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Annex to Solar Keymark Certificate		Licence Number	011-7S3311 R
		Date issued	2025-09-08
		Issued by	DIN CERTCO

Licence holder	**Changzhou Sunrise Sistema, Energia Co., Ltd**	**Country**	CHINA
Brand (optional)	SUNRISE	**Web**	http://www.czsunriseeco.com
Street, Number	No. 168 Cuiheng North Road	**E-mail**	sales@czsunriseeco.com
Postcode, City	Changzhou City, Jiangsu Province	**Tel**	+86 15861158951

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 = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	84 K
	m²	mm	mm	mm	W	W	W	W	W	W
SR-HCA-10	1.59	1,990	800	135	790	754	677	592	500	432
SR-HCA-12	1.89	1,990	950	135	938	896	804	703	594	513
SR-HCA-15	2.34	1,990	1,175	135	1,160	1,108	995	870	734	634
SR-HCA-16	2.49	1,990	1,250	135	1,234	1,179	1,058	925	781	675
SR-HCA-18	2.79	1,990	1,400	135	1,383	1,320	1,185	1,037	875	756
SR-HCA-20	3.08	1,990	1,550	135	1,531	1,461	1,312	1,148	968	837
SR-HCA-24	3.68	1,990	1,850	135	1,827	1,744	1,566	1,370	1,156	999
SR-HCA-25	3.83	1,990	1,925	135	1,901	1,815	1,629	1,425	1,203	1,039
SR-HCA-30	4.58	1,990	2,300	135	2,271	.2 (13.01	1,947	1,703	1,437	1,242
Power output per m² gross area					496	474	425	372	314	271

Performance parameters test method	Steady state - outdoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0.493	2.18	0.006	0.000	0.00	6,793	0.000	0.00	0.00	1.04

Incidence angle modifier test method		Steady state - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.04	1.07	1.11	1.20	1.29	1.31	0.87	0.44	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.50	0.00

Heat transfer medium for testing		Water-Glycole	
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	53.72	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	220	°C
Maximum operating temperature	$\vartheta_{max\ op}$	220	°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)	220526149GZU-001	**Dated**	2025/9/8

Comments of testing laboratory	Ver. 6.2 (13.01.2022)
All test result are tested from model DX-HCA-10	intertek Steve Zhu

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Supplementary Information	Issued	2025-09-08

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
SR-HCA-10	1,438	1,094	788	1,123	835	586	826	586	398	897	635	424
SR-HCA-12	1,707	1,299	936	1,334	991	696	981	696	472	1,065	754	503
SR-HCA-15	2,112	1,607	1,157	1,650	1,226	861	1,213	861	584	1,317	932	623
SR-HCA-16	2,246	1,709	1,231	1,755	1,305	916	1,291	916	621	1,401	992	662
SR-HCA-18	2,516	1,914	1,379	1,966	1,461	1,025	1,445	1,025	696	1,569	1,111	742
SR-HCA-20	2,786	2,119	1,527	2,176	1,618	1,135	1,600	1,135	770	1,738	1,230	821
SR-HCA-24	3,325	2,530	1,822	2,597	1,931	1,355	1,910	1,355	920	2,074	1,468	980
SR-HCA-25	3,459	2,632	1,896	2,703	2,009	1,410	1,987	1,410	957	2,158	1,528	1,020
SR-HCA-30	4,133	3,145	2,265	3,229	2,400	1,685	2,375	1,685	1,143	2,578	1,825	1,219
Gross Thermal Yield per m² gross area	903	687	495	706	524	368	519	368	250	563	399	266
Annual efficiency, η_a	51%	39%	28%	43%	32%	23%	44%	32%	21%	45%	32%	21%
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1630 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. 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				No	
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)				B	--
G (W/m²) >	900	ϑ_a (°C) >	15	H_x (MJ/m²) >	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

	Reference Area, A_{sol} (m²)
SR-HCA-10	1.59
SR-HCA-12	1.89
SR-HCA-15	2.34
SR-HCA-16	2.49
SR-HCA-18	2.79
SR-HCA-20	3.08
SR-HCA-24	3.68
SR-HCA-25	3.83
SR-HCA-30	4.58

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

Collector efficiency (η_{col})	40%

Remark: Collector efficiency (ηcol) 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 ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
1-H-12S-C:24,905-D	0.93
1-H-12S-C:24,1055-D	1.12
1-H-12S-C:24,1280-D	1.40
1-H-12S-C:24,1355-D	1.49
1-H-12S-C:24,1505-D	1.68
1-H-12S-C:24,1655-D	1.86
1-H-12S-C:24,1955-D	2.23
1-H-12S-C:24,2030-D	2.33
1-H-12S-C:24,2405-D	2.79

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

Zero-loss efficiency (η_0)	0.50	--
First-order coefficient (a_1)	2.18	W/(m²K)
Second-order coefficient (a_2)	0.006	W/(m²K²)
Incidence angle modifier IAM (50°)	1.16	--

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.