



Annex to Solar Keymark Certificate							Licence Number		011-7S628 F					
Supplementary Information							Issued		2020-01-13					
Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$														
Standard Locations		Athens			Davos			Stockholm			Würzburg			
Collector name	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	
VarioSol A 2x2 m		4 493	3 276	2 137	3 463	2 408	1 484	2 543	1 687	1 008	2 768	1 829	1 075	
Annual output per m <sup>2</sup> gross area		1 101	803	524	849	590	364	623	414	247	678	448	263	
Annual efficiency, $\eta_a$		62%	45%	30%	52%	36%	22%	53%	35%	21%	55%	36%	21%	
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 <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>														
<b>Additional Information</b>														
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 <sub>x</sub> (MJ/m <sup>2</sup> ) >		600				
Maximum tested positive load							3000			Pa				
Maximum tested negative load							2400			Pa				
Hail resistance using steel ball (maximum drop height)							-			m				
<b>Additional collector attribute(s)</b>														
<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)										
<b>Energy Labelling Information</b>						<b>Additional Informative Technical Data</b>								
Reference Area, A <sub>sol</sub> (m <sup>2</sup> )						Hydraulic Designation Code				Aperture Area, A <sub>a</sub> (m <sup>2</sup> )				
VarioSol A 2x2 m						4,4,5,5-H-23R-A:7.0,1860-C:20.6,2050				3.64				
Data required for CDR (EU) No 811/2013 - Reference Area A <sub>sol</sub>						Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>								
Collector efficiency ( $\eta_{col}$ )						55%				Zero-loss efficiency ( $\eta_0$ )		0.69		--
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 <sub>sol</sub> ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.						First-order coefficient (a <sub>1</sub> )				2.84		W/(m <sup>2</sup> K)		
						Second-order coefficient (a <sub>2</sub> )				0.017		W/(m <sup>2</sup> K <sup>2</sup> )		
						Incidence angle modifier IAM (50°)				0.91		--		
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.														
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