




Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2872 F				
					Date issued		2018-07-30				
					Issued by		TÜV Rheinland Energy GmbH				
Licence holder	STI - Solar Technologie International GmbH				Country	Germany					
Brand (optional)	STI				Web	www.sti-solar.de					
Street, Number	Seiferitzer Allee 14				E-mail	info@sti-solar.de					
Postcode, City	08393 Meerane				Tel	+49 (0) 3763 7956 10					
Collector Type					Flat plate collector, glazed						
Collector name	Gross area (A _G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² ; u = 3 m/s ∅ _m - ∅ _a						
					0 K W	10 K W	30 K W	50 K W	70 K W	90 K W	
WPK 250 V Al/Al	2.63	2 293	1 145	85	1 696	1 580	1 319	1 017	676	294	
WPK 250 H Al/Al	2.63	1 145	2 293	85	1 696	1 580	1 319	1 017	676	294	
Power output per m ² gross area					646	602	502	387	257	112	
Performance parameters test method		Quasi dynamic									
Performance parameters (related to AG)		η _{0,b}	c ₁	c ₂	c ₃	c ₄	c ₆	K _d			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results		0.660	4.223	0.019	0.000	0.000	0.000	0.859			
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 _{θT, coll}	1.00	0.99	0.97	0.95	0.90	0.83	0.67		0.00
Longitudinal		K _{θL, coll}	1.00	0.99	0.97	0.95	0.90	0.83	0.67		0.00
Heat transfer medium for testing		Water-Glycole									
Flow rate for testing (per gross area, A _G)		dm/dt	0.018		kg/(sm ²)						
Maximum temperature difference for thermal performance calculations		(∅ _m -∅ _a) _{max}	90		K						
Standard stagnation temperature (G = 1000 W/m ² ; ∅ _a = 30 °C)		∅ _{stg}	160		°C						
Effective thermal capacity, incl. fluid (per gross area, A _G)		C/m ²	4.97		kJ/(Km ²)						
Maximum operating temperature		∅ _{max, op}	160		°C						
Maximum operating pressure		p _{max, op}	600		kPa						
Testing laboratory		TÜV Rheinland Energy GmbH				www.tuv.com/solarpower					
Test report(s)		21242098.001 21242098.002				Dated		25.07.2018 25.07.2018			
Comments of testing laboratory		Datashet version: 5.01, 2016-03-01									
The EN 9806 tests were performed on the largest and smallest possible collector size WPK 200 V Al/Al and WPK 270 V Al/Al with 2.1 and 2.85 m ² gross area. The basic thermal performance test results are based on the WPK 200 V Al/Al test results. Currently, only the intermediate size WPK 250 V / H Al/Al is covered by the certificate. The collector was tested according to EN ISO 9806:2017.					 Genuu. Richtig.  TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln 						
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2872 F
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on EN 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
WPK 250 V Al/Al		2 582	1 572	790	1 816	1 043	466	1 362	742	331	1 489	794	352
WPK 250 H Al/Al		2 582	1 572	790	1 816	1 043	466	1 362	742	331	1 489	794	352
Annual output per m ² gross area		984	599	301	692	397	178	519	283	126	567	303	134
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
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 ϑ_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 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	Yes	
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	5400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	-	m

Energy Labelling Information			
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
WPK 250 V Al/Al	2.63	Collector efficiency (η_{col})	45 %
WPK 250 H Al/Al	2.63	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/m ² , 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)	0.646 --
		First-order coefficient (a_1)	4.22 W/(m ² K)
		Second-order coefficient (a_2)	0.019 W/(m ² K ²)
		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.	