



Certificate no. **PSK-014/2018**
Certificado nº

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:

ECO S150; ECO S200; ECO S230; ECO S260

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

ECO

Technical characteristics:
Características técnicas:

Summary of EN 12975 Test Results: *Registration No. PSK-014/2018,*
(in annex)
Resumo dos resultados dos ensaios realizados segundo a norma EN 12975:
Registo Nº PSK-014/2018, (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:
Relatórios de ensaios nº(s) / emitidos por:

Nº 6.V1/LES/2018 and/e Nº 9.V1/LES/2018 / LNEG
Nº 4154 DE4 / DEMOKRITOS

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

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

2020-11-22

and supersedes certificate no:
e substitui o certificado nº:

PSK-001/2016

Date of issue:
Data de emissão:

2018-11-19



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 - Summary of EN ISO 9806:2013 Test Results					Licence Number		PSK-014/2018				
					Date issued		2018-11-19				
					Issued by		CERTIF				
Licence holder		Sole, S.A.			Country		Greece				
Brand (optional)		ECO			Web		www.eurostar-solar.com				
Street, Number		Lefktron & Laikon 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	
ECO S260	2,64	2 135	1 230	81	1 922	1 807	1 558	1 284	985	488	
ECO S230	2,28	1 960	1 165	81	1 660	1 561	1 346	1 109	851	422	
ECO S200	1,88	1 960	960	81	1 369	1 287	1 110	915	701	348	
ECO S150	1,48	1 540	960	81	1 077	1 013	874	720	552	274	
Power output per m ² gross area					728	685	590	487	373	185	
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		0,728	4,230	0,012							
Incidence angle modifier test method		Steady state - outdoor									
Bi-directional incidence angle modifiers		No									
Incidence angle modifier		Angle:	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal		K _{BT, coll}	1,00	0,98	0,95	0,90	0,82	0,68	0,38	0,00	0,00
Longitudinal		K _{BL, coll}	1,00	0,98	0,95	0,90	0,82	0,68	0,38	0,00	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) _{max}	100	K							
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)		θ _{stg}	164	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)		C/m ²	15,6	kJ/(Km ²)							
Maximum operating temperature		θ _{max, op}	150	°C							
Maximum operating pressure		P _{max, op}	1000	kPa							
Testing laboratory		LNEG			www.lneg.pt						
Test report(s)		n.6.V1/LES/2018 (Thermal performance test - ECO S150) n.9.V1/LES/2018 (Thermal performance test - ECO S260) 4154 DE4 (Reliability and durability tests - ECO S260)			Dated		29/06/2018 07/09/2018 22/09/2015				
Comments of testing laboratory		<p>Reliability and durability tested by NCSR "Demokritos" (www.solar.demokritos.gr). Performance parameters related to aperture area obtained applying the correction factor: Gross Area/Aperture Area. η_{0,hem} = 0,773; a₁ = 4,492; a₂ = 0,013 Aperture area based on manufacturer information.</p>									
		<p>Datasheet version: 5.01, 2016-03-01</p> <p>Stamp & signature of test lab LNEG, I.P. Laboratório Nacional de Energia e Geologia Laboratório de Energia Solar</p>									
<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-014/2018
	Issued	2018-11-19

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
ECO S260		2 738	1 759	1 022	1 990	1 258	697	1 469	876	478	1 593	930	496
ECO S230		2 364	1 519	882	1 719	1 087	602	1 268	756	413	1 375	803	428
ECO S200		1 950	1 252	728	1 417	896	496	1 046	624	340	1 134	662	353
ECO S150		1 535	986	573	1 116	705	391	823	491	268	893	521	278
Annual output per m ² gross area		1 037	666	387	754	477	264	556	332	181	603	352	188
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	Yes	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	A	--
Maximum tested positive load	3000	Pa
Maximum tested negative load	3000	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information

	Reference Area, A_{ref} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{ref}	
ECO S260	2,64	Collector efficiency (η_{col})	54 %
ECO S230	2,28	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_{ref}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.	
ECO S200	1,88		
ECO S150	1,48		
Data required for CDR (EU) No 812/2013 - Reference Area A_{ref}			
		Zero-loss efficiency (η_0)	0,728 --
		First-order coefficient (a_1)	4,23 W/(m ² K)
		Second-order coefficient (a_2)	0,012 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_{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.			