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Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results		Licence Number	011-7S2835 F
		Date issued	2018-02-23
		Issued by	DIN CERTCO

Licence holder	**GREENoneTEC Solarindustrie GmbH**	**Country**	Austria
Brand (optional)	-	**Web**	www.greenonetec.com
Street, Number	Industriepark St. Veit, Energieplatz 1	**E-mail**	info@greenonetec.com
Postcode, City	9300 St. Veit/Glan	**Tel**	+43 4241 28 136-0

Collector Type	Flat plate collector, glazed

	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m²; Gd = 150 W/m²; u = 3 m/s ϑm - ϑa					
					0 K	10 K	30 K	50 K	70 K	107 K
Collector name	m²	mm	mm	mm	W	W	W	W	W	W
GK 3602 FL	5.24	1 185	4 426	114	4 046	3 866	3 470	3 023	2 526	1 473
GK 3802 FL	7.86	1 185	6 632	114	6 069	5 800	5 205	4 534	3 789	2 210
Power output per m² gross area					772	738	662	577	482	281

Performance parameters test method	Quasi dynamic								
Performance parameters (related to AG)	η0,b	c1	c2	c3	c4	c6	Kd		
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	s/m	-		
Test results	0.777	3.304	0.012	0.000	0.000	0.000	0.958		

Incidence angle modifier test method	Quasi dynamic - outdoor								
Bi-directional incidence angle modifiers	No								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	1.00	0.99	0.98	0.93	0.87	0.61	0.31	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.93	0.87	0.61	0.31	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	107	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	201	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	11.89	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	110	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	TZS, ITW University Stuttgart	www.itw.uni-stuttgart.de	
Test report(s)	17COL1392 17COL1392Q	**Dated**	24.01.2018 22.02.2018

Comments of testing laboratory — Datasheet version: 5.01, 2016-03-01

Documented performance parameters are taken from test report 17COL1392 (GK3602 FL)

TZS Forschungs- und Testzentrum für Solaranlagen
Institut für Thermodynamik und Wärmetechnik
Universität Stuttgart
Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)

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Supplementary Information	Issued	2018-02-23

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results

Standard Locations	Athens			Davos			Stockholm			Würzburg		
Collector name ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
GK 3602 FL	6 565	4 845	3 311	5 083	3 641	2 411	3 712	2 525	1 605	4 048	2 742	1 721
GK 3802 FL	9 847	7 267	4 967	7 625	5 461	3 617	5 568	3 787	2 408	6 071	4 112	2 581
Annual output per m² gross area	1 253	925	632	970	695	460	708	482	306	772	523	328
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 kWh/m²			1166 kWh/m²			1244 kWh/m²		
Mean annual ambient air temperature	18.5°C			3.2°C			7.5°C			9.0°C		
Collector orientation or tracking mode	South, 25°			South, 30°			South, 45°			South, 35°		

The collector is operated at constant temperature ϑm (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	A	--
Maximum tested positive load	3000	Pa
Maximum tested negative load	2500	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
GK 3602 FL	5.24
GK 3802 FL	7.86

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
Collector efficiency (η_{col})	62	%

Remark: Collector efficiency (η_{col}) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m², expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
Zero-loss efficiency (η_0)	0.772	--
First-order coefficient (a_1)	3.30	W/(m²K)
Second-order coefficient (a_2)	0.012	W/(m²K²)
Incidence angle modifier IAM (50°)	0.93	--

Remark: The data given in this section are related to collector reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.