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Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results			Licence Number	011-7S2231 F
			Date issued	2018-07-30
			Issued by	DIN CERTCO

Licence holder	SONNENKRAFT GmbH		Country	ÖSTERREICH	
Brand (optional)			Web	www.sonnenkraft.com	
Street, Number	Industriepark St. Veit, Energieplatz 1		E-mail	office@sonnenkraft.com	
Postcode, City	9300	St. Veit a.d. Glan	Tel	+43	(0)4212 45010

Collector Type	Flat plate collector, glazed

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m²; Gd = 150 W/m² ϑm - ϑa					
					0 K	10 K	30 K	50 K	70 K	102 K
	m²	mm	mm	mm	W	W	W	W	W	W
RKAQ2000 ALPIN	2.02	1 168	1 728	83	1 460	1 387	1 232	1 066	888	580
RKA2000 ALPIN	2.02	1 728	1 168	83	1 460	1 387	1 232	1 066	888	580
RKA2001 ALPIN	2.02	1 728	1 168	83	1 460	1 387	1 232	1 066	888	580
RKAQ2500 ALPIN	2.51	1 168	2 148	83	1 815	1 724	1 531	1 324	1 103	721
RKAH2500 ALPIN	2.51	2 148	1 168	83	1 815	1 724	1 531	1 324	1 103	721
RKA2501 ALPIN	2.51	2 148	1 168	83	1 815	1 724	1 531	1 324	1 103	721
Power output per m² gross area					723	687	610	528	440	287

Performance parameters test method	Steady state - indoor								
Performance parameters (related to AG)	η0,hem	a1	a2						
Units	-	W/(m²K)	W/(m²K²)						
Test results	0.723	3.559	0.007						

Incidence angle modifier test method		Quasi dynamic - outdoor								
Bi-directional incidence angle modifiers	No									
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	0.99	0.99	0.97	0.95	0.91	0.82	0.57	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.99	0.97	0.95	0.91	0.82	0.57	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 for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	102	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	207	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	8.908	kJ/(Km²)
Maximum operating temperature	$\vartheta_{max\ op}$	n.a.	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	TZS, ITW University Stuttgart	www.itw.uni-stuttgart.de	
Test report(s)	12COL1134/1OEM01/1 + 12COL1135OEM01/2	Dated	04.07.2018/30.07.2018
	12COL1136/1OEM01/1 + 12COL1136Q/1OEM01/2		04.07.2018/30.07.2018
	13COL1184OEM01 + 13COL1185OEM01		04.07.2018/04.07.2018

Comments of testing laboratory — Datasheet version: 5.01, 2016-03-01

This data sheet replaces the data sheet issued on 04.07.2018
Documented performance parameters are taken from 12COL1134/1OEM01/1 (RKAQ2000 ALPIN)
Changing the collector name from RKA2500 ALPIN to RKAH2500 ALPIN.

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	2018-07-30

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results

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
RKAQ2000 ALPIN	2 346	1 677	1 125	1 777	1 244	814	1 310	863	541	1 424	934	575
RKA2000 ALPIN	2 346	1 677	1 125	1 777	1 244	814	1 310	863	541	1 424	934	575
RKA2001 ALPIN	2 346	1 677	1 125	1 777	1 244	814	1 310	863	541	1 424	934	575
RKAQ2500 ALPIN	2 915	2 083	1 398	2 208	1 546	1 012	1 627	1 073	672	1 770	1 160	715
RKAH2500 ALPIN	2 915	2 083	1 398	2 208	1 546	1 012	1 627	1 073	672	1 770	1 160	715
RKA2501 ALPIN	2 915	2 083	1 398	2 208	1 546	1 012	1 627	1 073	672	1 770	1 160	715
Annual output per m² gross area	1 162	830	557	880	616	403	648	427	268	705	462	285
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	B	--
Maximum tested positive load	3000	Pa
Maximum tested negative load	2500	Pa
Hail resistance using steel ball (maximum drop height)	n.a.	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
RKAQ2000 ALPIN	2.02
RKA2000 ALPIN	2.02
RKA2001 ALPIN	2.02
RKAQ2500 ALPIN	2.51
RKAH2500 ALPIN	2.51
RKA2501 ALPIN	2.51

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

Collector efficiency (η_{col})	57	%

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/m², 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 9806:2013.

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

Zero-loss efficiency (η_0)	0.723	--
First-order coefficient (a_1)	3.56	W/(m²K)
Second-order coefficient (a_2)	0.007	W/(m²K²)
Incidence angle modifier IAM (50°)	0.95	--

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.