



Annex to Solar Keymark Certificate					Licence Number		MIRTEC1-01-2983CER24032300004							
					Date issued		2023-03-08							
					Issued by		MIRTEC S.A							
Licence holder		BARTEC S.A.			Country		Greece							
Brand (optional)		SOLBAR			Web		http://www.bartec.gr							
Street, Number		12th km of Thessaloniki-Edessa National Road			E-mail		info@info.bartec.gr							
Postcode, City		57008 Ionia, Thessaloniki			Tel		+30 2310 722901							
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 θ _m - θ _a					
									0 K W	10 K W	30 K W	50 K W	70 K W	81 K W
SOLBAR 1.5 m ²					1.50	1,482	1,010	80	971	915	792	655	503	414
SOLBAR 2 m ²					2.00	1,983	1,010	83	1,300	1,225	1,060	876	674	554
SOLBAR 2.5 m ²					2.44	1,983	1,230	83	1,583	1,491	1,291	1,067	820	674
Power output per m ² gross area									649	611	529	438	336	276
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					0.657	3.63	0.012	0.000	0.00	10,020	0.000	0.00	0.0E+00	0.92
Incidence angle modifier test method					Steady state - outdoor									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K _{θT, coll}	1.00	1.00	1.00	0.98	0.96	0.90	0.77	0.52	0.00
Longitudinal					K _{θL, coll}	1.00	1.00	1.00	0.98	0.96	0.90	0.77	0.52	0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0.021		kg/(sm ²)						
Maximum temperature difference during thermal performance test					(θ _m -θ _a) _{max}	51		K						
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)					θ _{stg}	140		°C						
Maximum operating temperature					θ _{max, op}			°C						
Maximum operating pressure					p _{max, op}	1000		kPa						
Testing laboratory					NCSR "DEMOKRITOS"			www.solar.demokritos.gr						
Test report(s)					4260 DE1 4261 DE1 4262 DQ1			Dated		03/09/19 03/09/19 16/09/19				
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
					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, P.O.Box 13, GR 385 00 Volos, Tel.:+30 24210 95340-2, email: volos.office@mirtec.gr, Athens office: M.Merkouri 76, GR 173 42 Athens Tel.:+30 210 9961408, email:athens.office@mirtec.gr http://www.mirtec.gr														

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Supplementary Information							Issued		2023-03-08				

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
SOLBAR 1.5 m2		1,557	1,049	630	1,147	744	424	850	520	286	928	561	304
SOLBAR 2 m2		2,084	1,404	843	1,535	996	567	1,138	696	383	1,241	751	407
SOLBAR 2.5 m2		2,538	1,709	1,027	1,869	1,213	690	1,386	847	466	1,512	915	496
Gross Thermal Yield per m ² gross area		1,041	701	421	766	497	283	568	347	191	620	375	203
Annual efficiency, η_a		59%	40%	24%	47%	31%	17%	49%	30%	16%	50%	30%	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) >
Maximum tested positive load				2400
Maximum tested negative load				2400
Hail resistance using steel ball (maximum drop height)				2
Additional collector attribute(s)				
Using external power source(s) for normal operation		No	Active or passive measure(s) for self-protection	
Co-generating thermal and electrical power		No	Façade collector(s)	
No		No		

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
SOLBAR 1.5 m2	1.50	8-V-14S-A:7.2,1380-C:20.6,1020-D	1.37
SOLBAR 2 m2	2.00	8-V-14S-A:7.2,1880-C:20.6,1020-D	1.84
SOLBAR 2.5 m2	2.44	10-V-14S-A:7.2,1880-C:20.6,1240-D	2.27

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})	48%	Zero-loss efficiency (η_0)	0.65
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)	3.63
		Second-order coefficient (a_2)	0.012
		Incidence angle modifier IAM (50°)	0.96
		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.	

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