BRITISH STANDARD

BS EN
1170-6 : 1998

Precast concrete products — Test method for glass-fibre reinforced cement

Part 6. Determination of the absorption of water by immersion and determination of the dry density

The European Standard EN 1170-6 : 1997 has the status of a British Standard

ICS 91.100.30

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National foreword

This British Standard is the English language version of EN 1170-6 : 1997.

The UK participation in its preparation was entrusted to Technical Committee B/524, Precast concrete products, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

The UK voted against this standard at the CEN Formal Vote stage but the analysis of voting, in accordance with CEN/CENELEC Internal Regulations Part 2 : *Common rules for standards work*, resulted in a positive vote. In consequence, the document was accepted as a European Standard.

This standard, together with BS EN 1170 : Parts 1 to 5 and 7 supersedes BS 6432 : 1984 which is withdrawn.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled 'International Standards Correspondence Index', or by using the 'Find' facility of the BSI Standards Electronic Catalogue.

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, the EN title page, pages 2 to 5 and a back cover.

This British Standard, having been prepared under the direction of the Sector Board for Building and Civil Engineering, was published under the authority of the Standards Board and comes into effect on 15 March 1998

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Amendments issued since publication

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1170-6

November 1997

ICS 91.100.30

Descriptors: Concrete products, prefabricated elements, composite materials, cements, glass, verification, conformity tests, water absorption tests, measurements, density (mass/volume), immersion tests

English version

Precast concrete products — Test method for glass-fibre reinforced cement — Part 6: Determination of the absorption of water by immersion and determination of the dry density

Produits préfabriqués en béton — Méthode d'essai des composites ciment-verre — Partie 6: Détermination de l'absorption d'eau par immersion et de la masse volumique sèche

Vorgefertigte Betonerzeugnisse — Prüfverfahren für Glasfaserbeton — Teil 6: Bestimmung der Wasseraufnahme mittels Tauchverfahren und der Trockenrohdichte

This European Standard was approved by CEN on 29 October 1997.

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CEN

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

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Ref. No. EN 1170-6 : 1997 E

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 229, Precast concrete products, the secretariat of which is held by AFNOR.

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 1998, and conflicting national standards shall be withdrawn at the latest by May 1998.

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

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1 Scope

This European Standard specifies a test method for determining the dry density and water absorption of a given GRC composition.

2 Symbols and abbreviation

2.1 Symbols

m_d mass of a test piece after drying, 'dry mass', in grams;

m_{wj} mass of a test piece after immersion for '*j*' days, 'wet mass', in grams;

V volume of a test piece, in cm^3;

γ water absorption by immersion, in percentage by mass;

ρ_d dry density, in kg/m^3.

2.2 Abbreviation

GRC Glass-fibre reinforced cement.

3 Apparatus

The apparatus comprises:

– *a scale*, with a measuring range 0 kg to 2 kg, accurate to 0,1 g;

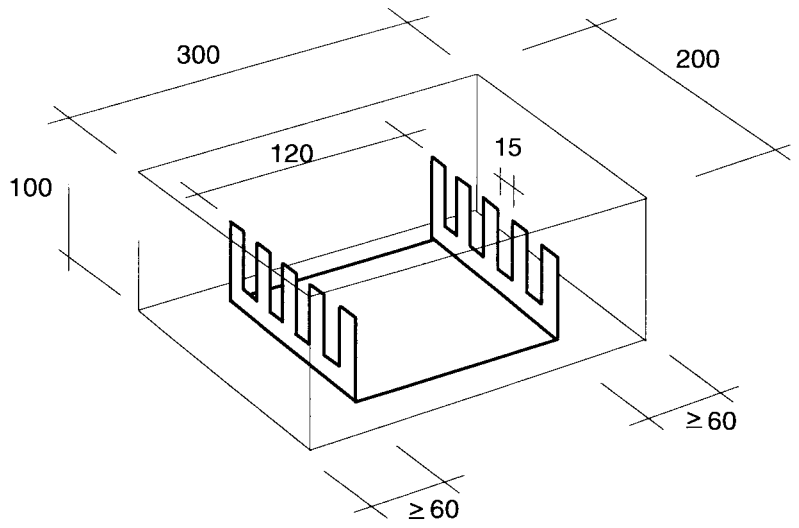
– *a ventilated drying oven*, adjusted to (105 ± 5) °C;

– *a flat board*, made of smooth, easily cleaned material, approximately (500×800) mm;

– *a rule*, accurate to 0,5 mm;

– *a calliper*, accurate to 0,1 mm;

– *a flat bottomed tank*, filled with water maintained at (20 ± 2) °C, approximately $(300 \times 200 \times 100)$ mm, equipped with a device allowing the positioning of the samples in conformity with **4.2**, for example, non-corrodible 'rack'-type 'comb' as shown in figure 1.



