

Annex to Solar Keymark Certificate					Licence Number		011-7S3022 F							
					Date issued		2021-05-28							
					Issued by		DIN CERTCO							
Licence holder		Megasun manufacture Co., Ltd			Country		Vietnam							
Brand (optional)		Megasun			Web		www.megasun.com.vn							
Street, Number		387-388/5B-5B Block, Tan Bien Ward			E-mail		info@megasun.com.vn							
Postcode, City		Bien Hoa City, Dong Nai Province			Tel		+84 2513 882488							
Collector Type					Flat plate 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	100 K				
					m ²	mm	mm	mm	mm	mm	mm			
MGS-2000-BLT					2.00	2,000	1,000	80	1,399	1,335	1,191	1,022	829	494
MGS-2500-BLT					2.50	2,000	1,250	80	1,749	1,669	1,488	1,277	1,036	618
Power output per m² gross area					699	668	595	511	414	247				
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		0.714	3.02	0.015	0.000	0.00	6,345	0.000	0.00	0.00	0.86			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.00	1.00	0.99	0.97	0.93	0.85	0.71	0.46	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.97	0.93	0.85	0.71	0.46	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}	70	K							
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)					ϑ_{stg}	210	°C							
Maximum operating temperature					$\vartheta_{max, op}$	120	°C							
Maximum operating pressure					p _{max, op}	1000	kPa							
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch					http://www.intertek.com							
Test report(s)		200925107GZU-001					Dated		2021-03-17					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
Above efficiency parameters come from test type MGS-2000-BLT; The performance parameter based aperture area (1.81 m ²) are: $\eta_0, b' = 0.789$, $a1' = 3.34$, $a2' = 0.017$.					Stamp & signature of test lab									
DIN CERTCO ● Alboinstraße 56 ● D-12103 Berlin Tel: +49 30 7562-1131 ● Fax: +49 30 7562-1141 ● E-Mail: info@dincertco.de ● www.dincertco.de														

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S3022 F
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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
MGS-2000-BLT		2,205	1,593	1,042	1,696	1,181	740	1,243	822	497	1,347	885	527
MGS-2500-BLT		2,756	1,992	1,303	2,120	1,476	925	1,554	1,028	621	1,684	1,107	658
Annual output per m ² gross area		1,102	797	521	848	591	370	621	411	248	673	443	263
Annual efficiency, η_a		62%	45%	30%	52%	36%	23%	53%	35%	21%	54%	36%	21%
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	Yes
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)	2 m

Additional collector attribute(s)

- Using external power source(s) for normal operation
 Active or passive measure(s) for self-protection
 Co-generating thermal and electrical power
 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)
MGS-2000-BLT	2.00	8-VH-1234S-A:9,1890-C:20.6,1100-D	1.81
MGS-2500-BLT	2.50	10-VH-1234S-A:9,1890-C:20.6,1310-D	2.31

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})	55%	Zero-loss efficiency (η_0)	0.70	
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)	3.02 W/(m ² K)	
		Second-order coefficient (a_2)	0.015 W/(m ² K ²)	
		Incidence angle modifier IAM (50°)	0.93	--
		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.		