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IGTE

Annex to Solar Keymark Certificate		Licence Number	011-7S2566 F
		Date issued	2021-09-06
		Issued by	DIN CERTCO

Licence holder	GREENoneTEC Solarindustrie GmbH	**Country**	Austria
Brand (optional)		**Web**	www.greenonetec.com
Street, Number	Industriepark St. Veit, Energieplatz 1	**E-mail**	info@greenonetec.com
Postcode, City	9300 St. Veit a.d. Glan	**Tel**	+43 (0)4212 28136-0

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
GK 3803 S	7.91	2224	3557	135	6274	6036	5503	4894	4209	2699
GK 3133 S	13.17	2224	5920	135	10445	10049	9162	8149	7009	4494
Power output per m² gross area					793	763	696	619	532	341

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	0.803	2.888	0.012	0.000	0.00	9354	0.000	0.00	0.0	0.918

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	0.97	0.95	0.91	0.83	0.68	0.21	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.97	0.95	0.91	0.83	0.68	0.21	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}	214	°C
Maximum operating temperature	$\vartheta_{max\ op}$	n.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)	15COL1257 15COL1257Q	**Dated**	28.08.2015 28.08.2015

Comments of testing laboratory — Datasheet version: 6.1, 2019-09-26

Documented performance parameters are taken from test report 15COL1257 (GK 3803 S)
This data sheet replaces the data sheet issued on 28.08.2015
This data sheet is issued by version 6.1

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	2021-09-06

Annual collector output 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
GK 3803 S		9 965	7 628	5 455	7 887	5 859	4 068	5 743	4 076	2 727	6 236	4 412	2 910
GK 3133 S		16 592	12 701	9 082	13 131	9 755	6 774	9 562	6 786	4 541	10 382	7 346	4 845
Annual output per m² gross area		1 260	964	690	997	741	514	726	515	345	788	558	368
Annual efficiency, η_a		71%	55%	39%	61%	45%	32%	62%	44%	30%	63%	45%	30%
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. 6.1 (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/m²) >	900	ϑ_a (°C) >	15	H_X (MJ/m²) >	540
Maximum tested positive load				3000	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
☐ Active or passive measure(s) for self-protection
☐ Co-generating thermal and electrical power
☐ Façade collector(s)

Energy Labelling Information

	Reference Area, A_{sol} (m²)
GK 3803 S	7.91
GK 3133 S	13.17

Additional Informative Technical Data

Hydraulic Designation Code	Aperature Area, A_a (m²)
3-H-1234S-A:7,2,24800-C:26,3595-D	7.41
5-H-1234S-A:7,2,24800-C:26,5955-D	12.35

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

Collector efficiency (η_{col})	66%

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)	0.79	--
First-order coefficient (a_1)	2.89	W/(m²K)
Second-order coefficient (a_2)	0.012	W/(m²K²)
Incidence angle modifier IAM (50°)	0.90	--

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.