



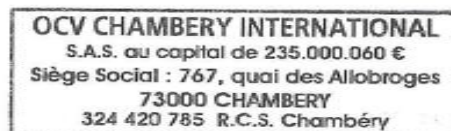
CERTIFICADO DE CONFORMIDAD

Certificamos que todos nuestros productos Cem-FIL® y Anti-Crak® están fabricados de acuerdo con los requerimientos especificados en EN 15422 “Especificaciones para las fibras de vidrio destinadas al armado de morteros y hormigones” (capítulo 6).

Certificamos que las fibras Cem-FIL® y Anti-Crak® son producidas para resistir la degradación en ambientes de elevada alcalinidad asociados a los materiales basados en cemento Portland. Tal y como se especifica en la norma EN 15422, la resistencia remanente de las fibras de vidrio en cemento y hormigón se revisa regularmente de acuerdo con la norma EN 14649 “Método de ensayo para la determinación de la resistencia remanente de las fibras de vidrio en el cemento y el hormigón (ensayo SIC)”.

De acuerdo con las categorías definidas en la norma EN 15422, nuestras fibras integrales cortadas y las bobinas de fibra continua se clasifican como categoría B (resistencia remanente según EN 14649). En esta categoría se incluyen las siguientes designaciones: Cem-FIL 60, Cem-FIL 62, Anti-Crak HP, Cem-FIL 54, Cem-FIL 61 y Cem-FIL 5325. Por otro lado, las fibras dispersables se clasifican como categoría A (resistencia remanente según EN 14649). Esta categoría incluye las designaciones: Cem-FIL 70 y Anti-Crak HD.

Y para que así conste, se expide este certificado en Chambéry (Francia), 2 de enero de 2015



Your OCV Reinforcements Team

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Certification Experts B.V
Nieuwstad 100
1381 CE
The Netherlands

Weesp, July 1, 2014

Subject: Confirmation letter concerning European Technical Assessment for European Owens Corning Fiberglas, Sprl. Under supervision of Certification Experts B.V.

To whom it may concern,

By means of this letter, I, S.A. Koumatchev., active as a technical and legal expert for Certification Experts B.V., would like to confirm that European Owens Corning Fiberglas, Sprl., under supervision of Certification Experts B.V., lodged an application to issue a European Technical Assessment under Article 26 of Construction Products Regulation (EU) No. 305/2011. The purpose of this assessment is to update the current European Technical Approval (ETA-11/0410), to align the conformity assessment documentation with previously mentioned Regulation and to renew the current CE marking documents and procedures.

European Owens Corning Fiberglas, Sprl. ensures that the products currently manufactured in China meet exactly the same characteristics, specifications, and quality than those previously manufactured in Spain, and at the same time are subjected to an equal Quality Control Plan, and tracking system.

Whereas the CE mark is not mandatory for AR glass fibers (due to the lack of harmonised European standard), during this transition period such products from European Owens Corning Fiberglas, Sprl. can be marketed in the European Union if they comply with the specific legislation of the corresponding Member State.

For questions with regard to this application, you can contact me directly.

Yours sincerely,



S. Koumatchev, *LL.M.*

Technical and Legal Expert

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EUROPEAN TECHNICAL ASSESSMENT

ETA 17/0169Version 01
Date of issue: 2017-05-19UBAtc Assessment Operator:
Belgian Construction Certification Association
Rue d'Arlon 53 - 1040 Brussels
www.bcca.be - info@bcca.be

Technical Assessment Body issuing the European Technical Assessment: UBAtc.
UBAtc has been designated according to Article 29 of Regulation (EU) No 305/2011
and is member of EOTA (European Organisation for Technical Assessment)

Trade name of the construction product:

"Cem-FIL® AR-glass fibres", "Anti-Crak® AR-glass fibres" and "Arcotex® AR-glass fibres"

Product family to which the construction product belongs:26 - Products related to concrete, mortar and grout
Alkali resistant glass fibres containing zirconium dioxide for the use in concrete**Manufacturer:**European Owens Corning Fiberglas SPRL
Chaussée de la Hulpe 166
1170 Watermael-Boitsfort
Belgium**Manufacturing plant(s):**

Owens Corning manufacturing plant 9810

Website:

www.ocvreinforcements.com

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

European Assessment Document (EAD): 260002-00-0301

This European Technical Assessment contains:

11 pages, including 4 annexes which form an integral part of the document.

