


Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		011-7S1476 R						
						Issued		2015-10-12						
Company holding the		Kloben Sud S.r.l.				Country		Italien						
Brand (optional)						Website		www.ktsolar.com						
Street, street number		Località Terzerie				E-mail		info@ktsolar.com						
Postal Code / City, province		84061	Ogliastro Cilento (SA)			Tel/Fax		+39/0974 844202 / 0974 833 821						
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Evacuated tubular collector								
Thermal / photo voltaic hybrid collector? (PVT collector)						No								
Integration in the roof possible ? (manufacturers declaration)						No								
Collector name	Aperture area (Aa) m <sup>2</sup>	Gross length mm	Gross width mm	Gross height mm	Gross area (AG) m <sup>2</sup>	Power output per collector module								
						Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup>								
						Tm-Ta								
						0 K	10 K	30 K	50 K	70 K				
						W	W	W	W	W				
PANNELLO SKY PRO 10 CPC 58	1.90	1 925	1 127	117	2.17	1 364	1 343	1 297	1 245	1 187				
PANNELLO SKY PRO 12 CPC 58*	2.28	1 927	1 342	116	2.59	1 637	1 612	1 557	1 494	1 425				
PANNELLO SKY PRO 14 CPC 58*	2.66	1 927	1 562	116	3.01	1 910	1 881	1 816	1 743	1 662				
PANNELLO SKY PRO 16 CPC 58*	3.04	1 927	1 782	116	3.43	2 183	2 149	2 076	1 992	1 899				
PANNELLO SKY PRO 18 CPC 58*	3.43	1 927	2 002	116	3.86	2 463	2 425	2 342	2 248	2 143				
PANNELLO SKY PRO 20 CPC 58*	3.81	1 927	2 222	116	4.28	2 735	2 694	2 602	2 497	2 380				
PANNELLO SKY PRO 22 CPC 58	4.19	1 925	2 446	117	4.71	3 008	2 963	2 861	2 746	2 618				
PANNELLO SKY PRO 10 ADVANCED*	1.90	1 925	1 127	127	2.17	1 364	1 343	1 297	1 245	1 187				
PANNELLO SKY PRO 12 ADVANCED*	2.28	1 927	1 342	126	2.59	1 637	1 612	1 557	1 494	1 425				
PANNELLO SKY PRO 14 ADVANCED*	2.66	1 927	1 562	126	3.01	1 910	1 881	1 816	1 743	1 662				
PANNELLO SKY PRO 16 ADVANCED*	3.04	1 927	1 782	126	3.43	2 183	2 149	2 076	1 992	1 899				
PANNELLO SKY PRO 18 ADVANCED*	3.43	1 927	2 002	126	3.86	2 463	2 425	2 342	2 248	2 143				
PANNELLO SKY PRO 20 ADVANCED*	3.81	1 927	2 222	126	4.28	2 735	2 694	2 602	2 497	2 380				
PANNELLO SKY PRO 22 ADVANCED*	4.19	1 925	2 446	127	4.71	3 008	2 963	2 861	2 746	2 618				
PANNELLO NATURAL SKY 12-200 L*	2.28	1 927	1 342	116	2.59	1 637	1 612	1 557	1 494	1 425				
PANNELLO NATURAL SKY 16-300 L*	3.04	1 927	1 782	116	3.43	2 183	2 149	2 076	1 992	1 899				
Performance test method						Liquid heating collector - quasi-dynamic - outdoor								
Performance parameters related to aperture						η <sub>0b</sub>	c <sub>1</sub>	c <sub>2</sub>	c <sub>3</sub>	c <sub>4</sub>	c <sub>6</sub>	Kθ <sub>d</sub>		
Units						-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	s/m	-		
Test results - Flow rate and fluid see note 1						0.721**	1.051**	0.004**	0.000	0.000	0.000	0.972		
Bi-directional incidence angle modifiers? Yes						Kθ values are obligatory for 50°.								
Incidence angle modifiers Kθ(θT) transversal direction		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
		Kθ(θT)	1.00	0.99	1.00	1.01	1.09	1.10	1.29	0.65	0.00			
Incidence angle modifiers Kθ(θL) longitudinal direction		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
		Kθ(θL)	1.00	0.99	0.97	0.95	0.90	0.81	0.66	0.33	0.00			
Stagnation temperature - Weather conditions see note 2						T <sub>stg</sub>		259		°C				
Effective thermal capacity						c <sub>eff</sub> = C/A <sub>Ap</sub>		42.71		kJ/(m <sup>2</sup> K)				
Max. intended operation temperature - see note 3						T <sub>max,op</sub>		-		°C				
Max. operation pressure - see note 3						p <sub>max,op</sub>		600		kPa				
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m <sup>2</sup> aperture area														
Flow rate		kg/(s m <sup>2</sup> )	-	-	-	-	-	-	-	-	-	-	-	
Pressure drop, ΔP		Pa	-	-	-	-	-	-	-	-	-	-	-	
Optional weather data		Location	-			Link	-							
Testing Laboratory						TZS, ITW University Stuttgart								
Website						http://www.itw.uni-stuttgart.de								
Test report id. number						10COL942/1, 10COL943/1, 10COL943Q/2		Date of test report		2015.10.12				
During the test GDIF/GTOT was always between						0.1	and	0.2						
Comments of testing laboratory:														
* dimensions according to manufacturer														
** dimensions according Annex D test reports id. no. 10COL943/1														
η <sub>0b</sub> = 0.721 = F' (τα) <sub>0</sub> c <sub>1</sub> = a <sub>1</sub> c <sub>2</sub> = a <sub>2</sub> η <sub>0</sub> = 0.718														
Note 1	Flow rate	0.017	kg/(s m <sup>2</sup> )	Fluid	Water									
Note 2	Irradiance, G = 1000 W/m <sup>2</sup> ; Ambient temperature, T <sub>a</sub> =30 °C													
Note 3	Given by manufacturer													
						 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmeübertragung Universität Stuttgart Pfaffenwaldring 6, 70569 Stuttgart (Vallingen)								
						Datasheet version: 4.06, 2014-01-15								
<b>CERTIFICATION BODY FOOTER</b> address etc.														



