



Annex to Solar Keymark Certificate					Licence Number		SKM 10061					
					Date issued		2024-04-16					
					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		Gross area (A _G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s θ _m - θ _a						
						0 K W	10 K W	30 K W	50 K W	70 K W	86 K W	
AL-SF 1.5		1.50	1,485	1,010	85	1,014	966	850	709	541	388	
AL-SF 1.5 HOR		1.50	1,010	1,485	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 1.75 HOR		1.75	1,010	1,730	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 2.0 HOR		2.00	1,010	1,980	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 2.3 HOR		2.30	1,160	1,980	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	
AL-SF 2.5 HOR		2.46	1,235	1,990	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		(θ _m - θ _a) _{max}	56		K							
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)		θ _{stg}	172		°C							
Maximum operating temperature		θ _{max, op}	°C									
Maximum operating pressure		p _{max, op}	1000 kPa									
Testing laboratory		NCSR Demokritos / Solar & other Energy System					www.solar.demokritos.gr					
Test report(s)		4240 DE1 4241 DQ1 4243 DE1					Dated		31/10/18 05/11/18 30/10/18			
Comments of testing laboratory		Ver. 6.2 (13.01.2022)										
The data was obtained from the test reports 4240 DE1 (Collector AL-SF 1.5) and 4241 DQ1 (Collector AL-SF 2.5).		N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Tel: +210 6503815 - Fax: +210 6544592 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.alexiou@dqs.gr												

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Supplementary Information							Issued		2024-04-16				
Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	ϑ_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		1,535	1,067	639	1,161	763	424	856	537	294	928	576	309
AL-SF 1.5 HOR		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 1.75 HOR		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 2.0 HOR		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 2.3 HOR		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
AL-SF 2.5 HOR		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 1.5 HOR	1.50			10-V-24S-A:7.2,930-C:20.6,1570-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 1.75 HOR	1.75			12-V-24S-A:7.2,930-C:20.6,1840-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 2.0 HOR	2.00			14-V-24S-A:7.2,930-C:20.6,2070-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 2.3 HOR	2.30			14-V-24S-A:7.2,1080-C:20.6,2070-D			2.21						
AL-SF 2.5	2.46			10-V-24S-A:7.2,1880-C:20.6,1250-D			2.37						
AL-SF 2.5 HOR	2.46			14-V-24S-A:7.2,1150-C:20.6,2070-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		W/(m ² K)					
			Second-order coefficient (a_2)			0.022		W/(m ² K ²)					
			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.													
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