**European Organisation
for Technical Assessment**

Legal bases and general conditions

- 1 This European Technical Assessment is issued by UBAtc (Union belge pour l'Agrément technique de la construction, i.e. Belgian Union for technical Approval in construction), in accordance with:
 - Regulation (EU) No 305/2011¹ of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC
 - Commission Implementing Regulation (EU) No 1062/2013² of 30 October 2013 on the format of the European Technical Assessment for construction products
 - European Assessment Document (EAD) : EAD 26002-00-0301
- 2 Under the provisions of Regulation (EU) No 305/2011, UBAtc is not authorized to check whether the provisions of this European Technical Assessment are met once the ETA has been issued.
- 3 The responsibility for the conformity of the performances of the products with this European Technical Assessment and the suitability of the products for the intended use remains with the holder of the European Technical Assessment.
- 4 Depending on the applicable Assessment and verification of constancy of performance (AVCP) system, (a) notified body(ies) may carry out third-party tasks in the process of assessment and verification of constancy of performance under this Regulation once the European Technical Assessment has been issued.
- 5 This European Technical Assessment allows the manufacturer of the construction product covered by this ETA to draw up a declaration of performance for the construction product.
- 6 CE marking should be affixed to all construction products for which the manufacturer has drawn up a declaration of performance.
- 7 This European Technical Assessment is not to be transferred to other manufacturers, agents of manufacturers, or manufacturing plants other than those indicated on page 1 of this European Technical Assessment.
- 8 The European Technical Assessment holder confirms to guarantee that the product(-s) to which this assessment relates, is/are produced and marketed in accordance with and comply with all applicable legal and regulatory provisions, including, without limitation, national and European legislation on the safety of products and services. The ETA-holder shall notify the UBAtc immediately in writing of any circumstance affecting the aforementioned guarantee. This assessment is issued under the condition that the aforementioned guarantee by the ETA-holder will be continuously observed.
- 9 According to Article 11(6) of Regulation (EU) No 305/2011, when making a construction product available on the market, the manufacturer shall ensure that the product is accompanied by instructions and safety information in a language determined by the Member State concerned which can be easily understood by users. These instructions and safety information should fully correspond with the technical information about the product and its intended use which the manufacturer has submitted to the responsible Technical Assessment Body for the issuing of the European Technical Assessment.
- 10 Pursuant to Article 11(3) of Regulation (EU) No 305/2011, manufacturers shall adequately take into account changes in the product-type and in the applicable harmonised technical specifications. Therefore, when the contents of the issued European Technical Assessment do not any longer correspond to the product-type, the manufacturer should refrain from using this European Technical Assessment as the basis for their declaration of performance.
- 11 All rights of exploitation in any form and by any means of this European Technical Assessment is reserved for UBAtc and the ETA-holder, subject to the provisions of the applicable UBAtc regulations.
- 12 Reproduction of this European Technical Assessment including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of UBAtc. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Assessment.
- 13 Subject to the application introduced, this European Technical Assessment is issued in English and may be issued by the UBAtc in its official languages. The translations correspond fully to the English reference version circulated in EOTA.
- 14 This European Technical Assessment was first issued by UBAtc on 19 May 2017.

¹ OJEU, L 88 of 2011/04/04

² OJEU, L 289 of 2013/10/31

Technical Provisions

1 Technical description of the product

1.1 Description of the construction product

The alkali resistant glass fibres (AR-glass fibres) "CEM-FIL® AR-glass fibres", "Anti-Crak® AR-glass fibres" and "Arcotex® AR-glass fibres", given in annexes I, II and III, are glass fibres made of a glass composition containing at least 16 % of zirconium dioxide (ZrO₂) to obtain a high alkali resistance. The AR-glass fibres have a sizing which is known at UBAtc and are produced as chopped strands or as rovings which are chopped up by the user to a length ≤ 75 mm.

This technical assessment includes only AR-glass fibres which provide a strand-in-cement (SIC) strength of the AR-glass fibres after ageing according to EN 14649 of at least 250 N/mm².

