TÜVRheinland®
DIN CERTCO
Precisely Right.

ISFH CalTeC

Annex to Solar Keymark Certificate - Summary of EN 12975-2:2006 Test Results

Licence Number	**011-7S558 R**
Date issued	**2016-07-19**
Issued by	**ISFH CalTeC**

Licence holder	**Changzhou Blueclean Solar Energy Co., Ltd**	**Country**	China
Brand (optional)		**Web**	www.sunstar-solar.com
Street, Number	No. 8 Xilin Industrial Park	**E-mail**	sales@sunstar-solar.com
Postcode, City	Changzhou, Jiangsu	**Tel**	+86 519 83118706

Collector Type	Evacuated tubular collector

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m²; Gd = 150 W/m²; u = 3 m/s ϑm - ϑa: 0 K	10 K	30 K	50 K	70 K	K
	m²	mm	mm	mm	W	W	W	W	W	W
SB-1800/58-12 ST	2.02	1 990	1 015	182	886	859	801	736	663	
SB-1800/58-13 ST	2.18	1 990	1 095	182	956	928	865	794	716	
SB-1800/58-14 ST	2.34	1 990	1 175	182	1 026	996	928	852	768	
SB-1800/58-15 ST	2.50	1 990	1 255	182	1 096	1 064	992	911	821	
SB-1800/58-16 ST	2.66	1 990	1 335	182	1 166	1 132	1 055	969	873	
SB-1800/58-17 ST	2.82	1 990	1 415	182	1 237	1 200	1 119	1 027	926	
SB-1800/58-18 ST	2.98	1 990	1 495	182	1 307	1 268	1 182	1 085	978	
SB-1800/58-19 ST	3.13	1 990	1 575	182	1 373	1 332	1 242	1 140	1 027	
SB-1800/58-20 ST	3.29	1 990	1 665	182	1 443	1 400	1 305	1 198	1 080	
SB-1800/58-21 ST	3.45	1 990	1 735	182	1 513	1 468	1 368	1 257	1 132	
SB-1800/58-22 ST	3.61	1 990	1 815	182	1 583	1 536	1 432	1 315	1 185	
SB-1800/58-23 ST	3.77	1 990	1 895	182	1 653	1 604	1 495	1 373	1 237	
SB-1800/58-24 ST	3.93	1 990	1 975	182	1 723	1 672	1 559	1 432	1 290	
SB-1800/58-25 ST	4.09	1 990	2 055	182	1 793	1 740	1 622	1 490	1 342	
SB-1800/58-26 ST	4.25	1 990	2 135	182	1 864	1 808	1 686	1 548	1 395	
SB-1800/58-27 ST	4.41	1 990	2 215	182	1 934	1 876	1 749	1 606	1 447	
SB-1800/58-28 ST	4.57	1 990	2 295	182	2 004	1 944	1 813	1 665	1 500	
SB-1800/58-29 ST	4.73	1 990	2 375	182	2 074	2 012	1 876	1 723	1 553	
SB-1800/58-30 ST	4.89	1 990	2 455	182	2 144	2 081	1 940	1 781	1 605	
Power output per m² gross area					439	425	397	364	328	

Performance parameters test method	Quasi dynamic								
Performance parameters (related to AG)	η0,b	c1	c2	c3	c4	c6	Kd		
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	s/m	-		
Test results	0.437	1.259	0.005				1.018		

Incidence angle modifier test method	Quasi dynamic - outdoor								
Bi-directional incidence angle modifiers	Yes								
Incidence angle modifier Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal $K_{\theta T,coll}$	1.00	1.03	1.08	1.17	1.25	1.24	1.17		0.00
Longitudinal $K_{\theta L,coll}$	1.00	0.99	0.99	0.97	0.95	0.91	0.82		0.00

Heat transfer medium for testing		Water-Glycole	
Flow rate for testing (per gross area, A_G)	dm/dt	0.011	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$		K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	215	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	58.695	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}		°C
Maximum operating pressure	$p_{max,op}$	600	kPa

Issued by	Institut für Solarenergieforschung GmbH	www.isfh.de	
Test report(s)	21209544_12 (TÜV Rheinland)	**Dated**	22.10.2008
	21209544_30 (TÜV Rheinland)		22.10.2008

Comments of testing laboratory

Datasheet version: 5.01, 2016-03-01

The following collector sizes had been tested: SB-1800/58-12 ST & -30 ST.
A declaration about the "same Collector" was given by the manufacturer.
Data sheet based on tests and test reports according to EN 12975-2:2006 from TÜV Rheinland. Performance parameters recalculated related to gross area.

