



Annex to Solar Keymark Certificate	Licence Number	SKM 10132.3
	Date issued	2024-12-15
	Issued by	DQS Hellas

Licence holder	PAPAEMMANOUEL S.A.	Country	Greece
Brand (optional)	SOLAR FLAME	Web	www.papaemmanouel.gr
Street, Number	Thesi Loumaria	E-mail	exports@papaemmanouel.gr
Postcode, City	32009 Oinofyta Viotias	Tel	+30 22620 31931

Collector Type	Flat plate collector
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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	10 K	30 K	50 K	70 K	94 K
					W	W	W	W	W	W
OLD300V	3.02	2,160	1,400	86	2,353	2,246	2,031	1,817	1,603	1,347
OLD300H	3.02	1,400	2,160	86	2,353	2,246	2,031	1,817	1,603	1,347
Power output per m ² gross area					779	744	673	602	531	446

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	0.788	3.54	0.000	0.000	0.00	14,947	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	$K_{\theta T, coil}$	1.00	1.00	1.00	0.99	0.96	0.91	0.78	0.53	0.00
Longitudinal	$K_{\theta L, coil}$	1.00	1.00	1.00	0.99	0.96	0.91	0.78	0.53	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.022	kg/(sm ²)
Maximum temperature difference during thermal performance test	$(\vartheta_m - \vartheta_a)_{max}$	63.9	K
Standard stagnation temperature (G = 1000 W/m ² ; ϑ_a = 30 °C)	ϑ_{stg}	284	°C
Maximum operating temperature	$\vartheta_{max, op}$	250	°C
Maximum operating pressure	$p_{max, op}$	1000	kPa

Testing laboratory	NCSR Demokritos / Solar & other Energy System	www.solar.demokritos.gr	
Test report(s)	4443 DE1	Dated	03/12/24
	4444 DQ1		12/12/24

Comments of testing laboratory	Ver. 6.2 (13.01.2022)
<div style="text-align: right;"> <p>N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Tel: +210 6503815 - Fax: +210 6544592 P.O. BOX 60037, 15310 Ag. Paraskevi, Greece</p> </div>	



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SKM 10132.3
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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
OLD300V		3,821	2,862	2,102	2,968	2,217	1,628	2,167	1,524	1,068	2,354	1,649	1,138
OLD300H		3,821	2,862	2,102	2,968	2,217	1,628	2,167	1,524	1,068	2,354	1,649	1,138
Gross Thermal Yield per m ² gross area		1,265	948	696	983	734	539	718	505	354	779	546	377
Annual efficiency, η_a		72%	54%	39%	60%	45%	33%	62%	43%	30%	63%	44%	30%
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		Additional Informative Technical Data	
	Reference Area, A _{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A _a (m ²)
OLD300V	3.02	20-V-1234S-A:11,2060-C:20.6,1460-	2.88
OLD300H	3.02	20-V-1234S-A:11,1300-C:20.6,2220-	2.88

Data required for CDR (EU) No 811/2013 - Reference Area		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	64%	Zero-loss efficiency (η_0)	0.78
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 values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient (a ₁)	3.54
		Second-order coefficient (a ₂)	0.000
		Incidence angle modifier IAM (50°)	0.97
		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.	