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S1476 R
	Issued	12.10.2015

Annual collector output kWh/module															
Collector name	Location and collector temperature (Tm)														
	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 10 CPC 58	2 363	2 137	1 897	2 039	1 814	1 587	1 476	1 286	1 104	1 585	1 383	1 187			
PANNELLO SKY PRO 12 CPC 58	2 836	2 565	2 276	2 446	2 176	1 904	1 771	1 543	1 325	1 901	1 659	1 425			
PANNELLO SKY PRO 14 CPC 58	3 308	2 992	2 655	2 854	2 539	2 222	2 066	1 800	1 546	2 218	1 936	1 662			
PANNELLO SKY PRO 16 CPC 58	3 781	3 420	3 035	3 262	2 902	2 539	2 361	2 058	1 767	2 535	2 212	1 900			
PANNELLO SKY PRO 18 CPC 58	4 266	3 858	3 424	3 680	3 274	2 865	2 664	2 322	1 993	2 860	2 496	2 143			
PANNELLO SKY PRO 20 CPC 58	4 739	4 286	3 803	4 088	3 637	3 182	2 959	2 579	2 214	3 177	2 773	2 381			
PANNELLO SKY PRO 22 CPC 58	5 211	4 713	4 183	4 496	4 000	3 499	3 254	2 836	2 435	3 494	3 049	2 618			
PANNELLO SKY PRO 10 ADVANCED	2 363	2 137	1 897	2 039	1 814	1 587	1 476	1 286	1 104	1 585	1 383	1 187			
PANNELLO SKY PRO 12 ADVANCED	2 836	2 565	2 276	2 446	2 176	1 904	1 771	1 543	1 325	1 901	1 659	1 425			
PANNELLO SKY PRO 14 ADVANCED	3 308	2 992	2 655	2 854	2 539	2 222	2 066	1 800	1 546	2 218	1 936	1 662			
PANNELLO SKY PRO 16 ADVANCED	3 781	3 420	3 035	3 262	2 902	2 539	2 361	2 058	1 767	2 535	2 212	1 900			
PANNELLO SKY PRO 18 ADVANCED	4 266	3 858	3 424	3 680	3 274	2 865	2 664	2 322	1 993	2 860	2 496	2 143			
PANNELLO SKY PRO 20 ADVANCED	4 739	4 286	3 803	4 088	3 637	3 182	2 959	2 579	2 214	3 177	2 773	2 381			
PANNELLO SKY PRO 22 ADVANCED	5 211	4 713	4 183	4 496	4 000	3 499	3 254	2 836	2 435	3 494	3 049	2 618			
PANNELLO NATURAL SKY 12-200 L	2 836	2 565	2 276	2 446	2 176	1 904	1 771	1 543	1 325	1 901	1 659	1 425			
PANNELLO NATURAL SKY 16-300 L	3 781	3 420	3 035	3 262	2 902	2 539	2 361	2 058	1 767	2 535	2 212	1 900			

Collector mounting: Fixed or tracking Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations				
Location	Latitude °	Gtot kWh/m <sup>2</sup>	Ta °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

<b>CERTIFICATION BODY FOOTER</b> address etc.	Datasheet version: 4.06, 2014-01-15
	ScenoCalc version: Ver. 4.06 (Jan, 2014)