



Annex to Solar Keymark Certificate					Licence Number		SKM 10061							
					Date issued		2023-05-16							
					Issued by		DQS Hellas							
Licence holder		SIRAKIAN ANDRONIKOS MON.			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									
Collector name					Power output per collector Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	86 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
AL-SF 1.5					1.50	1,485	1,010	85	1,014	966	850	709	541	388
AL-SF 1.75					1.75	1,730	1,010	85	1,183	1,127	992	827	631	453
AL-SF 2.0					2.00	1,980	1,010	85	1,352	1,288	1,134	945	721	517
AL-SF 2.3					2.30	1,980	1,160	85	1,555	1,481	1,304	1,086	829	595
AL-SF 2.5					2.46	1,990	1,235	85	1,663	1,584	1,394	1,162	887	636
Power output per m ² gross area					676	644	567	472	361	259				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A _G)		η_0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-			
Test results		0.693	2.99	0.022	0.000	0.00	9,084	0.000	0.00	0.0E+00	0.83			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.00	0.99	0.97	0.93	0.86	0.76	0.61	0.37	0.00			
Longitudinal		K _{θL, coll}	1.00	0.99	0.97	0.93	0.86	0.76	0.61	0.37	0.00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0.022	kg/(sm ²)							
Maximum temperature difference during thermal performance test					($\vartheta_m - \vartheta_a$) _{max}	56	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}	172	°C							
Maximum operating temperature					$\vartheta_{max, op}$	°C								
Maximum operating pressure					p _{max, op}	1000	kPa							
Testing laboratory		NCSR Demokritos / Solar & other Energy System Lab					www.solar.demokritos.gr							
Test report(s)		4240 DE1 4241 - 4242 DQ1 4243 DE1					Dated		31/10/18 05/11/18 30/10/18					
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
					N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Tel: +210 6503815 - Fax: +210 6544590 P.O. BOX 60037, 15310 Ag. Paraskevi, Greece									
Central Offices: Kalavriton 2, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqs.gr, e-mail: i.alexou@dqs.gr														



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SKM 10061
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Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m													
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
AL-SF 1.5		1,535	1,067	639	1,161	763	424	856	537	294	928	576	309
AL-SF 1.75		1,791	1,244	745	1,354	890	495	998	626	343	1,082	672	360
AL-SF 2.0		2,047	1,422	852	1,548	1,017	566	1,141	716	392	1,237	768	412
AL-SF 2.3		2,354	1,636	979	1,780	1,170	650	1,312	823	450	1,422	883	473
AL-SF 2.5		2,517	1,749	1,047	1,904	1,251	696	1,404	881	482	1,521	945	506
Gross Thermal Yield per m ² gross area		1,023	711	426	774	509	283	571	358	196	618	384	206
Annual efficiency, η_a		58%	40%	24%	47%	31%	17%	49%	31%	17%	50%	31%	17%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1630 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. 6.2 (13.01.2022). A detailed description of the calculations is available at http://www.estif.org/solarkeymarknew/													

Additional Information			
Collector heat transfer medium	Water-Glycole		
The collector is deemed to be suitable for roof integration	No		
The collector was tested successfully under the following conditions:			
Climate class (A+, A, B or C)	A		--
G (W/m ²) >	1000	ϑ_a (°C) >	20
		H_x (MJ/m ²) >	600
Maximum tested positive load	2400		Pa
Maximum tested negative load	2400		Pa
Hail resistance using steel ball (maximum drop height)	2		m
Additional collector attribute(s)			
Using external power source(s) for normal operation	No	Active or passive measure(s) for self-protection	No
Co-generating thermal and electrical power	No	Façade collector(s)	No

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
AL-SF 1.5	1.50	8-V-24S-A:7.2,1380-C:20.6,1000-D	1.36
AL-SF 1.75	1.75	8-V-24S-A:7.2,1650-C:20.6,1000-D	1.65
AL-SF 2.0	2.00	8-V-24S-A:7.2,1880-C:20.6,1000-D	1.88
AL-SF 2.3	2.30	9-V-24S-A:7.2,1880-C:20.6,1160-D	2.21
AL-SF 2.5	2.46	10-V-24S-A:7.2,1880-C:20.6,1250-D	2.37

Data required for CDR (EU) No 811/2013 - Reference Area		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	52%	Zero-loss efficiency (η_0)	0.68
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 9806:2017.		First-order coefficient (a_1)	2.99
		Second-order coefficient (a_2)	0.022
		Incidence angle modifier IAM (50°)	0.86
		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.	