



Certificate no.
Certificado nº **PSK – 008/2019**

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

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

FLOGA

Technical characteristics:
Características técnicas:

Summary of EN ISO 9806 Test Results: Registration No. PSK-008/2019,
(in annex)
Resumo dos resultados dos ensaios realizados segundo a norma EN ISO 9806:
Registo Nº PSK-008/2019, (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.01.12.16.05, Σ.01.12.16.04, Σ.01.12.16.04/PD, Σ.01.12.16.06,
Σ.01.12.16.06/PD / AEL

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

Vertical Operation / Operação vertical

This certificate is valid until:
Este certificado é válido até:
and supersedes certificate no:
e substitui o certificado nº:

2024-11-27



Date of issue:
Data de emissão:

2019-11-28

Francisco Barroca
General Manager / Diretor Geral



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 - 008/2019																	
					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 $G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$											
					m ²		mm		mm		mm		0 K		10 K		30 K		50 K		70 K		85 K	
FLOGA BLUE COPPER 1.5V					1,52		1.511		1.009		80		1.004		942		806		657		494		364	
FLOGA BLUE COPPER 1.9V					1,90		1.510		1.260		80		1.255		1.177		1.007		821		618		455	
FLOGA BLUE COPPER 2.0V					2,03		2.010		1.010		80		1.341		1.257		1.076		877		660		486	
FLOGA BLUE COPPER 2.5V					2,53		2.010		1.260		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		0		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					$K_{BT, coll}$		1,00		0,99		0,97		0,93		0,87		0,77		0,61		0,37		0,00	
Longitudinal					$K_{BL, coll}$		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					$(\vartheta_m - \vartheta_a)_{max}$		55																K	
Standard stagnation temperature ($G = 1000 \text{ W/m}^2; \vartheta_a = 30 \text{ }^\circ\text{C}$)					ϑ_{str}		155																°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)					$\Sigma.01.12.16.04, \Sigma.01.12.16.04/PD$ $\Sigma.01.12.16.05$ $\Sigma.01.12.16.06, \Sigma.01.12.16.06/PD$							Dated		11-09-2017 11-09-2017 11-09-2017										
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26																			
																								
CERTIF Associação para a Certificação												Rua José Afonso, 9E - 2810-237 Almada - Portugal												
Tel: +351 212 586 940 / Fax: +351 212 586 959 / mail@certif.pt / www.certif.pt																								

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	PSK - 008/2019
	Issued	2019-11-28

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations ϑ_m	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
FOGA BLUE COPPER 1.5V		1.513	970	552	1.089	679	367	810	475	251	883	508	263
FOGA BLUE COPPER 1.9V		1.891	1.212	690	1.362	848	458	1.013	593	314	1.103	634	329
FOGA BLUE COPPER 2.0V		2.021	1.295	738	1.455	907	490	1.082	634	335	1.179	678	351
FOGA BLUE COPPER 2.5V		2.518	1.614	919	1.813	1.130	610	1.349	790	417	1.469	845	438
Annual output per m ² gross area		995	638	363	717	447	241	533	312	165	581	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. 6.1 (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/m ²) >	1000	ϑ_a (°C) >	20
		H_v (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)			
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection		
<input type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Façade collector(s)		

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{ref} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
FOGA BLUE COPPER 1.5V	1,52	{10}-{V}-{1234S}-{A:14,1375}-	"[1,38]"
FOGA BLUE COPPER 1.9V	1,90	{12}-{V}-{1234S}-{A:14,1375}-	"[1,74]"
FOGA BLUE COPPER 2.0V	2,03	{10}-{V}-{1234S}-{A:14,1880}-	"[1,85]"
FOGA BLUE COPPER 2.5V	2,53	{12}-{V}-{1234S}-{A:14,1880}-	"[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
		Second-order coefficient (a_2)	0,011
		Incidence angle modifier IAM (50°)	0,87
			--
		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.	