



**Certificate no.** PSK – 019/2016  
*Certificado n.º*

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

VELPA SOLAR HEATERS, LTD.  
25A Optikou Nikolaides  
3045 Limassol  
Cyprus

**Product:**  
*Produto:*

Thermal Solar Collector  
*Coletor Solar Térmico*

**Type references:**  
*Referências:*

CAS1-F8, CAS2-F8, CAS3-F8, CAS4-F8

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

VELPA

**Technical characteristics:**  
*Características técnicas:*

Summary of EN 12975 Test Results: Registration No. PSK-019/2016  
(in annex)  
*Resumo dos resultados dos ensaios realizados segundo a norma EN 12975:  
Registo N.º PSK-019/2016 (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) ref. / Issued by:**  
*Relatório(s) de ensaios n.º(s) / Emitido(s) por:*

11.V1/LES/2011 / LNEG-LES

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

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

2021-05-05

**and supersedes certificate no:**  
*e substitui o certificado n.º:*

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**Date of issue:**  
*Data de emissão:*

2016-08-08



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*





<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>						<b>Licence Number</b>	<b>PSK-019/2016</b>					
						<b>Issued</b>	<b>2016-08-08</b>					
<b>Company holding the</b>	<b>VELPA SOLAR HEATERS, LTD</b>					<b>Country</b>	<b>Cyprus</b>					
<b>Brand (optional)</b>	<b>VELPA</b>					<b>Website</b>	<b>www.velpasolar.com</b>					
<b>Street, street number</b>	<b>25A Optikou Nikolaides</b>					<b>E-mail</b>	<b>velpa.solar@cytanet.com.cy</b>					
<b>Postal Code / City, province</b>	<b>3045 Limassol</b>					<b>Tel/Fax</b>	<b>357/25576031 / 25563815</b>					
<b>Collector Type (flat plate glazed/un-glazed; evacuated tubular)</b>						<b>Flat plate collector - glazed</b>						
<b>Thermal / photo voltaic hybrid collector? (PVT collector)</b>						<b>No</b>						
<b>Integration in the roof possible ? (manufacturers declaration)</b>						<b>No</b>						
<b>Collector name</b>	<b>Aperture area (Aa)</b>	<b>Gross length</b>	<b>Gross width</b>	<b>Gross height</b>	<b>Gross area (AG)</b>	<b>Power output per collector module</b>						
						<b>G = 1000 W/m<sup>2</sup></b>						
						<b>Tm-Ta</b>						
						<b>0 K</b>	<b>10 K</b>	<b>30 K</b>	<b>50 K</b>	<b>70 K</b>		
	<b>m<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>mm</b>	<b>m<sup>2</sup></b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>		
CAS1-F8	1.32	1 490	990	85	1.48	1 028	968	844	715	580		
CAS2-F8	1.67	1 490	1 225	85	1.83	1 301	1 225	1 068	904	734		
CAS3-F8	1.80	1 990	990	85	1.97	1 402	1 320	1 151	975	791		
CAS4-F8	2.24	1 989	1 226	85	2.44	1 745	1 643	1 432	1 213	984		
<b>Performance test method</b>						<b>Glazed liquid heating collector - steady state - outdoor</b>						
<b>Performance parameters related to aperture</b>						<b>η<sub>0</sub></b>	<b>a<sub>1</sub></b>	<b>a<sub>2</sub></b>				
<b>Units</b>						-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K)				
<b>Test results - Flow rate and fluid see note 1</b>						0.779	4.500	0.005				
<b>Bi-directional incidence angle</b>						<b>No</b>						
<b>Incidence angle modifiers Kθ(θ)</b>						<i>Kθ values are obligatory for 50°.</i>						
<b>Angle</b>						10°	20°	30°	40°	50°	60°	
<b>Kθ(θ)</b>						1.00	0.98	0.95	0.91	0.84	0.71	
<b>Incidence angle modifier not bi-directional - leave fields blank</b>						0.45	0.00	0.00				
<b>Stagnation temperature - Weather conditions see note 2</b>						<b>T<sub>stg</sub></b>	165 °C					
<b>Effective thermal capacity</b>						<b>ceff = C/Ag</b>	9 kJ/(m <sup>2</sup> K)					
<b>Max. intended operation temperature - see note 3</b>						<b>T<sub>max,op</sub></b>	— °C					
<b>Max. operation pressure - see note 3</b>						<b>p<sub>max,op</sub></b>	1000 kPa					
<b>Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m<sup>2</sup> aperture area</b>												
<b>Flow rate</b>	<b>kg/(s m<sup>2</sup>)</b>	0.000	0.005	0.011	0.002	0.024	0.030					
<b>Pressure drop, ΔP</b>	<b>Pa</b>	0	38	91	141	191	242					
<b>Optional weather data</b>						<b>Location</b>				<b>Link</b>		
<b>Testing Laboratory</b>						<b>LNEG</b>						
<b>Website</b>						<b>www.lneg.pt</b>						
<b>Test report Id. number</b>						<b>n<sup>o</sup>11.V1/LES/2011</b>			<b>Date of test report</b>			<b>2011-05-04</b>
<b>During the test GDIF/GTOT was always between</b>						0.09	and		0.13			
<b>Comments of testing laboratory:</b>												
Collector CAS1-F8 was thermal performance tested.												
Collector CAS4-F8 was submitted to thermal performance and reliability tests.												
Dimensions for CAS1-F8, CAS2-F8 and CAS3-F8 are based on manufacturer informations												
Information on T <sub>max,op</sub> not available.												
<b>Note 1</b>	<b>Flow rate</b>	0.020 kg/(s m <sup>2</sup> )	<b>Fluid</b>	Water								
<b>Note 2</b>	<b>Irradiance, G = 1000 W/m<sup>2</sup>; Ambient temperature, Ta=30 °C</b>											
<b>Note 3</b>	<b>Given by manufacturer</b>											
sheet version: 4.06, 2014-01-15												
<b>CERTIF Associação para a Certificação</b> Rua José Afonso, 9E - 2810-237 Almada - Portugal Tel: +351 212 586 940 / Fax: +351 212586959 / mail@certif.pt / www.certif.pt												



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	PSK-019/2016
	Issued	08-08-2016

Annual collector output kWh/module												
Collector name	Location and collector temperature (T <sub>m</sub> )											
	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
CAS1-F8	1 489	984	613	1 093	722	443	804	498	296	872	530	308
CAS2-F8	1 884	1 245	775	1 383	914	561	1 017	630	375	1 104	671	389
CAS3-F8	2 031	1 342	836	1 490	985	605	1 096	679	404	1 189	723	419
CAS4-F8	2 528	1 670	1 040	1 855	1 226	753	1 364	845	503	1 480	900	522

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	G <sub>tot</sub> kWh/m <sup>2</sup>	T <sub>a</sub> °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

G <sub>tot</sub>	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
T <sub>a</sub>	Mean annual ambient air temperature	°C
T <sub>m</sub>	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (T<sub>m</sub>). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

<p align="center"> <b>CERTIF Associação para a Certificação</b>            Rua José Afonso, 9E - 2810-237 Almada - Portugal            Tel: +351 212 586 940 / Fax: +351 212586959 / mail@certif.pt / www.certif.pt         </p>	Datasheet version:
	4.06, 2014-01-15
	ScenoCalc version:
	Ver. 4.06 (Jan, 2014)