

AENOR

Keymark Certificate Solar thermal energy



078/000365

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 Technical information	VSM+ 2000, HSM+ 2000, VSM+ 2500, HSM+ 2500 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	2020-11-26
Validity date	2025-11-26


Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

AENOR INTERNACIONAL SAU.
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					Licence Number		078/000365							
					Date issued		2020-11-26							
					Issued by		AENOR							
Licence holder		DELPASO SOLAR, S.L.			Country		SPAIN							
Brand (optional)		--			Web		http://www.delpasosolar.com							
Street, Number		Avda. Juan López Peñalver, 3 Parque Tecnológico de Andalucía			E-mail		sac@delpasosolar.com							
Postcode, City		29590 Campanillas Málaga			Tel		+99 952 111 524							
Collector Type					Flat plate collector									
Collector name					Power output per collector G _b = 850 W/m ² , G _d = 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
VSM+ 2000					2,01	2.070	970	85	1.517	1.445	1.280	1.086	863	702
HSM+ 2000					2,00	968	2.067	85	1.510	1.438	1.274	1.081	859	699
HSM+ 2500					2,52	1.218	2.067	85	1.902	1.812	1.605	1.362	1.082	881
VSM+ 2500					2,52	2.067	1.218	85	1.902	1.812	1.605	1.362	1.082	881
Power output per m ² gross area					755	719	637	540	429	349				
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					0,764	3,39	0,018	0,000	0,00	4.526	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 _{θT, coll}	1,00	0,99	0,99	0,97	0,95	0,92	0,84	0,81	0,00
Longitudinal					K _{θL, coll}	1,00	0,99	0,99	0,97	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	0,013	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}	210,1	°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)					30.3796.0-001 30.3796.0-002 / 30.3796.0-003 30.3796.0			Dated		10/11/2020				
Comments of testing laboratory					Datashet version: 6.1, 2019-09-26									
- The collectors models VSM+ 2000 and VSM+ 2500 were tested according to ISO 9806:2017. According to SKM rules, the results of the collector model VSM+ 2000 are representative for the whole VSM+/HSM+ 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	078/000365
	Issued	2020-11-26

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
VSM+ 2000		2.450	1.752	1.118	1.863	1.271	763	1.378	891	518	1.497	966	552
HSM+ 2000		2.438	1.744	1.113	1.853	1.264	759	1.372	887	515	1.490	961	549
HSM+ 2500		3.072	2.197	1.402	2.335	1.593	957	1.728	1.118	649	1.877	1.211	692
VSM+ 2500		3.072	2.197	1.402	2.335	1.593	957	1.728	1.118	649	1.877	1.211	692
Annual output per m ² gross area		1.219	872	556	927	632	380	686	443	258	745	481	275
Annual efficiency, η_a		69%	49%	32%	57%	39%	23%	59%	38%	22%	60%	39%	22%
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				2500 Pa
Maximum tested negative load				2500 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)
VSM+ 2000	2,01	1-V-1234S-A:7.2,19640-C:16.4,1023-	1,86
HSM+ 2000	2,00	1-H-1234S-A:7.2,18110-C:16.4,2108-	1,86
HSM+ 2500	2,52	1-H-1234S-A:7.2,22230-C:16.4,2108-	2,38
VSM+ 2500	2,52	1-V-1234S-A:7.2,24840-C:16.4,1273-	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})	59%	Zero-loss efficiency (η_0)	0,75
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)	3,39 W/(m ² K)
		Second-order coefficient (a_2)	0,018 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,94
		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 9806:2017. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.	