SLOVENSKI STANDARD
SIST EN 1170-7:2001

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Montažni betonski izdelki - Preskusna metoda za steklocementni kompozit - 7. del: Merjenje sprememb mer v odvisnosti od deleža vlage

Precast concrete products - Test method for glass-fibre reinforced cement - Part 7: Measurement of extremes of dimensional variations due to moisture content

Vorgefertigte Betonerzeugnisse - Prüfverfahren für Glasfaserbeton - Teil 7: Bestimmung der feuchtigkeitsabhängigen Längenänderungen

Produits préfabriqués en béton - Méthode d'essai des composites ciment-verre - Partie 7: Mesure des variations dimensionnelles extremes en fonction de la teneur en eau

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91.100.30	Beton in betonski izdelki	Concrete and concrete products

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English version

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

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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of an identical text or by endorsement, at the latest by May 1998, and conflicting national standards shall be withdrawn at the latest by May 1998.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.

1 Scope

This European Standard specifies a test method for identifying the maximum dimensional variations (residual hydraulic shrinkage and reversible expansion) of a GRC composition attributable to variations in the water content to which products exposed to the elements may be subjected.

2 Symbols and abbreviations

2.1 Symbols

ℓ_0 : distance between pads measured at the beginning of the test, expressed in micrometres ;

ℓ_1 : distance between pads measured after 96 h immersion, expressed in micrometres ;

ℓ_2 : distance between pads measured after 21 days drying in oven and 6 h stabilization, expressed in micrometres ;

m_0 : mass of test piece at the beginning of the test, in grams ;

m_1 : mass of test piece after 96 h immersion, in grams ;

m_2 : mass of test piece after 21 days oven drying and 6 h stabilization, in grams ;

$\frac{\Delta\ell_c}{\ell}$: value of extreme dimensional variation, in millimetres per metre ;

$\frac{\Delta\ell_e}{\ell}$: value of expansion, in millimetres per metre. This is the arithmetic mean of the expansion values of the three test pieces tested ;

$\frac{\Delta\ell_s}{\ell}$: value of residual shrinkage, in millimetres per metre. This is the arithmetic mean of the shrinkage values of the three test pieces tested.

2.2 Abbreviation

GRC : Glassfibre 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 maintained a temperature of (33 ± 3) °C ;

- a test board made of smooth, easily cleaned material, approximately (500 x 800) mm. With "premix" production, provide a frame of thickness equal to that of the product manufactured ;

- a rule accurate to 0,5 mm ;

- a flat bottomed tank, approximately (500 x 200 x 100) mm filled with water maintained at (20 ± 2) °C ;

- an extensometer with a minimum gauge length of 200 mm accurate to 0,002 mm ;

- stainless steel measuring pads, with a minimum surface area of 25 mm^2 ;

- epoxy resin suitable for fixing the gauge pads.

4 Procedure

4.1 Test pieces

On the flat board, make a sample panel with its facing layer under the same conditions as for the actual production it represents : premix or spray.

After 24 h, demould and store the sample panel in the same conditions as for the actual production which it represents until it is 6 days old.

Cut by sawing, (50^{+1}_{0}) mm from the edges of the panel, six test pieces from the positions illustrated in figure 1.

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

Dimensions of the test pieces :

- width : (50 ± 2) mm ;

- length : (400 ± 2) mm.

Mark the test pieces as shown in figure 1.

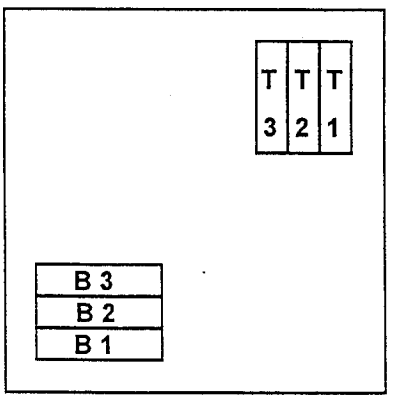

Figure 1 : Positions for cutting out test pieces

Store the test pieces in the laboratory at a temperature of (20 ± 3) °C and relative humidity of (60 ± 5) % until the products have reached the test age defined by agreement between the producer and the customer. If no information is provided, the test age adopted is conventionally 10 days after manufacture.

The test pieces shall be placed individually into leaktight bags for transportation from the production site to the test laboratory. The transportation time shall not be taken into account when calculating the age.

4.2 Test method

Bond two location pads, using an epoxy resin suitable for gauge fixing, (to the two faces of each test piece).

Mark each face, i.e. "U" for the top face and "D" for the bottom face.

Weigh each test piece, i.e. m_0 (in grams).

Measure the distance, expressed in µm, between the pads on each test piece face, i.e. :

- $\ell_{o,u}$ for the "U" face ;
- $\ell_{o,D}$ for the "D" face.

4.2.1 Measurement of residual shrinkage by drying

Place the three test pieces T_1, T_3, B_1 in the ventilated oven adjusted to (33 ± 3) °C. Place the test pieces on an edge so that the hot air circulates correctly over the two measuring faces.

After 21 days, remove the test pieces from the oven and place them in the laboratory at a temperature of (20 ± 3) °C.

After stabilizing for 6 h :

- weigh each test piece, i.e. m_2 (in grams) ;
- measure the distance between pads on each face, expressed in µm, i.e. :
- $\ell_{2,U}$ for the "U" face ;
- $\ell_{2,D}$ for the "D" face ;

4.2.2 Measurement of reversible expansion by immersion

Place the three test pieces T_2, B_2 and B_3 in the tank filled with water at a temperature of (20 ± 2) °C. Place the test pieces on an edge and ensure that the test pieces are completely immersed.

After 96 h of immersion in the water at (20 ± 2) °C, remove the test pieces and wipe with a damp cloth, and :

- weigh each test piece, i.e. m_1 (in grams) ;

- measure the distance between the pads on each face, expressed in µm, i.e. :

- $\ell_{1,U}$ for the "U" face ;

- $\ell_{1,D}$ for the "D" face.

5 Expression of results

5.1 Shrinkage value

The residual shrinkage value of each test piece $\frac{\Delta \ell_s}{\ell}$, expressed in mm/m, is the arithmetic mean of the value obtained for each face (face "U" and face "D") each calculated from the equation :

$$\frac{\Delta \ell_s}{\ell} = \frac{\ell_o - \ell_2}{\ell_o} \times 10^3$$

The shrinkage value of a GRC composition is characterized by the arithmetic mean of the shrinkage values of the three test pieces.

5.2 Expansion value

The expansion value of each test piece $\frac{\Delta \ell_e}{\ell}$, expressed in mm/m, is equal to the arithmetic mean of the two values (face "U" and face "D") each being calculated from the equation :

$$\frac{\Delta \ell_e}{\ell} = \frac{\ell_1 - \ell_o}{\ell_o} \times 10^3$$

The expansion value of a GRC composition is characterized by the arithmetic mean of the expansion values of the three test pieces.

5.3 Value of extreme dimensional variations

The value of the extreme dimensional variation as a function of the water content of a GRC composition is given by the equation :

$$\frac{\Delta \ell_c}{\ell} = \frac{\Delta \ell_s}{\ell} + \frac{\Delta \ell_e}{\ell}$$