



**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 060-057937**

**On test of tensile properties, 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: 3 Pages of annexes: -

Prepared by:

**Ing. Lubomír Opat**  
test technician - specialist

Approved by:



**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 23<sup>rd</sup> May 2024

Declaration: 1) The test results in this Report relate only to the tested article and they do not substitute any other documents.  
2) The test report must be copied as a whole only otherwise a written consent of the testing laboratory is needed.  
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).  
4) This test report is issued in Czech and English. In the event of a dispute the Czech version shall prevail.

## 1. Sample data

Evidence Number: VZ060240086 - 16 mm  
 Sample: FRP bars made of glass fibres (wrapped) diameter 16 mm  
 Date of sample delivery: 28<sup>th</sup> 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

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

## 3. Test results

The tests were evaluated on: 23<sup>rd</sup> 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.

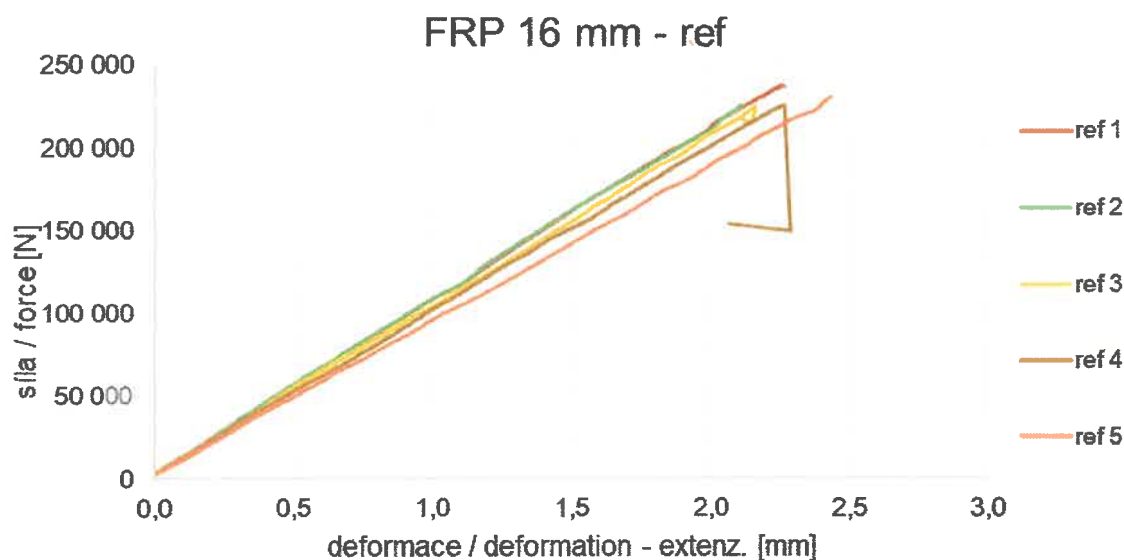
### 3.1 Determination of nominal diameter according to ISO 10406-1 chap. 5

Sample	Length [mm]	Volume [mm <sup>3</sup> ]	Nom. diameter Ø [mm]	Cross-sec. area A [mm <sup>2</sup> ]
I	101,52	21 000	16,23	206,86
II	100,92	20 500	16,08	203,12
III	101,73	21 000	16,21	206,44
<b>Average</b>	<b>101,40</b>	<b>20 833</b>	<b>16,20</b>	<b>205,50</b>



### 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 <sup>2</sup> ]	Average tensile strength $f_{um}$ [N/mm <sup>2</sup> ]	Standard deviation [N/mm <sup>2</sup> ]	Tensile strength - char. value $f_{uc}$ [N/mm <sup>2</sup> ]
1 ref	237 627	1 156	<b>1 115</b>	22,7	<b>1 062</b>
2 ref	226 207	1 101			
3 ref	225 152	1 096			
4 ref	225 842	1 099			
5 ref	231 001	1 124			



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	2,23	<b>2,20</b>	10 537	<b>10 149</b>	<b>527</b>
2 ref	2,04		10 666		
3 ref	2,14		10 134		
4 ref	2,18		10 242		
5 ref	2,41		9 169		

### 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	51,3	<b>49,4</b>	<b>2,57</b>
2 ref	51,9		
3 ref	49,3		
4 ref	49,8		
5 ref	44,6		

END OF THE TEST REPORT

