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Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results		Licence Number	011-7S2618 F
		Date issued	2018-04-25
		Issued by	TÜV Rheinland Energy GmbH

Licence holder	**Ariston Thermo S.p.A.**	**Country**	Italy
Brand (optional)	Chaffoteaux	**Web**	http://www.aristonthermo.com
Street, Number	Via A. Merloni 45	**E-mail**	public.relation@aristonthermo.com
Postcode, City	60044 Fabriano	**Tel**	+39 02763209-1

Collector Type	Flat plate collector, glazed

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	90 K
	m²	mm	mm	mm	W	W	W	W	W	W
Zelios CF 2.0-1	2.01	1 500	900	50	1 347	1 274	1 115	937	739	522
Power output per m² gross area					670	634	555	466	368	260

Performance parameters test method	Steady state - indoor								
Performance parameters (related to AG)	η0,hem	a1	a2						
Units	-	W/(m²K)	W/(m²K²)						
Test results	0.670	3.480	0.012						

Incidence angle modifier test method	Quasi dynamic - outdoor								
Bi-directional incidence angle modifiers	No								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	0.99	0.97	0.94	0.90	0.81	0.64	0.32	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.97	0.94	0.90	0.81	0.64	0.32	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.025	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	90	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	190	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	3.92	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	190	°C
Maximum operating pressure	$p_{max,op}$	600	kPa

Testing laboratory	TÜV Rheinland Energy GmbH	www.tuv.com/solarpower	
Test report(s)	21229451.002	**Dated**	01.12.2015

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

The perfromance values related to 1.833 m² aperture area are: eta0a=0.740; a1a=3.82; a2a=0.013.

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Supplementary Information	Issued	2018-04-25

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on EN 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
Zelios CF 2.0-1	2 059	1 403	863	1 532	1 012	596	1 131	707	404	1 229	758	425
Annual output per m² gross area	1 024	698	429	762	504	297	563	352	201	611	377	211
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	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	5400	Pa
Maximum tested negative load	3500	Pa
Hail resistance using steel ball (maximum drop height)	35	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
Zelios CF 2.0-1	2.01	Collector efficiency (η_{col})	51	%
		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)	0.670	--
		First-order coefficient (a_1)	3.48	W/(m²K)
		Second-order coefficient (a_2)	0.012	W/(m²K²)
		Incidence angle modifier IAM (50°)	0.90	--
		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.		