



<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S2975 F</b>
	<b>Issued</b>	<b>2020-06-04</b>

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
Collector name	Standard Locations $\vartheta_m$	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
ARIS2904H		3'416	2'359	1'550	2'544	1'745	1'138	1'873	1'203	748	2'039	1'294	792
ARIS2904V		3'416	2'359	1'550	2'544	1'745	1'138	1'873	1'203	748	2'039	1'294	792
Annual output per m <sup>2</sup> gross area		1'166	805	529	868	596	388	639	411	255	696	442	270
Annual efficiency, $\eta_a$		66%	46%	30%	53%	37%	24%	55%	35%	22%	56%	36%	22%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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  $\vartheta_m$  (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

Additional Information					
Collector heat transfer medium	Water-Glycole				
The collector is deemed to be suitable for roof integration	No				
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)	A		--		
G (W/m <sup>2</sup> ) >	1000	$\vartheta_a$ (°C) >	20	$H_x$ (MJ/m <sup>2</sup> ) >	600
Maximum tested positive load	2400		Pa		
Maximum tested negative load	2400		Pa		
Hail resistance using ice balls (diameter)	35		mm		

Additional collector attribute(s)				
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection			
<input type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Façade collector(s)			

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Hydraulic Designation Code	Aperture Area, $A_a$ (m <sup>2</sup> )
ARIS2904H	2.93	14-VH-1234S-A:7.0,1910-C:20.4,1470-D	2.69
ARIS2904V	2.93	14-VH-1234S-A:7.0,1910-C:20.4,1470-D	2.69

Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
Collector efficiency ( $\eta_{col}$ )	57%	Zero-loss efficiency ( $\eta_0$ )	0.74
Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ is based on reference area ( $A_{sol}$ ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient ( $a_1$ )	4.12
		Second-order coefficient ( $a_2$ )	0.003
		Incidence angle modifier IAM (50°)	0.93
		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.	