TÜVRheinland®
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Annex to Solar Keymark Certificate

Licence Number	**011-7S776 F**
Date issued	**2019-12-19**
Issued by	**DINCERTCO**

Licence holder	**SIKO GmbH**	**Country**	Austria
Brand (optional)	CLASSIC	**Web**	http://www.siko.at
Street, Number	Solarstrasse 1	**E-mail**	info@siko.at
Postcode, City	A-6200 Jenbach	**Tel**	+43 5244644-66

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	105 K
	m²	mm	mm	mm	W	W	W	W	W	W
CLASSIC 3B1H	**3.46**	**1 092**	**3 166**	**138**	2 174	2 060	1 813	1 539	1 236	640
CLASSIC 2B3H	6.45	3 030	2 129	138	4 052	3 841	3 380	2 868	2 305	1 194
Power output per m² gross area					628	596	524	445	357	185

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	0.632	3.17	0.010	0.000	0.00	5 059	0.000	0.00	0.0E+00	0.96

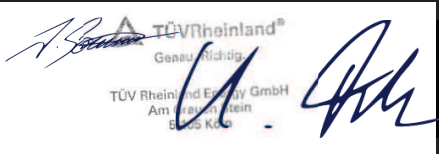
Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	0.98	0.95	0.91	0.84	0.71	0.43	0.22	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.98	0.95	0.91	0.84	0.71	0.43	0.22	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.025	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	75	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	210	°C
Maximum operating temperature	$\vartheta_{max\ op}$	n.n.	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	TÜV Rheinland Energy GmbH	http://www.testlab.domain	
Test report(s)	21247029.001	**Dated**	19.12.2019

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

The collector is available with modular dimension between 3.3 and 22 m² gross area. A sample with the weakest l/w ratio (CLASSIC 3B1H) was used for performance testing.



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Supplementary Information	Issued	2019-12-19

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
CLASSIC 3B1H		3 362	2 326	1 465	2 506	1 676	1 009	1 851	1 173	689	2 027	1 273	729
CLASSIC 2B3H		6 267	4 335	2 730	4 673	3 124	1 881	3 451	2 186	1 285	3 778	2 373	1 359
Annual output per m² gross area		972	672	423	724	484	292	535	339	199	586	368	211
Annual efficiency, η_a		55%	38%	24%	44%	30%	18%	46%	29%	17%	47%	30%	17%
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					Yes	
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					5000	Pa
Maximum tested negative load					900	Pa
Hail resistance using ice balls (diameter)					35	mm

Additional collector attribute(s)

☐ Using external power source(s) for normal operation
☐ Co-generating thermal and electrical power
☐ Active or passive measure(s) for self-protection
☐ Façade collector(s)

Energy Labelling Information

	Reference Area, A_{sol} (m²)
CLASSIC 3B1H	3.46
CLASSIC 2B3H	6.45

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

Collector efficiency (η_{col})	49%

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	Aperature Area, A_a (m²)
HDC=8-V-12S-A:7.0,2978-C:20.4,1080	3.03
HDC=8,8-V-12S-A:7.0,2818-	5.84

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

Zero-loss efficiency (η_0)	0.63	--
First-order coefficient (a_1)	3.17	W/(m²K)
Second-order coefficient (a_2)	0.010	W/(m²K²)
Incidence angle modifier IAM (50°)	0.85	--

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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