1.2 Production

The AR-glass fibres are produced in a manufacturing plant known by the responsible Technical Assessment Body, UBAtc.

2 Specification of the intended use(s) in accordance with the applicable EAD

2.1 Intended uses

This ETA covers AR-glass fibres intended to be used for concrete, mortar and other mixes for construction and for the manufacturing of construction products.

If indicated in annexes I, II or III, the "AR glass fibres" can be used for improving the flexural tensile behaviour of concrete or mortar. In that case the fibres are intended to be used in load bearing applications.

In particular, the AR-glass fibres for which annexes I, II or III do not indicate mechanical performance of the concrete, are intended to be used to improve the cracking resistance in early age concrete and are not meant to be used in load bearing applications.

Concrete, mortar, grout and other mixing compositions, complying with commonly used mix-design parameters given in this ETA, and the constituent materials for described mixes shall be chosen to satisfy the requirements specified for fresh and hardened mixes, including consistency, density, strength, durability, protection of embedded steel against corrosion, taking into account the production process and the intended method of execution of works, following the appropriate standards and/or regulations for concrete and mortar valid in the place of use.

For each case of application, initial tests shall be carried out with the intended concrete composition and the intended addition of fibres to demonstrate that the concrete can be processed reliably with the intended consistency provided under the conditions of the site and that the required properties are achieved.

2.2 Working life/Durability

The provisions made in this European Technical Assessment have been written based on the manufacturer's request to take into account a working life of concrete incorporating the "alkali resistant glass fibres" for the intended use of 50 years when installed in the works provided that the concrete incorporating the "alkali resistant glass fibres" is subject to appropriate installation (see 2.3.2). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works³.

³ The real working life of a product incorporated in a specific work depends on the environmental conditions to which that work is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than the working life referred to above.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by the Technical Assessment Body issuing this ETA, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

2.3 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed

2.3.1 Manufacturing directives

The European technical assessment is issued for the products on the basis of agreed data/information, deposited with the Technical Assessment Body, which identifies the product that has been assessed. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to the Responsible Technical Assessment Body (RTAB), UBAtc, before the changes are introduced. The RTAB will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

2.3.2 Recommendations regarding packaging, handling, installation and maintenance

With regard to product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

Materials shall be handled and stored with care. For packaging and storage EN 14020-2:2002, clause 8.1 applies. On site the products must be stored in bags and protected against weather.

It is assumed that the product shall be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Technical Assessment shall be considered for the determination of the performance and detailed in the ETA.

Mixing instructions which recommend the mixing sequence to be adopted shall be supplied by the manufacturer.

In the case of fibres that are intended to be used in load bearing applications, it is recommended by the manufacturer that the fibres shall be added to the concrete mix at the end of the mixing process, i.e. once all other materials have been mixed and the plain concrete is ready. In that case a mixing time no longer than 1 minute after beginning of the fiber introduction, for a 1 m³ concrete mixer, is enough to achieve a uniform distribution of the fibers. When the fibres are added on site, usually 2-3 minutes of high speed mixing on a concrete truck is enough to achieve a uniform fibre distribution within the mass of concrete.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR1)

3.1.1 Tensile strength of the strands

The tensile strength of strands is measured in accordance with ISO 3341 respectively EN 14649. The assessed tensile strengths of the "CEM-FIL® AR-glass fibres", "Anti-Crak® AR-glass fibres" and Arcotex® AR-glass fibres" are given in annexes I, II and III.

3.1.2 Alkali resistance (SIC strength)

The alkali resistance is determined in accordance with the strand-in-cement (SIC) test method according to EN 14649. Based upon the test results, the alkali resistant glass fibres of the "CEM-FIL® AR-glass fibres", "Anti-Crak® AR-glass fibres" and "Arcotex® AR-glass fibres" were classified into the following categories according to their alkali resistance (see Annexes I, II and III):

- Category I: ≥ 400 MPa;
- Category II: ≥ 350 MPa;
- Category III: ≥ 250 MPa.

