

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

Licence Number	011-7S2573 F
Date issued	2018-04-11
Issued by	DINCERTCO

Licence holder	PLEION SRL	Country	ITALY
Brand (optional)	--	Web	http://www.pleion.it
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Postcode, City	37053 CEREA (VR)	Tel	+39 442320295

Collector Type	Flat plate collector, glazed
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Power output per m ² gross area	791	756	678	589	488	584
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Performance parameters test method	Steady state - indoor							
Performance parameters (related to AG)	$\eta_{0,hem}$	a1	a2					
Units	-	W/(m²K)	W/(m²K²)					
Test results	0,791	3,342	0,014					

Incidence angle modifier test method		Steady state - outdoor								
Bi-directional incidence angle modifiers	No									
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T, coll}$					0,95				0,00
Longitudinal	$K_{\theta L, coll}$					0,95				0,00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0,020	kg/(sm ²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m - \vartheta_a)_{\max}$	51	K
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ }^\circ\text{C}$)	ϑ_{stg}	196,6	$^\circ\text{C}$
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m^2	4,486	kJ/(Km ²)
Maximum operating temperature	$\vartheta_{\max, \text{op}}$	250	$^\circ\text{C}$
Maximum operating pressure	$p_{\max, \text{op}}$	1000	kPa

Testing laboratory	Fundación CENER-CIEMAT, LEST	http:// www.cener.com	
Test report(s)	30.3139.1-4-1 / 30.3139.1-5-1 30.3139.1-6-1 / 30.3139.1-2 30.3335.0	Dated	30/10/2017 30/10/2017 10/04/2018

Comments of testing laboratory

Datasheet version: 5.01, 2016-03-01

- The collectors models KS 2100F TP ACR (UNIKO P21) and KS 26000F TP ACR (KSF P26) were tested according to ISO 9806:2013 According to SKM rules, the results of the collector model KS 2100F TP ACR are representative for the whole KS F-ACR family.



CENER



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Supplementary Information	Issued	2018-04-11

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	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
UNIKO P21		2.635	1.940	1.315	2.035	1.448	941	1.496	1.010	632	1.624	1.094	673
KSF P26		3.352	2.467	1.672	2.589	1.842	1.197	1.903	1.285	804	2.065	1.392	855
Annual output per m ² gross area		1.279	942	638	988	703	457	726	490	307	788	531	327
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)	A	--
Maximum tested positive load	2400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using ice balls (diameter)	25	mm

Energy Labelling Information				
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
UNIKO P21	2,06	Collector efficiency (η_{col})	63	%
KSF P26	2,62	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/m ² , 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)	0,791	--
		First-order coefficient (a_1)	3,34	W/(m ² K)
		Second-order coefficient (a_2)	0,014	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,95	--
		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.		