


Annex to Solar Keymark Certificate					Licence Number		011-7S1020 F							
					Date issued		2020-01-20							
					Issued by		DIN CERTCO							
Licence holder			Retec Solar GmbH		Country		Germany							
Brand (optional)			-		Web		www.retec-solar.de							
Street, Number			Marianne-Brandt-Straße 4		E-mail		kontakt@retec-solar.de							
Postcode, City			DE-09112 Chemnitz		Tel		+49 371 240 034 89							
Collector Type					Flat plate collector									
Collector name					Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s θ _m - θ _a									
					Gross area (A _G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	120 K
					m ²	mm	mm	mm	W	W	W	W	W	W
RS					1.66	1'272	1'303	95	1'117	1'052	916	771	617	190
Power output per m ² gross area					673	634	552	465	372	115				
Performance parameters test method			Steady state - outdoor											
Performance parameters (related to A _G)			η _{0, b}	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆	a ₇	a ₈	K _d		
Units			-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-		
Test results			0.686	3.81	0.007	0.000	0.00	4'917	0.000	0.00	0.0E+00	0.87		
Incidence angle modifier test method			Steady state - outdoor											
Incidence angle modifier			Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°		
Transversal			K _{θT, coll}	1.00	1.00	0.99	0.97	0.89	0.80	0.61	0.33	0.00		
Longitudinal			K _{θL, coll}	1.00	1.00	0.99	0.97	0.92	0.84	0.69	0.44	0.00		
Heat transfer medium for testing					Water-Glycole									
Flow rate for testing (per gross area, A _G)					dm/dt	0.021	kg/(sm ²)							
Maximum temperature difference during thermal performance test					(θ _m -θ _a) _{max}	90	K							
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)					θ _{stg}	180	°C							
Maximum operating temperature					θ _{max op}	115	°C							
Maximum operating pressure					p _{max, op}	600	kPa							
Testing laboratory			SPF Testing, CH-8640 Rapperswil, Switzerland				www.spf.ch							
Test report(s)			C1806ISO				Dated		20.01.2020					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
The collector usually sold as multiples of the basic element RS. The gross size for a NxM collector is calculated as A _G =(Nx1232mm+2x20mm)x(Mx1267mm+2x18mm). Upon request, the collector is manufactured in other sizes and shapes.														
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S1020 F
	Issued	2020-01-20

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
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
RS		1'732	1'168	728	1'280	849	517	942	586	343	1'026	630	362
Annual output per m ² gross area		1'043	704	439	771	511	311	567	353	206	618	379	218
Annual efficiency, η_a		59%	40%	25%	47%	31%	19%	49%	30%	18%	50%	31%	18%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1630 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. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

Additional Information			
Collector heat transfer medium	Water-Glycole		
The collector is deemed to be suitable for roof integration	Yes		
The collector was tested successfully under the following conditions:			
Climate class (A+, A, B or C)			A
G (W/m ²) >	1000	ϑ_a (°C) >	20
			H_x (MJ/m ²) >
Maximum tested positive load			2400 Pa
Maximum tested negative load			500 Pa
Hail resistance using ice balls (diameter)			35 mm

Additional collector attribute(s)			
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection		
<input type="checkbox"/> Co-generating thermal and electrical power	<input checked="" type="checkbox"/> Façade collector(s)		

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
RS	1.66	8-H-43B-A:8.8,1225-C:20,2510	1.47

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	51%	Zero-loss efficiency (η_0)	0.67
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 9806:2017.		First-order coefficient (a_1)	3.81
		Second-order coefficient (a_2)	0.007
		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.	