3.1.3 Effect on consistency (workability) of fresh concrete

The effect of the addition of AR glass fibres on the consistency of fresh concrete, for which the intended use is structural reinforcement for concrete elements, is assessed in accordance with EN 12350-3 using a reference concrete conforming to EN 14845-1. The consistency is determined on the reference concrete without fibres and on an identical mix with fibres. The consistency of the reference concrete obtains a Vébé time of 10 to 6 sec. (Class V3).

In case of fibres for which the effect on strength of concrete in accordance with 3.1.13 is determined, the amount of fibres that is tested is the same as used for the effect on concrete strength test.

Where relevant, the effect on consistency and, if used, the amount and type of plasticizer or superplasticizer are given in Annexes I, II and III.

In case the effect on flexural tensile strength has not been determined, the effect on consistency of fresh concrete has not been assessed either.

3.1.4 Effect on strength of concrete (Residual flexural tensile strength)

The effect on strength is determined according to EN 14845-2 and respectively EN 14651 using a reference concrete conforming to EN 14845-1.

The effect on strength of concrete of the "CEM-FIL® AR-glass fibres", "Anti-Crak® AR-glass fibres" and "Arcotex® AR-glass fibres" is given in annexes I, II and III.

Where relevant, the amount of fibres to achieve a minimum average residual flexural strength of 1,5 MPa at a CMOD of 0,5 mm and 1,0 MPa at a CMOD of 3,5 mm is given.

Otherwise, in case the fibres are not intended to be used for structural load bearing applications, no performance is assessed with regard to the effect on strength of concrete.

3.1.5 Effect on strength of GRC products (Bending strength)

No performance assessed.

3.2 Safety in case of fire (BWR2)

3.2.1 Reaction to fire

The concrete incorporating the "alkali resistant glass fibres" is considered to satisfy the requirements for performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC Decision 96/603/EC⁴, amended by Decision 2000/605/EC⁵ and Decision 2003/424/EC⁶, without the need for further testing, on the basis of the stipulations of these decisions.

3.2.2 Resistance to fire

No performance assessed.

3.3 Hygiene, health and the environment (BWR3)

3.3.1 Air and/or water permeability

No performance assessed.

3.3.2 Release of dangerous substances

No performance assessed.

3.4 Safety in use (BWR4)

No performance assessed.

3.5 Protection against noise (BWR5)

No performance assessed.

3.6 Energy and heat retention (BWR6)

No performance assessed.

3.7 Aspects of durability and serviceability

The durability aspects of the AR-glass fibres that are the subject of this ETA have been covered by the assessment of the essential characteristics that are given above.

3.8 Characterization of the products

3.8.1 Zirconium dioxide content (ZrO₂)

The zirconium dioxide content (ZrO₂) is determined by X-ray fluorescence method (XRF) with appropriate standards.

The zirconium dioxide content (ZrO₂) of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is at least 16 %.

3.8.2 Density

The density of the filament is measured according to EN 196-6:2010, 4.5.3, resp. EN ISO 1183-3. The manufacturing process of the manufacturer is such that the absolute density of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is equal to (2,68 ± 0,20) g/cm³.

3.8.3 Size content

The size content of the alkali resistant fibres is determined in accordance with ISO 1887 and complies with the combustible organic matter content or loss on ignition.

The size content of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is given in annexes I, II and III. The manufacturing process is such that the following tolerances are met:

- ± 0,3 % (absolute value) for a size content ≤ 1,5 %
- ± 20 % (relative value) for a size content > 1,5 %.

3.8.4 Moisture content

The moisture content is determined in accordance with EN ISO 3344. The moisture content of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is limited by the manufacturer to ≤ 0,50 % by mass.

3.8.5 Average diameter of filaments

The average diameter of the filaments is determined according to ISO 1888. The average diameter of the filaments of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is given in annexes I, II and III. The tolerances on the filament diameter are such that the average filament diameter is between 8 µm and 30 µm.

3.8.6 Length of the chopped strands

If relevant, the length of chopped strands is measured with optical equipment, with an accuracy of 0,1 mm. The length of the chopped strands of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is given in annexes I, II and III.

The tolerances as given in table 1 apply. At least 90 % of the individual specimen fibres shall meet the specified tolerances. In case the glass fibre rovings are chopped by the user to a length ≤ 75 mm, the same tolerances shall be met.

