
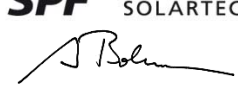


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2688 F				
					Date issued		2016-10-07				
					Issued by						
Licence holder	Savo-Solar Oyj				Country	Finland					
Brand (optional)	-				Web	www.savosolar.fi					
Street, Number	Insinöörinkatu 7				E-mail	info@savosolar.fi					
Postcode, City	50150 Mikkeli				Tel	+358 (0)50 410 5247					
Collector Type					Flat plate collector, glazed						
					Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² ϑ _m - ϑ _a						
					0 K	10 K	30 K	50 K	70 K	130 K	
Collector name	Gross area (A _G) m ²	Gross length mm	Gross width mm	Gross height mm	W	W	W	W	W	W	
SF500-15	15.96	2'591	6'158	213	12'960	12'477	11'424	10'257	8'976	4'440	
Power output per m² gross area					812	782	716	643	562	278	
Performance parameters test method		Steady state - outdoor									
Performance parameters (related to AG)		η _{0,hem}	a ₁	a ₂							
Units		-	W/(m ² K)	W/(m ² K ²)							
Test results		0.812	2.936	0.009							
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 _{GT, coll}	1.00	1.00	1.00	0.99	0.97	0.91	0.75	0.42	0.00
Longitudinal		K _{GL, coll}	1.00	1.00	1.00	0.99	0.98	0.94	0.84	0.59	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					(ϑ _m -ϑ _a) _{max}		130	K			
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)					ϑ _{stg}		210	°C			
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²		10.2	kJ/(Km ²)			
Maximum operating temperature					ϑ _{max, op}		225	°C			
Maximum operating pressure					p _{max, op}		1000	kPa			
Testing laboratory					SPF, CH-8640 Rapperswil		www.spf.ch				
Test report(s)		C1704LPEN C1704QPEN				Dated		28.09.2016 28.09.2016			
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01						
--					 INSTITUT FÜR SOLARTECHNIK 						
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2688 F
	Issued	2016-10-10

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
SF500-15		21'242	16'517	12'226	16'929	12'886	9'338	12'288	8'916	6'212	13'328	9'665	6'642
Annual output per m ² gross area		1'331	1'035	766	1'061	807	585	770	559	389	835	606	416
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	1100	Pa
Maximum tested negative load	1100	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}		
SF500-15	15.96	Collector efficiency (η_{col})	68	%
		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)	0.812	--
		First-order coefficient (a_1)	2.94	W/(m ² K)
		Second-order coefficient (a_2)	0.009	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.98	--
		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.		