



Certificate no.
Certificado nº **PSK-004/2019**

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

SOLE S. A.
Lefktron and Laikon Agonon,
Acharnai – 13671, Athens
Greece

Product:
Produto:

Thermal solar collector
Coletor solar térmico

Type references:
Referências:

Climasol 1.75; Climasol 2.00; Climasol 2.50; Climasol 2.70

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

EUROSTAR, AQUASOL, OLYMPUS, SUNLIT

Technical characteristics:
Características técnicas:

Summary of EN 12975 Test Results: Registration No. PSK-004/2019
(in annex)
*Resumo dos resultados dos ensaios realizados segundo a norma EN 12975:
Registo Nº PSK-004/2019 (em anexo)*

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

EN 12975-1:2006+A1:2010, EN 12975-2:2006

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:

Nº 32/DER-LECS/2008 / INETI

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

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

2019-12-31

PSK-001/2019


Date of issue:
Data de emissão:

2019-06-17

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-004/2019																	
						Date issued		2019-06-17																	
						Issued by		CERTIF																	
Licence holder		SOLE, S.A.				Country		Greece																	
Brand (optional)		EUROSTAR, AQUASOL, OLYMPUS, SUNLIT				Web		www.eurostar-solar.com																	
Street, Number		Lefktron and Laikon, Agonon				E-mail		export@sole.gr																	
Postcode, City		13671 Acharnai - Athens				Tel		+30 2102389500/2																	
Collector Type						Flat plate collector																			
Collector name						Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s $\theta_m - \theta_a$																			
						Gross height		Gross area (A _G)		Gross length		Gross width		Aperture area (A _a)		Power output per collector									
		mm		m ²		mm		mm		m ²		0 K		10 K		30 K		50 K		70 K		100 K			
		W		W		W		W		W		W		W		W		W		W		W			
Climasol 1.75		86		1.76		1760		1000		1.59		1151		1094		965		816		648		359			
Climasol 2.00		86		1.91		1970		970		1.73		1249		1187		1047		886		703		389			
Climasol 2.50		86		2.31		1970		1175		2.12		1510		1436		1266		1072		851		471			
Climasol 2.70		86		2.69		2470		1250		2.47		1759		1672		1475		1248		991		548			
Power output per m ² gross area						654		621		548		464		368		204									
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 ² K)		-		J/(m ² K)		s/m		W/(m ² K ⁴)		W/(m ² K ⁴)		-	
Test results						0.672		3.10		0.014														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 _{qT, coll}		1.00		0.99		0.97		0.93		0.88		0.78		0.58		0.00		0.00	
Longitudinal						K _{qL, coll}		1.00		0.99		0.97		0.93		0.88		0.78		0.58		0.00		0.00	
Heat transfer medium for testing						Water-Glycole																			
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}		70		K															
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)						θ _{stg}		154		°C															
Maximum operating temperature						θ _{max, op}		150		°C															
Maximum operating pressure						P _{max, op}		600		kPa															
Testing laboratory						LNEG						www.lneg.pt													
Test report(s)						n°32/DER-LECS/2008						Dated		14-11-2008											
Comments of testing laboratory						Tests performed according to EN 12975-2:2006						Datashet version: 6.0, 2018-10-30													
												 <p>Paulo José signature of test lab Laboratório Nacional de Energia e Geologia Instituto de Energia Solar</p>													

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	PSK-004/2019
	Issued	2019-06-17

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
Climasol 1.75		1 735	1 205	753	1 311	881	525	962	615	357	1 043	658	374
Climasol 2.00		1 883	1 308	817	1 422	956	570	1 043	667	387	1 132	714	406
Climasol 2.50		2 277	1 582	988	1 720	1 156	689	1 262	807	468	1 369	863	491
Climasol 2.70		2 651	1 842	1 151	2 003	1 346	803	1 470	940	545	1 594	1 005	572
Annual output per m ² gross area		986	685	428	745	500	298	546	349	203	593	374	213
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 6.0 (October 2018). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc													

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)				C	--
G (W/m ²) >	850	ϑ_a (°C) >	10	H_x (MJ/m ²) >	1046
Maximum tested positive load				3000	Pa
Maximum tested negative load				3000	Pa
Hail resistance using steel ball (maximum drop height)				---	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"/> Wind and/or infrared sensitive collector(s) (WISC)
<input type="checkbox"/> Façade collector(s)	

Energy Labelling Information		
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code
Climasol 1.75	1.76	9-VH-1234S-A:7,1760-C:21,1000
Climasol 2.00	1.91	9-VH-1234S-A:7,1970-C:21,970
Climasol 2.50	2.31	11-VH-1234S-A:7,1970-C:21,1175
Climasol 2.70	2.69	12-VH-1234S-A:7,2148-C:21,1250

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		Data required for CDR (EU) No 812/2013 - Reference Area A_{ref}	
Collector efficiency (η_{col})	51%	Zero-loss efficiency (η_0)	0.65
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)	3.10
		Second-order coefficient (a_2)	0.014
		Incidence angle modifier IAM (50°)	0.86
		Remark: The data given in this section are related to collector reference area (A_{ref}) 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.	