AENOR

Keymark Certificate
Solar thermal energy

078/000219

AENOR certifies that the organization

DELPASO SOLAR, S.L.

registered office	PARQUE TECNOLÓGICO DE ANDALUCÍA, AVENIDA JUAN LÓPEZ DE PEÑALVER, 3 29590 MÁLAGA *(Malaga - España)*
supplies	Solar collectors
in compliance with	UNE-EN 12975-1:2006+A1:2011 *(EN 12975-1:2006+A1:2010)*
Trade Mark	DPS VSH2200, DPS HSH2200, DPS VSHJ2200, DPS HSHJ2200, DPS VSH2600, DPS HSH2600, DPS VSHJ2600, DPS HSHJ2600
Technical information	Specified in Annexes to the Certificate
Production site	PARQUE TECNOLÓGICO DE ANDALUCÍA, AVENIDA JUAN LÓPEZ DE PEÑALVER, 3 29590 MÁLAGA *(Malaga - España)*
Certification scheme	In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented for its manufacture. AENOR performs these tasks periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP 078.01.
First issued on	2014-12-04
Last issued on	2019-12-04
Validity date	2024-12-04

Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

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Product certification body accredited by ENAC, number 1/C-PR271

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results		Licence Number	078/000219
		Date issued	2019-12-04
		Issued by	AENOR

Licence holder	DELPASO SOLAR S.L.	**Country**	SPAIN
Brand (optional)	--	**Web**	http://www.delpasosolar.com
Street, Number	AV. Juan Lopez de Peñalver 3	**E-mail**	calidad@delpasosolar.com
Postcode, City	29590 - Málaga	**Tel**	+34 952 111 524

Collector Type	Flat plate collector, glazed

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m²; Gd = 150 W/m² ϑm - ϑa: 0 K	10 K	30 K	50 K	70 K	49 K
	m²	mm	mm	mm	W	W	W	W	W	W
DPS VSH2200	2,23	2.089	1.069	98	1.557	1.478	1.303	1.105	884	1.115
DPS HSH2200	2,23	1.069	2.089	98	1.557	1.478	1.303	1.105	884	1.115
DPS VSHJ2200	2,22	2.074	1.074	98	1.550	1.471	1.297	1.100	880	1.110
DPS HSHJ2200	2,22	1.074	2.074	98	1.550	1.471	1.297	1.100	880	1.110
DPS VSHJ2600	2,57	2.074	1.239	98	1.794	1.703	1.502	1.273	1.018	1.285
DPS HSHJ2600	2,57	1.239	2.074	98	1.794	1.703	1.502	1.273	1.018	1.285
DPS HSH2600	2,58	1.234	2.089	98	1.801	1.710	1.507	1.278	1.022	1.290
DPS VSH2600	2,58	2.089	1.234	98	1.801	1.710	1.507	1.278	1.022	1.290
Power output per m² gross area					698	663	584	495	396	500

Performance parameters test method		Steady state - indoor								
Performance parameters (related to AG)		η0,hem	a1	a2						
Units		-	W/(m²K)	W/(m²K²)						
Test results		0,698	3,401	0,013						
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	$K_{\theta T,coll}$					0,96				0,00
Longitudinal	$K_{\theta L,coll}$					0,96				0,00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0,033	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	49	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	214,8	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m^2	4,36	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	200	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	Fundación CENER-CIEMAT, LEST	www.cener.com	
Test report(s)	30.2367.0-4-1 / 30.2367.0-5-1 30.2367.0-6-1 / 30.2367.0 30.3280.0	**Dated**	29/10/2014 04/01/2018

Comments of testing laboratory — Datasheet version: 5.01, 2016-03-01

- The only difference between the SH and SHJ collectors is the colector box profile.
- The collectors models VSH2200 and VSH2600 were tested according to ISO 9806:2013 According to SKM rules, the results of the collector model VSH2600 are representative for the whole SH-SHJ family.

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Annex to Solar Keymark Certificate	Licence Number	078/000219
Supplementary Information	Issued	2019-12-04

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

Standard Locations	Athens			Davos			Stockholm			Würzburg		
Collector name / ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
DPS VSH2200	2.528	1.786	1.143	1.905	1.295	788	1.411	906	531	1.535	982	566
DPS HSH2200	2.528	1.786	1.143	1.905	1.295	788	1.411	906	531	1.535	982	566
DPS VSHJ2200	2.517	1.778	1.138	1.897	1.290	784	1.404	902	528	1.528	978	563
DPS HSHJ2200	2.517	1.778	1.138	1.897	1.290	784	1.404	902	528	1.528	978	563
DPS VSHJ2600	2.913	2.058	1.317	2.196	1.493	908	1.626	1.044	612	1.769	1.132	652
DPS HSHJ2600	2.913	2.058	1.317	2.196	1.493	908	1.626	1.044	612	1.769	1.132	652
DPS HSH2600	2.925	2.066	1.322	2.205	1.499	911	1.632	1.048	614	1.776	1.136	654
DPS VSH2600	2.925	2.066	1.322	2.205	1.499	911	1.632	1.048	614	1.776	1.136	654
Annual output per m² gross area	1.134	801	512	854	581	353	633	406	238	688	440	254
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 ϑm (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	2100	Pa
Maximum tested negative load	2100	Pa
Hail resistance using ice balls (diameter)	25	mm

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
DPS VSH2200	2,23
DPS HSH2200	2,23
DPS VSHJ2200	2,22
DPS HSHJ2200	2,22
DPS VSHJ2600	2,57
DPS HSHJ2600	2,57
DPS HSH2600	2,58
DPS VSH2600	2,58

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	54	%

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/m², 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.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0,698	--
First-order coefficient (a_1)	3,40	W/(m²K)
Second-order coefficient (a_2)	0,013	W/(m²K²)
Incidence angle modifier IAM (50°)	0,96	--

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.