


<b>Annex to Solar Keymark Certificate</b>					<b>Licence Number</b>		<b>011-7S3187 F</b>				
					<b>Date issued</b>		<b>2023-06-16</b>				
					<b>Issued by</b>		<b>DIN CERTCO</b>				
<b>Licence holder</b>		<b>COM FORM</b>			<b>Country</b>		<b>FRANCE</b>				
<b>Brand (optional)</b>		<b>SUNCOMPACT</b>			<b>Web</b>		<b>www.ultimate-group.eu</b>				
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<b>Postcode, City</b>		<b>69100 Villeurbanne</b>			<b>Tel</b>		<b>+33 481 922 523</b>				
<b>Collector Type</b>					<b>Flat plate collector</b>						
<b>Collector name</b>	<b>Gross area (A<sub>G</sub>)</b> m <sup>2</sup>	<b>Gross length</b> mm	<b>Gross width</b> mm	<b>Gross height</b> mm	<b>Power output per collector</b> G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$						
					0 K W	10 K W	30 K W	50 K W	70 K W	89 K W	
<b>SUNCOMPACT</b>	2.04	920	2.220	195	1.141	1.065	898	709	499	0	
<b>Power output per m<sup>2</sup> gross area</b>					559	522	440	347	244	137	
<b>Performance parameters test method</b>		<b>Quasi dynamic</b>									
<b>Performance parameters (related to A<sub>G</sub>)</b>		$\eta_0, b$	a1	a2	a3	a4	a5	a6	a7	a8	Kd
<b>Units</b>		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-
<b>Test results</b>		0.567	3.59	0.013	0.000	0.00	585.300	0.000	0.00	0.00	0.91
<b>Incidence angle modifier test method</b>		<b>Quasi dynamic - outdoor</b>									
<b>Incidence angle modifier</b>		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Transversal</b>		K <sub>θT, coll</sub>	1.00	1.00	0.97	0.93	0.88	0.64	0.30	0.15	0.00
<b>Longitudinal</b>		K <sub>θL, coll</sub>	1.00	1.00	0.97	0.93	0.88	0.64	0.30	0.15	0.00
<b>Heat transfer medium for testing</b>					<b>Water</b>						
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					dm/dt	0.020	kg/(sm <sup>2</sup> )				
<b>Maximum temperature difference during thermal performance test</b>					( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	59	K				
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; <math>\vartheta_a = 30</math> °C)</b>					$\vartheta_{stg}$	n.sp.	°C				
<b>Maximum operating temperature</b>					$\vartheta_{max, op}$	n.sp.	°C				
<b>Maximum operating pressure</b>					p <sub>max, op</sub>	1000	kPa				
<b>Testing laboratory</b>		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)				http://www.igte.uni-stuttgart.de					
<b>Test report(s)</b>		21COL1633OEM01 21246623.002rev01_Sunpad_ISO9806_ Reliability_report (TÜV-Rheinland)				<b>Dated</b>		16.06.2023 29.05.2019			
<b>Comments of testing laboratory</b>					Ver. 6.2 (13.01.2022)						
Documented performance parameters are taken from 21COL1633OEM01.					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70560 Stuttgart (Vaihingen) 511						
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Supplementary Information							Issued		2023-06-16					
<b>Gross Thermal Yield in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>														
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	
SUNCOMPACT		998	552	264	998	552	264	998	552	264	998	552	264	
Gross Thermal Yield per m <sup>2</sup> gross area		489	271	129	489	271	129	489	271	129	489	271	129	
Annual efficiency, $\eta_a$		28%	15%	7%	30%	17%	8%	42%	23%	11%	39%	22%	10%	
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							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							3000			Pa				
Hail resistance using steel ball (maximum drop height)							2			m				
<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> )							
SUNCOMPACT		2.04		1-H-RR-AC:20,19000			1.68							
<b>Data required for CDR (EU) No 811/2013 - Reference Area</b>														
Collector efficiency ( $\eta_{col}$ )		39%												
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.														
<b>Data required for CDR (EU) No 812/2013 - Reference Area A<sub>sol</sub></b>						Zero-loss efficiency ( $\eta_0$ )			0.56				--	
						First-order coefficient (a <sub>1</sub> )			3.59				W/(m <sup>2</sup> K)	
						Second-order coefficient (a <sub>2</sub> )			0.013				W/(m <sup>2</sup> K <sup>2</sup> )	
						Incidence angle modifier IAM (50°)			0.87				--	
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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