


Annex to Solar Keymark Certificate						Licence Number		011-7S3059 R																	
						Date issued		2021-09-10																	
						Issued by		DIN CERTCO																	
Licence holder			Beijing Sunda Solar Energy Technology Co., Ltd.			Country		P.R China																	
Brand (optional)			Sunda			Web		www.sundasolar.com																	
Street, Number			No.3 Huayuan Road, Haidian District			E-mail		zhaohua@sundasolar.com																	
Postcode, City			100091, Beijing City			Tel		+86 10-57930246																	
Collector Type						Evacuated tubular collector																			
Collector name						Power output per collector																			
						$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$																			
						0 K		10 K		30 K		50 K		70 K		92 K									
						W		W		W		W		W		W									
SEIDO 1-8						1,073		1,042		967		874		763		623									
SEIDO 1-12						1,633		1,586		1,472		1,330		1,162		949									
SEIDO 1-16						2,162		2,100		1,948		1,761		1,537		1,256									
Power output per m² gross area						529		513		476		431		376		307									
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						0.535		1.411		0.011		0.000		0.000		4,010		0.000		0.000		0.000		0.920	
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		1.02		1.04		1.02		1.00		0.67		0.33		0.00	
Longitudinal						$K_{\theta L, coll}$		1.00		0.99		0.99		0.99		0.96		0.93		0.62		0.31		0.00	
Heat transfer medium for testing						Water-Glycole																			
Flow rate for testing (per gross area, A_G)						dm/dt		0.020		kg/(sm ²)															
Maximum temperature difference during thermal performance test						$(\vartheta_m - \vartheta_a)_{max}$		61.6		K															
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30 \text{ }^\circ\text{C}$)						ϑ_{stg}		260		°C															
Maximum operating temperature						$\vartheta_{max, op}$		150		°C															
Maximum operating pressure						$p_{max, op}$		600		kPa															
Testing laboratory						Intertek Testing Services Shenzhen Ltd. Guangzhou						http://www.intertek.com													
Test report(s)						150324039GZU-003						Dated		2016/4/1											
Comments of testing laboratory						1. Above efficiency parameters come from test type SEIDO 1-8						Datasheet version: 6.1, 2019-09-26  <i>Stamp & signature</i>													
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Supplementary Information		Issued			2021-09-10													
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					
SEIDO 1-8		1,780	1,445	1,088	1,461	1,140	828	1,054	795	559	1,141	862	599					
SEIDO 1-12		2,710	2,199	1,656	2,224	1,736	1,261	1,605	1,209	850	1,736	1,312	912					
SEIDO 1-16		3,587	2,911	2,192	2,944	2,297	1,669	2,124	1,601	1,126	2,298	1,736	1,207					
Annual output per m ² gross area		877	712	536	720	562	408	519	391	275	562	424	295					
Annual efficiency, η_a		50%	40%	30%	44%	34%	25%	45%	34%	24%	45%	34%	24%					
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-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 ²) >		900		ϑ_a (°C) >		15		H _x (MJ/m ²) >		540								
Maximum tested positive load										2400		Pa						
Maximum tested negative load										2400		Pa						
Hail resistance using steel ball (maximum drop height)										1.2		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)									
SEIDO 1-8	2.03				1-H-12S-C:22,980-D				1.45									
SEIDO 1-12	3.09				1-H-12S-C:22,1440-D				2.18									
SEIDO 1-16	4.09				1-H-12S-C:22,1940-D				2.90									
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})					45%				Zero-loss efficiency (η_0)				0.53	--				
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)				1.41	W/(m ² K)				
													Second-order coefficient (a ₂)				0.011	W/(m ² K ²)
													Incidence angle modifier IAM (50°)				1.01	--
													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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