



Annex to Solar Keymark Certificate					Licence Number		SKM 10112.1				
					Date issued		2022-07-26				
					Issued by		DQS Hellas				
Licence holder		PAPAEMMANOUEL S.A.			Country		Greece				
Brand (optional)					Web		www.papaemmanouel.gr				
Street, Number		1o Km Inofyta – St. Thomas, Inofyta			E-mail		exports@papaemmanouel.gr				
Postcode, City		32011, Viotia			Tel		+30 22620 31931				
Collector Type					Flat plate collector						
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$						
					0 K W	10 K W	30 K W	50 K W	70 K W	82 K W	
OLC200	2.00	1,980	1,010	85	1,367	1,277	1,089	890	680	545	
Power output per m ² gross area					683	639	545	445	340	273	
Performance parameters test method		Steady state - outdoor									
Performance parameters (related to A_G)		η_0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-
Test results		0.692	4.42	0.007	0.000	0.00	13,170	0.000	0.00	0.0E+00	0.92
Incidence angle modifier test method		Steady state - outdoor									
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal		$K_{\theta T, coll}$	1.00	1.00	1.00	0.99	0.96	0.90	0.77	0.52	0.00
Longitudinal		$K_{\theta L, coll}$	1.00	1.00	1.00	0.99	0.96	0.90	0.77	0.52	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 during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$		52.24		K		
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ }^\circ\text{C}$)					ϑ_{stg}		178		°C		
Maximum operating temperature					$\vartheta_{max, op}$		210		°C		
Maximum operating pressure					$p_{max, op}$		-		kPa		
Testing laboratory		NCSR Demokritos / Solar & other Energy System					www.solar.demokritos.gr				
Test report(s)		4269 DE1 4270 DQ1					Dated		30/06/20 06/08/20		
Comments of testing laboratory					Ver. 6.2 (13.01.2022)						
					N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Tel: +210 6503815 - Fax: +210 6544592 P.O. BOX 60037, 15310 Ag. Paraskevi, Greece						
Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexou@dqshellas.gr											

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Supplementary Information							Issued		2022-07-26						
Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m															
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		
OLC200		2,180	1,409	823	1,566	987	554	1,166	687	371	1,275	741	394		
Gross Thermal Yield per m ² gross area		1,090	704	412	783	494	277	583	344	185	638	370	197		
Annual efficiency, η_a		62%	40%	23%	48%	30%	17%	50%	29%	16%	51%	30%	16%		
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)													
Annual irradiation on collector plane		1765 kWh/m ²			1630 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. 6.2 (13.01.2022). A detailed description of the calculations is available at http://www.estif.org/solarkeymarknew/															
Additional Information															
Collector heat transfer medium											Water-Glycole				
The collector is deemed to be suitable for roof integration											No				
The collector was tested successfully under the following conditions:															
Climate class (A+, A, B or C)											A		--		
G (W/m ²) >		1000		ϑ_a (°C) >		20		H _x (MJ/m ²) >		600					
Maximum tested positive load											3000		Pa		
Maximum tested negative load											3000		Pa		
Hail resistance using steel ball (maximum drop height)											2		m		
Additional collector attribute(s)															
Using external power source(s) for normal operation											No		Active or passive measure(s) for self-protection	No	
Co-generating thermal and electrical power											No		Façade collector(s)	No	
Energy Labelling Information															
											Reference Area, A _{sol} (m ²)				
OLC200											2.00		Hydraulic Designation Code	Aperture Area, A _a (m ²)	
													8-V-1234S-A:11,1880-C:20.6,1080-D	1.83	
Data required for CDR (EU) No 811/2013 - Reference Area															
Collector efficiency (η_{col})											50%		Data required for CDR (EU) No 812/2013 - Reference Area A _{sol}		
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 9806:2017.											Zero-loss efficiency (η_0)		0.68		--
											First-order coefficient (a_1)		4.42		W/(m ² K)
											Second-order coefficient (a_2)		0.007		W/(m ² K ²)
											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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