



Annex to Solar Keymark Certificate					Licence Number		OEM 10196.1							
					Date issued		2024-01-22							
					Issued by		DQS Hellas							
Licence holder		TANCREDI SOLAR SYSTEM			Country		ITALIA							
Brand (optional)		TANCREDI			Web		https://www.tancredisolarsystem.co							
Street, Number		VIA APPIA , 184 / A			E-mail		info@tancredisolarsystem.com							
Postcode, City		85100 POTENZA			Tel		+349 6669413							
Collector Type					Flat plate collector									
Collector name					Gross area (A <sub>G</sub> ) m <sup>2</sup>	Gross length mm	Gross width mm	Gross height mm	Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
									0 K W	10 K W	30 K W	50 K W	70 K W	95 K W
TAN2504					2.53	2,040	1,240	89	1,911	1,831	1,646	1,429	1,181	827
Power output per m <sup>2</sup> gross area					755	724	650	565	467	327				
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to A <sub>G</sub> )					$\eta_0, b$	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-
Test results					0.767	3.03	0.016	0.000	0.00	9,597	0.000	0.00	0.0E+00	0.90
Incidence angle modifier test method					Steady state - outdoor									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K <sub>θT, coll</sub>	1.00	1.00	0.99	0.98	0.94	0.87	0.73	0.48	0.00
Longitudinal					K <sub>θL, coll</sub>	1.00	1.00	0.99	0.98	0.94	0.87	0.73	0.48	0.00
Heat transfer medium for testing					Water-Glycole									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt		0.021		kg/(sm <sup>2</sup> )					
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$		65		K					
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30^\circ\text{C}$ )					$\vartheta_{stg}$		209		°C					
Maximum operating temperature					$\vartheta_{max, op}$		200		°C					
Maximum operating pressure					p <sub>max, op</sub>		1000		kPa					
Testing laboratory					NCSR "DEMOKRITOS"					www.solar.demokritos.gr				
Test report(s)					1268 DE2 4402 DQ3					Dated		19/01/24 19/01/24		
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
					<b>N.C.S.R. "DEMOKRITOS"</b> SOLAR ENERGY LABORATORY Tel: +210 6503815 - Fax: +210 6544582 P.O. BOX 60037, 15310 Ag. Paraskevi, Greece									
Central Offices: Kalavriton 2, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqs.gr, e-mail: i.alexou@dqs.gr														



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Supplementary Information										Issued					2024-01-22				
Gross Thermal Yield in kWh/collector at mean fluid temperature $\vartheta_m$																			
Standard Locations		Athens			Davos			Stockholm			Würzburg								
Collector name	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C						
TAN 2504		3,067	2,273	1,537	2,387	1,704	1,105	1,746	1,186	741	1,894	1,283	789						
Gross Thermal Yield per m <sup>2</sup> gross area		1,212	898	608	943	674	437	690	469	293	749	507	312						
Annual efficiency, $\eta_a$		69%	51%	34%	58%	41%	27%	59%	40%	25%	60%	41%	25%						
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)																	
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 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. 6.2 (13.01.2022). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>																			
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 <sup>2</sup> ) >		1000		$\vartheta_a$ (°C) >		20		H <sub>x</sub> (MJ/m <sup>2</sup> ) >		600									
Maximum tested positive load										3000		Pa							
Maximum tested negative load										3000		Pa							
Hail resistance using steel ball (maximum drop height)										2		m							
Additional collector attribute(s)																			
Using external power source(s) for normal operation										No		Active or passive measure(s) for self-protection		No					
Co-generating thermal and electrical power										No		Façade collector(s)		No					
Energy Labelling Information																			
		Reference Area, A <sub>sol</sub> (m <sup>2</sup> )		Hydraulic Designation Code					Aperture Area, A <sub>a</sub> (m <sup>2</sup> )										
TAN 2504		2.53		15-VH-12345-A:7,1930-C:20.6,1290-					2.32										
Data required for CDR (EU) No 811/2013 - Reference Area																			
Collector efficiency ( $\eta_{col}$ )		61%																	
Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>																			
Zero-loss efficiency ( $\eta_0$ )		0.76																	
First-order coefficient ( $a_1$ )		3.03																	
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 <sub>sol</sub> ) 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.																			
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