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IGTE

Annex to Solar Keymark Certificate		Licence Number	011-7S3232 F
		Date issued	2024-04-29
		Issued by	DINCERTCO
Licence holder	SUPREME SOLAR PROJECTS PRIVATE	Country	India
Brand (optional)	-	Web	http://www.supremesolar.in
Street, Number	Plot No. 28-C, SY NO. 92, 93, 94 & 95 Doddaballapura Main Road, Veerapura Village Kasaba Hobli	E-mail	quality.dbr@supremesolar.in
Postcode, City	561203 Bangalore	Tel	+91 9481949160
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	108 K
	m²	mm	mm	mm	W	W	W	W	W	W
2.045 m2 FLAT PLATE COLLECTOR	2.05	2 015	1 015	100	1 248	1 132	884	615	324	0
Power output per m² gross area					610	554	432	301	158	0

Performance parameters test method	Quasi dynamic									
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	0.611	5.55	0.013	0.000	0.00	7 729	0.000	0.00	0.0	0.99

Incidence angle modifier test method		Quasi dynamic - 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	0.99	0.96	0.89	0.72	0.36	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	0.99	0.96	0.89	0.72	0.36	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		$(\vartheta_m-\vartheta_a)_{max}$	78 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	150 °C
Maximum operating temperature		$\vartheta_{max\ op}$	80 °C
Maximum operating pressure		$p_{max,op}$	1000 kPa
Testing laboratory	Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)	http://www.igte.uni-stuttgart.de	
Test report(s)	23COL1723 23COL1723Q	Dated	09.04.2024 09.04.2024

Comments of testing laboratory	Ver. 6.2 (13.01.2022)
Documented performance parameters are taken from 23COL1723	TZS Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)

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Supplementary Information	Issued	2024-04-29

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
2.045 m2 FLAT PLATE COLLECTOR		1 995	1 064	440	1 300	642	220	993	462	159	1 102	503	177
Gross Thermal Yield per m² gross area		976	520	215	636	314	108	486	226	78	539	246	86
Annual efficiency, η_a		55%	29%	12%	39%	19%	7%	42%	19%	7%	43%	20%	7%
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
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)				A	--
G (W/m²) >	1000	ϑ_a (°C) >	20	H_x (MJ/m²) >	600
Maximum tested positive load				3250	Pa
Maximum tested negative load				3000	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)
2.045 m2 FLAT PLATE COLLECTOR	2.05

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
9-VH-1234S-A:12,1922-C:24,1100	1.89

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

Collector efficiency (η_{col})	37%

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.

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

Zero-loss efficiency (η_0)	0.61	--
First-order coefficient (a_1)	5.55	W/(m²K)
Second-order coefficient (a_2)	0.013	W/(m²K²)
Incidence angle modifier IAM (50°)	0.98	--

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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