


<b>Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results</b>					<b>Licence Number</b>		<b>011-7S611 F</b>																	
					<b>Date issued</b>		<b>2017-02-13</b>																	
					<b>Issued by</b>		<b>Din Certco</b>																	
<b>Licence holder</b>		<b>Clage GmbH</b>			<b>Country</b>		<b>Germany</b>																	
<b>Brand (optional)</b>					<b>Web</b>		<b>www.clage.de</b>																	
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<b>Collector Type</b>					<b>Flat plate collector, glazed</b>																			
<b>Collector name</b>					<b>Gross area (A<sub>G</sub>)</b>		<b>Gross length</b>		<b>Gross width</b>		<b>Gross height</b>		<b>Power output per collector</b>											
					<b>Gb = 850 W/m<sup>2</sup>; Gd = 150 W/m<sup>2</sup></b>		<b>∅<sub>m</sub> - ∅<sub>a</sub></b>																	
					m <sup>2</sup>		mm		mm		mm		0 K		10 K		30 K		50 K		70 K		65 K	
					W		W		W		W		W		W		W		W		W		W	
<b>SCM 215, SCM 215 q</b>					2,15		2.088		1.031		81		1.541		1.460		1.285		1.096		892		944	
<b>Power output per m<sup>2</sup> gross area</b>					716		678		597		509		414		439									
<b>Performance parameters test method</b>					<b>Steady state - outdoor</b>																			
<b>Performance parameters (related to AG)</b>					$\eta_{0,hem}$		a1		a2															
<b>Units</b>					-		W/(m <sup>2</sup> K)		W/(m <sup>2</sup> K <sup>2</sup> )															
<b>Test results</b>					0,716		3,70		0,009															
<b>Incidence angle modifier test method</b>					<b>Steady state - outdoor</b>																			
<b>Bi-directional incidence angle modifiers</b>					<b>No</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		0,99		0,98		0,95		0,89		0,76		0,50		0,00	
<b>Longitudinal</b>					K <sub>θL, coll</sub>		1,00		1,00		0,99		0,98		0,95		0,89		0,76		0,50		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		0,018		kg/(sm <sup>2</sup> )															
<b>Maximum temperature difference for thermal performance calculations</b>					(∅ <sub>m</sub> -∅ <sub>a</sub> ) <sub>max</sub>		65		K															
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; ∅<sub>a</sub> = 30 °C)</b>					∅ <sub>stg</sub>		191		°C															
<b>Effective thermal capacity, incl. fluid (per gross area, A<sub>G</sub>)</b>					C/m <sup>2</sup>		5,3		kJ/(Km <sup>2</sup> )															
<b>Maximum operating temperature</b>					∅ <sub>max, op</sub>		140		°C															
<b>Maximum operating pressure</b>					p <sub>max, op</sub>		1000		kPa															
<b>Testing laboratory</b>					<b>TestLab Solar Thermal Systems, Fraunhofer ISE</b>							<b><a href="http://www.collectortest.com">http://www.collectortest.com</a></b>												
<b>Test report(s)</b>					ktb-2008-02-a-en 30.0858.0-1 (CENER)							<b>Dated</b>		09.03.2009 18.03.2008										
<b>Comments of testing laboratory</b>					Datashet version: 5.01, 2016-03-01																			
<p><i>This data sheet is not complete as the testing of the collector was not performed according to ISO 9806:2013.</i></p> <p><i>According to Scenocalc v5.01 the power output per collector unit of a steady state performance test does not consider the fraction of the diffuse irradiance, but it is calculated based on <math>\eta_{0,hem}</math> for a global hemispherical irradiance of 1000 W/m<sup>2</sup>.</i></p>					<p><b>TestLab</b> Solar Thermal Systems</p>  <p>Heidenhofstraße D-79111 Freiburg Tel: +49 (0)761 4588 5354</p>																			
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	<b>Issued</b>	<b>2017-02-13</b>

<b>Annual collector output in kWh/collector at mean fluid temperature <math>\vartheta_m</math>, based on EN ISO 9806:2013 test results</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
SCM 215, SCM 215 q		2.466	1.726	1.118	1.852	1.266	796	1.365	878	530	1.486	948	563
Annual output per m <sup>2</sup> gross area		1.145	802	519	860	588	370	634	408	246	690	440	261
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													

<b>Additional Information</b>		
Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	C	--
Maximum tested positive load	1010	Pa
Maximum tested negative load	1052	Pa
Hail resistance using ice balls (diameter)	0	mm

<b>Energy Labelling Information</b>				
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$		
SCM 215, SCM 215 q	2,15	Collector efficiency ( $\eta_{col}$ )	55	%
		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 9806:2013.		
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$		
		Zero-loss efficiency ( $\eta_0$ )	0,716	--
		First-order coefficient ( $a_1$ )	3,70	W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0,009	W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,95	--
		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.		