


Annex to Solar Keymark Certificate					Licence Number		011-7S2439 F							
					Date issued		2024-10-10							
					Issued by		DINCERTCO							
Licence holder		Wolf GmbH			Country		Germany							
Brand (optional)					Web		www.wolf-heiztechnik.de							
Street, Number		Industriestr. 1			E-mail		info@wolf-heiztechnik.de							
Postcode, City		84048 Mainburg			Tel		+49 (0)8751 74-1797							
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	100 K				
					m ²	mm	mm	mm	mm	mm	mm			
F3-1Q					2.30	1 100	2 100	110	1 576	1 506	1 349	1 168	963	611
Power output per m ² gross area					685	655	587	508	419	266				
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		0.693	2.90	0.013	0.000	0.00	6 512	0.000	0.00	0.0E+00	0.92			
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	1.00	0.99	0.98	0.96	0.93	0.87	0.68	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.98	0.96	0.93	0.87	0.68	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					$(\vartheta_m - \vartheta_a)_{max}$		70	K						
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}		210	°C						
Maximum operating temperature					$\vartheta_{max, op}$		210	°C						
Maximum operating pressure					p _{max, op}		1000	kPa						
Testing laboratory		TÜV Rheinland Solar GmbH			http://www.tuv.com/solar									
Test report(s)		DE24VL8D 001			Dated		10.10.2024							
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
														
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Supplementary Information											Issued			2024-10-10		
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			
F3-1Q		2 565	1 886	1 271	1 979	1 403	903	1 457	980	608	1 581	1 062	647			
Gross Thermal Yield per m ² gross area		1 115	820	552	860	610	393	633	426	264	687	462	281			
Annual efficiency, η_a		63%	46%	31%	53%	37%	24%	54%	37%	23%	55%	37%	23%			
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)											A		--			
G (W/m ²) >		1000		ϑ_a (°C) >		20		H _x (MJ/m ²) >		600						
Maximum tested positive load											5400		Pa			
Maximum tested negative load											3200		Pa			
Hail resistance using ice balls (diameter)											35		mm			
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)					
F3-1Q							1-H-1234S-A:9.2,18244-C:16.4,2079				2.10					
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})							55%		Zero-loss efficiency (η_0)				0.69		--	
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)				2.90		W/(m ² K)			
							Second-order coefficient (a ₂)				0.013		W/(m ² K ²)			
							Incidence angle modifier IAM (50°)				0.95		--			
							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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