

KEYMARK CERTIFICATE SK08055762301

TUV CYPRUS LTD Certifies that the organization

Thermosifones FLOGA - Petros Hadjiyiannis,Ltd.

Address: 71 Tseriou Street
2042 Strovolos, Nicosia
Cyprus

Supplies: Thermal solar collector

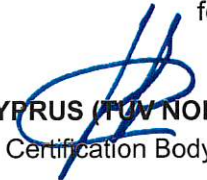
In compliance with: EN 12975:2022 & EN ISO 9806:2013

Certified Product: Solar Collector

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

Test Results: Annex to certificate

Certification scheme: The initial Certificate with number PSK-007/2019 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



SOLAR KEYMARK
CERTIFICATION BODY
CEN 033

Accredited by
CYSAB
Certificate No. C 004-2



Annex to Solar Keymark Certificate

Licence Number	SK08055762301
Date issued	2023-10-27
Issued by	TUV CYPRUS LTD

Licence holder	Thermosifones FLOGA Petros Hadjiyiannis,Ltd.	Country	CYPRUS
Brand (optional)		Web	https://www.flogasolar.com
Street, Number	71 Tseriou Street, Strovolos	E-mail	floga@cytanet.com.cy
Postcode, City	2042, Nicosia	Tel	+357 22424591

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 θ _m - θ _a					
					0 K	10 K	30 K	50 K	70 K	78 K
					W	W	W	W	W	W
FLOGA BLUE ALUMINIUM 1.5 V	1.53	1,512	1,011	80	999	934	788	621	434	353
FLOGA BLUE ALUMINIUM 1.9 V	1.90	1,510	1,260	80	1,240	1,160	979	772	539	438
FLOGA BLUE ALUMINIUM 2.0 V	2.03	2,010	1,010	80	1,325	1,239	1,045	824	576	468
FLOGA BLUE ALUMINIUM 2.5 V	2.53	2,010	1,260	80	1,653	1,546	1,304	1,028	718	584
FLOGA BLUE ALUMINIUM 1.5 H	1.53	1,011	1,512	80	999	934	788	621	434	353
FLOGA BLUE ALUMINIUM 1.9 H	1.90	1,260	1,510	80	1,240	1,160	979	772	539	438
FLOGA BLUE ALUMINIUM 2.0 H	2.03	1,010	2,010	80	1,325	1,239	1,045	824	576	468
FLOGA BLUE ALUMINIUM 2.5 H	2.53	1,260	2,010	80	1,653	1,546	1,304	1,028	718	584
Power output per m ² gross area	653	610	515	406	284	231				

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	0.671	4.09	0.017	0.000	0.00	12,400	0.000	0.00	0.0E+00	0.82

Incidence angle modifier test method	Steady state - outdoor									
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	K _{θT, coll}	1.00	0.99	0.96	0.92	0.85	0.74	0.59	0.35	0.00
Longitudinal	K _{θL, coll}	1.00	0.99	0.96	0.92	0.85	0.74	0.59	0.35	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}	48	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.01.12.16.02, Σ.01.12.16.03, Σ.01.12.16.01 Σ.01.12.16.01/PD, Σ.01.12.16.03/PD	Dated 11/09/2017 11/09/2017

Comments of testing laboratory	Ver. 6.2 (13.01.2022)
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Annex to Solar Keymark Certificate	Licence Number	SK08055762301
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 ALUMINIUM 1.5 V		1,479	914	480	1,049	620	297	785	438	209	854	467	220
FLOGA BLUE ALUMINIUM 1.9 V		1,837	1,135	595	1,303	770	369	975	544	259	1,061	580	273
FLOGA BLUE ALUMINIUM 2.0 V		1,962	1,213	636	1,392	822	394	1,041	582	277	1,134	620	292
FLOGA BLUE ALUMINIUM 2.5 V		2,448	1,513	794	1,737	1,026	492	1,299	725	346	1,414	773	364
FLOGA BLUE ALUMINIUM 1.5 H		1,479	914	480	1,049	620	297	785	438	209	854	467	220
FLOGA BLUE ALUMINIUM 1.9 H		1,837	1,135	595	1,303	770	369	975	544	259	1,061	580	273
FLOGA BLUE ALUMINIUM 2.0 H		1,962	1,213	636	1,392	822	394	1,041	582	277	1,134	620	292
FLOGA BLUE ALUMINIUM 2.5 H		2,448	1,513	794	1,737	1,026	492	1,299	725	346	1,414	773	364
Gross Thermal Yield per m ² gross area		967	598	313	686	405	194	513	286	136	558	305	144
Annual efficiency, η_a		55%	34%	18%	42%	25%	12%	44%	25%	12%	45%	25%	12%
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	Façade collector(s)	No

Energy Labelling Information

Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
FLOGA BLUE ALUMINIUM 1.5 V	8-V-1234S-A:14,1375-C:20.6,1080	1.38
FLOGA BLUE ALUMINIUM 1.9 V	10-V-1234S-A:14,1375-C:20.6,1330	1.74
FLOGA BLUE ALUMINIUM 2.0 V	8-V-1234S-A:14,1880-C:20.6,1080	1.85
FLOGA BLUE ALUMINIUM 2.5 V	10-V-1234S-A:14,1880-C:20.6,1330	2.34
FLOGA BLUE ALUMINIUM 1.5 H	15-V-1234S-A:14,1880-C:20.6,1580	1.38
FLOGA BLUE ALUMINIUM 1.9 H	15-V-1234S-A:14,1130-C:20.6,1580	1.74
FLOGA BLUE ALUMINIUM 2.0 H	21-V-1234S-A:14,1880-C:20.6,2080	1.85
FLOGA BLUE ALUMINIUM 2.5 H	21-V-1234S-A:14,1130-C:20.6,1580	2.34

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	46%
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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/m², 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.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0.65	--
First-order coefficient (a_1)	4.09	W/(m ² K)
Second-order coefficient (a_2)	0.017	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.