Table 1. Tolerances for length of chopped strands

Length <i>l</i> (mm)	Deviation of the individual value relative to the specified value	Deviation of the average value relative to the specified value
$l > 30$		± 5 %
$20 \leq l \leq 30$	± 10 %	
$l < 20$	± 2,0 mm	± 1,5 mm

3.8.7 Linear density of the strand (strand tex)

The linear density of the strand is determined in accordance with EN ISO 1889. Where relevant, The linear density of the strand of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is given in annexes I, II and III. The manufacturing process is organised such that the values don't deviate from the specified values by more than ± 10%

3.8.8 Linear density of the roving (roving tex)

The linear density of the roving is determined in accordance with EN ISO 1889. Where relevant, the linear density of the roving of the «CEM-FIL® AR-glass fibres», «Anti-Crak® AR-glass fibres» and «Arcotex® AR-glass fibres» is given in annexes I, II and III.

The manufacturing process is organised as such that the values don't deviate from the specified values by more than ± 10%.

⁴ OJ L 267, 19.10.1996, p. 23

⁵ OJ L 258, 12.10.2000, p. 36

⁶ OJ L 144, 12.6.2003, p. 9

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with Regulation (EU) N° 305/2011, Directive 89/106/EEC is repealed, but references to the repealed Directive shall be construed as references to the Regulation.

The system(s) of assessment and verification of constancy of performance, specified in the Decision of the Commission 1999/469/EC⁷, amended by 2001/596/EC⁸ are specified in Table 2.

Table 2. System of assessment and verification of constancy of performance applicable for fibres for concrete, mortar and grout

Product(s)	Intended use(s)	Level(s) or class(es)	Assessment and verification of constancy of performance system(s) ^(a)
fibres	for structural uses in concrete, mortar and grout	-	1
	for other uses in concrete, mortar and grout	-	3

^(a) See Annex V to Regulation (EU) N° 305/2011

5 Technical details necessary for the implementation of the AVCP system, as foreseen in EAD 260002-00-0301

5.1 Tasks for the Manufacturer

The manufacturer shall install, document and maintain a FPC system that ensures the products placed on the market are conforming to the requirements of this ETA. The FPC system shall consist of procedures, regular inspections and controls in order to assure that the product characteristics are conforming to the initially determined product type.

Raw materials, production process parameters and specifications of semi-finished and finished products shall be regularly controlled as laid down in the control plan. The results of inspections and tests in the framework of the FPC system, as well as the eventual required actions to be taken, shall be documented.

The basic elements that shall be concluded in the FPC system shall be in accordance to chapter 6 of EN 14889-1:2006, with the exception of paragraph 6.3.5. The product testing and evaluation plan shall be conform to the plan in table 3 of paragraph 3.2 of EAD 260002-01-0301 (also given in Annex IV of this ETA).

5.2 Tasks for the notified product certification body

5.2.1 Initial inspection of the manufacturing plant and of factory production control

In case the applicable AVCP system is 1, the notified product certification body shall initially audit the FPC system of the manufacturer and the agreement with the requirements given in paragraph 5.1.1. The result of the audit shall be documented in a report.

The notified product certification body involved by the manufacturer shall issue a certificate of constancy of performance of the product stating the conformity with the provisions of this European Technical Assessment.

5.2.2 Continuing surveillance, assessment and evaluation of factory production control.

In case the applicable AVCP system is 1, the notified product certification body shall perform a continuous surveillance on the FPC system of the manufacturer by visiting the production plant for inspection.

In cases where the provisions of the European Technical Assessment and its control plan are no longer fulfilled the notified body shall withdraw the certificate of constancy of performance and inform the responsible Technical Assessment Body without delay.

