



<b>Annex to Solar Keymark Certificate</b> <b>Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S3003 F</b>
	<b>Issued</b>	<b>2021-04-28</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
Vitosol 100-F XF13		17 208	13 620	9 875	13 936	10 562	7 330	10 089	7 354	4 931	10 929	7 982	5 283
Annual output per m <sup>2</sup> gross area		1 264	1 001	726	1 024	776	539	741	540	362	803	587	388
Annual efficiency, $\eta_a$		72%	57%	41%	63%	48%	33%	64%	46%	31%	65%	47%	31%
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	1000 / 2400 Pa
Maximum tested negative load	1000 / 2400 Pa
Hail resistance using ice balls (diameter)	35 mm

<b>A</b>	<b>Colle</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)

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> )
Vitosol 100-F XF13	13.61	18-H-12V-A:9.3,5800-C:33,2280	12.56

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 ( $\eta_{col}$ )	65%	Zero-loss efficiency ( $\eta_0$ )	0.77
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 ( $a_1$ )	2.27
		Second-order coefficient ( $a_2$ )	0.018
		Incidence angle modifier IAM (50°)	0.97
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.			