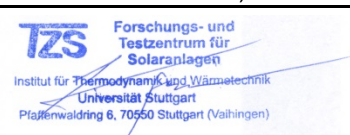


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2682R								
					Date issued		2016-08-24								
					Issued by		DIN CERTCO								
Licence holder		RA-Collectoren BVBA			Country		Belgium								
Brand (optional)		RA-Collectoren BVBA			Web		http://www.racolcollectoren.be/								
Street, Number		Hellevoortstraat, 25			E-mail		walter@racollectoren.be								
Postcode, City		2560, Nijlen			Tel		+32 476 531 650								
Collector Type					Evacuated tubular collector										
					Power output per collector										
					G _b = 850 W/m ² ; G _d = 150 W/m ² ; u = 3 m/s ϑ _m - ϑ _a										
Collector name					Gross area (A _G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	106 K	
					m ²	mm	mm	mm	W	W	W	W	W	W	
Solking 16					1.63	1 614	1 008	143	836	816	765	700	620	441	
Solking 24					2.41	1 614	1 488	160	1 236	1 207	1 131	1 035	917	651	
Power output per m ² gross area									513	501	469	429	380	270	
Performance parameters test method					Quasi dynamic										
Performance parameters (related to A _G)					η _{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					0.501	1.124	0.011	0.000	0.000	0.000	1.160				
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}	1.08	1.16	1.20	1.23	1.41	1.35	1.41	0.71	0.00	
Longitudinal					K _{θL, coll}	0.99	0.97	0.96	0.94	0.87	0.84	0.77	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					(ϑ _m -ϑ _a) _{max}	106		K							
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)					ϑ _{stg}	252		°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²	46.343		kJ/(Km ²)							
Maximum operating temperature					ϑ _{max, op}	280		°C							
Maximum operating pressure					p _{max, op}	600		kPa							
Testing laboratory					TZS, ITW University Stuttgart					www.itw.uni-stuttgart.de					
Test report(s)					15COL1307 15COL1308 15COL1308Q					Dated		2016-08-24 2016-08-24 2016-08-24			
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01										
Collector parameters fo collector "Solking 16" (15COL1307) were used for this data sheet															
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	011-7S2682R
	Issued	2016-08-24

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
Solking 16		1 636	1 401	1 124	1 366	1 121	865	1 002	805	605	1 080	871	653
Solking 24		2 419	2 071	1 662	2 019	1 657	1 279	1 481	1 190	895	1 597	1 287	966
Annual output per m ² gross area		1 004	859	690	838	688	531	614	494	371	663	534	401
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	
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	2750	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	0.6	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
Solking 16	1.63	Collector efficiency (η_{col})	45 %
Solking 24	2.41	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)	0.513 --
		First-order coefficient (a_1)	1.12 W/(m ² K)
		Second-order coefficient (a_2)	0.011 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.16 --
		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.	