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Capitale Soc EUR. 260.000,00 int. versato ed esistente
C.F./P. IVA e Iscriz. Reg. Imprese di Milano n. 12908230159 - R.E.A. n. 1596292

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results

Licence Number	ICIM-CLS-000151
Date issued	2018-06-27
Issued by	ICIM S.p.A.

Licence holder	SUNWOOD S.r.l.	Country	Italy
Brand (optional)		Web	www.sunwoodsrl.it
Street, Number	Viale del Lavoro, 18	E-mail	info@sunwood.it
Postcode, City	37069, Villafranca di Verona (VR)	Tel	+39 045.7903582

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 ϑm - ϑa: 0 K	10 K	30 K	50 K	70 K	72 K
	m²	mm	mm	mm	W	W	W	W	W	W
HP CPC 14 OCS	3,01	1.570	1.917	133	1.523	1.479	1.374	1.245	1.091	1.079
HP CPC 21 OCS	4,49	2.340	1.917	133	2.272	2.207	2.050	1.857	1.628	1.609
Power output per m² gross area					506	492	457	414	363	358

Performance parameters test method	Steady state - outdoor								
Performance parameters (related to AG)	η0,hem	a1	a2						
Units	-	W/(m²K)	W/(m²K²)						
Test results	0,506	1,350	0,010						

Incidence angle modifier test method		Steady state - 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	1,00	1,01	1,01	1,02	1,04	1,03	0,82	0,00
Longitudinal	$K_{\theta L,coll}$	1,00	0,99	0,98	0,97	0,94	0,89	0,78	0,46	0,00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0,019	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	71,5	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	217	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	87,7	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	280	°C
Maximum operating pressure	$p_{max,op}$	10	kPa

Testing laboratory	ENEA Centro Ricerche Trisaia	http://www.trisaia.enea.it/it/home	
Test report(s)	RP.2018.COL.200.1	Dated	23/05/2018
	RP.2018.COL.200a.1		

Comments of testing laboratory	Datasheet version: 5.01, 2016-03-01
	ENEA DTE-STT Dr Vincenzo Sabatelli

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Annex to Solar Keymark Certificate	**Licence Number**	**ICIM-CLS-000151**
Supplementary Information	**Issued**	**2018-06-27**

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
HP CPC 14 OCS	2.573	2.097	1.592	2.100	1.643	1.197	1.534	1.162	818	1.656	1.257	878
HP CPC 21 OCS	3.838	3.129	2.375	3.133	2.451	1.786	2.288	1.734	1.219	2.470	1.875	1.309
Annual output per m² gross area	855	697	529	698	546	398	510	386	272	550	418	292
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	
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)	C	--
Maximum tested positive load	2400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	--	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
HP CPC 14	3,01
HP CPC 21	4,49

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
Collector efficiency (η_{col})	44	%

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)	0,506	--
First-order coefficient (a_1)	1,35	W/(m²K)
Second-order coefficient (a_2)	0,010	W/(m²K²)
Incidence angle modifier IAM (50°)	0,98	--

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.