

Holder/Issued to/Manufacturer

Haining Ensun Solar Technology Co., Ltd.

No.1 Lianbao Rd, Qianjiang Industry, Haining, Zhejiang, China.

Product name and description

Vacuum tube solar thermal collectors for water heating.
For technical information see Appendix (2 pages).

Models: ENSUN-HSC10 ENSUN-HSC12 ENSUN-HSC15 ENSUN-HSC18
 ENSUN-HSC20 ENSUN-HSC24 ENSUN-HSC30

Performance specification

The product is found to comply with the requirements in EN 12975-1:2006+A1:2010 Solar collectors, Part 1: General requirements and the Specific CEN Keymark Scheme Rules for Solar Thermal Products, and are based on test results according to EN ISO 9806:2017 Solar thermal collectors – Test methods.

Marking

Products conforming to this certificate shall be marked in accordance with the requirements in the Specific CEN Keymark Scheme Rules for Solar Thermal Products. The marking shall, together with the Keymark logo, show the identification code of the empowered certification body (RISE Research Institutes of Sweden AB, No. 012), also see CEN-CENELEC Internal Regulations Part 4 Certification, Annex A.

Validity

This certificate is valid until 2025-06-02 provided that the conditions in the Solar Keymark Rules are fulfilled and the standard or rules are not modified significantly. The validity of the certificate can be checked in the database, see Solar Keymark website <http://www.solarkeymark.org>.

Miscellaneous

The manufacturer's factory production control procedures are under surveillance by the responsibility of RISE. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

Johan Åkesson


Certificate No. C900098 | issue 1 | 2020-06-02

RISE Research Institutes of Sweden AB | Certification
Box 857, SE-501 15 Borås, Sweden
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2017-08-08



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Annex to Solar Keymark Certificate					Licence Number		C900098							
					Date issued		2020-06-02							
					Issued by		RISE							
Licence holder		Haining Ensun Solar Technology Co., Ltd			Country		China							
Brand (optional)		ENSUN			Web		www.ensunsolar.cn							
Street, Number		No.1 Lianbao Rd, Qianjiang Industry			E-mail		Eric@ensunchina.com							
Postcode, City		314400, Haining City, Zhejiang Province			Tel		+86 (0)573-87788080							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	85 K				
					m ²	mm	mm	mm	mm	mm	mm			
					W	W	W	W	W	W				
ENSUN-HSC10					1,55	1 926	805	110	562	529	441	326	184	59
ENSUN-HSC12					1,84	1 926	955	110	668	628	524	387	218	70
ENSUN-HSC15					2,27	1 926	1 180	110	824	774	646	478	269	87
ENSUN-HSC18					2,71	1 926	1 405	110	983	925	771	570	321	104
ENSUN-HSC20					2,99	1 926	1 555	110	1 085	1 020	851	629	355	114
ENSUN-HSC24					3,57	1 926	1 862	110	1 295	1 218	1 016	751	423	136
ENSUN-HSC30					4,45	1 926	2 312	110	1 615	1 518	1 266	936	528	170
Power output per m ² gross area					363	341	285	210	119	38				
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		0,361	1,95	0,022	0,000	0,00	9 136	0,000	0,00	0,0E+00	1,03			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1,06	1,12	1,19	1,25	1,31	1,29	0,86	0,43	0,00			
Longitudinal		K _{θL, coll}	1,00	0,99	0,98	0,94	0,89	0,79	0,64	0,39	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}	55	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}	200	°C							
Maximum operating temperature					$\vartheta_{max, op}$	100	°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)		190612120GZU-001					Dated		2020-05-15					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
Above efficiency parameters come from test type ENSUN-HSC10; The efficiency parameter related to aperture area (0.94m ²) are: $\eta_0, b=0.595$, $a1'=3.214$, $a2'=0.036$					 Constant Zhano									
RISE Research Institutes of Sweden AB Certification Box 857, SE-501 15 Borås, Sweden, Phone: +46 10-516 50 00, certifiering@ri.se www.ri.se														

Annex to Solar Keymark Certificate	Licence Number	C900098
Supplementary Information	Issued	2020-06-02

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations ϑ_m	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
ENSUN-HSC10		1 020	677	347	749	448	189	564	329	144	614	354	156
ENSUN-HSC12		1 210	803	412	889	532	225	669	390	171	729	420	185
ENSUN-HSC15		1 493	991	508	1 097	656	277	826	482	211	899	518	228
ENSUN-HSC18		1 783	1 183	607	1 309	783	331	986	575	252	1 073	619	272
ENSUN-HSC20		1 967	1 305	669	1 445	864	365	1 088	634	278	1 184	683	300
ENSUN-HSC24		2 348	1 558	799	1 725	1 031	436	1 299	758	332	1 414	815	358
ENSUN-HSC30		2 927	1 942	996	2 150	1 285	544	1 619	944	413	1 763	1 016	447
Annual output per m ² gross area		658	436	224	483	289	122	364	212	93	396	228	100
Annual efficiency, η_a		37%	25%	13%	30%	18%	7%	31%	18%	8%	32%	18%	8%
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 Ver. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

Additional Information

Collector heat transfer medium	Water
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	2300 Pa
Hail resistance using steel ball (maximum drop height)	0,4 m

Additional collector attribute(s)

<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)

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
ENSUN-HSC10	1,55	1-H-12S-C:20,900-D	0,94
ENSUN-HSC12	1,84	1-H-12S-C:20,1050-D	1,13
ENSUN-HSC15	2,27	1-H-12S-C:20,1275-D	1,41
ENSUN-HSC18	2,71	1-H-12S-C:20,1500-D	1,69
ENSUN-HSC20	2,99	1-H-12S-C:20,1650-D	1,88
ENSUN-HSC24	3,57	1-H-12S-C:20,1950-D	2,26
ENSUN-HSC30	4,45	1-H-12S-C:20,2400-D	2,81

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})	25%	Zero-loss efficiency (η_0)	0,36
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)	1,95
		Second-order coefficient (a_2)	0,022
		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 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.	