



Annex to Solar Keymark Certificate

Annex to Solar Keymark Certificate					Licence Number		MRTEC1-01-7709CER24042500003				
					Date issued		2025-04-25				
					Issued by		MIRTEC S.A.				
Licence holder		MALTEZOS SA			Country		Greece				
Brand (optional)		SAC			Web		www.maltezos.gr				
Street, Number		Irodotou Str, Mavri Ora			E-mail		info@maltezos.gr				
Postcode, City		19300, Aspropirgos, Attica			Tel		+30 2109402015				
Collector Type					Flat plate collector						
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	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 W	10 K W	30 K W	50 K W	70 K W	95 K W	
90X150	1.33	1,492	890	90	950	902	786	642	471	217	
100X150	1.48	1,492	994	90	1,057	1,004	875	715	524	242	
130X150	1.93	1,492	1,294	90	1,379	1,309	1,141	932	683	315	
100X200	1.98	1,994	994	90	1,414	1,343	1,170	956	701	323	
130X200	2.56	1,990	1,285	90	1,829	1,737	1,513	1,236	906	418	
Power output per m ² gross area					714	678	591	483	354	163	
Performance parameters test method		Steady state - outdoor									
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		0.733	3.33	0.026	0.000	0.00	12,000	0.000	0.00	0.0E+00	0.83
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	0.99	0.97	0.93	0.86	0.76	0.60	0.36	0.00
Longitudinal		$K_{\theta L, coll}$	1.00	0.99	0.97	0.93	0.86	0.76	0.60	0.36	0.00
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					$(\vartheta_m - \vartheta_a)_{max}$		65		K		
Standard stagnation temperature (G = 1000 W/m ² ; ϑ_a = 30 °C)					ϑ_{stg}		168		°C		
Maximum operating temperature					$\vartheta_{max, op}$				°C		
Maximum operating pressure					$p_{max, op}$				kPa		
Testing laboratory											
Test report(s)		4367 DE1 4368 DQ1 4370 DE1 -4445 DE1				Dated		14/11/22 15/11/22 14/11/2022 - 5/11/2024			
Comments					Ver. 6.2 (13.01.2022)						
According to the "Annex P5.8 Exchangeable absorber coatings" because exchanging the absorber material with Alanod Mirotherm control					N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Tel: +210 6503815 - Fax: +210 6544592 P.O. BOX 60037, 15310 Ag. Paraskevi, Greece						
Head Office: A-Industrial Area of Volos, GR-38500 Volos Athens Office: 76 M. Merkouri Str. GR-17342 Agios Dimitrios - Attica											

Annex to Solar Keymark Certificate								Licence Number		MRTEC1-01-7709CER24042500003			
Supplementary Information								Issued		2025-04-25			
Gross Thermal Yield 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
90X150		1,430	968	551	1,068	678	352	790	480	247	857	514	260
100X150		1,591	1,077	613	1,188	755	391	879	534	275	954	572	289
130X150		2,075	1,405	799	1,550	984	510	1,147	696	359	1,244	746	377
100X200		2,129	1,441	820	1,590	1,010	524	1,176	714	368	1,277	765	387
130X200		2,753	1,863	1,060	2,056	1,306	677	1,521	923	476	1,650	990	500
Gross Thermal Yield per m ² gross area		1,075	728	414	803	510	264	594	361	186	645	387	195
Annual efficiency, η_a		61%	41%	23%	49%	31%	16%	51%	31%	16%	52%	31%	16%
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. 6.2 (13.01.2022). 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										3000		Pa	
Maximum tested negative load										2700		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						Additional Informative Technical Data							
		Reference Area, A _{sol} (m ²)		Hydraulic Designation Code				Aperture Area, A _a (m ²)					
90X150		1.33		8-V-23S-A:7.2,1370-C:20.6,900-D				1.20					
100X150		1.48		9-V-23S-A:7.2,1370-C:20.6,1000-D				1.35					
130X150		1.93		12-V-23S-A:7.2,1370-C:20.6,1300-D				1.76					
100X200		1.98		9-V-23S-A:7.2,1870-C:20.6,1000-D				1.79					
130X200		2.56		12-V-23S-A:7.2,1870-C:20.6,1300-D				2.39					
Data required for CDR (EU) No 811/2013 - Reference Area						Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}							
Collector efficiency (η_{col})		54%		Zero-loss efficiency (η_0)		0.71		--					
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)		3.33		W/(m ² K)							
		Second-order coefficient (a_2)		0.026		W/(m ² K ²)							
		Incidence angle modifier IAM (50°)		0.85		--							
		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.											
Head Office: A-Industrial Area of Volos, GR-38500 Volos													
Athens Office: 76 M. Merkouri Str. GR-17342 Agios Dimitrios - Attica													