



Certificate no.
Certificado nº **PSK – 007/2018**

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:

WASCO 175; WASCO 200; WASCO 250; WASCO 270

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

WASCO

Technical characteristics:
Características técnicas:

Summary of EN 12975 Test Results: *Registration No. PSK-007/2018,*
(in annex)
Resumo dos resultados dos ensaios realizados segundo a norma EN 12975:
Registo Nº PSK-007/2018, (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:
Relatórios de ensaios nº(s) / emitidos por:

Nº 11.V3/LES/2010 / INETI-LECS

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

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

2019-12-31

and supersedes certificate no:
e substitui o certificado nº:

Date of issue:
Data de emissão:

2018-09-28

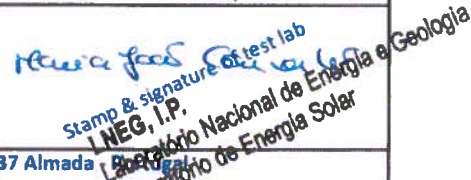


Francisco Barroca
General Manager / *Diretor Geral*

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 - Summary of EN ISO 9806:2013 Test Results					Licence Number		PSK-007/2018							
					Date issued		2018-09-28							
					Issued by		CERTIF							
Licence holder					Sole, S.A.		Country		Greece					
Brand (optional)					Wasco		Web		www.eurostar-solar.com					
Street, Number					Lefktron & Lalkon Agonon		E-mail		export@sole.com					
Postcode, City					13671, Acharnai – Athens		Tel		+30 2102389500					
Collector Type					Flat plate collector, glazed									
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 θ _m - θ _a									
					0 K W	10 K W	30 K W	50 K W	70 K W	100 K W				
Wasco 175	1,76	1 760	1 000	85	1 170	1 111	978	823	647	343				
Wasco 200	1,91	1 970	970	86	1 271	1 207	1 062	893	702	373				
Wasco 250	2,32	1 970	1 175	86	1 539	1 462	1 286	1 082	851	451				
Wasco 270	2,68	2 145	1 248	86	1 782	1 692	1 489	1 253	985	523				
Power output per m ² gross area					665	632	556	468	368	195				
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to AG)					η _{0,hem}	a ₁	a ₂							
Units					-	W/(m ² K)	W/(m ² K ²)							
Test results					0,665	3,200	0,015							
Incidence angle modifier test method					Quasi dynamic - outdoor									
BI-directional incidence angle modifiers					No									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K _{GT, coll}	0,96	0,93	0,89	0,86	0,82	0,62	0,41	0,20	0,00
Longitudinal					K _{BL, coll}	0,96	0,93	0,89	0,86	0,82	0,62	0,41	0,20	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 for thermal performance calculations					(θ _m -θ _a) _{a/max}	100	K							
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)					θ _{stg}	160	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²	11,1	kJ/(Km ²)							
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.11.V3/LES/2010		Dated		04/12/2013					
Comments of testing laboratory					Datashet version: S.01, 2016-03-01									
Wasco 175 was thermal performance tested.														
Wasco 270 was thermal performance tested and reliability and durability tested.														
<p>CERTIF Associação para a Certificação Rua José Afonso, 9E - 2810-237 Almada Tel: +351 212 586 940 / Fax: +351 212586959 / mail@certif.pt / www.certif.pt</p>														

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	PSK-007/2018
	Issued	2018-09-28

Annual collector output in kWh/collector at mean fluid temperature θ_m , based on ISO 9806:2013 test results

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
Wasco 175		1 569	1 040	609	1 160	745	412	857	522	287	927	555	297
Wasco 200		1 704	1 129	661	1 260	809	447	931	567	312	1 007	602	322
Wasco 250		2 064	1 367	801	1 526	980	541	1 128	687	378	1 220	730	390
Wasco 270		2 389	1 583	927	1 767	1 134	627	1 305	795	438	1 412	845	452
Annual output per m ² gross area		892	591	346	659	423	234	487	297	163	527	315	169
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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Water-Glycole
Hybrid Thermal and Photo Voltaic collector	No
The collector is deemed to be suitable for roof integration	No
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:	
Climate class (A, B or C)	C
Maximum tested positive load	3000 Pa
Maximum tested negative load	3000 Pa
Hail resistance using steel ball (maximum drop height)	0 m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
Wasco 175	1,76	Collector efficiency (η_{col})	51 %
Wasco 200	1,91	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 9806:2013.	
Wasco 250	2,32		
Wasco 270	2,68		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0,665
		First-order coefficient (a_1)	3,20 W/(m ² K)
		Second-order coefficient (a_2)	0,015 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,82
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.			