

Annex to Solar Keymark Certificate - Summary of EN 12975-2:2006 Test Results					Licence Number		011-7S 1512 F							
					Date issued		2017-01-19							
					Issued by		ISFH CalTeC							
Licence holder	Oventrop GmbH & Co. KG				Country	Germany								
Brand (optional)					Web	www.oventrop.de								
Street, Number	Paul-Oventrop-Str. 1				E-mail	mail@oventrop.de								
Postcode, City	D-59939 Olsberg				Tel	+49 (0)2962 82 0								
Collector Type					Flat plate collector, glazed									
Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	85 K				
	m ²	mm	mm	mm	W	W	W	W	W	W				
OKF-CS 22	2.25	1 933	1 163	80	1 568	1 486	1 306	1 104	880	698				
Power output per m² gross area					697	661	580	491	391	310				
Performance parameters test method					Steady state - indoor									
Performance parameters (related to AG)					$\eta_{0,hem}$	a1	a2							
Units					-	W/(m ² K)	W/(m ² K ²)							
Test results					0.697	3.530	0.012							
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					$K_{\theta T, coll}$	1.00	0.98	0.96	0.92	0.86	0.75	0.52		0.00
Longitudinal					$K_{\theta L, coll}$	1.00	0.98	0.96	0.92	0.86	0.75	0.52		0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A_G)					dm/dt	0.035	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations					$(\vartheta_m - \vartheta_a)_{max}$	85	K							
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ }^\circ\text{C}$)					ϑ_{stg}	191	$^\circ\text{C}$							
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²	4.0	kJ/(Km ²)							
Maximum operating temperature					$\vartheta_{max, op}$	-	$^\circ\text{C}$							
Maximum operating pressure					$p_{max, op}$	1000	kPa							
Testing laboratory					ISFH CalTeC									
Test report(s)					25-11/KD 26-11/KQ									
					Dated									
					31.11.2011 31.11.2011									
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01									
The performance parameter are related to gross area A_G and based on EN 12975-2:2006 test results.					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	011-7S 1512 F
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on EN 12975-2:2006 test results													
Collector name	Standard Locations ϑ_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
OKF-CS 22		2 326	1 587	983	1 736	1 156	690	1 279	805	468	1 386	859	489
Annual output per m ² gross area		1 034	706	437	772	514	306	568	358	208	616	382	217
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
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 ϑ_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 www.solarkeymark.org/scenocalc

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	No	
The collector was tested successfully according to EN 12975-2:2006 under the following conditions:		
Climate class (A, B or C)	--	--
Maximum tested positive load	5000	Pa
Maximum tested negative load	3200	Pa
Hail resistance using steel ball (maximum drop height)	-	m

Energy Labelling Information				
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
OKF-CS 22	2.25	Collector efficiency (η_{col})	54	%
		Remark: Collector efficiency (η_{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 ² , expressed in % and rounded to the nearest integer. Deviating from the regulation η_{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 (η_0)	0.697	--
		First-order coefficient (a_1)	3.53	W/(m ² K)
		Second-order coefficient (a_2)	0.012	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.86	--
		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.		