Reaction to Fire Classification Report

Glassfibre Reinforced Concrete

Client:	B.B. Fiberbeton A/S		
File no.:	PCA10672A		
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ilac-MRA DANAK Test Reg.no. 0012

Client information

Client:	B.B. Fiberbeton A/S
Address:	Hjørnegårdsvej 10
	4623 Lille Skensved
	Denmark

1. Introduction

This classification report defines the classification assigned to the product "Glassfibre Reinforced Concrete" in accordance with the procedures given in EN 13501-1:2018.

2. Details of classified product

2.1 General

The product "Glassfibre Reinforced Concrete" is defined as glassfibre reinforced concrete of GRC Grade 18P according to "Specification for the Manufacture, Curing & Testing of Glassfibre Reinforced Concrete (GRC) Products" by The International Glassfibre Reinforced Concrete Association (GRCA) dated October 2017.

2.2 Product description

The product "Glassfibre Reinforced Concrete" is described in the test reports in support of the classification listed in 3.1.

Details were stated by the client, see enclosure 1.

Specifications on Grade 18P composition taken from table 3c of "Specification for the Manufacture, Curing & Testing of Glassfibre Reinforced (GRC) Products" October 2017 is shown in enclosure 2.

3. Reports and results in support of this classification

3.1 Reports

Name of laboratory	Name of client	Report ref. No	Test method Field of application rules	Test date
DBI	B.B. Fiberbeton A/S	PFA11587A	EN ISO 1716 EN ISO 1182	2020-10-07 2020-10-01

3.2 Results

Test method	Parameter	Number of tests[a]	Results	
			Continuous parameter mean	Compliance with parameters
EN ISO 1182	ΔT (°C) (1) Δm (%) (1) t_f (s) (1)	5 5 5	1.2 12.4 0	(-) (-) (-)
EN ISO 1716	PCS (MJ/kg) (1)	3	0.55	(-)
(1) Homogeneous product				

4. Classification and field of application

4.1 Reference of classification

This classification has been carried out in accordance with clause 11.8 of EN 13501-1:2018.

4.2 Classification

The product "Glassfibre Reinforced Concrete" in relation to its reaction to fire behavior is classified: A1

Reaction to fire classification:

A1

4.3 Field of application

The classification is valid for any end use condition.

The classification is valid for the following product parameter:

- for the specifications of the tested product described in the test report

The exact amount of polymer solids in the sample tested were not stated by the client.

5. Limitations

This classification document does not represent type approval or certification of the product.

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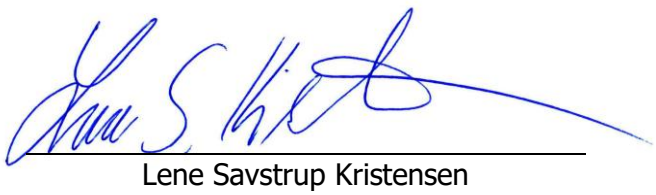

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BB fiberbeton

TECHNICAL DATA

DESCRIPTION	SYMBOL	CHARACTERISTICS 28 DAYS	DESIGN RESISTANCE	SAFETY
COMPRESSIVE STRENGTH	F_c	60 MPa	12 MPa	γ=5
TENSILE STRENGTH	UTS f_t	10 MPa	4 MP$_a$	22 % af MOR
TENSILE DEFORMATION		1,2 ‰		
BENDING STRENGTH, EN 1170-4/6				
t ≥ 8 mm	LOP f_R	10 MPa	6 MPa	
t < 8 mm	LOP f_R	10 MPa	3 MPa	
	MOR	18 MPa	6 MPa	γm=3
SHEAR STRENGTH	FT	3,5 MPa	2 MPA	γ=1,7
IN-PLANE SHEAR STRENGTH	FTB	9 MPA	4,5 MPA	Γ=2
EXTRACTING CHOPPER				
(Ø4 mm)	Ø 4 mm	2 kN	1.1 kN	γ=1,8
	Ø 6 mm	3,9 kN	2,1 kN	γ=1,8
	BH-M6	2,2 kN	1,2 kN	γ=1,8
IMPACT RESISTANCE		40-50 kJ/m²		
E-MODUS				
Short term	E_0	20 X 10³ MPa	14 X 10³ MPa	γG=1,4
Long term	E_1	8.5 X 10³ MPa	4.7 X 10³ MPa	γG=1,8
U short	Uk	L/200		
U long	Ul	L/350		
ISOLATION ABILITY	°C	0.5-1.0 w/m		
TEMPERATURE EXPANSION		1.0 X 10⁻⁵ / °C		
MOISTURE EXPANSION		0.1-1.5 ‰		
DEAD WEIGHT		20 kN/m²		
SPECIFIC HEAT	°C	≈ 2.4 MJ/m³		
SOUND REDUCTION				
1 = 10 mm		30-32 dBA		
FIRE RESISTANCE CLASSIFICATION		Class A2-s1, d0 material, EN 13501		

	CHARACTERISTICS
MATERIAL	Spray-up glass fibre reinforced concrete, Grade 18P according to GRCA
CEMENT	White cement, EN 197-1
SAND	Crushed white dolomite or crushed calcium with crystallised structure sorted to well-defined grain. Both types are free of asbestos and asbestos like material.
GLASS FIBRE	Alkali-resistant roving (Cem FIL AR glass fibre)
WATER	Water of drinking water quality from public water supply, EN 1008
ADDITIVES	Superplasticisers based on melamin. Curing improvement admixture based on acrylic polymers (type Forton)
QUALITY	Production of BB fiberbeton elements is carried out and controlled in accordance with BB fiberbeton A/S's quality manual. BB fiberbeton A/S's documentation for applying to quality manual is available on request. All elements from BB fiberbeton A/S are clearly marked with cast date, element number and serial number.
TOLERANCES	Thickness plane elements: +/- 2 mm Thickness 3D-elements: +/-3 mm Height and width of units: - Up to 4 m = +/- 3 mm - 4 to 9 m = +/- 5 mm Straightness (local smoothness) or bow (deviation from intended line): - Up to 3 m = 5 mm - 3 to 6 m = 8 mm Squareness: Difference in length of 2 diagonals = 3 mm per 2 m, up to maximum of 6 mm Twist (any corner from the plane containing the other 3 corners): - Up to 3 m = 5 mm - 3 to 6 m = 8 mm

The above listed material data can be used dimensioning of spray-up GFRC from BB fiberbeton A/S.

Characteristic strength parameters are based on 5% fractal and indicates uniaxial stress states. In the above design strengths, partial coefficient % = 1.8 is used.

This means that the design material parameters are specified for normal safety class and normal control class.

Foreningen af Rådgivende Ingeniører FRI

Statiske beregninger udføres af: KLAUS NIELSEN Rådgivende ingeniørfirma FRI AS
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Table 3c: Guide mix designs — Grade 18

Spray Grade	Grade 18	Grade 18P
Description	Direct sprayed GRC	
Aggregate/cement ratio	0.5 -1.5	0.5 -1.5
Water/cement ratio	0.30 - 0.38	0.30 - 0.38
Glassfibre content (% by weight of total mix)	4.0 - 5.5%	4.0 - 5.5%
Polymer solids content (% by weight of cement)	Nil	4-7%
Extreme dimensional variations mm/m	0.6 – 1.2	0.6 – 1.2
Water Absorption	5 – 11%	5 – 11%
Minimum bulk dry density kg/m^3	1800	1800
Minimum bulk wet density kg/m^3	2000	2000