



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		SKM 9983							
					Date issued		20/12/2015							
					Issued by		DQS Hellas							
Licence holder	SIRAKIAN ANDRONIKOS MON. I.K.E.				Country	GREECE								
Brand (optional)					Web	http://www.sirakian.gr/								
Street, Number	Industrial Area Sindos				E-mail	office@sirakian.gr								
Postcode, City	57022-Thessaloniki				Tel	+30 2310 795677 / 2310 795690								
Collector Type					Flat plate collector, glazed									
Collector name	Gross area (A <sub>G</sub> ) m <sup>2</sup>	Gross length mm	Gross width mm	Gross height mm	Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> θ <sub>m</sub> - θ <sub>a</sub>									
					0 K W	10 K W	30 K W	50 K W	70 K W	50 K W				
ALS 1.5	1.50	1,480	1,010	85	947	885	753	608	452	608				
ALS 2.0	2.00	1,980	1,010	85	1,262	1,180	1,003	811	603	811				
ALS 2.3	2.30	1,980	1,160	85	1,451	1,357	1,154	933	693	933				
ALS 2.5	2.46	1,980	1,240	85	1,552	1,451	1,234	998	741	998				
Power output per m <sup>2</sup> gross area					631	590	502	406	301	406				
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to A <sub>G</sub> )					η <sub>0,hem</sub>	a <sub>1</sub>	a <sub>2</sub>							
Units					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
Test results					0.631	4.010	0.010							
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 <sub>PT, coll</sub>					0.85				0.00
Longitudinal					K <sub>PL, coll</sub>					0.85				0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.020	kg/(sm <sup>2</sup> )							
Maximum temperature difference for thermal performance calculations					(θ <sub>m</sub> -θ <sub>a</sub> ) <sub>max</sub>	50	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; θ <sub>a</sub> = 30 °C)					θ <sub>stg</sub>	97.56	°C							
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )					C/m <sup>2</sup>	11.92	kJ/(Km <sup>2</sup> )							
Maximum operating temperature					θ <sub>max op</sub>	100	°C							
Maximum operating pressure					p <sub>max,op</sub>	1500	kPa							
Testing laboratory					NCSR Demokritos									
Test report(s)					4163DE1 4164DQ1 4166DE1									
					http://www.solar.demokritos.gr									
					Dated									
					23/9/2015 23/9/2015 23/9/2015									
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01									
					<p>N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Belessiotis Tel: +210 6503815 - Fax: +210 6544592 153 10 Ag. Paraskevi - Attiki - Greece</p>									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SKM 9983
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Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
Collector name	Standard Locations $\vartheta_m$	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
ALS 1.5		1,381	863	480	987	604	317	732	421	218	797	449	228
ALS 2.0		1,842	1,150	641	1,316	805	423	976	562	290	1,062	598	304
ALS 2.3		2,118	1,323	737	1,514	926	487	1,122	646	334	1,222	688	349
ALS 2.5		2,265	1,415	788	1,619	991	520	1,200	691	357	1,307	736	373
Annual output per m <sup>2</sup> gross area		921	575	320	658	403	212	488	281	145	531	299	152
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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 $\vartheta_m$ (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (March 2016). A detailed description of the calculations is available at <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													

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 <sub>sol</sub> (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area A <sub>sol</sub>		
ALS 1.5	1.50	Collector efficiency ( $\eta_{col}$ )	45	%
ALS 2.0	2.00	<i>Remark: Collector efficiency (<math>\eta_{col}</math>) 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<sup>2</sup>, expressed in % and rounded to the nearest integer. Deviating from the regulation <math>\eta_{col}</math> is based on reference area (A<sub>sol</sub>) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.</i>		
ALS 2.3	2.30			
ALS 2.5	2.46			
		Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>		
		Zero-loss efficiency ( $\eta_0$ )	0.631	--
		First-order coefficient (a <sub>1</sub> )	4.01	W/(m <sup>2</sup> K)
		Second-order coefficient (a <sub>2</sub> )	0.010	W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.85	--
<i>Remark: The data given in this section are related to collector reference area (A<sub>sol</sub>) 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.</i>				