


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2702 F							
					Date issued		2016-09-24							
					Issued by		DIN CERTCO							
Licence holder	SOLARFOCUS GmbH				Country	Austria								
Brand (optional)	-				Web	www.solarfocus.at								
Street, Number	Werkstraße 1				E-mail	info@solarfocus.de								
Postcode, City	A-4451 St.Ulrich/Steyr				Tel	+43 (0)7252-50002-0								
Collector Type					Flat plate collector, glazed									
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² ; u = 3 m/s ̑ _m - ̑ _a									
					0 K W	10 K W	30 K W	50 K W	70 K W	102 K W				
SUN ^{eco} 21	2.06	1 785	1 155	91	1 383	1 311	1 151	971	772	411				
SUN ^{eco} 28	2.78	2 404	1 155	91	1 867	1 769	1 553	1 310	1 041	555				
Power output per m² gross area					671	636	559	471	375	200				
Performance parameters test method					Quasi dynamic									
Performance parameters (related to A_G)					̷ _{0,b}	c1	c2	c3	c4	c6	K _d			
Units					-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results					0.675	3.402	0.012	0.000	0.000	0.000	0.965			
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 _{̑T, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.39	0.00
Longitudinal					K _{̑L, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.39	0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A_G)					dm/dt	0.020		kg/(sm ²)						
Maximum temperature difference for thermal performance calculations					(̑ _m -̑ _a) _{max}	102		K						
Standard stagnation temperature (G = 1000 W/m²; ̑_a = 30 °C)					̑ _{stg}	189		°C						
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²	12.16		kJ/(Km ²)						
Maximum operating temperature					̑ _{max, op}	120		°C						
Maximum operating pressure					p _{max, op}	1000		kPa						
Testing laboratory					TZS, ITW University Stuttgart			www.itw.uni-stuttgart.de						
Test report(s)					16COL1300 16COL1329 16COL1329Q			Dated		24.09.2016 24.09.2016 24.09.2016				
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01									
documented performance parameters are taken from 16COL1329 (SUN ^{eco} 28)					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2702 F
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results

Standard Locations Collector name	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
SUNeco 21		2 227	1 552	977	1 666	1 117	667	1 232	782	451	1 347	849	482
SUNeco 28		3 006	2 094	1 318	2 248	1 507	901	1 663	1 055	609	1 818	1 145	650
Annual output per m ² gross area		1 081	753	474	809	542	324	598	379	219	654	412	234
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	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	1500	Pa
Maximum tested negative load	1250	Pa
Hail resistance using steel ball (maximum drop height)	1.8	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
SUNeco 21	2.06	Collector efficiency (η_{col})	52 %
SUNeco 28	2.78	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)	0.671 --
		First-order coefficient (a_1)	3.40 W/(m ² K)
		Second-order coefficient (a_2)	0.012 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.	