


<b>Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results</b>					<b>Licence Number</b>		<b>011-7S2845 F</b>							
					<b>Date issued</b>		<b>2018-04-04</b>							
					<b>Issued by</b>		<b>DIN CERTCO</b>							
<b>Licence holder</b>	<b>GREENoneTEC Solarindustrie GmbH</b>				<b>Country</b>	Austria								
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<b>Postcode, City</b>	9300 St. Veit/Glan				<b>Tel</b>	+43 4212 28 136-0								
<b>Collector Type</b>					Flat plate collector, glazed									
<b>Collector name</b>	<b>Gross area (A<sub>G</sub>)</b> m <sup>2</sup>	<b>Gross length</b> mm	<b>Gross width</b> mm	<b>Gross height</b> mm	<b>Power output per collector</b> 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 W	10 K W	30 K W	50 K W	70 K W	100 K W				
<b>FK 6163N 4H</b>	1.67	1 674	998	58	1 202	1 132	983	822	648	366				
<b>Power output per m<sup>2</sup> gross area</b>					720	678	589	492	388	219				
<b>Performance parameters test method</b>					Steady state - indoor									
<b>Performance parameters (related to A<sub>G</sub>)</b>					η <sub>0,hem</sub>	a <sub>1</sub>	a <sub>2</sub>							
<b>Units</b>					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
<b>Test results</b>					0.720	4.109	0.009							
<b>Incidence angle modifier test method</b>					Quasi dynamic - outdoor									
<b>Bi-directional incidence angle modifiers</b>					No									
<b>Incidence angle modifier</b>					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Transversal</b>					K <sub>θT, coll</sub>					0.93				0.00
<b>Longitudinal</b>					K <sub>θL, coll</sub>					0.93				0.00
<b>Heat transfer medium for testing</b>					Water									
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					dm/dt	0.020	kg/(sm <sup>2</sup> )							
<b>Maximum temperature difference for thermal performance calculations</b>					(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>	100	K							
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; ϑ<sub>a</sub> = 30 °C)</b>					ϑ <sub>stg</sub>	164	°C							
<b>Effective thermal capacity, incl. fluid (per gross area, A<sub>G</sub>)</b>					C/m <sup>2</sup>	9.87	kJ/(Km <sup>2</sup> )							
<b>Maximum operating temperature</b>					ϑ <sub>max, op</sub>	164	°C							
<b>Maximum operating pressure</b>					p <sub>max, op</sub>	1000	kPa							
<b>Testing laboratory</b>					TZS, ITW University Stuttgart			www.itw.uni-stuttgart.de						
<b>Test report(s)</b>					18COLP2040128010OEM01 18COLP2040128010QOEM01			<b>Dated</b>		26.03.2018 26.03.2018				
<b>Comments of testing laboratory</b>					Datashet version: 5.01, 2016-03-01									
Documented performance parameters are taken from test report 18COLP2040128010OEM01					 <b>TZS</b> Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 7050 Stuttgart (Vaihingen)									
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<b>Annex to Solar Keymark Certificate</b> <b>Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S2845 F</b>
	<b>Issued</b>	<b>2018-04-04</b>

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
Collector name	Standard Locations $\vartheta_m$	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
FK 6163N 4H		1 888	1 268	777	1 387	908	536	1 028	633	359	1 120	681	380
Annual output per m <sup>2</sup> gross area		1 131	760	465	830	544	321	616	379	215	671	408	228
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>													

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	5041	Pa
Maximum tested negative load	3020	Pa
	-	m

Energy Labelling Information			
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
FK 6163N 4H	1.67	Collector efficiency ( $\eta_{col}$ )	54 %
		<i>Remark: Collector efficiency (<math>\eta_{col}</math>) 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 <math>\eta_{col}</math> is based on reference area (<math>A_{sol}</math>) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.</i>	
		<b>Data required for CDR (EU) No 812/2013 - Reference Area <math>A_{sol}</math></b>	
		Zero-loss efficiency ( $\eta_0$ )	0.720 --
		First-order coefficient ( $a_1$ )	4.11 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.009 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.93 --
		<i>Remark: The data given in this section are related to collector reference area (<math>A_{sol}</math>) 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.</i>	