

Test report no.: 122842/16

Client: R&G Faserverbundwerkstoffe GmbH
Im Meißel 7-13
71111 Waldenbuch
GERMANY

Order: Tests of carbon fibre tubes, roll-wrapped

Letter of: 2016-09-27 **Reference:** ---

Receipt of samples: 2016-09-29 **Date of sampling:** ---

Test period: 2016-09-30 to 2016-10-26

This test report comprises 5 pages.

Würzburg, 17 November 2016
For/hn

i. V.



Dr. Anton Zahn



i. A. *R. Forster*

M.Sc. Regina Forster

The original language of the test report is German. In case of doubt, the German version is obligatory.

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1. Order

By letter of 27th September 2016 the company R&G Faserverbundwerkstoffe GmbH, Im Meißel 7-13, 71111 Waldenbuch, GERMANY, placed an order with SKZ - Testing GmbH to carry out tests on carbon round tubes.

2. Test material

The following test material was sent to SKZ - Testing GmbH by the customer on 29 September 2016:

Material	Quantity	Denomination*	Dimensions [mm]
1	6	7410081 Carbon fibre tube, roll-wrapped, plain weave 3k	approx. (∅ 10 / 8) x 1000

* according to the client

The SKZ - Testing GmbH had no influence on the selection of the test material.

3. Test procedure

Usually, we carry out tests according to standards for which we have an accreditation. The list of all standards for which we are accredited is shown on the homepage at www.szk.de.

Unless stated otherwise, all the tests were performed at standard atmosphere 23/50 according to DIN EN ISO 291: 2008-08, class 1 "Plastics - Standard atmospheres for conditioning and testing" and after storage for at 24 hours at this atmosphere.

The following tests were carried out:

3.1 Mass per unit length

The mass per unit length was determined on 6 round tubes. For this purpose the round rod length was measured and the weight determined. On the basis of these data the mass per meter was calculated.

3.2 Flexural test

The bending strength was determined according to DIN EN ISO 14125: 2011-05 "Fibre-reinforced plastic composites - Determination of flexural properties".

Number of specimens:	10
Specimens:	approx. 500 mm x (Ø 10 / 8) mm
Testing speed:	26.7 mm/min
Distance between the supports:	400 mm
Deflection measurement:	Touching sensor
Load cell:	2 kN

3.3 Compression test

The compressive strength was determined according to DIN EN ISO 604: 2003-12 "Plastics - Determination of compressive properties".

Number of specimens:	10
Specimens:	approx. 10 mm x (Ø 10 / 8) mm
Testing speed:	1 mm/min
Deflection measurement:	Traverse
Load cell:	250 kN

4. Results

4.1 Mass per unit length

Material	Parameter	Unit	SV	Result	
				\bar{x}	s
1 (7410081)	Mass per unit length	g/m	40.6	41.0	0.5
			41.4		
			41.8		
			40.6		
			40.5		
			41.0		

SV = single value; \bar{x} = arithmetic mean value; s = standard deviation

4.2 Bending strength

Material	Parameter	Unit	SV	Result	
				\bar{x}	s
1 (7410081)	Bending strength	MPa	378	461	42
			425		
			485		
			465		
			529		
			505		
			467		
			459		
			462		
			439		

SV = single value; \bar{x} = arithmetic mean value; s = standard deviation

4.3 Compressive strength

Material	Parameter	Unit	Result		
			SV	\bar{x}	s
1 (7410081)	Compressive strength	MPa	209	224	17
			201		
			221		
			226		
			242		
			227		
			216		
			211		
			232		
			259		

SV = single value;

\bar{x} = arithmetic mean value;

s = standard deviation