

# AENOR

## Keymark Certificate Solar thermal energy



**078/000217**

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 ECO2000, DPS ECO2500, DPS VSP 2000, DPS VSP 2500**  
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



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		078/000217								
					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		PARQUE TECNOLÓGICO DE ANDALUCÍA, AVENIDA JUAN LÓPEZ DE PEÑALVER, 3			E-mail		calidad@delpasosolar.com								
Postcode, City		29590 MALAGA			Tel		+34 952111524								
Collector Type					Flat plate collector, glazed										
Collector name					Gross area (A <sub>G</sub> )	Gross length	Gross width	Gross height	Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> ; u = 3 m/s ϑ <sub>m</sub> - ϑ <sub>a</sub>						
					m <sup>2</sup>	mm	mm	mm	0 K	10 K	30 K	50 K	70 K	105 K	
DPS ECO2000					1,97	2.056	957	70	1.466	1.399	1.256	1.098	926	592	
DPS ECO2500					2,48	2.055	1.205	70	1.845	1.761	1.581	1.382	1.166	745	
DPS VSP 2000					1,98	2.060	960	75	1.473	1.406	1.262	1.104	931	595	
DPS VSP 2500					2,49	2.030	1.210	75	1.853	1.769	1.587	1.388	1.171	748	
Power output per m <sup>2</sup> gross area					744	710	637	557	470	300					
Performance parameters test method					Quasi dynamic										
Performance parameters (related to AG)					η <sub>0,b</sub>	c1	c2	c3	c4	c6	Kd				
Units					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	s/m	-				
Test results					0,746	3,281	0,009	0,000	0,000	0,000	0,982				
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 <sub>θT, coll</sub>	1,00	1,00	0,98	0,95	0,89	0,76	0,45	0,23	0,00	
Longitudinal					K <sub>θL, coll</sub>	1,00	1,00	0,98	0,95	0,89	0,76	0,45	0,23	0,00	
Heat transfer medium for testing					Water										
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0,020									kg/(sm <sup>2</sup> )
Maximum temperature difference for thermal performance calculations					(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>	105									K
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ϑ <sub>a</sub> = 30 °C)					ϑ <sub>stg</sub>	208									°C
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )					C/m <sup>2</sup>	12,85									kJ/(Km <sup>2</sup> )
Maximum operating temperature					ϑ <sub>max, op</sub>	200									°C
Maximum operating pressure					p <sub>max, op</sub>	1000									kPa
Testing laboratory		Fundación CENER-CIEMAT, LEST TZS, ITW University Stuttgart			http://www.cener.com http://www.itw.uni-stuttgart.de										
Test report(s)		17COL1398 / 17COL1398Q 17COL13989 / 17COL1399Q 30.3255.0-1-1 / 30.3255.0			Dated		09/05/2018 09/05/2018 13/11/2018								
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01										
The collectors models DPS ECO 2000, DPS ECO 2500 and DSP VSP 2500 were tested according to ISO 9806:2013. According to SKM rules the results of the collector model DPS ECO 2500 is representative for the whole ECO/VSP family.															
AENOR INTERNACIONAL,S.A.U. - Génova, 6. - 28004 - Madrid, España - Tel. 91 432 60 00 - www.aenor.com															
Product certification body accredited by ENAC, number 1/C-PR271															



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000217
	Issued	2019-12-04

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
Collector name	Standard Locations $\vartheta_m$	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
DPS ECO2000		2.349	1.725	1.185	1.811	1.297	871	1.322	898	579	1.445	976	621
DPS ECO2500		2.957	2.172	1.492	2.280	1.633	1.096	1.664	1.131	729	1.819	1.229	782
DPS VSP 2000		2.361	1.734	1.191	1.820	1.304	875	1.329	903	582	1.452	981	624
DPS VSP 2500		2.969	2.181	1.498	2.289	1.639	1.101	1.671	1.136	732	1.826	1.234	785
Annual output per m <sup>2</sup> gross area		1.192	876	602	919	658	442	671	456	294	733	496	315
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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 $\vartheta_m$ (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 <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													

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)	A	--
Maximum tested positive load	2500	Pa
Maximum tested negative load	2500	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information			
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
DPS ECO2000	1,97	Collector efficiency ( $\eta_{col}$ )	60 %
DPS ECO2500	2,48	Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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.	
DPS VSP 2000	1,98		
DPS VSP 2500	2,49		
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
		Zero-loss efficiency ( $\eta_0$ )	0,744 --
		First-order coefficient ( $a_1$ )	3,28 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0,009 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,89 --
		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.	