

# AENOR

## Keymark Certificate Solar thermal energy



078/000305

AENOR certifies that the organization

### TERMICOL ENERGIA SOLAR, S.L.

registered office PI LA ISLA - CL RIO VIEJO, 39 41703 DOS HERMANAS (Sevilla - España)

supplies Solar collectors

in compliance with UNE-EN 12975-1:2006 (EN 12975-1:2006)

Trade Mark P21, P21H  
Technical information Specified in Annexes to the Certificate

Production site PI LA ISLA - CL RIO VIEJO, 39 41703 DOS HERMANAS (Sevilla - 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 2018-11-30

Validity date 2023-11-30


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 01/C-PR002.078



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		078/000305								
					Date issued		2018-11-30								
					Issued by		AENOR								
Licence holder		TERMICOL ENERGÍA SOLAR, S.L.			Country		SPAIN								
Brand (optional)		--			Web		<a href="http://www.termicol.es">http://www.termicol.es</a>								
Street, Number		C/ Rio Viejo 39			E-mail		<a href="mailto:l.gonzalez@termicol.es">l.gonzalez@termicol.es</a>								
Postcode, City		41703 - Dos Hermanas - Sevilla			Tel		+34 954 930 545								
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> 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	52 K	
P21					2,29	2.095	1.092	100	1.569	1.495	1.340	1.174	996	1.156	
P21H					2,29	1.092	2.095	100	1.569	1.495	1.340	1.174	996	1.156	
Power output per m <sup>2</sup> gross area					685	653	585	513	435	505					
Performance parameters test method					Steady state - indoor										
Performance parameters (related to A <sub>G</sub> )					η <sub>0,hem</sub>	a <sub>1</sub>	a <sub>2</sub>								
Units					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )								
Test results					0,685	3,150	0,006								
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 <sub>θT, coll</sub>					0,92				0,00	
Longitudinal					K <sub>θL, coll</sub>					0,92				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>	52								K	
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ϑ <sub>a</sub> = 30 °C)					ϑ <sub>stg</sub>	219,5								°C	
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )					C/m <sup>2</sup>	4,518								kJ/(Km <sup>2</sup> )	
Maximum operating temperature					ϑ <sub>max, op</sub>	210								°C	
Maximum operating pressure					p <sub>max, op</sub>	800								kPa	
Testing laboratory					Fundación CENER-CIEMAT, LEST					<a href="http://www.cener.com">http:// www.cener.com</a>					
Test report(s)					30.3127.0-10-1 30.3127.0-11-1 30.3127.0					Dated		28/09/2018			
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01										
--					 <b>CENER</b>										
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 01/C-PR002.078															



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000305
	Issued	2018-11-30

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
P21		2.463	1.790	1.232	1.889	1.352	915	1.384	935	606	1.501	1.007	642
P21H		2.463	1.790	1.232	1.889	1.352	915	1.384	935	606	1.501	1.007	642
Annual output per m <sup>2</sup> gross area		1.076	782	538	825	590	400	604	408	265	656	440	280
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 [www.solarkeymark.org/scenocalc](http://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	2400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using ice balls (diameter)	25	mm

Energy Labelling Information				
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$		
P21	2,29	Collector efficiency ( $\eta_{col}$ )	55	%
P21H	2,29	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.		
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$		
		Zero-loss efficiency ( $\eta_0$ )	0,685	--
		First-order coefficient ( $a_1$ )	3,15	W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0,006	W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,92	--
		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.		