


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S2769 F							
						Date issued		2017-06-21							
						Issued by		DIN CERTCO							
Licence holder		EURONOM				Country		Schweden							
Brand (optional)						Web		www.euronom.se							
Street, Number		Blidögatan 34				E-mail		info@euronom.se							
Postcode, City		21124		Malmö		Tel		+46 48 022 125							
Collector Type						Flat plate collector, glazed									
Collector name						Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² ; u = 3 m/s ̑m - ̑a									
						Gross area (A _G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	116 K
						m ²	mm	mm	mm	W	W	W	W	W	W
ExoSol PA 2.3						2.43	1 990	1 222	91	1 757	1 671	1 484	1 275	1 045	434
Power output per m ² gross area						723	688	611	525	430	179				
Performance parameters test method						Quasi dynamic									
Performance parameters (related to AG)						̑ _{0,b}	c1	c2	c3	c4	c6	Kd			
Units						-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results						0.730	3.416	0.011	0.000	0.000	0.000	0.936			
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 _{̑T, coll}	1.00	0.99	0.98	0.97	0.94	0.90	0.80	0.51	0.00
Longitudinal						K _{̑L, coll}	1.00	0.99	0.98	0.97	0.94	0.90	0.80	0.51	0.00
Heat transfer medium for testing						Water									
Flow rate for testing (per gross area, A _G)						dm/dt	0.018	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations						(̑ _m -̑ _a) _{max}	116	K							
Standard stagnation temperature (G = 1000 W/m ² ; ̑ _a = 30 °C)						̑ _{stg}	203	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)						C/m ²	8.658	kJ/(Km ²)							
Maximum operating temperature						̑ _{max, op}	n.a.	°C							
Maximum operating pressure						p _{max, op}	1000	kPa							
Testing laboratory						TZS, ITW University Stuttgart		www.itw.uni-stuttgart.de							
						12COL1079/2OEM23		21.06.2017							
						12COL1079Q/2OEM23		21.06.2017							
none						 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70560 Stuttgart (Vaihingen)									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2769 F
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on 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
ExoSol PA 2.3		2 829	2 026	1 335	2 148	1 490	944	1 584	1 039	633	1 725	1 126	675
Annual output per m ² gross area		1 164	834	549	884	613	389	652	428	261	710	463	278
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 ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	C	--
Maximum tested positive load	3000	Pa
Maximum tested negative load	2250	Pa
Hail resistance using steel ball (maximum drop height)	n.a	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
ExoSol PA 2.3	2.43	Collector efficiency (η_{col})	57 %
		<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>	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.723 --
		First-order coefficient (a_1)	3.42 W/(m ² K)
		Second-order coefficient (a_2)	0.011 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.94 --
		<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>	