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Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results		Licence Number	011-7S2665 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
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Postcode, City	84060 Ogliastro C.to (SA)	**Tel**	+39 3334904236

Collector Type	Evacuated tubular 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 = 3 m/s ϑm - ϑa: 0 K	10 K	30 K	50 K	70 K	118 K
	m²	mm	mm	mm	W	W	W	W	W	W
PANNELLO SKY PRO 10 CPC 58	**2.17**	1 925	1 127	117	1 385	1 364	1 316	1 262	1 201	1 025
PANNELLO SKY PRO 12 CPC 58	**2.59**	1 927	1 342	116	1 653	1 628	1 571	1 506	1 433	1 223
PANNELLO SKY PRO 14 CPC 58	**3.01**	1 927	1 562	116	1 921	1 892	1 826	1 750	1 665	1 422
PANNELLO SKY PRO 16 CPC 58	**3.43**	1 927	1 782	116	2 189	2 156	2 081	1 995	1 898	1 620
PANNELLO SKY PRO 18 CPC 58	**3.86**	1 927	2 002	116	2 464	2 426	2 342	2 245	2 136	1 823
PANNELLO SKY PRO 20 CPC 58	**4.28**	1 927	2 222	116	2 732	2 690	2 596	2 489	2 368	2 021
PANNELLO SKY PRO 22 CPC 58	**4.71**	1 925	2 446	117	3 006	2 961	2 857	2 739	2 606	2 224
PANNELLO SKY PRO 10 ADVANCED	**2.17**	1 925	1 127	127	1 385	1 364	1 316	1 262	1 201	1 025
PANNELLO SKY PRO 12 ADVANCED	**2.59**	1 927	1 342	127	1 653	1 628	1 571	1 506	1 433	1 223
PANNELLO SKY PRO 14 ADVANCED	**3.01**	1 927	1 562	126	1 921	1 892	1 826	1 750	1 665	1 422
PANNELLO SKY PRO 16 ADVANCED	**3.43**	1 927	1 782	126	2 189	2 156	2 081	1 995	1 898	1 620
PANNELLO SKY PRO 18 ADVANCED	**3.86**	1 927	2 002	126	2 464	2 426	2 342	2 245	2 136	1 823
PANNELLO SKY PRO 20 ADVANCED	**4.28**	1 927	2 222	126	2 732	2 690	2 596	2 489	2 368	2 021
PANNELLO SKY PRO 22 ADVANCED	**4.71**	1 925	2 446	127	3 006	2 961	2 857	2 739	2 606	2 224
PANNELLO NATURAL SKY 12-200 L	**2.59**	1 927	1 342	116	1 653	1 628	1 571	1 506	1 433	1 223
PANNELLO NATURAL SKY 16-300 L	**3.43**	1 927	1 782	116	2 189	2 156	2 081	1 995	1 898	1 620
Power output per m² gross area					638	629	607	582	553	472

Performance parameters test method	Quasi dynamic								
Performance parameters (related to AG)	η0,b	c1	c2	c3	c4	c6	Kd		
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	s/m	-		
Test results	0.641	0.935	0.004	0.000	0.000	0.000	0.972		

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	$K_{\theta T,coll}$	1.00	0.99	1.00	1.01	1.09	1.10	1.29	0.65	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.97	0.95	0.90	0.81	0.66	0.33	0.00

Heat transfer medium for testing	Water-Glycole		
Flow rate for testing (per gross area, A_G)	dm/dt	0.017	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	118	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	259	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	37.99	kJ/(Km²)
Maximum operating temperature	ϑ_{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)	10COL943/2	**Dated**	22.06.2016
	10COL942/2		22.06.2016
	10COL943Q/3		22.06.2016

Comments of testing laboratory — Datasheet version: 5.01, 2016-03-01

TZS Forschungs- und Testzentrum für Solaranlagen
Institut für Thermodynamik und Wärmetechnik
Universität Stuttgart
Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)