Dimensions in millimetres

Figure 1. Example of a device for positioning the test pieces

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4 Procedure

4.1 Test pieces

On the flat board, make a sample panel with no facing layer (i.e. made entirely of GRC) under the same conditions as the actual production it represents: spray or premix.

After 24 h, demould and store the sample panel until the age of 6 days, under the same conditions as for the actual production it represents.

Cut out by sawing, at $(50\ ^{+1}_{0})$ mm from the edges, four test pieces from the positions illustrated in figure 2.

NOTE. The test pieces may also be cut out on the day of demoulding.

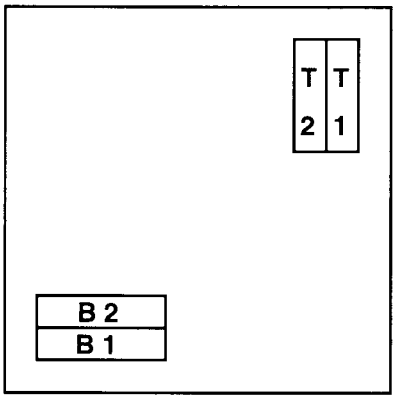

Figure 2. Position and identification of test pieces

Dimensions of the test pieces:

– width: (50 ± 2) mm;

– length: (225 ± 2) mm;

When the four test pieces have been aged for 6 days, store them in the test room at a temperature of (20 ± 3) °C for approximately 24 h so that they have been aged for 7 days at the time of the tests.

4.2 Test method

Measure the dimensions of each sample to the nearest millimetre and calculate the volume, expressed in cm^3, for each sample.

NOTE. It is also possible to determine the volume by the hydrostatic weighing method.

Place the four test pieces in the flat bottomed tank filled with water at (20 ± 2) °C. The test pieces are held in place vertically by the combs and resting on one of their lengthwise edges. The depth of covering by water shall be $(20\ ^{+4}_{0})$ mm.

The duration of immersion, depending on the GRC composition, shall be:

– 24 h for compositions with no polymer content;

– 7 days, with an intermediate measurement at 24 h.

After removal from the water and before weighing, wipe the test pieces with a damp cloth to remove any surface water.

Weigh the test pieces:

m_{w1} is the mass after immersion for 24 h, in grams;

m_{w7} is the mass after immersion for 7 days, in grams.

Then place the test pieces in the ventilated drying oven until they reach constant mass 'm_d', i.e. when the difference between two weighing results 24 h apart is less than 0,1 %.

5 Expression of results

5.1 Water absorption by immersion

The water absorption by immersion, γ, expressed as a percentage by mass, is determined by the equation:

$$\gamma = \frac{m_w - m_d}{m_d} \times 100$$

For formulations with polymer content γ is calculated at 24 h with m_{w1} and γ at 7 days with m_{w7}.

5.2 Dry density

The dry density ρ_d, expressed in kg/m^3, is determined by the following equation:

$$\rho_d = \frac{m_d \times 10^3}{V \times 10^6}$$

6 Interpreting the test

The results depend on the characteristics of the GRC composition (granulometry of the sand, polymer content, etc.) and its workmanship (compaction).

7 Test report sheet

The test report sheet shall comprise the following information:

– the date of test;

– the identification of the manufacturer;

– the dimensions of test pieces;

– the intermediate results: wet mass, dry mass;

– the results: water absorption at 24 h, at 7 days in the case of compositions with polymer content, dry density.

NOTE. An example of the test report sheet is given in annex A.

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Annex A (informative)
Example of test report sheet

ORDER and marking of parts			PRODUCTION TESTS of : ..... by :			TESTS performed on this day of production*) CONSISTENCY – FIBRE CONTENT – BENDING STRENGTH		
WATER ABSORPTION BY IMMERSION AND DENSITY						(Solid GRC ONLY)		
Marking of test pieces	Dimensions (mm)	Volume V (cm^3)	Wet mass (g) m_{w1}	Wet mass (g) m_{w7}**)	Dry mass (g) m_d	Water absorption at 24 h $\frac{m_{w1} - m_d}{m_d} \times 100$	Water absorption at 7 days*) $\frac{m_{w7} - m_d}{m_d} \times 100$	Dry density ρ_d (g/cm^3 or kg/m^3) $\frac{m_d}{V}$
T_1	..... × ..... ×	.....	.....	.....	.....	.....	.....	.....
T_2	..... × ..... ×	.....	.....	.....	.....	.....	.....	.....
B_1	..... × ..... ×	.....	.....	.....	.....	.....	.....	.....
B_2	..... × ..... ×	.....	.....	.....	.....	.....	.....	.....
					Mean	..... %	..... %	..... kg/m^3

*) Delete where not applicable.

**) Water absorption at 7 days only for composition with polymer content.

NOTE. It is possible to determine the volume by the hydrostatic weighing method.

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