Institut für
Solarenergieforschung GmbH
Am Ohrberg 1
D-31860 Emmerthal
Tel.: 05151/999-100
Fax: 05151/999-500

Annex to Solar Keymark Certificate	Licence Number	011-7S558 R
Supplementary Information	Issued	2016-07-19

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results

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
SB-1800/58-12 ST	1 600	1 328	1 062	1 311	1 063	833	957	752	570	1 034	813	613
SB-1800/58-13 ST	1 727	1 434	1 146	1 415	1 148	899	1 033	811	615	1 116	877	662
SB-1800/58-14 ST	1 853	1 539	1 231	1 519	1 232	965	1 109	871	661	1 198	941	710
SB-1800/58-15 ST	1 980	1 644	1 315	1 623	1 316	1 031	1 185	930	706	1 280	1 006	759
SB-1800/58-16 ST	2 107	1 749	1 399	1 727	1 400	1 097	1 261	990	751	1 362	1 070	807
SB-1800/58-17 ST	2 233	1 855	1 483	1 831	1 484	1 163	1 337	1 049	796	1 444	1 135	856
SB-1800/58-18 ST	2 360	1 960	1 567	1 935	1 569	1 229	1 412	1 109	841	1 526	1 199	904
SB-1800/58-19 ST	2 479	2 058	1 646	2 032	1 648	1 291	1 484	1 165	884	1 602	1 259	950
SB-1800/58-20 ST	2 606	2 164	1 730	2 136	1 732	1 357	1 559	1 224	929	1 684	1 324	998
SB-1800/58-21 ST	2 732	2 269	1 814	2 240	1 816	1 423	1 635	1 284	974	1 766	1 388	1 047
SB-1800/58-22 ST	2 859	2 374	1 898	2 344	1 900	1 489	1 711	1 343	1 019	1 848	1 452	1 096
SB-1800/58-23 ST	2 986	2 479	1 983	2 448	1 984	1 555	1 787	1 403	1 064	1 930	1 517	1 144
SB-1800/58-24 ST	3 113	2 585	2 067	2 552	2 069	1 621	1 863	1 462	1 109	2 012	1 581	1 193
SB-1800/58-25 ST	3 239	2 690	2 151	2 655	2 153	1 687	1 939	1 522	1 155	2 094	1 646	1 241
SB-1800/58-26 ST	3 366	2 795	2 235	2 759	2 237	1 753	2 014	1 582	1 200	2 176	1 710	1 290
SB-1800/58-27 ST	3 493	2 900	2 319	2 863	2 321	1 819	2 090	1 641	1 245	2 258	1 774	1 338
SB-1800/58-28 ST	3 619	3 005	2 403	2 967	2 406	1 885	2 166	1 701	1 290	2 340	1 839	1 387
SB-1800/58-29 ST	3 746	3 111	2 487	3 071	2 490	1 951	2 242	1 760	1 335	2 421	1 903	1 435
SB-1800/58-30 ST	3 873	3 216	2 572	3 175	2 574	2 017	2 318	1 820	1 380	2 503	1 967	1 484
Annual output per m² gross area	792	658	526	649	526	412	474	372	282	512	402	303
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 ϑm (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN 12975-2 under the following conditions:		
Maximum tested positive load	2400	Pa
Maximum tested negative load	-	Pa
Hail resistance using steel ball (maximum drop height)	-	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
SB-1800/58-12 ST	2.02
SB-1800/58-13 ST	2.18
SB-1800/58-14 ST	2.34
SB-1800/58-15 ST	2.50
SB-1800/58-16 ST	2.66
SB-1800/58-17 ST	2.82
SB-1800/58-18 ST	2.98
SB-1800/58-19 ST	3.13
SB-1800/58-20 ST	3.29
SB-1800/58-21 ST	3.45
SB-1800/58-22 ST	3.61
SB-1800/58-23 ST	3.77
SB-1800/58-24 ST	3.93
SB-1800/58-25 ST	4.09
SB-1800/58-26 ST	4.25
SB-1800/58-27 ST	4.41
SB-1800/58-28 ST	4.57
SB-1800/58-29 ST	4.73
SB-1800/58-30 ST	4.89

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	38	%

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/m², 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 9806:2013.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0.439	--
First-order coefficient (a_1)	1.26	W/(m²K)
Second-order coefficient (a_2)	0.005	W/(m²K²)
Incidence angle modifier IAM (50°)	1.13	--

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.

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