

Annex to Solar Keymark Certificate					Licence Number		011-7S3248 R							
					Date issued		2025-04-11							
					Issued by		DIN CERTCO							
Licence holder		Jiangsu Sunpower New Energy Technology Co., Ltd			Country		China							
Brand (optional)		SUNPOWER			Web		www.sunpower-solar.com							
Street, Number		No. 2969 Longcheng Road, Luoxi Town			E-mail		chris@sunpower-solar.com							
Postcode, City		213136 Changzhou City, Jiangsu Province			Tel		+86 519-85083393/85083220							
Collector Type					Evacuated tubular 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 $\vartheta_m - \vartheta_a$					
									0 K W	10 K W	30 K W	50 K W	70 K W	102 K W
SPA-58/1800-10					1.52	1,880	810	135	697	680	640	593	539	437
SPA-58/1800-12					1.80	1,880	960	135	826	805	758	703	639	518
SPA-58/1800-15					2.23	1,880	1,185	135	1,019	994	936	868	788	640
SPA-58/1800-18					2.65	1,880	1,410	135	1,213	1,183	1,114	1,032	938	761
SPA-58/1800-20					2.93	1,880	1,560	135	1,342	1,309	1,233	1,142	1,038	842
SPA-58/1800-22					3.21	1,880	1,710	135	1,471	1,435	1,351	1,252	1,138	923
SPA-58/1800-24					3.50	1,880	1,860	135	1,600	1,560	1,470	1,362	1,237	1,004
SPA-58/1800-30					4.34	1,880	2,310	135	1,987	1,938	1,825	1,691	1,537	1,247
SPA-58/1800-36					5.19	1,880	2,760	135	2,374	2,316	2,181	2,021	1,836	1,490
Power output per m² gross area					457	446	420	389	354	287				
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					0.458	1.06	0.006	0.000	0.00	7,780	0.000	0.00	0.000	0.99
Incidence angle modifier test method					Steady state - outdoor									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					$K_{\theta T, coll}$	1.03	1.05	1.09	1.20	1.29	0.96	0.65	0.32	0.00
Longitudinal					$K_{\theta L, coll}$	1.00	1.00	0.99	0.98	0.95	0.88	0.75	0.50	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					$(\vartheta_m - \vartheta_a)_{max}$		71.9		K					
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30^\circ \text{C}$)					ϑ_{stg}		220		°C					
Maximum operating temperature					$\vartheta_{max, op}$		95		°C					
Maximum operating pressure					$p_{max, op}$		600		kPa					
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch							http://www.intertek.com					
Test report(s)		240429043GZU-001							Dated		2025/4/11			
Comments of testing laboratory										Draft Ver. 6.2 (22.09.2021)				
<u>Example comment</u> Thermal performance parameters are given from model SPA-58/1800-10 which give smaller small value under the same maximum $T_m - T_a$.										 <i>Steve Zhu</i>				
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S3248 R
	Issued	2025-04-11

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
SPA-58/1800-10		1,237	1,053	860	1,041	863	690	749	604	469	807	651	502
SPA-58/1800-12		1,467	1,248	1,019	1,234	1,023	817	888	715	556	957	772	595
SPA-58/1800-15		1,810	1,541	1,258	1,523	1,262	1,009	1,096	883	686	1,181	953	735
SPA-58/1800-18		2,154	1,833	1,497	1,812	1,502	1,200	1,304	1,051	816	1,405	1,134	874
SPA-58/1800-20		2,383	2,029	1,656	2,005	1,662	1,328	1,443	1,162	903	1,555	1,254	967
SPA-58/1800-22		2,612	2,224	1,815	2,198	1,822	1,456	1,582	1,274	990	1,704	1,375	1,060
SPA-58/1800-24		2,841	2,419	1,974	2,390	1,982	1,583	1,721	1,386	1,076	1,854	1,495	1,153
SPA-58/1800-30		3,529	3,004	2,452	2,969	2,461	1,966	2,137	1,721	1,337	2,303	1,857	1,432
SPA-58/1800-36		4,216	3,589	2,929	3,547	2,940	2,349	2,553	2,057	1,597	2,751	2,219	1,711
Gross Thermal Yield per m ² gross area		813	692	565	684	567	453	492	396	308	530	428	330
Annual efficiency, η_a		46%	39%	32%	42%	35%	28%	42%	34%	26%	43%	34%	27%
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 Draft Ver. 6.2 (22.09.2021). 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				1500	Pa	
Maximum tested negative load				1500	Pa	
Hail resistance using steel ball (maximum drop height)				0.6	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)
SPA-58/1800-10	1.52	1-H-12S-C:20-885-D	0.94
SPA-58/1800-12	1.80	1-H-12S-C:20-1035-D	1.13
SPA-58/1800-15	2.23	1-H-12S-C:20-1260-D	1.41
SPA-58/1800-18	2.65	1-H-12S-C:20-1485-D	1.69
SPA-58/1800-20	2.93	1-H-12S-C:20-1635-D	1.88
SPA-58/1800-22	3.21	1-H-12S-C:20-1785-D	2.07
SPA-58/1800-24	3.50	1-H-12S-C:20-1935-D	2.26
SPA-58/1800-30	4.34	1-H-12S-C:20-2385-D	2.82
SPA-58/1800-36	5.19	1-H-12S-C:20-2835-D	3.39

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})	41%	Zero-loss efficiency (η_0)	0.46	--
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)	1.06	W/(m ² K)
		Second-order coefficient (a_2)	0.006	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.15	--
		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 <u>or</u> 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.		