



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		SKM 10061							
						Date issued		2018-11-10							
						Issued by		DQS Hellas							
Licence holder		SIRAKIAN ANDRONIKOS MON. I.K.E.				Country		Greece							
Brand (optional)						Web		www.sirakian.gr							
Street, Number		Industrial Area Sindos				E-mail		office@sirakian.gr							
Postcode, City		57022 Thessaloniki				Tel		+30 2310795677 / 2310795690							
Collector Type						Flat plate collector, glazed									
Collector name						Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> θ <sub>m</sub> - θ <sub>a</sub>									
						Gross area (A <sub>G</sub> )	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	55 K
						m <sup>2</sup>	mm	mm	mm	W	W	W	W	W	W
AL-SF 1.5						1.50	1,485	1,010	85	1,014	965	850	711	548	672
AL-SF 1.75						1.75	1,730	1,010	85	1,183	1,126	992	830	639	785
AL-SF 2.0						2.00	1,980	1,010	85	1,352	1,287	1,134	948	730	897
AL-SF 2.3						2.30	1,980	1,160	85	1,555	1,480	1,304	1,090	840	1,031
AL-SF 2.5						2.46	1,990	1,235	85	1,663	1,583	1,394	1,166	898	1,103
Power output per m <sup>2</sup> gross area										676	644	567	474	365	448
Performance parameters test method						Steady state - outdoor									
Performance parameters (related to AG)						η <sub>0</sub> ,hem	a <sub>1</sub>	a <sub>2</sub>							
Units						-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
Test results						0.676	3.040	0.020							
Incidence angle modifier test method						Steady state - 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>					0.87				0.00
Longitudinal						K <sub>θL, coll</sub>					0.87				0.00
Heat transfer medium for testing						Water									
Flow rate for testing (per gross area, A <sub>G</sub> )						dm/dt	0.021	kg/(sm <sup>2</sup> )							
Maximum temperature difference for thermal performance calculations						(θ <sub>m</sub> -θ <sub>a</sub> ) <sub>max</sub>	55	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; θ <sub>a</sub> = 30 °C)						θ <sub>stg</sub>	172	°C							
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )						C/m <sup>2</sup>	9.08	kJ/(Km <sup>2</sup> )							
Maximum operating temperature						θ <sub>max, op</sub>	180	°C							
Maximum operating pressure						p <sub>max, op</sub>	1000	kPa							
Testing laboratory		NCSR Demokritos / Solar & other Energy System Laboratory				www.solar.demokritos.gr									
Test report(s)		4240 DE1 4241 - 4242 DQ1 4243 DE1				Dated		31/10/2018 5/11/2018 30/10/2018							
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01									
						N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Belessiotis Tel: +210 6560815 - Fax: +210 6544599 153 10 Ag. Paraskevi - Attiki - Greece									
Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexidou@dqshellas.gr															

Annex to Solar Keymark Certificate Supplementary Information		Licence Number		SKM 10061									
		Issued		2018-11-10									
<b>Annual collector output in kWh/collector at mean fluid temperature <math>\vartheta_m</math>, based on ISO 9806:2013 test results</b>													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
AL-SF 1.5		1,518	1,052	635	1,150	759	429	843	533	295	915	570	310
AL-SF 1.75		1,771	1,227	741	1,341	886	500	984	621	344	1,067	665	361
AL-SF 2.0		2,024	1,403	847	1,533	1,013	572	1,124	710	393	1,219	760	413
AL-SF 2.3		2,327	1,613	974	1,763	1,165	657	1,293	817	452	1,402	874	475
AL-SF 2.5		2,489	1,725	1,042	1,885	1,246	703	1,383	874	484	1,500	934	508
Annual output per m <sup>2</sup> gross area		1,012	701	424	766	506	286	562	355	197	610	380	206
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 <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													
<b>Additional Information</b>													
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)											A		--
Maximum tested positive load											2400		Pa
Maximum tested negative load											2400		Pa
Hail resistance using steel ball (maximum drop height)											2		m
<b>Energy Labelling Information</b>													
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$											
AL-SF 1.5	1.50	Collector efficiency ( $\eta_{col}$ )								52		%	
AL-SF 1.75	1.75	Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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.											
AL-SF 2.0	2.00												
AL-SF 2.3	2.30												
AL-SF 2.5	2.46												
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$											
		Zero-loss efficiency ( $\eta_0$ )								0.676		--	
		First-order coefficient ( $a_1$ )								3.04		W/(m <sup>2</sup> K)	
		Second-order coefficient ( $a_2$ )								0.020		W/(m <sup>2</sup> K <sup>2</sup> )	
		Incidence angle modifier IAM (50°)								0.87		--	
		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.											
Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, <a href="http://www.dqshellas.gr">http://www.dqshellas.gr</a> , e-mail: ioannisalexou@dqshellas.gr													