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

Licence Number	**OEM 9999/1/3**
Date issued	**2017-04-10**
Issued by	**DQS Hellas**

Licence holder	MECALIA – METALURGICA Y CALDERERIA, S.L.	**Country**	Spain
Brand (optional)	SIASOL	**Web**	http://www.mecalia.com
Street, Number	El Pasaje, S/N	**E-mail**	mecalia@mecalia.com
Postcode, City	36780 La Guardia, Pontevedra	**Tel**	+34 986 627 242

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
SIASOL FMAX 1.5	1,50	1.480	1.010	86	1.142	1.085	961	819	661	819
SIASOL FMAX 1.5H	1,50	1.010	1.480	86	1.142	1.085	961	819	661	819
SIASOL FMAX 1.8	1,82	1.480	1.230	86	1.385	1.317	1.166	994	802	994
SIASOL FMAX 1.8H	1,82	1.230	1.480	86	1.385	1.317	1.166	994	802	994
SIASOL FMAX 2.0	2,00	1.980	1.010	86	1.522	1.447	1.281	1.092	881	1.092
SIASOL FMAX 2.0H	2,00	1.010	1.980	86	1.522	1.447	1.281	1.092	881	1.092
SIASOL FMAX 2.4	2,37	1.930	1.230	86	1.804	1.715	1.518	1.294	1.044	1.294
SIASOL FMAX 2.4H	2,37	1.230	1.930	86	1.804	1.715	1.518	1.294	1.044	1.294
SIASOL FMAX 2.7	2,72	2.160	1.260	86	2.070	1.968	1.742	1.485	1.198	1.485
SIASOL FMAX 2.7H	2,72	1.260	2.160	86	2.070	1.968	1.742	1.485	1.198	1.485
Power output per m² gross area					761	724	640	546	440	546

Performance parameters test method		Steady state - outdoor								
Performance parameters (related to AG)		η0,hem	a1	a2						
Units		-	W/(m²K)	W/(m²K²)						
Test results		0,761	3,600	0,014						
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	$K_{\theta T,coll}$					0,96				0,00
	$K_{\theta L,coll}$					0,96				0,00

		Water - Glycole	
Flow rate for testing (per gross area, A_G)	dm/dt	0,021	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}	190,5	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	10,85	kJ/(Km²)
Maximum operating temperature	$\vartheta_{max\ op}$	200	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	NCSR Demokritos	www.solar.demokritos.gr	
Test report(s)	4195 DE2	**Dated**	16/11/2016
	4196 DE2		16/11/2016
	4197 DQ3		2/6/2017

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

This data sheet was issued based on data appeared in the first SKM certificate.

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Supplementary Information	Issued	2017-04-10

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
SIASOL FMAX 1.5	1.856	1.324	859	1.406	966	597	1.040	675	402	1.131	732	428
SIASOL FMAX 1.5H	1.856	1.324	859	1.406	966	597	1.040	675	402	1.131	732	428
SIASOL FMAX 1.8	2.252	1.606	1.042	1.706	1.172	724	1.262	819	487	1.372	888	519
SIASOL FMAX 1.8H	2.252	1.606	1.042	1.706	1.172	724	1.262	819	487	1.372	888	519
SIASOL FMAX 2.0	2.475	1.765	1.145	1.875	1.288	795	1.387	900	535	1.508	976	571
SIASOL FMAX 2.0H	2.475	1.765	1.145	1.875	1.288	795	1.387	900	535	1.508	976	571
SIASOL FMAX 2.4	2.932	2.092	1.357	2.222	1.527	943	1.643	1.067	635	1.787	1.157	676
SIASOL FMAX 2.4H	2.932	2.092	1.357	2.222	1.527	943	1.643	1.067	635	1.787	1.157	676
SIASOL FMAX 2.7	3.366	2.400	1.557	2.550	1.752	1.082	1.886	1.224	728	2.051	1.328	776
SIASOL FMAX 2.7H	3.366	2.400	1.557	2.550	1.752	1.082	1.886	1.224	728	2.051	1.328	776
Annual output per m² gross area	1.237	883	572	938	644	398	693	450	268	754	488	285
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	3000	Pa
Maximum tested negative load	3000	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
SIASOL FMAX 1.5	1,50
SIASOL FMAX 1.5H	1,50
SIASOL FMAX 1.8	1,82
SIASOL FMAX 1.8H	1,82
SIASOL FMAX 2.0	2,00
SIASOL FMAX 2.0H	2,00
SIASOL FMAX 2.4	2,37
SIASOL FMAX 2.4H	2,37
SIASOL FMAX 2.7	2,72
SIASOL FMAX 2.7H	2,72

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

Collector efficiency (η_{col})		%

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)	0,761	--
First-order coefficient (a_1)	3,60	W/(m²K)
Second-order coefficient (a_2)	0,014	W/(m²K²)
Incidence angle modifier IAM (50°)	0,96	--

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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