



Annex to Solar Keymark Certificate					Licence Number		011-7S3270 F							
					Date issued		2024-11-04							
					Issued by		DIN CERTCO							
Licence holder		GOZUTOK METAL MUH. MAK. INS. TEK. SAN. TIC. LTD. STI.			Country		TURKIYE							
Brand (optional)		Gozutok			Web		www.gozutokmetal.com.tr							
Street, Number		GEZ KOY OSB MAH. 3. SAN. CAD. NO:8			E-mail		adem@gozutokmetal.com.tr							
Postcode, City		25700 AZIYIYE, ERZURUM			Tel		+90 (0)5322334950							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	94 K				
					W	W	W	W	W	W				
GMT-GK1.5-2					1.50	1 500	1 000	80	1 087	1 029	906	771	626	439
GMT-GK-L					1.78	1 926	925	80	1 290	1 221	1 075	915	743	521
GMT-GK2.0-2					2.00	2 000	1 000	80	1 450	1 372	1 207	1 028	835	585
GMT-GK2.4-2					2.40	2 400	1 000	80	1 739	1 647	1 449	1 234	1 002	702
GMT-GK-XL					2.43	2 010	1 210	80	1 761	1 667	1 467	1 249	1 015	711
GMT-GK2.5-2					2.52	2 100	1 200	80	1 826	1 729	1 521	1 296	1 052	737
GMT-GK3.0-2					3.00	2 500	1 200	80	2 174	2 058	1 811	1 543	1 253	878
Power output per m² gross area					725	686	604	514	418	293				
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		0.732	3.77	0.009	0.000	0.00	11 756	0.000	0.00	0.00	0.93			
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}	1.00	0.99	0.97	0.94	0.89	0.81	0.63	-	0.00			
Longitudinal		K _{θL, coll}	1.00	0.99	0.97	0.94	0.89	0.81	0.63	-	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}	64	K							
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)					ϑ_{stg}	213	°C							
Maximum operating temperature					$\vartheta_{max, op}$	99	°C							
Maximum operating pressure					p _{max, op}	1000	kPa							
Testing laboratory		TÜV Rheinland (Guangdong) Ltd.			http://www.tuv.com									
Test report(s)		CN24ODWL 001 CN24D58D 001			Dated		2024-11-04 2024-11-04							
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
Given collector parameters are determined on GMT-GK1.5-2;					 Precisely Right. 									
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Supplementary Information							Issued			2024-11-04				
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	
GMT-GK1.5-2		1 709	1 186	760	1 276	862	534	942	601	359	1 028	650	381	
GMT-GK-L		2 028	1 407	901	1 514	1 023	634	1 118	713	426	1 220	771	452	
GMT-GK2.0-2		2 279	1 581	1 013	1 701	1 149	712	1 256	801	479	1 371	866	508	
GMT-GK2.4-2		2 735	1 897	1 215	2 041	1 379	855	1 507	961	574	1 646	1 039	610	
GMT-GK-XL		2 769	1 921	1 230	2 066	1 397	865	1 526	973	581	1 666	1 052	617	
GMT-GK2.5-2		2 872	1 992	1 276	2 143	1 448	897	1 582	1 010	603	1 728	1 091	640	
GMT-GK3.0-2		3 419	2 372	1 519	2 551	1 724	1 068	1 884	1 202	718	2 057	1 299	762	
Gross Thermal Yield per m ² gross area		1 140	791	506	850	575	356	628	401	239	686	433	254	
Annual efficiency, η_a		65%	45%	29%	52%	35%	22%	54%	34%	21%	55%	35%	20%	
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							Yes							
The collector was tested successfully under the following conditions:														
Climate class (A+, A, B or C)							B			--				
G (W/m ²) >		900		ϑ_a (°C) >		15		H _x (MJ/m ²) >		540				
Maximum tested positive load							2200			Pa				
Maximum tested negative load							1650			Pa				
Hail resistance using steel ball (maximum drop height)							1.0			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)					
GMT-GK1.5-2		1.50			8-HV-1234S-A:8,1384-C:20.4,1060				1.39					
GMT-GK-L		1.78			8-HV-1234S-A:8,1810-C:20.4,985				1.63					
GMT-GK2.0-2		2.00			8-VH-1234S-A:8,1884-C:20.4,1060				1.87					
GMT-GK2.4-2		2.40			8-VH-1234S-A:8,1904-C:20.4,1060				2.25					
GMT-GK-XL		2.43			8-VH-1234S-A:8,1984-C:20.4,1280				2.30					
GMT-GK2.5-2		2.52			10-VH-1234S-A:10,2084-C:20.4,1260				2.34					
GMT-GK3.0-2		3.00			10-VH-1234S-A:10,2284-C:20.4,1260				2.84					
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})		56%			Zero-loss efficiency (η_0)				0.72					
					First-order coefficient (a_1)				3.77					
					Second-order coefficient (a_2)				0.009					
					Incidence angle modifier IAM (50°)				0.89					
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.					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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