



TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Construction Prague

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Testing Laboratory No 1018.3

accredited by ČIA pursuant to ČSN EN ISO/IEC 17025:2018

TEST REPORT

No 060-057936

On test of tensile properties, alkali resistance, determination of nominal diameter

Manufacturer: Composite Group s.r.o.
Address: Panenská 5, 811 03 Bratislava, Slovakia
Identification No: SK2121417892, 53577892

Plant address: Composite Group s.r.o.
Priemyselná 8, 924 01 Galanta, Slovakia

Test sample: **Composite GFRP reinforcement - TopBAR**

Order No: Z060240046

No. of pages of the test report incl. title page: 4 Pages of annexes: -

Prepared by:



Approved by:


Ing. Lubomír Opat
test technician - specialist


Ing. Robert Lhotský
deputy head of the Testing Department

Copy No: 1
Number of copies: 2

stamp of the testing laboratory No 1018.3

Brno, on 23rd May 2024

Declaration: 1) The test results in this Report relate only to the tested article and they do not substitute any other documents.
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3) The laboratory is not responsible for the result if it could be influenced by the information provided by the customer (marked with * in the report).
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1. Sample data

Evidence Number: VZ060240086 - 10 mm
 Sample: FRP bars made of glass fibres (wrapped) diameter 10 mm
 Date of sample delivery: 28th February 2024, taken over by Ing. Marek Sopko
 Bars before tests were prepared by pouring epoxy resin into the metal ends.
 The test results apply to the sample as received.

2. Test methods

Identification of the test method		Title of the test method
ISO 10406-1 chap. 5	Fibre-reinforced polymer (FRP) reinforcement of concrete - Test methods - Part 1: FRP bars and grids Test method for cross-sectional properties	Determination of the nominal cross-sectional area
ISO 10406-1 chap. 6	Fibre-reinforced polymer (FRP) reinforcement of concrete - Test methods - Part 1: FRP bars and grids Test method for tensile properties	Determination of the tensile strength, modulus of elasticity, elongation
ISO 10406-1 chap. 11.	Fibre-reinforced polymer (FRP) reinforcement of concrete - Test methods - Part 1: FRP bars and grids Test method for alkali resistance	Determination of the alkali resistance

deviations or exclusions from the standard procedure or use of non-standardized methods: were not applied.

3. Test results

The tests were evaluated on: 23rd May 2024
 Place of testing: Laboratories of Testing Department Brno
 The tests were performed by: Ing. Lubomír Opat

Measured data, test conditions and equipment used are listed in the Test Minutes. Apparatuses and measuring instruments that were used have been calibrated and verified pursuant to the valid plan of Testing Department Brno.

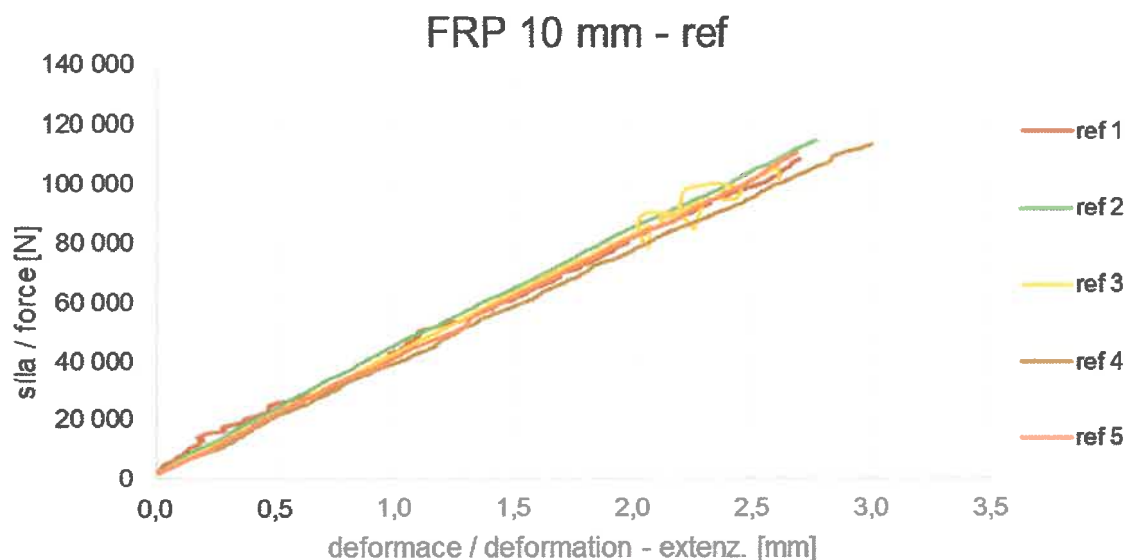
3.1 Determination of nominal diameter according to ISO 10406-1 chap. 5

Sample	Length [mm]	Volume [mm ³]	Nom. diameter Ø [mm]	Cross-sec. area A [mm ²]
I	100,55	8 000	10,06	79,56
II	100,88	8 500	10,36	84,26
III	100,88	8 500	10,36	84,26
Average	100,80	8 333	10,30	82,70



3.2 Determination of tensile strength according to ISO 10406-1 chap. 6.4.3

Sample No.	Maximum force F_u [N]	Tensile strength f_u [N/mm ²]	Average tensile strength f_{um} [N/mm ²]	Standard deviation [N/mm ²]	Tensile strength - char. value f_{uc} [N/mm ²]
1 ref	108 270	1 309	1 336	39,8	1 243
2 ref	114 731	1 387			
3 ref	105 707	1 278			
4 ref	113 420	1 371			
5 ref	110 355	1 334			



Graph 1: expression of the dependence of the sample deformation on the load

3.2.1 Determination of elongation and tensile rigidity according to ISO 10406-1 chap. 6.4.4, 6.4.5.

The elongation is determined by calculation from the extensometer data, unless otherwise stated.

