

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S798 F					
						Date issued		2017-02-14					
						Issued by		DIN CERTCO					
Licence holder	Enertech GmbH					Country	Germany						
Brand (optional)						Web	http://www.giersch.de						
Street, Number	Adjutantenkamp 18					E-mail	kontakt@giersch.de						
Postcode, City	D- 58675 Hemer					Tel	+49 (0) 2372 - 965 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 W	10 K W	30 K W	50 K W	70 K W	56 K W			
FK 3(s)	2.17	1 870	1 158	95	1 556	1 479	1 309	1 116	901	1 054			
FK 4(s)	2.51	2 168	1 158	95	1 800	1 711	1 514	1 291	1 042	1 219			
FK 3(w)	2.17	1 870	1 158	95	1 556	1 479	1 309	1 116	901	1 054			
FK 4(w)	2.51	2 168	1 158	95	1 800	1 711	1 514	1 291	1 042	1 219			
Power output per m <sup>2</sup> gross area					717	682	603	515	415	486			
Performance parameters test method		Steady state - indoor											
Performance parameters (related to A <sub>G</sub> )		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		0.717	3.400	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>					0.94				0.00		
Longitudinal		K <sub>θL, coll</sub>					0.94				0.00		
Heat transfer medium for testing		Water-Glycole											
Flow rate for testing (per gross area, A <sub>G</sub> )		dm/dt	0.070	kg/(sm <sup>2</sup> )									
Maximum temperature difference for thermal performance calculations		(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>	56	K									
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ϑ <sub>a</sub> = 30 °C)		ϑ <sub>stg</sub>	200	°C									
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )		C/m <sup>2</sup>	4.72	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		Institut für Solarenergieforschung Hameln						http://www.isfh.de					
Test report(s)		05-09/KD, 06-09/KQ, 08-09/KD, 55-09/KQ, 07-09/KD, 56-09/KQ						Dated 10.06.2009 10.06.2009 10.06.2009					
Comments of testing laboratory		Datashet version: 5.01, 2016-03-01											
This data sheet is not complete as the testing of the collector was not performed according to ISO 9806:2013.		Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-31860 Emmerthal Tel.: 05151/999-100 Fax: 05151/999-500											
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de													

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S798 F
	Issued	2017-02-14

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_{m,r}$ 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 3(s)		2 483	1 762	1 138	1 881	1 289	795	1 387	899	535	1 507	972	568
FK 4(s)		2 872	2 038	1 316	2 175	1 491	920	1 605	1 040	619	1 744	1 124	657
FK 3(w)		2 483	1 762	1 138	1 881	1 289	795	1 387	899	535	1 507	972	568
FK 4(w)		2 872	2 038	1 316	2 175	1 491	920	1 605	1 040	619	1 744	1 124	657
Annual output per m <sup>2</sup> gross area		1 144	812	524	867	594	367	639	414	246	695	448	262
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)		--
Maximum tested positive load	3000	Pa
Maximum tested negative load	3000	Pa
Hail resistance using steel ball (maximum drop height)	2	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 3(s)	2.17	Collector efficiency ( $\eta_{col}$ )	56 %
FK 4(s)	2.51	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.	
FK 3(w)	2.17		
FK 4(w)	2.51		
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
		Zero-loss efficiency ( $\eta_0$ )	0.717 --
		First-order coefficient ( $a_1$ )	3.40 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°)	0.94 --
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.			