



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2001 F				
					Date issued		2017-10-05				
					Issued by		TÜV Rheinland Energy GmbH				
Licence holder		GREENoneTEC Solarindustrie GmbH			Country		Austria				
Brand (optional)		GK3002 FL-AR Series			Web		www.greenonetec.com				
Street, Number		Energieplatz 1, Industriepark St. Veit			E-mail		Ingo.Lankmayr@greenonetec.com				
Postcode, City		9300 St. Veit			Tel		+43 4212 28136-0				
Collector Type					Flat plate collector, glazed						
Collector name	Gross area (A <sub>G</sub> ) m <sup>2</sup>	Gross length mm	Gross width mm	Gross height mm	Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> ϑ <sub>m</sub> - ϑ <sub>a</sub>						
					0 K	10 K	30 K	50 K	70 K	90 K	
					W	W	W	W	W	W	
GK3502 FL-AR	5.04	2 065	2 443	113	3 940	3 782	3 428	3 021	2 562	2 050	
GK3102 FL-AR	10.06	2 065	4 871	113	7 856	7 542	6 835	6 024	5 108	4 087	
Power output per m <sup>2</sup> gross area					781	750	680	599	508	406	
Performance parameters test method		Steady state - indoor									
Performance parameters (related to AG)		η <sub>0,hem</sub>	a <sub>1</sub>	a <sub>2</sub>							
Units		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
Test results		0.781	2.993	0.013							
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 <sub>θT, coll</sub>	1.00	0.99	0.97	0.94	0.90	0.82	0.65	-	0.00
Longitudinal		K <sub>θL, coll</sub>	1.00	0.99	0.97	0.94	0.90	0.82	0.65	-	0.00
Heat transfer medium for testing		Water									
Flow rate for testing (per gross area, A <sub>G</sub> )		dm/dt	0.020	kg/(sm <sup>2</sup> )							
Maximum temperature difference for thermal performance calculations		(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>	90	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ϑ <sub>a</sub> = 30 °C)		ϑ <sub>stg</sub>	212	°C							
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )		C/m <sup>2</sup>	6.73	kJ/(Km <sup>2</sup> )							
Maximum operating temperature		ϑ <sub>max, op</sub>	*	°C							
Maximum operating pressure		p <sub>max, op</sub>	1000	kPa							
Testing laboratory		TÜV Rheinland Energy GmbH					www.tuv.com/solarpower				
Test report(s)		21219755_EN_P_GK3502_FL-AR 21219755_EN_R_GK3502					Dated		10.09.2012 10.09.2012		
Comments of testing laboratory		Datashet version: 5.01, 2016-03-01									
<p><i>*This data sheet is not complete as the testing of the collector was not performed according to ISO 9806:2013. The steady state test evaluation was recalculated with gross area. The former values related to 4.64 m<sup>2</sup> aperture area had been: eta0a=0.849; a1a=3.251; a2a=0.014.</i></p>		 Genuin. Richtig.  TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln									
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<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S2001 F</b>
	<b>Issued</b>	<b>2017-10-05</b>

<b>Annual collector output in kWh/collector at mean fluid temperature <math>\vartheta_m</math>, based on EN ISO 9806:2013 test results</b>													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
GK3502 FL-AR		6 103	4 571	3 179	4 786	3 487	2 356	3 485	2 421	1 575	3 771	2 604	1 667
GK3102 FL-AR		12 169	9 115	6 339	9 542	6 953	4 697	6 948	4 828	3 140	7 519	5 191	3 324
Annual output per m <sup>2</sup> gross area		1 210	906	630	949	691	467	691	480	312	748	516	330
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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 $\vartheta_m$ (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 <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													

<b>Additional Information</b>		
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)	B	--
Maximum tested positive load	3000	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	*	m

<b>Energy Labelling Information</b>				
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$		
GK3502 FL-AR	5.04	Collector efficiency ( $\eta_{col}$ )	64	%
GK3102 FL-AR	10.06	Remark: Collector efficiency ( $\eta_{col}$ ) 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/m <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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 ( $\eta_0$ )	0.781	--
		First-order coefficient ( $a_1$ )	2.99	W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.013	W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.90	--
		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.		