


<b>Annex to Solar Keymark Certificate</b>					<b>Licence Number</b>		<b>011-7S2378 R</b>							
					<b>Date issued</b>		<b>2020-12-07</b>							
					<b>Issued by</b>		<b>DIN CERTCO</b>							
<b>Licence holder</b>		Changzhou 1st Sunflower Intelligence Technology Co. Ltd			<b>Country</b>		China							
<b>Brand (optional)</b>					<b>Web</b>		www.1stsunflower.com							
<b>Street, Number</b>		No.1, Hongxi Road, Niutang Ind. District			<b>E-mail</b>		info@sunflower-solar.com							
<b>Postcode, City</b>		Changzhou, Jiangsu			<b>Tel</b>		+0086 13584366733							
<b>Collector Type</b>					Evacuated tubular collector									
<b>Collector name</b>					<b>Power output per collector</b> G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	100 K				
					m <sup>2</sup>	mm	mm	mm	W	W	W	W	W	W
SFB105818					1.54	1 970	783	132	482	458	409	360	312	238
SFB125818					1.84	1 970	933	132	576	547	489	431	372	285
SFB155818					2.28	1 970	1 158	132	714	678	606	534	461	353
SFB185818					2.72	1 970	1 383	132	852	809	723	637	550	421
SFB205818					3.02	1 970	1 533	132	946	898	802	707	611	468
SFB225818					3.32	1 970	1 683	132	1 040	987	882	777	672	514
SFB245818					3.61	1 970	1 833	132	1 131	1 074	959	845	730	559
SFB305818					4.50	1 970	2 283	132	1 409	1 338	1 196	1 053	911	697
<b>Power output per m<sup>2</sup> gross area</b>					313	297	266	234	202	155				
<b>Performance parameters test method</b>		Quasi dynamic												
<b>Performance parameters (related to A<sub>G</sub>)</b>		η <sub>0</sub> , b	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
<b>Units</b>		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-			
<b>Test results</b>		0.285	1.584	0.000	0.000	0.00	62 330	0.000	0.00	0.0	1.66			
<b>Incidence angle modifier test method</b>		Quasi dynamic - outdoor												
<b>Incidence angle modifier</b>		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
<b>Transversal</b>		K <sub>θT, coll</sub>	1.06	1.11	1.26	1.41	1.70	1.67	2.24	1.12	0.00			
<b>Longitudinal</b>		K <sub>θL, coll</sub>	1.00	1.00	0.99	0.97	0.92	0.84	0.70	0.35	0.00			
<b>Heat transfer medium for testing</b>					Water									
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					dm/dt	0.020	kg/(sm <sup>2</sup> )							
<b>Maximum temperature difference during thermal performance test</b>					( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	70	K							
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; <math>\vartheta_a</math> = 30 °C)</b>					$\vartheta_{stg}$	230	°C							
<b>Maximum operating temperature</b>					$\vartheta_{max, op}$	230	°C							
<b>Maximum operating pressure</b>					p <sub>max, op</sub>	6	kPa							
<b>Testing laboratory</b>		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de							
<b>Test report(s)</b>		20COL1564 20COL1565 20COL1565Q					<b>Dated</b>		07.12.2020 07.12.2020 07.12.2020					
<b>Comments of testing laboratory</b>					Datasheet version: 6.1, 2019-09-26									
Documented performance parameters are taken from test report 20COL1564 (SFB105818)					 <p><b>TzS</b> Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70560 Stuttgart (Vaihingen)</p>									
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Supplementary Information		Issued		2020-12-07									
<b>Annual collector output in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
SFB105818		1 083	851	655	836	643	484	630	465	338	694	515	373
SFB125818		1 294	1 017	782	999	769	579	753	556	404	829	615	445
SFB155818		1 604	1 260	969	1 238	952	717	933	689	501	1 027	762	552
SFB185818		1 913	1 503	1 157	1 477	1 136	856	1 112	822	597	1 225	909	658
SFB205818		2 124	1 669	1 284	1 640	1 262	950	1 235	912	663	1 360	1 009	731
SFB225818		2 335	1 835	1 412	1 803	1 387	1 044	1 358	1 003	729	1 495	1 109	804
SFB245818		2 539	1 995	1 535	1 961	1 508	1 136	1 477	1 091	792	1 626	1 206	874
SFB305818		3 166	2 487	1 913	2 444	1 880	1 416	1 841	1 360	988	2 027	1 504	1 089
Annual output per m <sup>2</sup> gross area		703	553	425	543	418	315	409	302	220	450	334	242
Annual efficiency, $\eta_a$		40%	31%	24%	33%	26%	19%	35%	26%	19%	36%	27%	19%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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 $\vartheta_m$ (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 <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>													
<b>Additional Information</b>													
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 <sup>2</sup> ) >		900		$\vartheta_a$ (°C) >		15		H <sub>x</sub> (MJ/m <sup>2</sup> ) >		540			
Maximum tested positive load											2500		Pa
Maximum tested negative load											1250		Pa
Hail resistance using steel ball (maximum drop height)											0.6		m
<b>Additional collector attribute(s)</b>													
<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)									
<b>Energy Labelling Information</b>							<b>Additional Informative Technical Data</b>						
						Reference Area, A <sub>sol</sub> (m <sup>2</sup> )		Hydraulic Designation Code			Aperture Area, A <sub>a</sub> (m <sup>2</sup> )		
SFB105818						1.54		1-H-12S-C:20,895			0.94		
SFB125818						1.84		1-H-12S-C:20,1045			1.13		
SFB155818						2.28		1-H-12S-C:20,1270			1.41		
SFB185818						2.72		1-H-12S-C:20,1495			1.70		
SFB205818						3.02		1-H-12S-C:20,1645			1.89		
SFB225818						3.32		1-H-12S-C:20,1795			2.07		
SFB245818						3.61		1-H-12S-C:20,1945			2.26		
SFB305818						4.50		1-H-12S-C:20,2395			2.83		
<b>Data required for CDR (EU) No 811/2013 - Reference Area A<sub>sol</sub></b>							<b>Data required for CDR (EU) No 812/2013 - Reference Area A<sub>sol</sub></b>						
Collector efficiency ( $\eta_{col}$ )						25%		Zero-loss efficiency ( $\eta_0$ )			0.31		--
Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ is based on reference area (A <sub>sol</sub> ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.						First-order coefficient (a <sub>1</sub> )			1.58		W/(m <sup>2</sup> K)		
						Second-order coefficient (a <sub>2</sub> )			0.000		W/(m <sup>2</sup> K <sup>2</sup> )		
						Incidence angle modifier IAM (50°)			1.41		--		
						Remark: The data given in this section are related to collector reference area (A <sub>sol</sub> ) 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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