Certificado

Certificate no.
Certificado nº **PSK – 007/2019**

Name and address of the certificate holder:
Nome e morada do titular do certificado:

Thermosifones FLOGA – Petros Hadjiyiannis, Ltd.
71 Tseriou Street
2042 Strovolos
Nicosia
Cyprus

Product:
Produto:

Thermal solar collector
Coletor Solar Térmico

Type references:
Referências:

FLOGA BLUE ALUMINIUM 1.5 V, FLOGA BLUE ALUMINIUM 1.9 V, FLOGA BLUE ALUMINIUM 2.0 V, FLOGA BLUE ALUMINIUM 2.5 V

Trademark(s):
Marca(s) comercial(is):

FLOGA

Technical characteristics:
Características técnicas:

Summary of EN ISO 9806 Test Results: Registration No. PSK-007/2019, (in annex)
Resumo dos resultados dos ensaios realizados segundo a norma EN ISO 9806: Registo Nº PSK-007/2019, (em anexo)

This product is in conformity with:
Este produto está em conformidade com:

EN 12975-1:2006+A1:2010, EN ISO 9806:2013

and with the Specific Keymark Scheme Rules for Solar Thermal Products
e com as Regras Particulares do CEN Keymark Scheme para Produtos Solares Térmicos.

Test report(s) no. / issued by:
Relatório(s) de ensaios nº(s) / emitido(s) por:

Σ.01.12.16.02, Σ.01.12.16.01, Σ.01.12.16.01/PD, Σ.01.12.16.03, Σ.01.12.16.03/PD / AEL

Additional information (if any):
Informação adicional (se existir):

Vertical Operation / *Operação vertical*

This certificate is valid until:
Este certificado é válido até:

2024-11-27

and supersedes certificate no:
e substitui o certificado nº:

Date of issue:
Data de emissão:

2019-11-28

Francisco Barroca
General Manager / *Diretor Geral*

IPAC acreditação
C0004
ISO/IEC 17065
Produtos

This Certificate includes one Annex with 2 (two) pages
Este Certificado é constituído por um Anexo com 2 (duas) páginas

Annex to Solar Keymark Certificate

Licence Number	PSK - 007/2019
Date issued	2019-11-28
Issued by	CERTIF

Licence holder	Thermosifones FLOGA – Petros Hadjiyiannis, Ltd.	Country	Cyprus
Brand (optional)	FLOGA SOLAR SYSTEMS	Web	https://www.flogasolar.com
Street, Number	71 Tseriou Street, Strovolos	E-mail	floga@cytanet.com.cy
Postcode, City	2042 - Nicosia	Tel	+357 22 424591

Collector Type	Flat plate collector

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	78 K
	m²	mm	mm	mm	W	W	W	W	W	W
FLOGA BLUE ALUMINIUM 1.5V	1,53	1.512	1.011	80	999	934	788	621	434	353
FLOGA BLUE ALUMINIUM 1.9V	1,90	1.510	1.260	80	1.240	1.160	979	772	539	438
FLOGA BLUE ALUMINIUM 2.0V	2,03	2.010	1.010	80	1.325	1.239	1.045	824	576	468
FLOGA BLUE ALUMINIUM 2.5V	2,53	2.010	1.260	80	1.653	1.546	1.304	1.028	718	584
Power output per m² gross area					653	610	515	406	284	231

Performance parameters test method	Steady state - outdoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0,671	4,09	0,017	0,000	0,00	0	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	$K_{\theta T\ coll}$	1,00	0,99	0,96	0,92	0,85	0,74	0,59	0,35	0,00
Longitudinal	$K_{\theta l\ coll}$	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/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	48	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	153	°C
Maximum operating temperature	$\vartheta_{max\ op}$	-	°C
Maximum operating pressure	$p_{max\ op}$	600	kPa

Testing laboratory	AELAB - Applied Energy Laboratory	http://www.aelab.gov.cy	
Test report(s)	Σ.01.12.16.01, Σ.01.12.16.01/PD	Dated	11-09-2017
	Σ.01.12.16.02		11-09-2017
	Σ.01.12.16.03, Σ.01.12.16.03/PD		11-09-2017

Comments of testing laboratory

Datasheet version: 6.1, 2019-09-26

CERTIF Associação para a Certificação
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Tel: +351 212 586 940 / Fax: +351 212 586 959 / mail@certif.pt / www.certif.pt

Annex to Solar Keymark Certificate	Licence Number	PSK - 007/2019
Supplementary Information	Issued	2019-11-28

Annual collector output 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 1.5V		1.477	913	478	1.048	618	296	783	437	207	853	466	219
FLOGA BLUE ALUMINIUM 1.9V		1.835	1.134	594	1.301	768	367	973	543	258	1.060	579	272
FLOGA BLUE ALUMINIUM 2.0V		1.960	1.211	634	1.390	820	392	1.040	580	275	1.132	619	291
FLOGA BLUE ALUMINIUM 2.5V		2.445	1.511	791	1.734	1.023	490	1.297	723	343	1.413	772	363
Annual output per m² gross area		966	597	312	685	404	193	512	286	136	558	305	143
Annual efficiency, η_a		55%	34%	18%	42%	25%	12%	44%	24%	12%	45%	24%	12%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m²			1630 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 ϑm (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.1 (September 2019). 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/m²) >	1000	ϑ_a (°C) >	20	H_y (MJ/m²) >	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
- ☐ Active or passive measure(s) for self-protection
- ☐ Co-generating thermal and electrical power
- ☐ Façade collector(s)

Energy Labelling Information

	Reference Area, A_{sol} (m²)
FLOGA BLUE ALUMINIUM 1.5V	1,53
FLOGA BLUE ALUMINIUM 1.9V	1,90
FLOGA BLUE ALUMINIUM 2.0V	2,03
FLOGA BLUE ALUMINIUM 2.5V	2,53

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

Collector efficiency (η_{col})	46%

Remark: Collector efficiency (ηcol) 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 ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Additional Informative Technical Data

	Hydraulic Designation Code	Aperature Area, A_a (m²)
FLOGA BLUE ALUMINIUM 1.5V	{8}-{V}-{1234S}-{A:14,1375}-	"[1,38]"
FLOGA BLUE ALUMINIUM 1.9V	{10}-{V}-{1234S}-{A:14,1375}-	"[1,74]"
FLOGA BLUE ALUMINIUM 2.0V	{8}-{V}-{1234S}-{A:14,1880}-	"[1,85]"
FLOGA BLUE ALUMINIUM 2.5V	{10}-{V}-{1234S}-{A:14,1880}-	"[2,34]"

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/(m²K)
Second-order coefficient (a_2)	0,017	W/(m²K²)
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.

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