Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results

Licence Number	SKM 9926/3
Date issued	2018-08-05
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, glazed

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m²; Gd = 150 W/m² ϑm - ϑa: 0 K	10 K	30 K	50 K	70 K	50 K
	m²	mm	mm	mm	W	W	W	W	W	W
ST-2000-AL-SEL	2.07	2,050	1,010	90	1,242	1,173	1,006	801	558	801
ST-2500-AL-SEL	2.62	2,050	1,280	90	1,572	1,485	1,273	1,014	707	1,014
Power output per m² gross area					600	567	486	387	270	387

Performance parameters test method		Steady state - outdoor								
Performance parameters (related to AG)		η0,hem	a1	a2						
Units		-	W/(m²K)	W/(m²K²)						
Test results		0.600	3.109	0.023						
Incidence angle modifier test method										
Bi-directional incidence angle modifiers	No									
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$					0.86				0.00
Longitudinal	$K_{\theta L,coll}$					0.86				0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	50	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	136.5	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	10.61	kJ/(Km²)
Maximum operating temperature	$\vartheta_{max\ op}$	100	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	Demokritos	www.solar.demokritos.gr	
Test report(s)	4139DE3, 4223 DQ2, 4140DE3	Dated	12-11-2018, 30-07-2018, 12-11-2018

Comments of testing laboratory — Datasheet version: 5.01, 2016-03-01

Test Reports 4139DE3, 4140DE3, 4223DQ2 were issued for the transition from EN 12975-2:2006 to EN ISO 9806: 2013

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Supplementary Information	Issued	2018-08-05

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results

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-2000-AL-SEL	1,837	1,192	639	1,348	821	393	997	581	279	1,084	621	294
ST-2500-AL-SEL	2,326	1,508	809	1,706	1,039	497	1,262	736	353	1,372	786	372
Annual output per m² gross area	888	576	309	651	397	190	482	281	135	524	300	142
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 ϑm (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	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

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
ST-2000-AL-SEL	2.07
ST-2500-AL-SEL	2.62

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	44	%

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/m², 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)	0.600	--
First-order coefficient (a_1)	3.11	W/(m²K)
Second-order coefficient (a_2)	0.023	W/(m²K²)
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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