

KEYMARK CERTIFICATE SK08055762302

TUV CYPRUS LTD Certifies that the organization

Thermosifones FLOGA - Petros Hadjiyiannis,Ltd.

Address: 71 Tseriou Street
2042 Strovolos, Nicosia
Cyprus

Supplies: Thermal solar collector

In compliance with: EN 12975:2022 & EN ISO 9806:2013

Certified Product: Solar Collector

Model / Type ref: FLOGA BLUE COPPER 1.5 V, FLOGA BLUE COPPER 1.5 H
FLOGA BLUE COPPER 1.9 V, FLOGA BLUE COPPER 1.9 H
FLOGA BLUE COPPER 2.0 V, FLOGA BLUE COPPER 2.0 H
FLOGA BLUE COPPER 2.5 V, FLOGA BLUE COPPER 2.5 H

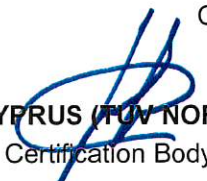


SOLAR KEYMARK
CERTIFICATION BODY
CEN 033

Accredited by
CYSAB
Certificate No. C 004-2

Test Results: Annex to certificate

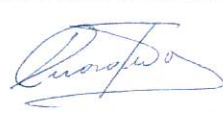
Certification scheme: The initial Certificate with number PSK-008/2019 of Solar Keymark Certification Body CEN1328 was issued on 28/11/2019. In order to grant this certificate, TUV CYPRUS has visited the manufacturing site and verified the implementation of the quality management system. TUV CYPRUS performs these tasks periodically while the certificate has not been cancelled, in accordance with the Product Certification Regulations and the Rules for Authorization to use Conformity Mark for Solar Collectors.


TUV CYPRUS (TUV NORD) LTD
Certification Body

Nicosia , 27/10/2023
Initial Certification : 28/11/2019
Valid until : 26/10/2028



Annex to Solar Keymark Certificate

Licence holder Thermosifones FLOGA Petros Hadjiyiannis,Ltd.					Licence Number		SK08055762302							
					Date issued		2023-10-27							
					Issued by		TUV CYPRUS LTD							
Brand (optional)					Country		CYPRUS							
Street, Number					Web		https://www.flogasolar.com							
Postcode, City					E-mail		floga@cytanet.com.cy							
					Tel		+357 22424591							
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 θ _m - θ _a									
					0 K W	10 K W	30 K W	50 K W	70 K W	85 K W				
FLOGA BLUE COPPER 1.5 V	1.52	1,511	1,009	80	1,004	942	806	657	494	364				
FLOGA BLUE COPPER 1.9 V	1.90	1,510	1,260	80	1,255	1,177	1,007	821	618	455				
FLOGA BLUE COPPER 2.0 V	2.03	2,010	1,010	80	1,341	1,257	1,076	877	660	486				
FLOGA BLUE COPPER 2.5 V	2.53	2,010	1,260	80	1,672	1,567	1,341	1,093	823	606				
FLOGA BLUE COPPER 1.5 H	1.52	1,009	1,511	80	1,004	942	806	657	494	364				
FLOGA BLUE COPPER 1.9 H	1.90	1,260	1,510	80	1,255	1,177	1,007	821	618	455				
FLOGA BLUE COPPER 2.0 H	2.03	1,010	2,010	80	1,341	1,257	1,076	877	660	486				
FLOGA BLUE COPPER 2.5 H	2.53	1,260	2,010	80	1,672	1,567	1,341	1,093	823	606				
Power output per m ² gross area					661	619	530	432	325	239				
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					0.677	4.02	0.011	0.000	0.00	14,300	0.000	0.00	0.0E+00	0.84
Incidence angle modifier test method					Steady state - outdoor									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K _{GT, coll}	1.00	0.99	0.97	0.93	0.87	0.77	0.61	0.37	0.00
Longitudinal					K _{GL, coll}	1.00	0.99	0.97	0.93	0.87	0.77	0.61	0.37	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					(θ _m -θ _a) _{max}	55		K						
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)					θ _{stg}	160		°C						
Maximum operating temperature					θ _{max, op}	-		°C						
Maximum operating pressure					p _{max, op}	600		kPa						
Testing laboratory					Aelab - Applied Energy Laboratory		www.aelab.gov.cy							
Test report(s)					Σ.01.12.16.04, Σ.01.12.16.05, Σ.01.12.16.06		Dated		11/09/2017					
					Σ.01.12.16.04/PD, Σ.01.12.16.06/PD				11/09/2017					
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
					 									
TÜV CYPRUS LTD, Papaflessa 2, 2235 Latsia, Nicosia, Cyprus P.O.Box: 20732, 1663 Nicosia - Cyprus														



Annex to Solar Keymark Certificate	Licence Number	SK08055762302
Supplementary Information	Issued	2023-10-27

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
FLOGA BLUE COPPER 1.5 V		1,513	970	552	1,089	678	366	810	475	251	882	507	263
FLOGA BLUE COPPER 1.9 V		1,891	1,212	690	1,361	848	458	1,013	593	314	1,103	634	329
FLOGA BLUE COPPER 2.0 V		2,020	1,295	738	1,454	906	489	1,082	634	335	1,178	678	351
FLOGA BLUE COPPER 2.5 V		2,518	1,614	919	1,812	1,129	610	1,349	790	418	1,469	845	438
FLOGA BLUE COPPER 1.5 H		1,513	970	552	1,089	678	366	810	475	251	882	507	263
FLOGA BLUE COPPER 1.9 H		1,891	1,212	690	1,361	848	458	1,013	593	314	1,103	634	329
FLOGA BLUE COPPER 2.0 H		2,020	1,295	738	1,454	906	489	1,082	634	335	1,178	678	351
FLOGA BLUE COPPER 2.5 H		2,518	1,614	919	1,812	1,129	610	1,349	790	418	1,469	845	438
Gross Thermal Yield per m ² gross area		995	638	363	716	446	241	533	312	165	580	334	173
Annual efficiency, η_a		56%	36%	21%	44%	27%	15%	46%	27%	14%	47%	27%	14%
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	
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				2392	Pa
Maximum tested negative load				1190	Pa
Hail resistance using steel ball (maximum drop height)				1.4	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	Facade 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)
FLOGA BLUE COPPER 1.5 V	1.52	10-V-1234S-A:14,1375-C:20.6,1080	1.38
FLOGA BLUE COPPER 1.9 V	1.90	12-V-1234S-A:14,1375-C:20.6,1330	1.74
FLOGA BLUE COPPER 2.0 V	2.03	10-V-1234S-A:14,1880-C:20.6,1080	1.85
FLOGA BLUE COPPER 2.5 V	2.53	12-V-1234S-A:14,1880-C:20.6,1330	2.34
FLOGA BLUE COPPER 1.5 H	1.52	15-V-1234S-A:14,880-C:20.6,1580	1.38
FLOGA BLUE COPPER 1.9 H	1.90	15-V-1234S-A:14,1130-C:20.6,1580	1.74
FLOGA BLUE COPPER 2.0 H	2.03	21-V-1234S-A:14,880-C:20.6,2080	1.85
FLOGA BLUE COPPER 2.5 H	2.53	21-V-1234S-A:14,1130-C:20.6,2080	2.34

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	48%	Zero-loss efficiency (η_0)	0.66
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.		First-order coefficient (a_1)	4.02 W/(m ² K)
		Second-order coefficient (a_2)	0.011 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.86
		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.	