

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		PSK-019/2016			
						Issued		2016-08-08			
Company holding the		VELPA SOLAR HEATERS, LTD				Country		Cyprus			
Brand (optional)		VELPA				Website		www.velpasolar.com			
Street, street number		25A Optikou Nikolaides				E-mail		velpa.solar@cytanet.com.cy			
Postal Code / City, province		3045 Limassol				Tel/Fax		357 25576031 / 25563815			
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Flat plate collector - glazed					
Thermal / photo voltaic hybrid collector? (PVT collector)						No					
Integration in the roof possible ? (manufacturers declaration)						No					
Collector name	Aperture area (Aa) m ²	Gross length mm	Gross width mm	Gross height mm	Gross area (AG) m ²	Power output per collector module					
						G = 1000 W/m ²					
						T _m -T _a					
						0 K	10 K	30 K	50 K	70 K	
						W	W	W	W	W	
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	
Performance test method						Glazed liquid heating collector - steady state - outdoor					
Performance parameters related to aperture area		η_0	a1	a2							
Units		-	W/(m ² K)	W/(m ² K ²)							
Test results - Flow rate and fluid see note 1		0.779	4.500	0.005							
Bi-directional incidence angle modifiers?		No <i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers Kθ(θ)		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
		K θ (θ)	1.00	0.98	0.96	0.91	0.84	0.71	0.45	0.00	0.00
Incidence angle modifier not bi-directional - leave fields blank											
Stagnation temperature - Weather conditions see note 2						T _{stg}		165 °C			
Effective thermal capacity						c _{eff} = C/Ag		9 kJ/(m ² K)			
Max. intended operation temperature - see note 3						T _{max,op}		--- °C			
Max. operation pressure - see note 3						p _{max,op}		1000 kPa			
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area											
Flow rate	kg/(s m ²)	0.000	0.005	0.011	0.002	0.024	0.030				
Pressure drop, ΔP	Pa	0	38	91	141	191	242				
Optional weather data		Location			Link						
Testing Laboratory		LNEG									
Website		www.lneg.pt									
Test report id. number		n°11.V1/LES/2011				Date of test report		2011-05-04			
During the test GDIF/GTOT was always between		0.09	and	0.13							
Comments of testing laboratory:											
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 _{max,op} not available.											
Note 1	Flow rate	0.020	kg/(s m ²)	Fluid	Water						
Note 2	Irradiance, G = 1000 W/m²; Ambient temperature, T_a=30 °C										
Note 3	Given by manufacturer										
Datashet version: 4.06, 2014-01-15											
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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	PSK-019/2016
	Issued	8-8-2016

Annual collector output kWh/module															
Collector name	Location and collector temperature (T _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			
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°)

Overview of locations				
Location	Latitude °	G _{tot} kWh/m ²	T _a °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 _{tot}	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	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_m). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.