



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2796 F																	
					Date issued		2017-09-25																	
					Issued by																			
Licence holder		Riello S.p.A.			Country		Italy																	
Brand (optional)		Thermital			Web		www.thermital.it																	
Street, Number		Via Ing. Pilade Riello, 7			E-mail		info@thermital.it																	
Postcode, City		IT-37045 Legnago (VR)			Tel		+39 0423 620288																	
Collector Type					Flat plate collector, glazed																			
Collector name					Gross area (A_G)		Gross length		Gross width		Gross height		Power output per collector $G_b = 850 \text{ W/m}^2$; $G_d = 150 \text{ W/m}^2$ $\vartheta_m - \vartheta_a$											
					m ²		mm		mm		mm		0 K		10 K		30 K		50 K		70 K		130 K	
TSOL 25/4 FLEX					2.30		2'004		1'148		85		1'726		1'632		1'437		1'231		1'014		296	
Power output per m ² gross area					750		709		625		535		441		129									
Performance parameters test method					Steady state - outdoor																			
Performance parameters (related to AG)					η_0, hem		a1		a2															
Units					-		W/(m ² K)		W/(m ² K ²)															
Test results					0.750		4.000		0.006															
Incidence angle modifier test method					Steady state - outdoor																			
Bi-directional incidence angle modifiers					Yes																			
Incidence angle modifier					Angle		10°		20°		30°		40°		50°		60°		70°		80°		90°	
Transversal					$K_{\theta T, coll}$		1.00		1.00		0.99		0.98		0.94		0.87		0.74		0.48		0.00	
Longitudinal					$K_{\theta L, coll}$		1.00		1.00		0.99		0.98		0.95		0.88		0.75		0.49		0.00	
Heat transfer medium for testing					Water-Glycole																			
Flow rate for testing (per gross area, A_G)					dm/dt		0.020		kg/(sm ²)															
Maximum temperature difference for thermal performance calculations					$(\vartheta_m - \vartheta_a)_{max}$		130		K															
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30^\circ \text{C}$)					ϑ_{stg}		197		°C															
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m^2		5.48		kJ/(Km ²)															
Maximum operating temperature					$\vartheta_{max, op}$		--		°C															
Maximum operating pressure					$p_{max, op}$		1000		kPa															
Testing laboratory					SPF, CH-8640 Rapperswil							www.spf.ch												
Test report(s)					C1748LPEN C1748QPEN							Dated		25.09.2017		25.09.2017								
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01																			
--					 INSTITUT FÜR SOLARTECHNIK 																			
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2796 F
	Issued	2017-09-25

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

Collector name	Standard Locations 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
TSOL 25/4 FLEX		2'751	1'919	1'257	2'060	1'415	909	1'517	978	600	1'652	1'055	638
Annual output per m ² gross area		1'195	834	546	895	615	395	659	425	261	718	458	277
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	2400 Pa
Maximum tested negative load	2400 Pa
Hail resistance using ice balls (diameter)	45 mm

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
TSOL 25/4 FLEX	2.30	Collector efficiency (η_{col})	58 %
		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)	0.750 --
		First-order coefficient (a_1)	4.00 W/(m ² K)
		Second-order coefficient (a_2)	0.006 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.96 --
		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.	