

Annex to Solar Keymark Certificate					Licence Number		011-7S3004 F							
					Date issued		2021-02-25							
					Issued by		DIN CERTCO							
Licence holder		Jiangsu Sunrain Solar Energy Co., Ltd			Country		China							
Brand (optional)		Sunrain			Web		http://www.sunrain.com							
Street, Number		Ninghai Industrial Zone			E-mail		certification@sunrain.com							
Postcode, City		222243, Lianyungang City, Jiangsu Province			Tel		+86 518 85959690							
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	104 K				
					W	W	W	W	W	W				
FPC1500C					15.02	2 520	5 960	166	12 645	12 169	11 089	9 841	8 425	5 632
Power output per m ² gross area					842	810	738	655	561	375				
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		0.852	3.03	0.014	0.000	0.00	6 833	0.000	0.00	0.00	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	0.99	0.96	0.90	0.78	0.52	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	1.00	0.99	0.96	0.90	0.78	0.52	0.00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0.019	kg/(sm ²)							
Maximum temperature difference during thermal performance test					($\vartheta_m - \vartheta_a$) _{max}	74	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30^\circ\text{C}$)					ϑ_{stg}	200	°C							
Maximum operating temperature					$\vartheta_{max, op}$	200	°C							
Maximum operating pressure					p _{max, op}	1000	kPa							
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch					http://www.intertek.com							
Test report(s)		201203085GZU-001					Dated		2021-02-08					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
The performance parameter based aperture area (13.95 m ²) are: $\eta_0, b = 0.918$, $a_1 = 3.266$, $a_2 = 0.015$.					Stamp & signature of test lab									
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Supplementary Information		Issued		2021-02-25													
Annual collector output 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				
FPC1500C		20 642	15 874	11 408	16 397	12 230	8 490	11 937	8 492	5 674	12 941	9 206	6 059				
Annual output per m ² gross area		1 374	1 057	760	1 092	814	565	795	565	378	862	613	403				
Annual efficiency, η_a		78%	60%	43%	67%	50%	35%	68%	48%	32%	69%	49%	32%				
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. 6.1 (September 2019). 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)										B		--					
G (W/m ²) >		900		ϑ_a (°C) >		15		H _x (MJ/m ²) >		540							
Maximum tested positive load										5900		Pa					
Maximum tested negative load										3000		Pa					
Hail resistance using steel ball (maximum drop height)										2		m					
Additional collector attribute(s)																	
<input type="checkbox"/> Using external power source(s) for normal operation <input type="checkbox"/> Active or passive measure(s) for self-protection <input type="checkbox"/> Co-generating thermal and electrical power <input type="checkbox"/> Façade collector(s)																	
Energy Labelling Information						Additional Informative Technical Data											
		Reference Area, A _{sol} (m ²)				Hydraulic Designation Code				Aperture Area, A _a (m ²)							
FPC1500C		15.02				24-H-12V-A:7.2,5807-C:40,2480				13.95							
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})		70%				Zero-loss efficiency (η_0)				0.84				--			
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)				3.03				W/(m ² K)			
						Second-order coefficient (a ₂)				0.014				W/(m ² K ²)			
						Incidence angle modifier IAM (50°)				0.97				--			
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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