

Annex to Solar Keymark Certificate - Summary of EN 12975-2 Test Results					Licence Number		011-7S 819 F								
					Date issued		2016-11-15								
					Issued by		ISFH CalTeC								
Licence holder					Roth Werke GmbH					Country		Germany			
Brand (optional)					-					Web		www.roth-werke.de			
Street, Number					Am Seerain 2					E-mail		service@roth-werke.de			
Postcode, City					D-35232 Dautphetal					Tel		+99 (0)6466 922-0			
Collector Type					Flat plate collector, glazed										
Collector name					Gross area (A _G)	Gross length	Gross width	Gross height	Power output per collector						
									G _b = 850 W/m ² ; G _d = 150 W/m ² θ _m - θ _a						
					m ²	mm	mm	mm	0 K	10 K	30 K	50 K	70 K	86 K	
					W	W	W	W	W	W	W	W	W	W	
Heliostar 218 S4 -Steck-					2.18	1 820	1 200	109	1 513	1 438	1 275	1 092	890	715	
Heliostar 252 S4 -Steck-					2.52	2 100	1 200	104	1 749	1 663	1 474	1 263	1 029	827	
Power output per m ² gross area					694	660	585	501	408	328					
Performance parameters test method					Steady state - indoor										
Performance parameters (related to AG)					η _{0,hem}	a ₁	a ₂								
Units					-	W/(m ² K)	W/(m ² K ²)								
Test results					0.694	3.31	0.011								
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 _{θT, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.38	0.00	
Longitudinal					K _{θL, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.38	0.00	
Heat transfer medium for testing					Water-Glycole										
Flow rate for testing (per gross area, A _G)					dm/dt		0.111	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations					(θ _m -θ _a) _{max}		86	K							
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)					θ _{stg}		208	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²		4.3	kJ/(Km ²)							
Maximum operating temperature					θ _{max, op}		-	°C							
Maximum operating pressure					p _{max, op}		100	kPa							
Testing laboratory					ISFH Calibration and Test Center					www.isfh.de					
Test report(s)					42-09/KD 43-09/KQ 54-16/KT					Dated		16.06.2009 29.06.2009 10.11.2016			
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01										
The performance parameters are related to G(DIF)/G(TOT)=0.15.					Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-31860 Emmerthal Tel.: 05151/999-100 Fax: 05151/999-500										
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de															

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S 819 F
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on EN 12975-2 test results													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	ϑ_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
Heliostar 218 S4 -Steck-		2 382	1 689	1 099	1 805	1 244	780	1 329	866	523	1 444	933	555
Heliostar 252 S4 -Steck-		2 753	1 952	1 270	2 087	1 437	902	1 536	1 001	605	1 669	1 079	641
Annual output per m ² gross area		1 093	775	504	828	570	358	609	397	240	662	428	254
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 under the following conditions:	
Climate class (A, B or C)	--
Maximum tested positive load	2250 Pa
Maximum tested negative load	3000 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}	
Heliostar 218 S4 -Steck-	2.18	Collector efficiency (η_{col})	54 %
Heliostar 252 S4 -Steck-	2.52	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)	0.694 --
		First-order coefficient (a_1)	3.31 W/(m ² K)
		Second-order coefficient (a_2)	0.011 W/(m ² K ²)
		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.	