling scheme

5.4 Preparation of test specimens

The test specimen shall be cut by means of a rotating carborundum blade or similar equipment. They shall not contain any reinforcement. All surfaces shall be plane and clean.

The surfaces of the test specimen shall not deviate from planeness by more than 0,1 mm. Planeness shall be checked across the two diagonal using a straight edge and a 0,1 mm-feeler gauge.

The angle between the loadbearing surfaces and the adjacent surfaces shall not deviate from a right angle by more than 1 mm/100 mm. This shall be checked along both orthogonal middle axes of the loadbearing surfaces by means of a square and a 1 mm-feeler gauge or similar instrument.

5.5 Measurement of test specimens and determination of their volume

The dimension of the test specimen shall be measured to an accuracy of 0,1 mm, using calipers.

Length and width of the loadbearing cross-sectional area, A_C, shall be measured in mid height at two opposite sides, and the cross-sectional area shall be calculated by multiplying the mean values of length and width measurements.

The height perpendicular to the loadbearing cross-sectional area shall be measured in the middle of two opposite sides adjacent to the loadbearing surfaces.

The volume V of the test specimen shall be calculated by multiplying A_C by the mean value of the height measurements.

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5.6 Conditioning of test specimens

The test specimen shall be conditioned at a temperature not exceeding 60 °C until their moisture content is expected to be (6 ± 2) % by mass. This may be estimated by comparing their moist density with the dry density determined in accordance with EN 678 on a companion specimen extracted from the same area of the same component (see NOTE).

After reaching the specified moisture content, the test specimen shall be stored, protected against moisture changes, for at least 2 h for ensuring thermal equilibrium with the laboratory at (20 ± 5) °C prior to the compression test. Immediately before the compression test the moist mass, m_{m}, of the test specimen shall be determined again, to an accuracy of 0,1 %.

NOTE The expected moisture content $\mu_{\mathrm{m,exp.}}$, in % by mass, of a test specimen can be calculated as

$$\mu_{\mathrm{m,exp.}} = \frac{\rho_{\mathrm{m,t}} - \rho_{\mathrm{comp}}}{\rho_{\mathrm{comp}}} \times 100 \qquad (1)$$

where

$\rho_{\mathrm{m,t}}$ m_{m}/V is the moist density of the test specimen, calculated by dividing its moist mass m_{m} by its volume V determined according to 5.5, in kilograms per cubic metre;

ρ_{comp} is the dry density of the companion specimen determined according to EN 678, in kilograms per cubic metre.

6 Testing procedure

6.1 Compression test

The platens of the testing machine shall be wiped clean, and the conditioned test specimen (see 5.6) shall be centred in the testing machine. The load shall be applied axially and perpendicularly to the direction of rise.

The test specimen shall be loaded gradually and without shock at a constant rate corresponding to a stress increase of $(0{,}1 \pm 0{,}05)$ MPa per s until rupture of the test specimen occurs.

The maximum load carried by the test specimen shall be recorded.

6.2 Determination of actual moisture content and dry density of test specimens

After the compression test the test specimens shall be dried at (105 ± 5) °C until constant mass in order to determine their actual moisture content at the moment of testing in accordance with EN 1353 and their dry density in accordance with EN 678. Care shall be taken that no material is lost.

If material is lost, the crushed test specimen should be weighed immediately after the compression test, and its residual volume should be calculated by multiplying its original volume V by the ratio of the moist masses determined immediately after and before the compression test.

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7 Test results

The compressive strength f_{ci}, in MPa, of the test specimen i is determined as follows:

$$f_{ci} = \frac{F_i}{A_{ci}} \qquad i = 1, 2, 3 \tag{2}$$

where

F_i is the maximum load at failure, in Newton's;

A_{ci} is the cross-sectional area to which the load is applied, determined in accordance with 5.5, in square millimetres.

The compressive strength of each individual test specimen, f_{ci}, shall be expressed to the nearest 0,05 MPa.

The compressive strength of the product f_c, in Megapascals, is defined as the mean value of the compressive strengths f_{ci} of the three test specimens of the test set:

$$f_c = (f_{c1} + f_{c2} + f_{c3}) / 3 \tag{3}$$

The compressive strength of the product, f_c, shall be expressed to the nearest 0,1 Megapascal.

8 Test report

The test report shall include the following:

a) identification of the product;

b) date of manufacture or other code;

c) place and date of testing, testing institute and person responsible for testing;

d) number and date of issue of this European Standard;

e) shape, size, and relative position of the test specimens;

f) moisture content of each individual test specimen and mean value;

g) dry density of each individual test specimen and mean value;

h) compressive strength of each individual test specimen and compressive strength of the product;

i) observations on the appearance of the test specimens.

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