





Annex to Solar Keymark Certificate Supplementary Information	Licence Number	OEM 9965/1/3
	Issued	2016-11-15

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
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
STAR 1500		1.667	1.118	683	1.222	798	469	907	557	315	989	600	334
STAR 2000		2.226	1.493	913	1.632	1.066	626	1.211	744	420	1.321	801	446
STAR 2600		2.775	1.860	1.137	2.034	1.328	781	1.509	927	524	1.646	998	556
Annual output per m <sup>2</sup> gross area		1.097	735	450	804	525	309	597	366	207	651	395	220
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													

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	No	
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	1000	Pa
Maximum tested negative load	1000	Pa
Hail resistance using steel ball (maximum drop height)	-	m

Energy Labelling Information			
	Reference Area, A <sub>sol</sub> (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area A <sub>sol</sub>	
APOLLON AL 1500	1,52	Collector efficiency ( $\eta_{col}$ )	52 %
APOLLON AL 2000	2,03	<i>Remark: Collector efficiency (<math>\eta_{col}</math>) 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 <math>\eta_{col}</math> is based on reference area (A<sub>sol</sub>) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.</i>	
APOLLON AL 2600	2,53		
		Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>	
		Zero-loss efficiency ( $\eta_0$ )	0,693 --
		First-order coefficient (a <sub>1</sub> )	4,00 W/(m <sup>2</sup> K)
		Second-order coefficient (a <sub>2</sub> )	0,009 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,94 --
<i>Remark: The data given in this section are related to collector reference area (A<sub>sol</sub>) 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.</i>			