

AENOR

Keymark Certificate Solar thermal energy



078/000356

AENOR certifies that the organization

DELPASO SOLAR, S.L.

registered office	PTA - AVDA. JUAN LÓPEZ PEÑALVER, 3 29590 CAMPANILLAS (Malaga - España)
supplies	Solar collectors
in compliance with	UNE-EN 12975-1:2006+A1:2011 (EN 12975-1:2006+A1:2010)
Trade Mark	TOP 2500, TOP 2500 H
Technical information	Specified in Annexes to the Certificate
Production site	PARQUE TECNOLÓGICO DE ANDALUCÍA, AVENIDA JUAN LÓPEZ DE PEÑALVER, 3 29590 CAMPANILLAS (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	2020-06-03
Validity date	2025-06-03


Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

AENOR INTERNACIONAL SAU.
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Product certification body accredited by ENAC, number 1/C-PR271



Annex to Solar Keymark Certificate					Licence Number		078/000356							
					Date issued		2020-06-03							
					Issued by		AENOR							
Licence holder		DELPASO SOLAR S.L.			Country		ESPAÑA							
Brand (optional)		--			Web		http://www.delpasosolar.com							
Street, Number		Parque Tecnológico de Andalucía Avda. Juan López de Peñalver, 3			E-mail		sac@delpasosolar.com							
Postcode, City		29590 - Málaga			Tel		+34 952 111 524							
Collector Type					Flat plate collector									
Collector name					Power output per collector Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	83 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
TOP 2500					2,52	2.067	1.218	85	1.932	1.846	1.649	1.420	1.159	972
TOP 2500 H					2,52	1.218	2.067	85	1.932	1.846	1.649	1.420	1.159	972
Power output per m ² gross area					767	732	654	564	460	386				
Performance parameters test method		Steady state - indoor												
Performance parameters (related to A _G)		η_0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-			
Test results		0,776	3,26	0,016	0,000	0,00	4.786	0,000	0,00	0,0E+00	0,92			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{ET, coll}	1,00	0,99	0,99	0,98	0,95	0,92	0,84	0,61	0,00			
Longitudinal		K _{EL, coll}	1,00	0,99	0,99	0,98	0,95	0,92	0,84	0,61	0,00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0,034	kg/(sm ²)							
Maximum temperature difference during thermal performance test					($\vartheta_m - \vartheta_a$) _{max}	53	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}	213,6	°C							
Maximum operating temperature					$\vartheta_{max, op}$	200	°C							
Maximum operating pressure					p _{max, op}	1000	kPa							
Testing laboratory		Fundación CENER, LEST					http://www.cener.com							
Test report(s)		30.3718.0-001 30.3718.0-002 30.3718.0-0					Dated		20/05/2020					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
														
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000356
	Issued	2020-06-03

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
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
TOP 2500		3.128	2.285	1.516	2.408	1.690	1.067	1.771	1.181	719	1.924	1.280	766
TOP 2500 H		3.128	2.285	1.516	2.408	1.690	1.067	1.771	1.181	719	1.924	1.280	766
Annual output per m ² gross area		1.241	907	602	956	671	424	703	469	285	764	508	304
Annual efficiency, η_a		70%	51%	34%	59%	41%	26%	60%	40%	24%	61%	41%	24%
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane		1765 kWh/m ²			1630 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. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

Additional Information					
Collector heat transfer medium	Water-Glycole				
The collector is deemed to be suitable for roof integration	No				
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)				A	--
G (W/m ²) >	1000	ϑ_a (°C) >	20	H_x (MJ/m ²) >	600
Maximum tested positive load				2400	Pa
Maximum tested negative load				2400	Pa
Hail resistance using ice balls (diameter)				25	mm

Additional collector attribute(s)	
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection
<input type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Façade collector(s)

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
TOP 2500	2,52	1-V-1234S-A:7,1895-C:16.8,1273-D	2,38
TOP 2500 H	2,52	1-H-1234S-A:7,1070-C:16.8,2108-D	2,38

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	61%	Zero-loss efficiency (η_0)	0,77
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_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient (a_1)	3,26
		Second-order coefficient (a_2)	0,016
		Incidence angle modifier IAM (50°)	0,95
			--
		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.	