


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2664 R							
					Date issued		2016-06-27							
					Issued by		DIN CERTCO							
Licence holder		C&G ENERGY S.R.L.			Country		Italien							
Brand (optional)					Web		www.ktsolar.it							
Street, Number		Loc.Tà Terzerie			E-mail		info@ktsolar.it							
Postcode, City		84060 Ogliastro C.to (SA)			Tel		+39 3334904236							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² ; u = 3 m/s ̑ _m - ̑ _a									
					0 K	10 K	30 K	50 K	70 K	118 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
PANNELLO SKY PRO 8L CPC 58					1.47	1 625	905	116	919	905	873	837	795	677
PANNELLO SKY PRO 10L CPC 58					1.82	1 625	1 122	116	1 138	1 121	1 081	1 036	985	838
PANNELLO SKY PRO 12L CPC 58					2.18	1 625	1 342	116	1 363	1 342	1 295	1 241	1 180	1 004
PANNELLO SKY PRO 14L CPC 58					2.54	1 625	1 562	116	1 589	1 564	1 509	1 446	1 374	1 170
PANNELLO SKY PRO 16L CPC 58					2.90	1 625	1 782	116	1 814	1 786	1 723	1 651	1 569	1 336
PANNELLO SKY PRO 18L CPC 58					3.26	1 625	2 002	116	2 039	2 007	1 937	1 856	1 764	1 502
PANNELLO SKY PRO 20L CPC 58					3.62	1 625	2 226	116	2 264	2 229	2 151	2 060	1 959	1 667
PANNELLO SKY PRO 8L ADVANCED					1.47	1 625	905	116	919	905	873	837	795	677
PANNELLO SKY PRO 10L ADVANCED					1.82	1 625	1 122	116	1 138	1 121	1 081	1 036	985	838
PANNELLO SKY PRO 12L ADVANCED					2.18	1 625	1 342	116	1 363	1 342	1 295	1 241	1 180	1 004
PANNELLO SKY PRO 14L ADVANCED					2.54	1 625	1 562	116	1 589	1 564	1 509	1 446	1 374	1 170
PANNELLO SKY PRO 16L ADVANCED					2.90	1 625	1 782	116	1 814	1 786	1 723	1 651	1 569	1 336
PANNELLO SKY PRO 18L ADVANCED					3.26	1 625	2 002	116	2 039	2 007	1 937	1 856	1 764	1 502
PANNELLO SKY PRO 20L ADVANCED					3.62	1 625	2 226	116	2 264	2 229	2 151	2 060	1 959	1 667
Power output per m ² gross area									625	616	594	569	541	461
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					0.623	0.925	0.004	0.000	0.000	0.000	1.026			
Incidence angle modifier test method					Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers					Yes									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K _{̑T, coll}	1.02	0.99	1.00	1.01	1.09	1.10	1.29	0.65	0.00
Longitudinal					K _{̑L, coll}	1.00	0.99	0.97	0.95	0.89	0.80	0.64	0.32	0.00
Heat transfer medium for testing					Water-Glycole									
Flow rate for testing (per gross area, A _G)					dm/dt		0.017		kg/(sm ²)					
Maximum temperature difference for thermal performance calculations					(̑ _m -̑ _a) _{max}		118		K					
Standard stagnation temperature (G = 1000 W/m ² ; ̑ _a = 30 °C)					̑ _{stg}		259		°C					
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²		34.75		kJ/(Km ²)					
Maximum operating temperature					̑ _{max, op}		n.a		°C					
Maximum operating pressure					p _{max, op}		600		kPa					
Testing laboratory					TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de					
Test report(s)					10COL945/2 10COL944/2 10COL945Q/2				Dated		22.06.2016 22.06.2016 22.06.2016			
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01									
					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2664 R
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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
PANNELLO SKY PRO 8L CPC 58		1 620	1 463	1 294	1 395	1 238	1 077	1 011	879	750	1 088	947	809
PANNELLO SKY PRO 10L CPC 58		2 005	1 812	1 602	1 727	1 532	1 333	1 252	1 088	929	1 347	1 173	1 002
PANNELLO SKY PRO 12L CPC 58		2 402	2 170	1 919	2 069	1 835	1 597	1 500	1 303	1 112	1 614	1 405	1 200
PANNELLO SKY PRO 14L CPC 58		2 798	2 528	2 236	2 410	2 138	1 860	1 747	1 518	1 296	1 880	1 637	1 398
PANNELLO SKY PRO 16L CPC 58		3 195	2 887	2 553	2 752	2 441	2 124	1 995	1 733	1 480	2 147	1 869	1 596
PANNELLO SKY PRO 18L CPC 58		3 592	3 245	2 870	3 094	2 744	2 388	2 243	1 949	1 663	2 413	2 101	1 794
PANNELLO SKY PRO 20L CPC 58		3 988	3 603	3 187	3 435	3 047	2 651	2 490	2 164	1 847	2 679	2 333	1 993
PANNELLO SKY PRO 8L ADVANCED		1 620	1 463	1 294	1 395	1 238	1 077	1 011	879	750	1 088	947	809
PANNELLO SKY PRO 10L ADVANCED		2 005	1 812	1 602	1 727	1 532	1 333	1 252	1 088	929	1 347	1 173	1 002
PANNELLO SKY PRO 12L ADVANCED		2 402	2 170	1 919	2 069	1 835	1 597	1 500	1 303	1 112	1 614	1 405	1 200
PANNELLO SKY PRO 14L ADVANCED		2 798	2 528	2 236	2 410	2 138	1 860	1 747	1 518	1 296	1 880	1 637	1 398
PANNELLO SKY PRO 16L ADVANCED		3 195	2 887	2 553	2 752	2 441	2 124	1 995	1 733	1 480	2 147	1 869	1 596
PANNELLO SKY PRO 18L ADVANCED		3 592	3 245	2 870	3 094	2 744	2 388	2 243	1 949	1 663	2 413	2 101	1 794
PANNELLO SKY PRO 20L ADVANCED		3 988	3 603	3 187	3 435	3 047	2 651	2 490	2 164	1 847	2 679	2 333	1 993
Annual output per m ² gross area		1 102	995	880	949	842	732	688	598	510	740	644	550
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	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	2000	Pa
Maximum tested negative load	n.a.	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}		
PANNELLO SKY PRO 8L CPC 58	1.47	Collector efficiency (η_{col})	58	%
PANNELLO SKY PRO 10L CPC 58	1.82	<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>		
PANNELLO SKY PRO 12L CPC 58	2.18			
PANNELLO SKY PRO 14L CPC 58	2.54			
PANNELLO SKY PRO 16L CPC 58	2.90			
PANNELLO SKY PRO 18L CPC 58	3.26			
PANNELLO SKY PRO 20L CPC 58	3.62			
PANNELLO SKY PRO 8L ADVANCED	1.47	Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
PANNELLO SKY PRO 10L ADVANCED	1.82	Zero-loss efficiency (η_0)	0.625	--
PANNELLO SKY PRO 12L ADVANCED	2.18	First-order coefficient (a_1)	0.93	W/(m ² K)
PANNELLO SKY PRO 14L ADVANCED	2.54	Second-order coefficient (a_2)	0.004	W/(m ² K ²)
PANNELLO SKY PRO 16L ADVANCED	2.90	Incidence angle modifier IAM (50°)	0.96	--
PANNELLO SKY PRO 18L ADVANCED	3.26	<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>		
PANNELLO SKY PRO 20L ADVANCED	3.62			