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Supplementary Information	Issued	2016-06-27

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

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
PANNELLO SKY PRO 10 CPC 58	2 401	2 168	1 917	2 070	1 836	1 599	1 499	1 303	1 113	1 609	1 401	1 197
PANNELLO SKY PRO 12 CPC 58	2 865	2 588	2 289	2 470	2 192	1 909	1 789	1 555	1 328	1 921	1 672	1 429
PANNELLO SKY PRO 14 CPC 58	3 330	3 008	2 660	2 871	2 547	2 218	2 079	1 807	1 544	2 232	1 943	1 660
PANNELLO SKY PRO 16 CPC 58	3 795	3 427	3 031	3 271	2 903	2 528	2 369	2 059	1 759	2 543	2 214	1 892
PANNELLO SKY PRO 18 CPC 58	4 270	3 857	3 411	3 682	3 267	2 845	2 666	2 318	1 980	2 862	2 492	2 129
PANNELLO SKY PRO 20 CPC 58	4 735	4 277	3 782	4 082	3 622	3 154	2 956	2 570	2 195	3 174	2 763	2 361
PANNELLO SKY PRO 22 CPC 58	5 211	4 706	4 162	4 492	3 986	3 471	3 253	2 828	2 416	3 493	3 041	2 598
PANNELLO SKY PRO 10 ADVANCED	2 401	2 168	1 917	2 070	1 836	1 599	1 499	1 303	1 113	1 609	1 401	1 197
PANNELLO SKY PRO 12 ADVANCED	2 865	2 588	2 289	2 470	2 192	1 909	1 789	1 555	1 328	1 921	1 672	1 429
PANNELLO SKY PRO 14 ADVANCED	3 330	3 008	2 660	2 871	2 547	2 218	2 079	1 807	1 544	2 232	1 943	1 660
PANNELLO SKY PRO 16 ADVANCED	3 795	3 427	3 031	3 271	2 903	2 528	2 369	2 059	1 759	2 543	2 214	1 892
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PANNELLO SKY PRO 22 ADVANCED	5 211	4 706	4 162	4 492	3 986	3 471	3 253	2 828	2 416	3 493	3 041	2 598
PANNELLO NATURAL SKY 12-200 L	2 865	2 588	2 289	2 470	2 192	1 909	1 789	1 555	1 328	1 921	1 672	1 429
PANNELLO NATURAL SKY 16-300 L	3 795	3 427	3 031	3 271	2 903	2 528	2 369	2 059	1 759	2 543	2 214	1 892
Annual output per m² gross area	1 106	999	884	954	846	737	691	600	513	742	646	552
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 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. 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)
PANNELLO SKY PRO 10 CPC 58	2.17
PANNELLO SKY PRO 12 CPC 58	2.59
PANNELLO SKY PRO 14 CPC 58	3.01
PANNELLO SKY PRO 16 CPC 58	3.43
PANNELLO SKY PRO 18 CPC 58	3.86
PANNELLO SKY PRO 20 CPC 58	4.28
PANNELLO SKY PRO 22 CPC 58	4.71
PANNELLO SKY PRO 10 ADVANCED	2.17
PANNELLO SKY PRO 12 ADVANCED	2.59
PANNELLO SKY PRO 14 ADVANCED	3.01
PANNELLO SKY PRO 16 ADVANCED	3.43
PANNELLO SKY PRO 18 ADVANCED	3.86
PANNELLO SKY PRO 20 ADVANCED	4.28
PANNELLO SKY PRO 22 ADVANCED	4.71
PANNELLO NATURAL SKY 12-200 L	2.59
PANNELLO NATURAL SKY 16-300 L	3.43

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

Collector efficiency (η_{col})	59	%

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.

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

Zero-loss efficiency (η_0)	0.638	--
First-order coefficient (a_1)	0.94	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	0.96	--

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.