Tensile rigidity was determined by calculation from measured values from tensile strength tests.

Sample No.	Elongation [%]	Average elongation [%]	Tensile rigidity E_A [kN]	Average value of tensile rigidity E_{Am} [kN]	Standard deviation S [kN]
1 ref	2,68	2,76	3 817	3 976	106
2 ref	2,86		4 077		
3 ref	2,64		4 054		
4 ref	2,96		3 880		
5 ref	2,66		4 053		

3.2.2 Determination of Young's modulus of elasticity according to ISO 10406-1 chap. 6.4.4

Modulus was determined by calculation from measured values from tensile strength tests.

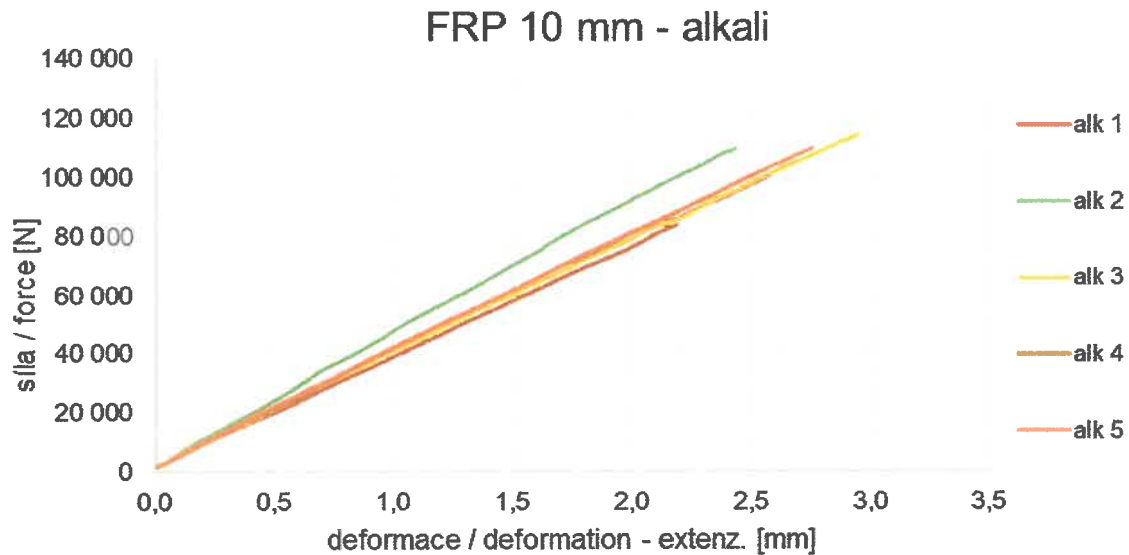
Sample No.	Modulus of elasticity E [GPa]	Average value of the modulus of elasticity E_m [GPa]	Standard deviation S [GPa]
1 ref	46,2	48,1	1,27
2 ref	49,3		
3 ref	49,0		
4 ref	46,9		
5 ref	49,0		



3.3 Determination of alkali resistance according to ISO 10406-1 chap. 11

3.3.1 Determination of tensile strength according to ISO 10406-1 chap. 6.4.3

Sample No.	Maximum force F_u [N]	Tensile strength f_u [N/mm ²]	Average tensile strength f_{um} [N/mm ²]	Standard deviation [N/mm ²]
1 alk	105 417	1 275	1 312	48,2
2 alk	109 735	1 327		
3 alk	114 538	1 385		
4 alk	102 976	1 245		
5 alk	109 725	1 327		



Graph 2: expression of the dependence of the sample deformation on the load after alkali cond.

3.3.2 Determination of elongation and tensile rigidity according to ISO 10406-1 chap. 6.4.4

The elongation is determined by calculation from the extensometer data, unless otherwise stated. Tensile rigidity was determined by calculation from measured values from tensile strength tests.

Sample No.	Elongation [%]	Average elongation [%]	Tensile rigidity E_A [kN]	Average value of tensile rigidity E_{Am} [kN]	Standard deviation S [kN]
1 alk	2,68	2,68	3 843	4 101	318
2 alk	2,43		4 712		
3 alk	2,96		3 919		
4 alk	2,54		4 109		
5 alk	2,78		3 924		

3.3.3 Determination of Young's modulus of elasticity according to ISO 10406-1 chap. 6.4.4

Modulus was determined by calculation from measured values from tensile strength tests.

Sample No.	Modulus of elasticity E [GPa]	Average value of the modulus of elasticity E_m [GPa]	Standard deviation S [GPa]
1 alk	46,5	49,6	3,85
2 alk	57,0		
3 alk	47,4		
4 alk	49,7		
5 alk	47,4		

END OF THE TEST REPORT

