SLOVENSKI STANDARD
SIST EN 1169:2001

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Montažni betonski izdelki - Splošna pravila za notranjo kontrolo proizvodnje steklocementnega kompozita

Precast concrete products - General rules for factory production control of glass-fibre reinforced cement

Vorgefertigte Betonerzeugnisse - Allgemeine Regeln für die werkseigene Produktionskontrolle von Glasfaserbeton

Produits préfabriqués en béton - Regles générales de contrôle de production des composites ciment-verre

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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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of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by April 2000.

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 is applicable to glass-fibre reinforced cement products manufactured in factories. It defines the general rules for production control of GRC material.

It constitutes the common "production" part of the control plan, for which guidelines are given in annex A.

It does not specify :

- the conformity control procedure for the finished products, for which reference should be made to the specification of European products Standards or, if none exist, to the technical requirements defined and agreed between the manufacturer and his customer ;

- the means and methods to be used to control the whole production process (moulds, curing, storage, etc.).

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.

prEN 197-1	Cement - Part 1: Composition, specifications and conformity criteria for common cements
EN 450	Fly ash for concrete - Definitions, requirements and quality control
EN 1170-1	Precast concrete products - Test method for glass-fibre reinforced cement - Part 1 : Measuring the consistency of the matrix "Slump test" method
EN 1170-2	Precast concrete products - Test method for glass-fibre reinforced cement - Part 2 : Measuring the fibre content in fresh GRC, "Wash out test"
EN 1170-3	Precast concrete products - Test method for glass-fibre reinforced cement - Part 3 : Measuring the fibre content of sprayed GRC
EN 1170-4	Precast concrete products - Test method for glass-fibre reinforced cement - Part 4 : Measuring bending strength - "Simplified bending test" method
EN 1170-5	Precast concrete products - Test method for glass-fibre reinforced cement - Part 5 : Measuring bending strength, "Complete bending test" method
EN 1170-6	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

EN 1170-7	Precast concrete products - Test method for glass-fibre reinforced cement - Part 7 : Measurement of extremes of dimensional variations due to moisture content
ENV 1170-8	Test method for glass-fibre reinforced cement - Part 8 : Cyclic weathering type test
EN 45001	General criteria for the operation of testing laboratories

3 Definitions and abbreviation

3.1 Definitions

For the purposes of this standard, the following definitions apply :

3.1.1 additive

Product that may be added to the matrix composition to improve some properties. It can be reactive (e.g. silica fumes) or inert, mineral or organic (e.g. polymer dispersions).

3.1.2 admixture

Product added in quantity less than 5 % of the mass of cement, before or during mixing and giving expected modifications to the initial properties (e.g. plasticiser, air entraining agents).

3.1.3 AR glass-fibre (Alkali-Resistant)

Glass-fibre resistant to the alkaline environment of matrices made from hydraulic binder. This resistance is due particularly to a specific composition of glass.

3.1.4 E glass-fibre (Electrical)

Glass-fibre usually used in the composites with organic binder. Due to the composition of glass, this type of fibre is degraded in alkaline environment.

3.1.5 basic strand

Glass fibre obtained by stranding 100 to 200 filaments having 10 µm to 30 µm individual diameter.

3.1.6 glass-fibre reinforced cement

Composite material consisting of a matrix of hydraulic binder (cement) reinforced with glass-fibres, these materials being compatible.

3.1.7 matrix

Part of glass-fibre reinforced cement comprising the mixture of sand, cement, water and if necessary additives and admixtures.

3.1.8 spray process

Process whereby continuous glass-fibre is cut into set lengths and sprayed together with the matrix. The process is designed to give a glass-fibre reinforced cement in which the fibres are oriented parallel to the mould surface.

3.1.9 premix process

Process whereby chopped strands of glass-fibres are blended with the matrix to make a glass-fibre reinforced cement ready for processing. The process may be : "casting and vibration", wet or dry spraying, injection, extrusion, etc.

3.1.10 Quality Assurance Manual (QAM)

Document describing the general measures taken by a manufacturer in the field of quality assurance. This document is the non-confidential contractual part of the Quality Manual, if this exists.

3.1.11 Quality Assurance Plan (QAP)

Document describing the general measures taken by a manufacturer to conform with the requirements relating to a given production.
QAM and QAP may be blended.

3.1.12 control plan

Document describing the specific measures used to effect the control of a product.

3.2 Abbreviation

GRC : Glass-fibre reinforced cement.

4 Control of raw materials

4.1 General

The raw materials shall conform to the requirements of the European Standards or if none exist to national standards valid in the place of use. In particular Portland cements shall comply with prEN 197-1 and fly ashes with EN 450.

If no standard exists, raw materials shall be covered in technical specifications describing the nature of the requirements for GRC and agreed by the supplier and the manufacturer.

The use of E glass-fibres is not recommended with Portland cement, unless in a modified cement matrix of which its performance and their change with time have been identified in accordance with ENV 1170-8.

NOTE 1 To estimate the resistance of glass-fibres to alkalis of Portland cement, it is recommended to refer to the GRCA publications n° S 0104/0184 and n° S 0105/0286. They define a test "Strand In Cement - S.I.C. Test" and give requirements for glass-fibres to be used in matrices with hydraulic binder.

NOTE 2 The glass-fibres are used in the following forms : chopped strands, continuous rovings/fibres (stratifils), nets and mats.

4.2 Reception controls

Each delivery batch shall be identified by the supplier and be accompanied by a delivery document which specifies particularly :

- for sands : the grain size analysis within the specified limits, the cleaness, the water content and the chemical analysis ;

- for polymers : the family of polymers, the dry extract and the limit of use date ;

- for cements : the type of cement and the strength class ;

- for glass-fibres : the quality of the glass (e.g. : AR), the diameter of filaments, definition of the strand and loss on ignition.

It is recommended that the GRC producer takes a sample for retention from each delivery batch, in accordance with table 1.

Note : If the case arises, the reception controls (all or a part) could be carried out by the producer.

Table 1 : Retention samples to be taken from each delivery batch

Materials		Approximate mass kg	Duration of retention months
Glass-fibres		0,5	6
Cement		5	1
Sands		5	1
Additions	Polymers	1	6
	Metakaolin, silica fumes and other fillers	1	6
Admixtures		0,5	6
Water		-	-

4.3 Storage of raw materials

All raw materials shall be stored in a sheltered place, in such a way they do not mix with others and are protected against deterioration or contamination. For certain materials, as indicated in the supplier's written instructions, protection from frost is necessary to preserve the qualities of the products.

The Rotation of stocks shall be ensured so that oldest stock is always used first.

5 Control of the mixing process

The equipment shall be used in such a way that in common circumstances the following tolerances can be obtained :

- for additives, cement, water and aggregates : ± 2 % of the required quantity ;

- for admixtures : ± 3 % of the required quantity.

The verification of conformity shall be carried out as follows :

- once a year by a body accredited for calibration in accordance with EN 45001 ;

- at regular intervals by the GRC producer.

The frequency, depending on the risk of deviation in the accuracy of equipment, shall be defined in the quality assurance plan.

6 Controls of hardened and fresh GRC

Tables 2, 3 and 4 summarise the control tests with indicative frequencies which shall be adjusted according to the product type to be processed.