⁷ OJ L 184, 17.7.1999, p. 27

⁸ OJ L 209, 2.8.2001, p. 33

6 Reference documents

EAD 26002-00-0301 (edition 2016)	Alkali resistant glass fibres containing zirconium dioxide for the use in concrete	EN 14889-1: 2006	Fibres for concrete - Part 1: Steel fibres - Definitions, specifications and conformity
EN 196-6:2010	Methods of testing cement - Part 6: Determination of fineness	EN ISO 1183-3	Plastics - Methods for determining the density of non-cellular plastics - Part 3: Gas pycnometer method
EN 12350-3	Testing fresh concrete - Part 3: Vebe test	EN ISO 1889	Reinforcement yarns - Determination of linear density
EN 14020-2:2002	Reinforcements – Specification for textile glass rovings - Part 2: Methods of test and general requirements	EN ISO 3344	Reinforcement products - Determination of moisture content
EN 14649	Precast concrete products - Test method for strength retention of glass fibres in cement and concrete (SIC TEST)	ISO 1887	Textile glass - Determination of combustible-matter content
EN 14651	Test method for metallic fibre concrete - Measuring the flexural tensile strength (limit or proportionality (LOP), residual)	ISO 1888	Textile glass - Staple fibres or filaments - Determination of average diameter
EN 14845-1	Test methods for fibres in concrete - Part 1: Reference concretes	ISO 3341	Textile glass - Yarns - Determination of breaking force and breaking elongation
EN 14845-2	Test methods for fibres in concrete - Part 2: Effect on concrete		

NOTE: The editions of reference documents given above are those which have been adopted by the UBAtc for its specific use when establishing this ETA. When new editions become available, these supersede the editions mentioned only when confirmed by the UBAtc.

UBAtc asbl is a non-profit organization according to Belgian law. It is a Technical Assessment Body notified by the Belgian notifying authority, the Federal Public Services Economy, SMEs, Self-Employed and Energy, on 17 July 2013 in the framework of Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC and is member of the European Organisation for Technical Assessment, EOTA (www.eota.eu).


This European Technical Assessment has been issued by UBAtc asbl on the basis of the technical work carried out by the Assessment Operator, BCCA.

On behalf of UBAtc asbl,



Peter Wouters,
director

On behalf of the Assessment Operator, BCCA,
responsible for the technical content of the
ETA,



Benny De Blaere,
director general

The most recent version of this European Technical Assessment may be consulted on the UBAtc website (www.ubadc.be).

Annex I : Description of product types of Cem-FIL® AR-glass fibres

Table A.I.1. Cem-FIL® AR-glass fibres

Cem-FIL® AR-glass fibres		Size content	Linear density			Tensile strength of strands (a) ISO 3341 (b) EN 14149	Alkali resistance (SiC strength)	Length of strands	Effect on consistency of concrete (**)	Effect on strength of concrete (**)
Type	Fibre Type		Average filament diameter	Strand tex	Roving tex					
		[% by mass]	[µm]	[g/km]	[g/km]	[MPa]	[MPa]	[mm]		
Integral Chopped Strands	Cem-FIL® 60.3 82 tex	0,95	14	82	-	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	≤ 40	NPA	NPA
	Cem-FIL® 60.3 135tex	0,95	18	135	-	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	≤ 40	NPA	NPA
	Cem-FIL® 62.4 45tex	2,25	13	45	-	>1000 ^(a) >700 ^(b)	≥ 400 Cat. I	≤ 40	NPA	NPA
	Cem-FIL® 62.4 82tex	1,75	14	82	-	>1000 ^(a) >700 ^(b)	≥ 400 Cat. I	≤ 40	NPA	NPA
Assembled Roving	Cem-FIL® 54.2 76tex 2450	2,00	14	76	2450	>1000 ^(a) >700 ^(b)	≥ 400 Cat. I	Endless*	NPA	NPA
	Cem-FIL® 54.2 38tex 2450	2,00	14	38	2450	>1000 ^(a) >700 ^(b)	≥ 400 Cat. I	Endless*	NPA	NPA
	Cem-FIL® 61.2 82tex 2500	1,75	14	82	2450	>1000 ^(a) >700 ^(b)	≥ 400 Cat. I	Endless*	NPA	NPA
Direct Roving	Cem-FIL® 5325 320tex	0,80	14	320	320	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	Endless*	NPA	NPA
	Cem-FIL® 5325 640tex	0,80	14	640	640	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	Endless*	NPA	NPA
	Cem-FIL® 5325 1200 tex	0,80	19	1200	1200	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	Endless*	NPA	NPA
* chopped by user to ≤ 75 mm										
** NPA = No Performance Assessed										

