


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2790 F				
					Date issued		2017-09-18				
					Issued by		DIN CERTCO				
Licence holder		THERMIC LTD			Country		Greece				
Brand (optional)					Web		www.thermicsol.com				
Street, Number		Loutsas & Mesologgiou			E-mail		info@thermicsol.com				
Postcode, City		19600 Mandra Industrial zone			Tel		+30 2 105 555 523				
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 Gb = 850 W/m ² ; Gd = 150 W/m ² ; u = 3 m/s $\vartheta_m - \vartheta_a$						
					0 K W	10 K W	30 K W	50 K W	70 K W	116 K W	
TS 2.00 FP	2.02	2 006	1 007	103	1 460	1 391	1 242	1 077	896	418	
TS 2.25 FP	2.24	1 893	1 183	103	1 618	1 543	1 377	1 194	993	463	
TS 2.50 FP	2.52	2 006	1 257	103	1 821	1 735	1 550	1 344	1 118	521	
TS 3.00 FP	2.92	2 006	1 457	103	2 110	2 011	1 796	1 557	1 295	604	
Power output per m ² gross area					723	689	615	533	444	207	
Performance parameters test method		Quasi dynamic									
Performance parameters (related to AG)		$\eta_{0,b}$	c1	c2	c3	c4	c6	Kd			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results		0.727	3.286	0.010	0.000	0.000	0.000	0.959			
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		$K_{\theta T, coll}$	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00
Longitudinal		$K_{\theta L, coll}$	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00
Heat transfer medium for testing		Water									
Flow rate for testing (per gross area, A_G)		dm/dt	0.018	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations		$(\vartheta_m - \vartheta_a)_{max}$	116	K							
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ °C}$)		ϑ_{stg}	185	°C							
Effective thermal capacity, incl. fluid (per gross area, A_G)		C/m ²	10.165	kJ/(Km ²)							
Maximum operating temperature		$\vartheta_{max, op}$	n.a.	°C							
Maximum operating pressure		$p_{max, op}$	1600	kPa							
Testing laboratory		TZS, ITW University Stuttgart					www.itw.uni-stuttgart.de				
Test report(s)		10COL931/2OEM04 10COL932/2OEM04 10COL932Q/2OEM04					Dated		18.09.2017 18.09.2017 18.09.2017		
Comments of testing laboratory		Datashet version: 5.01, 2016-03-01									
Documented performance parameters are taken from 10COL931/2OEM04 (TS 2.00 FP)		 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2790 F
	Issued	2017-09-18

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results

Standard Locations Collector name	ϑ_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
TS 2.00 FP		2 368	1 722	1 162	1 811	1 279	833	1 332	891	558	1 452	967	596
TS 2.25 FP		2 626	1 909	1 289	2 008	1 418	924	1 478	988	618	1 611	1 073	661
TS 2.50 FP		2 954	2 148	1 450	2 259	1 595	1 039	1 662	1 111	696	1 812	1 207	743
TS 3.00 FP		3 423	2 489	1 680	2 618	1 848	1 204	1 926	1 287	806	2 099	1 398	861
Annual output per m ² gross area		1 172	852	575	897	633	412	660	441	276	719	479	295
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	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	2500	Pa
Maximum tested negative load	2250	Pa
Hail resistance using steel ball (maximum drop height)	n.a.	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
TS 2.00 FP	2.02	Collector efficiency (η_{col})	58 %
TS 2.25 FP	2.24	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.	
TS 2.50 FP	2.52		
TS 3.00 FP	2.92		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.723 --
		First-order coefficient (a_1)	3.29 W/(m ² K)
		Second-order coefficient (a_2)	0.010 W/(m ² K ²)
		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.			