

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

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results		Licence Number		011-7S821 F
		Date issued		2016-07-20
		Issued by		DIN CERTCO
Licence holder	Chromagen España S.L.	Country	SPAIN	
Brand (optional)	--	Web	http://www.cromagen.es	
Street, Number	Diseño 6- Naves A/B - Parque Pisa	E-mail	sevilla@chromagen.es	
Postcode, City	41927 - Mairena de Aljarafe - SEVILLA	Tel	+34 954 184541 / 955 6457	

Collector Type	Flat plate collector, glazed
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[illegible]

Power output per m ² gross area	665	632	560	477	383	452
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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	0.665	3.123	0.013					

Incidence angle modifier test method		Steady state - indoor								
Bi-directional incidence angle modifiers	No									
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T, coll}$					0.86				0.00
Longitudinal	$K_{\theta L, coll}$					0.86				0.00

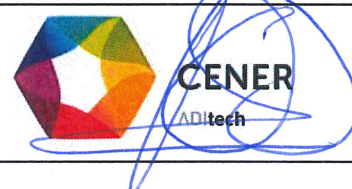
Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm ²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m - \vartheta_a)_{\max}$	55.4	K
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ }^\circ\text{C}$)	ϑ_{stg}	220.9	$^\circ\text{C}$
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m^2	1.178	kJ/(Km ²)
Maximum operating temperature	$\vartheta_{\max, \text{op}}$	16	$^\circ\text{C}$
Maximum operating pressure	$p_{\max, \text{op}}$	1000	kPa

Testing laboratory	Fundación CENER - CIEMAT	www.cener.com	
Test report(s)	30.1126.0-1-2 30.1126.0-2-1 30.1126.0-2-2	Dated	30/04/2009 06/05/2009

Comments of testing laboratory

Datasheet version: 5.01.2016-03-01

PA-F is representative collector of the collectors PA-K, PA-D and PA-E. These collectors were tested according to EN 12975-2 in 2009.



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S821 F
	Issued	2016-07-20

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

Collector name	Standard Locations 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
PA-K		1,659	1,156	731	1,257	851	518	920	592	350	997	632	366
PA-D		2,044	1,424	900	1,548	1,049	638	1,133	730	431	1,228	779	451
PA-E		2,340	1,630	1,031	1,773	1,201	730	1,297	836	493	1,406	892	517
PA-F		2,764	1,926	1,218	2,094	1,419	863	1,533	987	583	1,661	1,054	610
Annual output per m ² gross area		987	688	435	748	507	308	547	353	208	593	376	218
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	
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	1500	Pa
Maximum tested negative load	1500	Pa
Hail resistance using steel ball (maximum drop height)	25	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
PA-K	1.68	Collector efficiency (η_{col})	52 %
PA-D	2.07	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.	
PA-E	2.37		
PA-F	2.80		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.665 --
		First-order coefficient (a_1)	3.12 W/(m ² K)
		Second-order coefficient (a_2)	0.013 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.86 --
		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.	