

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2768 F							
					Date issued		2017-09-20							
					Issued by		ISFH CalTeC							
Licence holder			Solvis GmbH		Country		Germany							
Brand (optional)			-		Web		<a href="http://www.solvis.de">http://www.solvis.de</a>							
Street, Number			Grotrian-Steinweg-Straße 12		E-mail		<a href="mailto:info@solvis.de">info@solvis.de</a>							
Postcode, City			38112 Braunschweig		Tel		+49 (0)531 28904-0							
Collector Type					Flat plate collector, glazed									
Collector name					Gross area (A <sub>G</sub> )	Gross length	Gross width	Gross height	Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> ∅ <sub>m</sub> - ∅ <sub>a</sub>					
					m <sup>2</sup>	mm	mm	mm	0 K	10 K	30 K	50 K	70 K	80 K
SolvisCala 254 Eco					2.53	2 168	1 168	93	1 892	1 804	1 596	1 345	1 051	889
Power output per m <sup>2</sup> gross area					748	713	631	532	416	351				
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to AG)					η <sub>0,hem</sub>	a <sub>1</sub>	a <sub>2</sub>							
Units					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
Test results					0.748	3.280	0.021							
Incidence angle modifier test method					Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers					No									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K <sub>θT, coll</sub>	1.00	0.99	0.98	0.97	0.94	0.89	0.78	0.46	0.00
Longitudinal					K <sub>θL, coll</sub>	1.00	0.99	0.98	0.97	0.94	0.89	0.78	0.46	0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.021								kg/(sm <sup>2</sup> )
Maximum temperature difference for thermal performance calculations					(∅ <sub>m</sub> -∅ <sub>a</sub> ) <sub>max</sub>	80								K
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ∅ <sub>a</sub> = 30 °C)					∅ <sub>stg</sub>	200								°C
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )					C/m <sup>2</sup>	4.5								kJ/(Km <sup>2</sup> )
Maximum operating temperature					∅ <sub>max, op</sub>									°C
Maximum operating pressure					p <sub>max, op</sub>	400								kPa
Testing laboratory					ISFH CalTeC		<a href="http://www.isfh.de">http://www.isfh.de</a>							
Test report(s)					28-17/K		Dated		19.09.2017					
Comments of testing laboratory					no comment									
					Datasheet version: 5.01, 2016-03-01  Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-31860 Emmerthal Tel.: 05151/999-100 Fax: 05151/999-500									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2768 F
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Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
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
SolvisCala 254 Eco		3 010	2 141	1 338	2 293	1 548	903	1 690	1 087	617	1 837	1 176	656
Annual output per m <sup>2</sup> gross area		1 190	846	529	906	612	357	668	430	244	726	465	259
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>													

### Additional Information

Collector heat transfer medium	Water-Glycole
Hybrid Thermal and Photo Voltaic collector	No
The collector is deemed to be suitable for roof integration	Yes
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:	
Climate class (A, B or C)	A --
Maximum tested positive load	6000 Pa
Maximum tested negative load	3000 Pa
Hail resistance using steel ball (maximum drop height)	2 m

### Energy Labelling Information

	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
SolvisCala 254 Eco	2.53	Collector efficiency ( $\eta_{col}$ )	58 %
		<i>Remark: Collector efficiency (<math>\eta_{col}</math>) 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 <math>\eta_{col}</math> is based on reference area (<math>A_{sol}</math>) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.</i>	
		<b>Data required for CDR (EU) No 812/2013 - Reference Area <math>A_{sol}</math></b>	
		Zero-loss efficiency ( $\eta_0$ )	0.748 --
		First-order coefficient ( $a_1$ )	3.28 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.021 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.94 --
		<i>Remark: The data given in this section are related to collector reference area (<math>A_{sol}</math>) 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.</i>	

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