TÜVRheinland®
DIN CERTCO
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IGTE

Annex to Solar Keymark Certificate		Licence Number	011-7S1493 F
		Date issued	2023-03-07
		Issued by	DIN CERTCO

Licence holder	DIMAS SA	Country	Greece	
Brand (optional)		Web	https://www.dimas-solar.gr/	
Street, Number	2nd km Argos – Nafplio	E-mail	info@dimas-solar.gr	
Postcode, City	Argos 21200	Tel	+30	27510 20920

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	104 K
	m²	mm	mm	mm	W	W	W	W	W	W
SOL+EVO 19	1,96	1.503	1.305	103	1.457	1.393	1.254	1.099	928	602
SOL+EVO 20	2,02	2.006	1.007	103	1.501	1.436	1.292	1.132	956	620
SOL+EVO 23	2,24	1.893	1.183	103	1.665	1.592	1.433	1.255	1.060	687
SOL+EVO 25	2,52	2.006	1.257	103	1.873	1.791	1.612	1.412	1.193	773
SOL+EVO 27	2,67	2.261	1.183	103	1.985	1.898	1.708	1.497	1.264	819
SOL+EVO 29	2,92	2.006	1.447	103	2.170	2.075	1.868	1.637	1.382	896
TERRA+EVO 19	1,96	1.503	1.305	103	1.457	1.393	1.254	1.099	928	602
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TERRA+EVO 29	2,92	2.006	1.447	103	2.170	2.075	1.868	1.637	1.382	896
Power output per m² gross area					743	711	640	560	473	307

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	0,748	3,16	0,010	0,000	0,00	14.330	0,000	0,00	0,00	0,96

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	0,99	0,98	0,97	0,92	0,80	0,47	0,24	0,00
Longitudinal	$K_{\theta L,coll}$	1,00	0,99	0,98	0,97	0,92	0,80	0,47	0,24	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		$(\vartheta_m-\vartheta_a)_{max}$	74 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	220 °C
Maximum operating temperature		ϑ_{max_op}	k.A. °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)	22COL1679 22COL1681 22COL1647Q/1	Dated	20.12.2022 20.12.2022 20.12.2022

Comments of testing laboratory	Ver. 6.2 (13.01.2022)
Documented performance parameters are taken from 22COL1679 (SOL+EVO19). This data sheet replaces the data sheet issued on 20.12.2022; (A mistake in the brand name was corrected).	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	2023-03-07

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
SOL+EVO 19		2.333	1.727	1.192	1.810	1.306	880	1.319	903	584	1.439	980	627
SOL+EVO 20		2.404	1.779	1.229	1.866	1.345	907	1.359	931	602	1.483	1.010	646
SOL+EVO 23		2.666	1.973	1.362	2.069	1.492	1.006	1.507	1.032	668	1.644	1.121	716
SOL+EVO 25		2.999	2.220	1.533	2.327	1.679	1.131	1.695	1.161	751	1.850	1.261	806
SOL+EVO 27		3.178	2.352	1.624	2.466	1.778	1.199	1.796	1.230	796	1.960	1.336	853
SOL+EVO 29		3.475	2.572	1.776	2.697	1.945	1.311	1.964	1.345	871	2.144	1.461	933
TERRA+EVO 19		2.333	1.727	1.192	1.810	1.306	880	1.319	903	584	1.439	980	627
TERRA+EVO 20		2.404	1.779	1.229	1.866	1.345	907	1.359	931	602	1.483	1.010	646
TERRA+EVO 23		2.666	1.973	1.362	2.069	1.492	1.006	1.507	1.032	668	1.644	1.121	716
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TERRA+EVO 29		3.475	2.572	1.776	2.697	1.945	1.311	1.964	1.345	871	2.144	1.461	933
Gross Thermal Yield per m² gross area		1.190	881	608	924	666	449	673	461	298	734	500	320
Annual efficiency, η_a		67%	50%	34%	57%	41%	28%	58%	40%	26%	59%	40%	26%
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-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)				A	--
G (W/m²) >	1000	ϑ_a (°C) >	20	H_x (MJ/m²) >	600
Maximum tested positive load				2600	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)
SOL+EVO 19	1,96
SOL+EVO 20	2,02
SOL+EVO 23	2,24
SOL+EVO 25	2,52
SOL+EVO 27	2,67
SOL+EVO 29	2,92
TERRA+EVO 19	1,96
TERRA+EVO 20	2,02
TERRA+EVO 23	2,24
TERRA+EVO 25	2,52
TERRA+EVO 27	2,67
TERRA+EVO 29	2,92

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

Collector efficiency (η_{col})	60%

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)
SOL+EVO 19	11-V-1234S-7.2,1392-20.6,1370-D	1,79
SOL+EVO 20	9-V-1234S-7.2,1897-20.6,1060-D	1,83
SOL+EVO 23	10-V-1234S-7.2,1782-20.6,1240-D	2,05
SOL+EVO 25	11-V-1234S-7.2,1897-20.6,1310-D	2,32
SOL+EVO 27	10-V-1234S-7.2,2152-20.6,1240-D	2,46
SOL+EVO 29	12-V-1234S-7.2,1897-20.6,1510-D	2,71
TERRA+EVO 19	11-V-1234S-7.2,1392-20.6,1370-D	1,79
TERRA+EVO 20	9-V-1234S-7.2,1897-20.6,1060-D	1,83
TERRA+EVO 23	10-V-1234S-7.2,1782-20.6,1240-D	2,05
TERRA+EVO 25	11-V-1234S-7.2,1897-20.6,1310-D	2,32
TERRA+EVO 27	10-V-1234S-7.2,2152-20.6,1240-D	2,46
TERRA+EVO 29	12-V-1234S-7.2,1897-20.6,1510-D	2,71

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

Zero-loss efficiency (η_0)	0,74	--
First-order coefficient (a_1)	3,16	W/(m²K)
Second-order coefficient (a_2)	0,010	W/(m²K²)
Incidence angle modifier IAM (50°)	0,94	--

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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