



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		<b>OEM 9965/1/1</b>					
						Date issued		<b>2016-11-15</b>					
						Issued by		<b>DQS Hellas</b>					
Licence holder			BSG CALDAIE A GAS S.P.A.			Country		Italy					
Brand (optional)						Web							
Street, Number			Via Leopoldo Biasi			E-mail		Daniele_Chiesurin@biasi.it					
Postcode, City			37175, Verona			Tel		+390 434238341					
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> $\vartheta_m - \vartheta_a$								
					0 K W	10 K W	30 K W	50 K W	70 K W	90 K W			
15 SOL TOP	1,52	1.510	1.010	110	1.053	991	859	716	563	716			
20 SOL TOP	2,03	2.010	1.010	110	1.406	1.323	1.147	957	753	957			
26 SOL TOP	2,53	2.010	1.270	110	1.752	1.649	1.429	1.192	938	1.192			
Power output per m <sup>2</sup> gross area					693	652	565	471	371	471			
Performance parameters test method				Steady state - outdoor									
Performance parameters (related to AG)				$\eta_{0,hem}$	a1	a2							
Units				-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
Test results				0,693	3,999	0,009							
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>θT, coll</sub>	1,00	0,99	0,98	0,97	0,94	0,90	0,81	0,00	
Longitudinal				K <sub>θL, coll</sub>	1,00	0,99	0,98	0,97	0,94	0,90	0,81	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						( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	50			K			
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30\text{ }^{\circ}\text{C}$ )						$\vartheta_{stg}$	174			°C			
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )						C/m <sup>2</sup>	7,86			kJ/(Km <sup>2</sup> )			
Maximum operating temperature						$\vartheta_{max, op}$	100			°C			
Maximum operating pressure						p <sub>max, op</sub>	1000			kPa			
Testing laboratory				NCSR Demokritos		www.solar.demokritos.gr							
Test report(s)				4188DE1 4189DE1 4023DQ2, 4046DQ2		Dated		27/7/2016 27/7/2016 05/9/2013					
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01  <i>This data sheet was issued based on data appeared in the first SKM certificate.</i>							
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	OEM 9965/1/1
	Issued	2016-11-15

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
15 SOL TOP		1.667	1.118	683	1.222	798	469	907	557	315	989	600	334
20 SOL TOP		2.226	1.493	913	1.632	1.066	626	1.211	744	420	1.321	801	446
26 SOL TOP		2.775	1.860	1.137	2.034	1.328	781	1.509	927	524	1.646	998	556
Annual output per m <sup>2</sup> gross area		1.097	735	450	804	525	309	597	366	207	651	395	220
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	1000	Pa
Maximum tested negative load	1000	Pa
Hail resistance using steel ball (maximum drop height)	-	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>	
APOLLON AL 1500	1,52	Collector efficiency ( $\eta_{col}$ )	52 %
APOLLON AL 2000	2,03	Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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.	
APOLLON AL 2600	2,53		
		Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>	
		Zero-loss efficiency ( $\eta_0$ )	0,693 --
		First-order coefficient (a <sub>1</sub> )	4,00 W/(m <sup>2</sup> K)
		Second-order coefficient (a <sub>2</sub> )	0,009 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,94 --
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.			