



<b>Annex to Solar Keymark Certificate</b>							<b>Licence Number</b>		<b>011-7S3275 F</b>						
<b>Supplementary Information</b>							<b>Issued</b>		<b>2024-12-16</b>						
<b>Gross Thermal Yield in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>															
<b>Standard Locations</b>		<b>Athens</b>			<b>Davos</b>			<b>Stockholm</b>			<b>Würzburg</b>				
<b>Collector name</b>	<b><math>\vartheta_m</math></b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>		
In-Roof Solar Thermal Panel		1 369	1 007	671	1 062	750	478	777	524	323	844	565	343		
Gross Thermal Yield per m <sup>2</sup> gross area		1 029	756	504	798	564	359	584	393	243	634	425	258		
Annual efficiency, $\eta_a$		58%	43%	29%	49%	35%	22%	50%	34%	21%	51%	34%	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. 6.2 (13.01.2022). 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							Yes								
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							3600 Pa								
Maximum tested negative load							2400 Pa								
Hail resistance using ice balls (diameter)							35 mm								
<b>Additional collector attribute(s)</b>															
Using external power source(s) for normal operation							No		Active or passive measure(s) for self-protection				No		
Co-generating thermal and electrical power							No		Façade collector(s)				No		
<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> )					
In-Roof Solar Thermal Panel						1.33				6-V-TVBV-A:7.2,2070-C:20.4,675			1.13		
<b>Data required for CDR (EU) No 811/2013 - Reference Area A<sub>sol</sub></b>						<b>Data required for CDR (EU) No 812/2013 - Reference Area A<sub>sol</sub></b>									
Collector efficiency ( $\eta_{col}$ )						53%									
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.						Zero-loss efficiency ( $\eta_0$ )				0.66		--			
						First-order coefficient (a <sub>1</sub> )				2.63		W/(m <sup>2</sup> K)			
						Second-order coefficient (a <sub>2</sub> )				0.014		W/(m <sup>2</sup> K <sup>2</sup> )			
						Incidence angle modifier IAM (50°)				0.89		--			
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.															
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany															
Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: <a href="mailto:info@dincertco.de">info@dincertco.de</a> • <a href="http://www.dincertco.de">www.dincertco.de</a>															