


Annex to Solar Keymark Certificate					Licence Number		011-7S3227 F							
					Date issued		2023-12-15							
					Issued by		DIN CERTCO							
Licence holder		GREENoneTEC Solarindustrie GmbH			Country		Austria							
Brand (optional)					Web		www.greenonetec.com							
Street, Number		Industriepark St. Veit, Energieplatz 1			E-mail		info@greenonetec.com							
Postcode, City		A – 9300 St. Veit/Glan			Tel		+43 (0) 4212 28136-0							
Collector Type					Flat plate collector									
Collector name					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	10 K	30 K	50 K	70 K	105 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
FK8203N 4H FG MC					2.02	1 730	1 170	85	1 452	1 378	1 205	999	762	268
FK8203N 2H FG MC					2.02	1 730	1 170	85	1 452	1 378	1 205	999	762	268
FK8233N 4H FG MC					2.34	2 000	1 170	85	1 682	1 596	1 395	1 158	882	311
FK8233N 2H FG MC					2.34	2 000	1 170	85	1 682	1 596	1 395	1 158	882	311
FK8253N 4H FG MC					2.52	2 150	1 170	85	1 811	1 718	1 503	1 247	950	335
FK8253N 2H FG MC					2.52	2 150	1 170	85	1 811	1 718	1 503	1 247	950	335
Power output per m² gross area					719	682	596	495	377	133				
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		0.722	3.48	0.020	0.000	0.00	11 450	0.000	0.00	0.0E+00	0.97			
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	0.89	0.71	0.36	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.98	0.96	0.89	0.71	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}	75	K										
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)		ϑ_{stg}	170	°C										
Maximum operating temperature		$\vartheta_{max, op}$	n.s.	°C										
Maximum operating pressure		p _{max, op}	1000	kPa										
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)						http://www.igte.uni-stuttgart.de						
Test report(s)		23COL1708/1 20COL1538Q/2						Dated		15.12.2023 15.07.2021				
Comments of testing laboratory		Documented performance parameters are taken from 23COL1708 (FK8203N 4H FG MC). This data sheet replaces the data sheet issued on 15th November 2023. Standard stagnation temperature was changed from extrapolated to directly measured value.						Ver. 6.2 (13.01.2022)						
								 TzS Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)						
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de														

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Supplementary Information						Issued		2023-12-15					
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
FK8203N 4H FG MC		2 363	1 645	998	1 775	1 169	657	1 311	822	450	1 433	893	482
FK8203N 2H FG MC		2 363	1 645	998	1 775	1 169	657	1 311	822	450	1 433	893	482
FK8233N 4H FG MC		2 738	1 905	1 156	2 057	1 355	761	1 519	952	522	1 660	1 035	558
FK8233N 2H FG MC		2 738	1 905	1 156	2 057	1 355	761	1 519	952	522	1 660	1 035	558
FK8253N 4H FG MC		2 948	2 052	1 245	2 215	1 459	820	1 635	1 025	562	1 788	1 114	601
FK8253N 2H FG MC		2 948	2 052	1 245	2 215	1 459	820	1 635	1 025	562	1 788	1 114	601
Gross Thermal Yield per m ² gross area		1 170	814	494	879	579	325	649	407	223	710	442	238
Annual efficiency, η_a		66%	46%	28%	54%	36%	20%	56%	35%	19%	57%	36%	19%
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										3000		Pa	
Maximum tested negative load										2500		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)			
FK8203N 4H FG MC		2.02				12-V-1234S-7.2,1568-20.4,1215-D				1.84			
FK8203N 2H FG MC		2.02				12-V-12S-7.2,1568-20.4,1215				1.84			
FK8233N 4H FG MC		2.34				12-V-1234S-7.2,1838-20.4,1215-D				2.22			
FK8233N 2H FG MC		2.34				12-V-12S-7.2,1838-20.4,1215				2.22			
FK8253N 4H FG MC		2.52				12-V-1234S-7.2,1988-20.4,1215-D				2.31			
FK8253N 2H FG MC		2.52				12-V-12S-7.2,1988-20.4,1215				2.31			
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)				0.72		--	
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)				3.48		W/(m ² K)	
						Second-order coefficient (a ₂)				0.020		W/(m ² K ²)	
						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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