
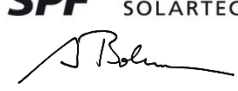


Annex to Solar Keymark Certificate - Summary of EN 12975-2 Test Results						Licence Number		011-7S2297 F					
						Date issued		2016-11-29					
						Issued by							
Licence holder		SOLTOP Schuppisser AG				Country		Switzerland					
Brand (optional)		--				Web		www.soltop.ch					
Street, Number		St. Gallerstrasse 5a				E-mail		info@soltop.ch					
Postcode, City		CH-8353, Elgg				Tel		+41 52 397 77 77					
Collector Type						Flat plate collector, glazed							
Collector name	Gross area (A _G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G = 1000 W/m ² ϑ _m - ϑ _a								
					0 K	10 K	30 K	50 K	70 K	130 K			
					W	W	W	W	W	W			
COBRALINO AK 2.2 V	2.212	1'897	1'166	100	1'650	1'573	1'405	1'223	1'024	334			
COBRALINO AK 2.3 H	2.267	967	2'344	100	1'691	1'612	1'440	1'253	1'050	342			
COBRALINO AK 2.8 V	2.775	2'370	1'171	100	2'070	1'973	1'763	1'534	1'285	419			
COBRALINO AK 2.8 H	2.784	1'187	2'345	100	2'077	1'979	1'769	1'539	1'289	420			
Power output per m ² gross area					746	711	635	553	463	151			
Performance parameters test method		Steady state - outdoor											
Performance parameters (aperture area)		η _{0,hem}	a ₁	a ₂									
Units		-	W/(m ² K)	W/(m ² K ²)									
Test results		0.838	3.84	0.0099									
Incidence angle modifier test method		Steady state - outdoor											
Bi-directional incidence angle modifiers		No											
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°		
Transversal		K _{GT, coll}	1.00	1.00	1.00	0.99	0.96	0.89	0.72	0.40	0.00		
Longitudinal		K _{GL, coll}	1.00	1.00	1.00	0.99	0.96	0.89	0.72	0.40	0.00		
Heat transfer medium for testing		Water-Glycole											
Flow rate for testing (per gross area, A _G)		dm/dt	0.021	kg/(sm ²)									
Maximum temperature difference for thermal performance calculations		(ϑ _m -ϑ _a) _{max}	130	K									
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)		ϑ _{stg}	193	°C									
Effective thermal capacity, incl. fluid (per gross area, A _G)		C/m ²	6.27	kJ/(Km ²)									
Maximum operating temperature		ϑ _{max, op}	130	°C									
Maximum operating pressure		p _{max, op}	600	kPa									
Testing laboratory		SPF, CH-8640 Rapperswil				www.spf.ch							
Test report(s)		C1593LPEN, C1594LPEN, C1594QPEN, C1595QPEN				Dated		30.04.2014					
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01							
--						 INSTITUT FÜR SOLARTECHNIK 							
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2297 F
	Issued	2016-11-29

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

Standard Locations Collector name	ϑ_m	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
COBRALINO AK 2.2 V		2'658	1'935	1'320	2'044	1'457	971	1'494	1'007	642	1'624	1'088	684
COBRALINO AK 2.3 H		2'724	1'984	1'353	2'095	1'493	995	1'531	1'032	658	1'665	1'115	701
COBRALINO AK 2.8 V		3'335	2'428	1'656	2'564	1'828	1'218	1'874	1'263	806	2'038	1'365	858
COBRALINO AK 2.8 H		3'345	2'436	1'662	2'572	1'834	1'222	1'881	1'267	808	2'044	1'369	861
Annual output per m ² aperture area		1'202	875	597	924	659	439	675	455	290	734	492	309
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
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 ϑ_m (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	Yes
The collector was tested successfully according to EN 12975-2 under the following conditions:	
No valid climate reference class	--
Maximum tested positive load	1000 Pa
Maximum tested negative load	1000 Pa
Hail resistance using ice balls (diameter)	35 mm

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
COBRALINO AK 2.2 V	1.96	Collector efficiency (η_{col})	67 %
COBRALINO AK 2.3 H	2.02	<i>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.</i>	
COBRALINO AK 2.8 V	2.47		
COBRALINO AK 2.8 H	2.51		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.838 --
		First-order coefficient (a_1)	3.84 W/(m ² K)
		Second-order coefficient (a_2)	0.010 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.96 --
<i>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.</i>			