Annex II: Description of product types of Anti-Crak® AR-glass fibres

Table A.II.1. Anti-Crak® AR-glass fibres

Anti-Crak® AR-glass fibres		Size content	Linear density			Tensile strength of strands (a) ISO 3341 (b) EN 14449	Alkali resistance (SiC strength)	Length of strands	Effect on consistency of concrete	Effect on strength of concrete
			Average filament diameter	Strand tex	Roving tex					
Type	Fibre Type	[% by mass]	[mm]	[g/km]	[g/km]	[MPa]	[MPa]	[mm]		
Integral chopped strands	Anti-CRAK® HP 58/12	1,00	17	80	-	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	12	NPA ¹	NPA ¹
	Anti-CRAK® HP 24	2,10	16	300	-	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	24	30 kg/m ³ Reference concrete: V4 (4 sec) ² Concrete with 30 kg fibres/m ³ : V3 (6 sec) ³	30 kg/m ³ F(CMOD 0,5mm) = 3,8 MPa F(CMOD 3,5mm) = 1,1 MPa
	Anti-CRAK® HP 67/36	2,00	19	430	-	>1000 ^(a) >700 ^(b)	≥ 350 Cat. II	36	20 kg/m ³ Reference concrete: V3 (9 sec) Concrete with 20 kg fibres/m ³ : V3 (7 sec) ⁴	20 kg/m ³ F(CMOD 0,5mm)= 3,0 MPa F(CMOD 3,5mm)= 1,4 MPa

¹ NPA = No Performance Assessed

² Due to a special mixing procedure, the Vebe time of the reference concrete is not conforming to the demands of EN 14845-1. With a normal mixing procedure, the reference Vebe time is 6 to 7 sec.

³ with addition of 0,25% of the cement weight of superplast "Sika Gold"

⁴ with addition of 0,6% of the cement weight of superplast "Sika Sikament FF"

Annex III: Description of product types of ARcoteX® AR-glass fibres

Table A.III.1. ARcoteX® AR-glass fibres

Arcotex® AR-glass fibres		Size content	Linear density			Tensile strength of strands (a) ISO 3341 (b) EN 14749	Alkali resistance (SiC strength)	Length of strands	Effect on consistency of concrete (**)	Effect on strength of concrete (**)
			Average filament diameter	Strand tex	Roving tex					
Type	Fibre Type	[% by mass]	[mm]	[g/km]	[g/km]	[MPa]	[MPa]	[mm]		
Direct	ARcoteX® 5326 600tex	0,80	19	600	600	>1000 (a) >700 (b)	≥ 250 Cat. III	Endless*	NPA	NPA
	ARcoteX® 5326 1200tex	0,80	19	1200	1200	>1000 (a) >700 (b)	≥ 250 Cat. III	Endless*	NPA	NPA
* chopped by user to ≤ 75 mm										
** NPA = No Performance Assessed										

Annex IV: Factory Production Control - test plan

Table A.IV.1. Factory production control (FPC)
[including testing of samples taken at the factory in accordance with a prescribed test plan]

No	<i>Subject/type of control (product, raw/constituent material, component - indicating characteristic concerned)</i>	<i>Test or control method</i>	<i>Criteria, if any</i>	<i>Minimum number of samples</i>	<i>Minimum frequency of control</i>
1	Zirconium dioxide content (ZrO ₂)	EAD; §2.2.2.2		1 sample	once a week
2	Density	EAD; §2.2.2.3*		1 sample	once a week
3	Size content	EAD; §2.2.2.4		2 samples	once a day
4	Moisture content	EAD; §2.2.2.5		2 samples	once a day
5	Average diameter of filaments	EAD; §2.2.2.6		30 filaments 2 samples (indirect measure)	once a week once a day
6	Length of chopped strands	EAD; §2.2.2.7		30 fibres	once a day
7	Linear density of strand (Strand tex) - continuous products - direct chopped strands	EAD; §2.2.2.8		2 samples 2 samples	once a day once a month
8	Linear density of roving (Roving tex)	EAD; §2.2.2.9		1 sample	once a day
9	Tensile strength of strands	EAD; §2.2.3		10 fibres	once a month
10	Alkali resistance (SIC strength)	EAD; §2.2.4		10 fibres	once a month
*) Other methods than the one indicated may be used provided they give results correlated and equivalent to those obtained with the reference method.					