

AENOR

Keymark Certificate Solar thermal energy



078/000341

AENOR certifies that the organization

THERMAL COOLING TECHNOLOGY, S.L.

registered office	CL PRÍNCIPE DE VERGARA, 33 28001 MADRID (España)
supplies	Solar collectors
in compliance with	UNE-EN 12975-1:2006 (EN 12975-1:2006)
Trade Mark Technical information	TCT RED R01 Specified in Annexes to the Certificate
Production site	CL ARGENTINA, 19 28806 ALCALÁ DE HENARES (Madrid - 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	2019-09-13
Validity date	2024-09-13


Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

AENOR INTERNACIONAL SA.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					Licence Number		078/000341							
					Date issued		2019-09-13							
					Issued by		AENOR							
Licence holder		Thermal Cooling Technology S.L.			Country		ESPAÑA							
Brand (optional)		TCT			Web		http://www.truesolarpower.com							
Street, Number		Calle Príncipe de Vergara 33			E-mail		jaime@truesolarpower.com							
Postcode, City		28001 – Madrid - España			Tel		+34 638 92 40 92							
Collector Type					Concentrating 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	93 K				
					m ²	mm	mm	mm	mm	mm	mm			
TCT RED R01					5,13	2.265	2.265	3.142	3.249	3.216	3.131	3.020	2.883	2.693
Power output per m ² gross area					633	627	610	589	562	525				
Performance parameters test method		Quasi dynamic												
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		0,745	0,58	0,006	0,000	0,00	5.274	0,000	0,00	0,0E+00	0,00			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	-	-	-	-	-	-	-	-	-			
Longitudinal		K _{θL, coll}	-	-	-	-	-	-	-	-	-			
Heat transfer medium for testing		Water												
Flow rate for testing (per gross area, A _G)		dm/dt	0,020	kg/(sm ²)										
Maximum temperature difference during thermal performance test		($\vartheta_m - \vartheta_a$) _{max}	63	K										
Standard stagnation temperature (G = 1000 W/m ² ; ϑ_a = 30 °C)		ϑ_{stg}	--	°C										
Maximum operating temperature		$\vartheta_{max, op}$	99	°C										
Maximum operating pressure		p _{max, op}	400	kPa										
Testing laboratory		FUNDACIÓN CENER					http://www.cener.com							
Test report(s)		30.3512.0-001 30.3512.0-002					Dated		10/09/2019					
Comments of testing laboratory		<p>The IAM was not determined because it is a concentrating collector with 2-axis tracking.</p> <p>The stagnation temperature was not determined because it is a concentrating collector with protection mechanism which avoids high temperatures through active management of the required working temperature.</p>												
														
<p style="text-align: center;">AENOR INTERNACIONAL, S.A.U. - Génova, 6. - 28004 - Madrid, España - Tel. 91 432 60 00 - www.aenor.com</p> <p style="text-align: center;">Product certification body accredited by ENAC, number 01/C-PR002.078</p>														



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000341
	Issued	2019-09-13

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations ϑ_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
TCT RED R01		5.687	5.355	4.929	4.920	4.553	4.126	4.036	3.729	3.352	3.765	3.480	3.141
Annual output per m ² gross area		1.109	1.044	961	959	887	804	787	727	653	734	678	612
Annual efficiency, η_a		42%	40%	37%	47%	43%	39%	48%	44%	40%	45%	42%	38%
Fixed or tracking collector		2-axis tracking											
Annual irradiation on collector plane		2609 kWh/m ²			2052 kWh/m ²			1634 kWh/m ²			1625 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		Tracking			Tracking			Tracking			Tracking		

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 (July 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	1000 Pa
Maximum tested negative load	1000 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 checked="" 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)
TCT RED R01	5,13	X-X-LRS-AC:24,4003-D	4,47

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})	60%	Zero-loss efficiency (η_0)	0,63
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)	0,58
		Second-order coefficient (a_2)	0,006
		Incidence angle modifier IAM (50°)	--
		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.	