



Annex to Solar Keymark Certificate		Licence Number		SKM 9926/3							
		Date issued		2020-08-05							
		Issued by		DQS Hellas							
Licence holder	HELIOAKMI S.A.			Country	Greece						
Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL			Web	www.helioakmi.com						
Street, Number	Thesi Nea Zoi - Aspropyrgos, Attiki			E-mail	megasun@helioakmi.com						
Postcode, City	193 00 Aspropyrgos, Attiki			Tel	+030 210 5595625						
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 $\vartheta_m - \vartheta_a$						
					0 K W	10 K W	30 K W	50 K W	70 K W	80 K W	
ST-1500-AL-SEL	1.56	1,545	1,010	90	988	931	809	678	537	462	
ST-2000-AL-SEL	2.07	2,050	1,010	90	1,311	1,235	1,074	900	712	614	
ST-2500-AL-SEL	2.62	2,050	1,280	90	1,659	1,563	1,359	1,139	901	777	
Power output per m² gross area					633	597	519	435	344	296	
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 ² K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-
Test results		0.644	3.57	0.008	0.000	0.00	0	0.000	0.00	0.0E+00	0.89
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	1.00	0.99	0.97	0.93	0.85	0.70	0.45	0.00
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.97	0.93	0.85	0.70	0.45	0.00
Heat transfer medium for testing				Water							
Flow rate for testing (per gross area, A_G)				dm/dt		0.021		kg/(sm ²)			
Maximum temperature difference during thermal performance test				$(\vartheta_m - \vartheta_a)_{max}$		50		K			
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)				ϑ_{stg}		136.5		°C			
Maximum operating temperature				$\vartheta_{max, op}$		180		°C			
Maximum operating pressure				p _{max, op}		100		kPa			
Testing laboratory		NCSR "Demokritos" - SOLAR & ENERGY SYSTEMS LAB				http://www.solar.demokritos.gr/					
Test report(s)		4223 DQ3 4276 DE1 4277 DE1				Dated		16/9/2018 13/7/2020 13/7/2020			
Comments of testing laboratory				Datasheet version: 6.1, 2019-09-26							
				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 4, 145 64 kifisia, Athens, Tel: +301 6233493-4, Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexidou@dqshellas.gr											



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Supplementary Information		Issued		2020-08-05									
Annual collector output 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
ST-1500-AL-SEL		1,552	1,047	646	1,144	754	450	846	524	301	922	564	318
ST-2000-AL-SEL		2,059	1,390	858	1,518	1,000	597	1,123	695	399	1,223	748	422
ST-2500-AL-SEL		2,606	1,759	1,086	1,922	1,266	756	1,421	880	505	1,548	947	535
Annual output per m ² gross area		995	671	414	733	483	288	542	336	193	591	361	204
Annual efficiency, η_a		56%	38%	23%	45%	30%	18%	47%	29%	17%	48%	29%	16%
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. 6.1 (September 2019). 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) >		1100		ϑ_a (°C) >		40		H _x (MJ/m ²) >		700			
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)													
<input type="checkbox"/> Using external power source(s) for normal operation <input type="checkbox"/> Active or passive measure(s) for self-protection <input type="checkbox"/> Co-generating thermal and electrical power <input type="checkbox"/> Façade collector(s)													
Energy Labelling Information						Additional Informative Technical Data							
		Reference Area, A _{sol} (m ²)		Hydraulic Designation Code				Aperture Area, A _a (m ²)					
ST-1500-AL-SEL		1.56		8-VH-1234S-A:9,1410-C:20,1043-D				1.34					
ST-2000-AL-SEL		2.07		-				-					
ST-2500-AL-SEL		2.62		10-VH-1234S-A:9,1923-C:20,1304-D				2.32					
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})		48%				Zero-loss efficiency (η_0)		0.63		--			
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)		3.57		W/(m ² K)			
						Second-order coefficient (a ₂)		0.008		W/(m ² K ²)			
						Incidence angle modifier IAM (50°)		0.93		--			
						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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