


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S264 R								
						Date issued		2017-06-12								
						Issued by		DIN CERTCO								
Licence holder		FK Solartechnik GmbH				Country		Deutschland								
Brand (optional)		-				Web		www.fk-solartechnik.de								
Street, Number		Industriepark Kleinkoschen				E-mail		info@fksolar.de								
Postcode, City		01968 Seftenberg				Tel		+49 (0) 3573 806725								
Collector Type						Evacuated tubular collector										
Collector name						Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² ; u = 3 m/s $\vartheta_m - \vartheta_a$										
						Gross area (A _G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	116 K	
						m ²	mm	mm	mm	W	W	W	W	W	W	
FK Solinas 3						2.34	1 964	1 190	133	729	698	638	578	518	380	
Power output per m² gross area						311	298	273	247	221	162					
Performance parameters test method						Quasi dynamic										
Performance parameters (related to AG)						$\eta_{0,b}$	c1	c2	c3	c4	c6	Kd				
Units						-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-				
Test results						0.293	1.284	0.000	0.000	0.000	0.000	1.417				
Incidence angle modifier test method						Quasi dynamic - outdoor										
Bi-directional incidence angle modifiers						Yes										
Incidence angle modifier						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal						K _{θT, coll}	1.04	1.07	1.18	1.28	1.46	1.35	1.16	0.35	0.00	
Longitudinal						K _{θL, coll}	1.00	1.00	0.99	0.97	0.92	0.84	0.70	0.58	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						$(\vartheta_m - \vartheta_a)_{max}$		116		K						
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)						ϑ_{stg}		224		°C						
Effective thermal capacity, incl. fluid (per gross area, A_G)						C/m ²		59.53		kJ/(Km ²)						
Maximum operating temperature						$\vartheta_{max, op}$		180		°C						
Maximum operating pressure						p _{max, op}		1000		kPa						
Testing laboratory						TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de						
Test report(s)						16COL1350 16COL1350Q				Dated		12.06.2017 12.06.2017				
Comments of testing laboratory						Documented performance parameters are taken from 16COL1350 (FK Solinas 3)						Datashet version: 5.01, 2016-03-01				
						 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	011-7S264 R
	Issued	2017-06-12

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
FK Solinas 3		1 483	1 196	953	1 179	938	739	868	663	504	954	731	552
Annual output per m ² gross area		634	511	407	504	401	316	371	283	216	408	312	236
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 ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	B	--
Maximum tested positive load	2000	Pa
Maximum tested negative load	2000	Pa
Hail resistance using steel ball (maximum drop height)	0.4	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
FK Solinas 3	2.34	Collector efficiency (η_{col})	26 %
		<i>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/m², 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.</i>	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.311 --
		First-order coefficient (a_1)	1.28 W/(m ² K)
		Second-order coefficient (a_2)	0.000 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.24 --
		<i>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.</i>	