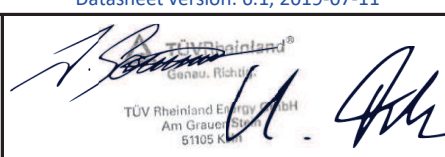


Annex to Solar Keymark Certificate					Licence Number		011-7S2989 R							
					Date issued		2021-05-18							
					Issued by		TÜV Rheinland Energy GmbH							
Licence holder		Rivusol BV			Country		The Netherlands							
Brand (optional)					Web		http://www.rivusol.com							
Street, Number		Bouwmeesterplain 1			E-mail		info@rivusol.com							
Postcode, City		2801BX Gouda			Tel		+31 40 292 84 88							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	110 K				
					m ²	mm	mm	mm	mm	mm	mm			
RC58-1800HP-10T					1.74	2 000	870	150	678	653	605	556	508	410
RC58-1800HP-15T					2.52	2 000	1 260	150	982	946	876	806	735	594
RC58-1800HP-20T					3.30	2 000	1 650	150	1 285	1 239	1 147	1 055	963	778
RC58-1800HP-25T					4.08	2 000	2 040	150	1 589	1 532	1 418	1 304	1 190	962
RC58-1800HP-30T					4.86	2 000	2 430	150	1 893	1 825	1 689	1 554	1 418	1 146
Power output per m ² gross area					390	376	348	320	292	236				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A _G)		$\eta_{0,b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
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		0.379	1.40	0.000	0.000	0.00	33 612	0.000	0.00	0.0E+00	1.19			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.02	1.08	1.19	1.37	1.52	1.58	1.50	1.20	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.98	0.96	0.94	0.88	0.44	0.00			
Heat transfer medium for testing		Water												
Flow rate for testing (per gross area, A _G)		dm/dt	0.015	kg/(sm ²)										
Maximum temperature difference during thermal performance test		($\vartheta_m - \vartheta_a$) _{max}	80	K										
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)		ϑ_{stg}	227	°C										
Maximum operating temperature		$\vartheta_{max, op}$	120	°C										
Maximum operating pressure		p _{max, op}	600	kPa										
Testing laboratory		TÜV Rheinland Energy GmbH					www.tuv.com/solar							
Test report(s)		154019941_EN_P_Sunrain_10_Report_Gao 154019941_EN_Sunrain_30_Report_Gao 21252328.001_EN12975_Doc check Rivusol					Dated		04.12.2013 04.12.2013 19.04.2021					
Comments of testing laboratory		The performance figures were converted to gross area:												
	Area [m ²]	dm/dt [kg/(sm ²)]	a5 [J/(m ² K)]	h _{0, hem} []	h _{0, b} []	a1 [W/(m ² K)]	a2 [W/(m ² K ²)]	Kd []						
Initial values based on aperture area	0.92	0.028	6357	0.733	-	2.643	0	0						
New values based on gross area	1.74	0.015	3361	0.388	0.378	1.397	0.000	1.185						
							Datasheet version: 6.1, 2019-07-11 TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln							
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							Licence Number		011-7S2989 R				
Supplementary Information							Issued		2021-05-18				
Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
	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
RC58-1800HP-10T		1 361	1 128	927	1 100	902	737	813	644	508	879	696	548
RC58-1800HP-15T		1 972	1 634	1 342	1 593	1 307	1 068	1 177	933	736	1 274	1 008	794
RC58-1800HP-20T		2 582	2 139	1 757	2 087	1 711	1 398	1 542	1 221	964	1 668	1 320	1 040
RC58-1800HP-25T		3 192	2 645	2 173	2 580	2 116	1 729	1 906	1 510	1 191	2 062	1 632	1 286
RC58-1800HP-30T		3 802	3 150	2 588	3 073	2 520	2 059	2 271	1 799	1 419	2 456	1 944	1 531
Annual output per m ² gross area		782	648	533	632	519	424	467	370	292	505	400	315
Annual efficiency, η_a		44%	37%	30%	39%	32%	26%	40%	32%	25%	41%	32%	25%
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 (July 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										No			
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) >		600			
Maximum tested positive load										2250		Pa	
Maximum tested negative load										--		Pa	
Hail resistance using steel ball (maximum drop height)										--		m	
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 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)						
RC58-1800HP-10T	1.74			1-H-12S-C:X			0.92						
RC58-1800HP-15T	2.52			1-H-12S-C:X			1.38						
RC58-1800HP-20T	3.30			1-H-12S-C:X			1.84						
RC58-1800HP-25T	4.08			1-H-12S-C:X			2.31						
RC58-1800HP-30T	4.86			1-H-12S-C:X			2.77						
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})			33%				Zero-loss efficiency (η_0)		0.39		--		
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)		1.40		Second-order coefficient (a_2)		0.000		W/(m ² K)		
			Incidence angle modifier IAM (50°)		1.32		--						
			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.										
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