TÜVRheinland®
DIN CERTCO
Precisely Right.

Annex to Solar Keymark Certificate		Licence Number	011-7S2296 F
		Date issued	2024-06-21
		Issued by	DIN CERTCO

Licence holder	SOLTOP Energie AG	Country	Switzerland	
Brand (optional)		Web	www.soltop-energie.ch	
Street, Number	St. Gallerstrasse 3	E-mail	info@soltop-energie.ch	
Postcode, City	CH-8353 Elgg	Tel	+41	52 397 77 77

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
COBRA AK 2.8V G3	2.77	2’370	1’167	101	2’080	1’988	1’788	1’568	1’328	860
COBRA AK 2.8H G3	2.79	1’190	2’347	101	2’095	2’002	1’801	1’579	1’338	867
Power output per m² gross area					751	718	645	566	479	311

Performance parameters test method	Steady state - outdoor									
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	0.766	3.25	0.009	0.000	0.00	2’348	0.000	0.00	0.0E+00	0.87

Incidence angle modifier test method		Steady state - 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	0.96	0.93	0.85	0.64	0.34	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.98	0.96	0.93	0.85	0.64	0.34	0.00

Heat transfer medium for testing	Water-Glycole		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	75	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	200	°C
Maximum operating temperature	$\vartheta_{max\ op}$	170	°C
Maximum operating pressure	$p_{max,op}$	600	kPa

Testing laboratory	SPF Institute for Solar Technology	www.spf.ch	
Test report(s)	C1898	Dated	21.06.2024

Comments of testing laboratory	Draft Ver. 6.2 (22.09.2021)
	SPF INSTITUT FÜR SOLARTECHNIK

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Supplementary Information	Issued	2024-06-21

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
COBRA AK 2.8V G3		3'261	2'396	1'652	2'522	1'816	1'228	1'842	1'257	815	1'998	1'353	865
COBRA AK 2.8H G3		3'284	2'413	1'664	2'541	1'829	1'236	1'855	1'266	821	2'012	1'363	871
Gross Thermal Yield per m² gross area		1'177	865	596	911	656	443	665	454	294	721	489	312
Annual efficiency, η_a		67%	49%	34%	56%	40%	27%	57%	39%	25%	58%	39%	25%
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 Draft Ver. 6.2 (22.09.2021). 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				4400	Pa
Maximum tested negative load				2400	Pa
Hail resistance using ice balls (diameter)				35	mm

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)	Yes

Energy Labelling Information

	Reference Area, A_{sol} (m²)
COBRA AK 2.8V G3	2.77
COBRA AK 2.8H G3	2.79

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

Collector efficiency (η_{col})	61%

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)
1-H-1234S-9.2,29541-20.4,1135-D	2.46
1-H-1234S-9.2,29568-20.4,2320-D	2.46

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

Zero-loss efficiency (η_0)	0.75	--
First-order coefficient (a_1)	3.25	W/(m²K)
Second-order coefficient (a_2)	0.009	W/(m²K²)
Incidence angle modifier IAM (50°)	0.91	--

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.