


<b>Annex to Solar Keymark Certificate</b>					<b>Licence Number</b>		<b>011-7S2972 F</b>							
					<b>Date issued</b>		<b>2020-05-11</b>							
					<b>Issued by</b>		<b>DIN CERTCO</b>							
<b>Licence holder</b>		<b>Sanitär Heinz GmbH &amp; Co. KG</b>			<b>Country</b>		<b>Germany</b>							
<b>Brand (optional)</b>					<b>Web</b>		<b>www.sanitaer-heinze.com</b>							
<b>Street, Number</b>		<b>Thomas-Dachser-Strasse 2</b>			<b>E-mail</b>		<b>Stefan.Gockel@sanitaer-heinze.com</b>							
<b>Postcode, City</b>		<b>83404 Ainring</b>			<b>Tel</b>		<b>+49 08654 475-183</b>							
<b>Collector Type</b>					<b>Flat plate collector</b>									
<b>Collector name</b>					<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	10 K	30 K	50 K	70 K	102 K				
					m <sup>2</sup>	mm	mm	mm	W	W	W	W	W	W
<b>Clima Sunline 206</b>					2.06	1785	1155	91	1 383	1 311	1 151	971	772	411
<b>Clima Sunline 277</b>					2.78	2 404	1 155	91	1 867	1 769	1 553	1 310	1 041	555
<b>Power output per m<sup>2</sup> gross area</b>					<b>671</b>	<b>636</b>	<b>559</b>	<b>471</b>	<b>375</b>	<b>200</b>				
<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>					<b>0.675</b>	<b>3.402</b>	<b>0.012</b>	<b>0.000</b>	<b>0.00</b>	<b>12 160</b>	<b>0.000</b>	<b>0.00</b>	<b>0.0</b>	<b>0.965</b>
<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	0.99	0.98	0.96	0.93	0.87	0.75	0.39	0.00
<b>Longitudinal</b>					K <sub>θL, coll</sub>	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.39	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>					$(\vartheta_m - \vartheta_a)_{max}$		72		K					
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; <math>\vartheta_a = 30^\circ\text{C}</math>)</b>					$\vartheta_{stg}$		189		°C					
<b>Maximum operating temperature</b>					$\vartheta_{max, op}$		120		°C					
<b>Maximum operating pressure</b>					p <sub>max, op</sub>		1000		kPa					
<b>Testing laboratory</b>					<b>Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)</b>					<b>http://www.igte.uni-stuttgart.de</b>				
<b>Test report(s)</b>					16COL1300OEM01 16COL1329OEM01 16COL1329QOEM01					<b>Dated</b>		08.06.2020 08.06.2020 08.06.2020		
<b>Comments of testing laboratory</b>					<b>Datasheet version: 6.1, 2019-09-26</b>									
<b>Documented performance parameters are taken from 16COL1329OEM01 (Clima Sunline 277)</b>					 <p>Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Postleitzahl 70560 Stuttgart (Vaihingen)</p>									
<b>DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany</b> <b>Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de</b>														

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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
Clima Sunline 206		2 227	1 552	977	1 666	1 117	667	1 232	782	452	1 347	849	482
Clima Sunline 277		3 006	2 094	1 319	2 248	1 507	901	1 663	1 055	610	1 818	1 145	651
Annual output per m <sup>2</sup> gross area		1 081	753	474	809	542	324	598	380	219	654	412	234
Annual efficiency, $\eta_a$		61%	43%	27%	50%	33%	20%	51%	33%	19%	53%	33%	19%
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		1500 Pa
Maximum tested negative load		1250 Pa
Hail resistance using steel ball (maximum drop height)		1.8 m

Additional collector attribute(s)	
<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> )
Clima Sunline 206	2.06	4,4-V-12VH-A:8,1712-C:18,2000	1.86
Clima Sunline 277	2.78	4,4-V-12VH-A:8,2280-C:18,2000	2.50

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 ( $\eta_{col}$ )	52%	Zero-loss efficiency ( $\eta_0$ )	0.67 --
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 ( $a_1$ )	3.40 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.012 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.93 --
		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.	