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Annex to Solar Keymark Certificate		Licence Number	011-7S3241 F
		Date issued	2025-04-04
		Issued by	DIN CERTCO

Licence holder	ZHEJIANG KESUN NEW ENERGY CO., LTD.	**Country**	China		
Brand (optional)	ENSUN	**Web**	www.kesunsolar.com		
Street, Number	No.28-1 Anren Road, Jianshan New District	**E-mail**	alan@ensunchina.com		
Postcode, City	Haining City, Zhejiang Province	**Tel**	+86	13586432400	

Collector Type	Flat plate 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	100 K
	m²	mm	mm	mm	W	W	W	W	W	W
FPC2.0	2.00	2,000	1,000	80	1,443	1,382	1,233	1,050	831	439
FPC2.5	2.50	2,000	1,250	80	1,803	1,727	1,541	1,312	1,038	549
Power output per m² gross area					721	691	617	525	415	220

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	0.731	2.83	0.022	0.000	0.00	6,427	0.000	0.00	0.000	0.91

Incidence angle modifier test method		Steady state - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	1.00	1.00	0.98	0.95	0.89	0.76	0.51	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	0.98	0.95	0.89	0.76	0.51	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	69.8	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	190	°C
Maximum operating temperature	ϑ_{max_op}	150	°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)	240312066GZU-001	**Dated**	2025/4/4

Comments of testing laboratory Draft Ver. 6.2 (22.09.2021)

Example comment
Thermal performance parameters are given from model FPC2.5 which give smaller small value under the same maximum Tm-Ta.

intertek
Star Steve Zhu

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Supplementary Information	Issued	2025-04-04

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
FPC2.0		2,331	1,707	1,099	1,807	1,252	752	1,326	877	512	1,440	951	546
FPC2.5		2,914	2,133	1,373	2,259	1,565	940	1,657	1,096	640	1,799	1,188	683
Gross Thermal Yield per m² gross area		1,166	853	549	904	626	376	663	439	256	720	475	273
Annual efficiency, η_a		66%	48%	31%	55%	38%	23%	57%	38%	22%	58%	38%	22%
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 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/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)				2	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)
FPC2.0	2.00
FPC2.5	2.50

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

Collector efficiency (η_{col})	57%

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)
10-VH-1234S-A:9,1960-C:20,1060-D	1.88
13-VH-1234S-A:9,1960-C:20,1310-D	2.37

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

Zero-loss efficiency (η_0)	0.72	--
First-order coefficient (a_1)	2.83	W/(m²K)
Second-order coefficient (a_2)	0.022	W/(m²K²)
Incidence angle modifier IAM (50°)	0.96	--

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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