


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S2894 P							
						Date issued		2019-01-16							
						Issued by		DIN CERTCO							
Licence holder		Consolar Solare Energiesysteme GmbH				Country		Germany							
Brand (optional)		-				Web		https://www.consolar.de/							
Street, Number		Gewerbestraße 7				E-mail		Anfrage@consolar.de							
Postcode, City		D-79539 Lörrach				Tel		+49 (0)7621 42228-34							
Collector Type						Flat plate collector, unglazed									
Collector name						Power output per collector Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup> ; u = 1 m/s $\vartheta_m - \vartheta_a$									
						Gross area (A <sub>G</sub> )	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	30 K
						m <sup>2</sup>	mm	mm	mm	W	W	W	W	W	W
SOLINK PVT-Wärmepumpenkollektor						1.98	1 987	995	67	702	96	0	0	0	0
Power output per m <sup>2</sup> gross area						354	49	0	0	0	0				
Performance parameters test method						Quasi dynamic									
Performance parameters (related to AG)						$\eta_{0,b}$	c1	c2	c3	c4	c6	Kd			
Units						-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	s/m	-			
Test results						0.468	22.990	0.000	7.572	0.434	0.067	0.953			
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	1.00	1.00	1.00	1.00	1.00	0.93	0.47	0.00
Longitudinal						K <sub>θL, coll</sub>	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.47	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						( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	30	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30$ °C)						$\vartheta_{stg}$	70	°C							
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )						C/m <sup>2</sup>	26.05	kJ/(Km <sup>2</sup> )							
Maximum operating temperature						$\vartheta_{max, op}$	80	°C							
Maximum operating pressure						p <sub>max, op</sub>	600	kPa							
Testing laboratory						TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de					
Test report(s)						18COL1436 18COL1436Q				Dated		16.01.2019 16.01.2019			
Comments of testing laboratory						Datashet version: 5.01, 2016-03-01									
none						 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70550 Stuttgart (Vaihingen)									
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	011-7S2894 P
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**Annual collector output in kWh/collector at mean fluid temperature  $\vartheta_m$ , based on ISO 9806:2013 test results**

Standard Locations Collector name	$\vartheta_m$	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
SOLINK PVT-Wärmepumpenkollektor	939				29			108				167	
Annual output per m <sup>2</sup> gross area	474				15			55				84	
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 [www.solarkeymark.org/scenocalc](http://www.solarkeymark.org/scenocalc)

**Additional Information**

Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	Yes	
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	5500	Pa
Maximum tested negative load	2500	Pa
Hail resistance using steel ball (maximum drop height)	1.4	m

**Energy Labelling Information**

	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
SOLINK PVT-Wärmepumpenkollektor	1.98	Collector efficiency ( $\eta_{col}$ )	0 %
<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 ( $\eta_0$ )	0.465 --
		First-order coefficient ( $a_1$ )	45.71 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.000 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	1.00 --
<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>			