AENOR

Keymark Certificate
Solar thermal energy

078/000342

AENOR certifies that the organization

TERMICOL ENERGÍA SOLAR, S.L.

registered office	POLIGONO INDUSTRIAL LA ISLA - CL RIO VIEJO, 39 41703 DOS HERMANAS *(Sevilla - España)*
supplies	Solar collectors
in compliance with	UNE-EN 12975-1:2006+A1:2011 *(EN 12975-1:2006+A1:2010)*
Trade Mark Technical information	G21M, G21MH, G26M, G26MH Specified in Annexes to the Certificate
Production site	POLIGONO INDUSTRIAL 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 Validity date	2019-11-05 2024-11-05

Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

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Product certification body accredited by ENAC, number 01/C-PR271

Annex to Solar Keymark Certificate		Licence Number	078/000342
		Date issued	2019-11-05
		Issued by	AENOR

Licence holder	**TERMICOL ENERGIA SOLAR, S.L.**	**Country**	SPAIN
Brand (optional)	--	**Web**	http://www.termicol.es
Street, Number	C/ Rio Viejo 39	**E-mail**	info@termicol.com
Postcode, City	41703 Dos Hermanas - SEVILLA	**Tel**	+34 954 930 545

Collector Type	Flat plate collector

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	80 K
	m²	mm	mm	mm	W	W	W	W	W	W
G21M	2,15	2.050	1.014	81	1.539	1.464	1.303	1.124	928	823
G21MH	2,15	1.014	2.050	81	1.539	1.464	1.303	1.124	928	823
G26MH	2,56	1.248	2.050	81	1.832	1.743	1.551	1.338	1.105	980
G26M	2,56	2.050	1.248	81	1.832	1.743	1.551	1.338	1.105	980
Power output per m² gross area					716	681	606	523	431	383

Performance parameters test method	Steady state - indoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0,731	3,36	0,010	0,000	0,00	4.857	0,000	0,00	0,0E+00	0,86

Incidence angle modifier test method		Steady state - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1,00	0,98	0,95	0,91	0,83	0,70	0,41	0,00	0,00
Longitudinal	$K_{\theta L,coll}$	1,00	0,98	0,95	0,91	0,83	0,70	0,41	0,00	0,00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0,015	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	50	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	204	°C
Maximum operating temperature	ϑ_{max_op}	210	°C
Maximum operating pressure	$p_{max,op}$	800	kPa

Testing laboratory	Fundación CENER, LEST	http://www.cener.com	
Test report(s)	30.3567.0-001 30.3567.0-002 30.3567.0-003	**Dated**	03/10/2019

Comments of testing laboratory — Datasheet version: 6.1, 2019-09-26

- The collectors models G21M and G26M were tested according to ISO 9806:2017.
According to SKM rules, the results of the collector model G26M are representative for the whole GOLDM family.

Annex to Solar Keymark Certificate	Licence Number	078/000342
Supplementary Information	Issued	2019-11-05

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
G21M		2.303	1.624	1.061	1.746	1.205	765	1.279	837	516	1.391	900	542
G21MH		2.303	1.624	1.061	1.746	1.205	765	1.279	837	516	1.391	900	542
G26MH		2.742	1.934	1.264	2.079	1.434	911	1.523	997	614	1.657	1.072	646
G26M		2.742	1.934	1.264	2.079	1.434	911	1.523	997	614	1.657	1.072	646
Annual output per m² gross area		1.071	755	494	812	560	356	595	389	240	647	419	252
Annual efficiency, η_a		61%	43%	28%	50%	34%	22%	51%	33%	21%	52%	34%	20%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m²			1630 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. 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/m²) >	1000	ϑ_a (°C) >	20	H_X (MJ/m²) >	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)

- ☐ Using external power source(s) for normal operation
- ☐ Active or passive measure(s) for self-protection
- ☐ Co-generating thermal and electrical power
- ☐ Façade collector(s)

Energy Labelling Information

	Reference Area, A_{sol} (m²)
G21M	2,15
G21MH	2,15
G26MH	2,56
G26M	2,56

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

Collector efficiency (η_{col})	57%

Remark: Collector efficiency (ηcol) 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 ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Additional Informative Technical Data

Hydraulic Designation Code	Aperature Area, A_a (m²)
1-V-1234S-A:7.2,22196-C:16,1084-D	2,02
1-H-1234S-A:7.2,18866-C:16,2085-D	2,02
1-H-1234S-A:7.2,23123-C:16,2085-D	2,44
1-V-1234S-A:7.2,26196-C:16,1285-D	2,44

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

Zero-loss efficiency (η_0)	0,72	--
First-order coefficient (a_1)	3,36	W/(m²K)
Second-order coefficient (a_2)	0,010	W/(m²K²)
Incidence angle modifier IAM (50°)	0,83	--

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.