




Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		SKM 10043/1							
						Date issued		2018-08-30							
						Issued by		DQS Hellas							
Licence holder		SONNE AKTION LTD				Country		Greece							
Brand (optional)		Phaethon				Web		www.sonne.gr							
Street, Number		68 Km N.R. Athens - Lamia				E-mail		info@sonne.gr							
Postcode, City		32009 Schimatari Viotias				Tel		30 22620 59260							
Collector Type						Flat plate collector, glazed									
					Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² θ _m - θ _a										
					0 K	10 K	30 K	50 K	70 K	46 K					
Collector name					m ²	mm	mm	mm	W	W	W	W	W	W	
Phaethon SA170					1.65	1,560	1,040	85	1,205	1,142	996	822	620	859	
Phaethon SA200					2.00	2,000	1,000	85	1,460	1,384	1,207	996	752	1,041	
Phaethon SA240					2.39	1,995	1,200	85	1,745	1,654	1,442	1,190	898	1,244	
Phaethon SA240 HOR					2.39	1,200	1,995	85	1,745	1,654	1,442	1,190	898	1,244	
Power output per m ² gross area					730	692	603	498	376	520					
Performance parameters test method						Steady state - outdoor									
Performance parameters (related to AG)						η _{0,hem}	a ₁	a ₂							
Units						-	W/(m ² K)	W/(m ² K ²)							
Test results						0.730	3.590	0.021							
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 _{θT,coll}					0.84			0.00	
Longitudinal						K _{θL,coll}					0.84			0.00	
Heat transfer medium for testing						Water									
Flow rate for testing (per gross area, A _G)						dm/dt	0.020	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations						(θ _m -θ _a) _{max}	46	K							
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)						θ _{stg}	182	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)						C/m ²	7.97	kJ/(Km ²)							
Maximum operating temperature						θ _{max,op}	100	°C							
Maximum operating pressure						p _{max,op}	1000	kPa							
Testing laboratory						NCSR "DEMOKRITOS"									
Test report(s)						4228 DE1 4229 DE1 4230 DQ1									
						www.solar.demokritos.gr									
						Dated									
						25/7/2018 30/7/2018									
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01									
						<p>N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Bellesiotis Tel: +210 6570516 - Fax: +210 6544692 153 10 Ag. Paraskevi - Attiki - Greece</p> 									
Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexidou@dqshellas.gr															



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SKM 10043/1
	Issued	2018-08-30

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
Collector name	Standard Locations ϑ_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
Phaethon SA170		1,747	1,169	681	1,303	837	453	957	586	314	1,038	625	328
Phaethon SA200		2,118	1,417	825	1,580	1,015	549	1,160	710	381	1,258	757	397
Phaethon SA240		2,531	1,694	986	1,888	1,213	656	1,387	849	455	1,503	905	474
Phaethon SA240 HOR		2,531	1,694	986	1,888	1,213	656	1,387	849	455	1,503	905	474
Annual output per m ² gross area		1,059	709	413	790	507	275	580	355	190	629	379	199
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 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)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
Phaethon SA170	1.65	Collector efficiency (η_{col})	55	%
Phaethon SA200	2.00	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 9806:2013.		
Phaethon SA240	2.39			
Phaethon SA240 HOR	2.39			
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
		Zero-loss efficiency (η_0)	0.730	--
		First-order coefficient (a_1)	3.59	W/(m ² K)
		Second-order coefficient (a_2)	0.021	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.84	--
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.				