

Test report no.: 121581/16

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

Order: Comparative tests of pultruded
carbon fibre tubes

Letter of: 2016-06-29 **Reference:** ---

Receipt of samples: 2016-06-30 **Date of sampling:** ---

Test period: 2016-07-15 to 2016-08-26

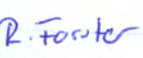
This test report comprises 6 pages.

Würzburg, 15 September 2016
For/hn

i. V.


Dr. Anton Zahn



i. A. 

M.Sc. Regina Forster

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

Die ungekürzte oder auszugsweise Wiedergabe, Vervielfältigung und Übersetzung dieses Berichtes zu Werbezwecken bedarf der schriftlichen Genehmigung der SKZ – Testing GmbH. Die Ergebnisse beziehen sich auf die geprüften Produkte. Die Akkreditierungen gelten nur für die in den Urkunden aufgeführten Normen und Verfahren, die im Internet unter www.skz.de eingesehen werden können.

1. Order

By letter of 29th June 2016 the company R&G Faserverbundwerkstoffe GmbH, Im Meißel 7-13, 71111 Waldenbuch, GERMANY, placed an order with SKZ - Testing GmbH to carry out comparative tests on carbon fibre round tubes.

2. Test material

The following test materials were sent to SKZ - Testing GmbH by the customer on 30 June 2016:

Material	Quantity	Denomination*	Dimensions [mm]
1	6	60510081 DPP™ Carbon tube, pultruded	approx. \varnothing (9.8 / 8.0) x 1000
2	6	7310081 R&G Carbon tube, pultruded	approx. (\varnothing 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.skz.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 48 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 each. 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 each
Specimens:	500 mm x ϕ (9.8 / 8.0) and (ϕ 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:	at least 9 each
Specimens:	500 mm x ϕ (9.8 / 8.0) and (ϕ 10 / 8) mm
Testing speed:	1 mm/min
Deflection measurement:	Traverse
Load cell:	100 kN



4. Results

4.1 Mass per unit length

Material	Parameter	Unit	Result		
			SV	\bar{x}	s
1 (60510081)	Mass per unit length	g/m	41.3	41,3	0,1
			41.3		
			41.2		
			41.3		
			41.3		
			41.3		
2 (7310081)	Mass per unit length	g/m	45.7	45.8	0.1
			45.8		
			45.9		
			45.9		
			45.7		
			45.8		

SV = single value;

\bar{x} = arithmetic mean value;

s = standard deviation



4.2 Bending strength

Material	Parameter	Unit	Result		
			SV	\bar{x}	s
1 (60510081)	Bending strength	MPa	351	358	19
			389		
			337		
			374		
			328		
			382		
			358		
			347		
			349		
			360		
2 (7310081)	Bending strength	MPa	398	409	19
			414		
			441		
			402		
			399		
			377		
			397		
			406		
			433		
			420		

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



4.3 Compressive strength

Material	Parameter	Unit	Result		
			SV	\bar{x}	s
1 (60510081)	Compressive strength	MPa	668	640	126
			657		
			776		
			612		
			359		
			581		
			628		
			699		
			781		
2 (7310081)	Compressive strength	MPa	497	497	80
			318		
			462		
			606		
			444		
			510		
			504		
			579		
			501		
			547		

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

