



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S207 R							
					Date issued		2017-01-19							
					Issued by		TÜV Rheinland Energy GmbH							
Licence holder		SUNSHORE SOLAR Deutschland GmbH			Country		Germany							
Brand (optional)		SUNSHORE			Web		http://www.sunshoresolar.de							
Street, Number		Auf dem Stein 20			E-mail		info@sunshoresolar.de							
Postcode, City		51702 Bergneustadt			Tel		+49 (0)2261 701373							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					G _b = 850 W/m ² ; G _d = 150 W/m ² ; u = 3 m/s θ _m - θ _a									
					0 K	10 K	30 K	50 K	70 K	90 K				
					W	W	W	W	W	W				
Q-B-J-1-54/2.30/0					1 338	1 308	1 250	1 191	1 132	1 073				
Q-B-J-1-60/2.60/0					1 471	1 439	1 374	1 310	1 245	1 181				
Q-B-J-1-78/3.38/0					1 875	1 834	1 751	1 669	1 587	1 504				
Q-B-J-1-90/3.90/0					2 047	2 002	1 912	1 822	1 732	1 643				
Power output per m ² gross area					414	405	387	369	350	332				
Performance parameters test method					Quasi dynamic									
Performance parameters (related to AG)					η _{0,b}	c ₁	c ₂	c ₃	c ₄	c ₆	K _d			
Units					-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results					0.410	0.909	0.000	0.000	0.000	0.000	1.067			
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}	1.00	1.06	1.13	1.24	1.37	1.53	1.02	0.51	0.00
Longitudinal					K _{θL, coll}	1.00	0.99	0.98	0.95	0.93	0.91	0.69	0.24	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}	90	K							
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)					θ _{stg}	230	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²	164.4	kJ/(Km ²)							
Maximum operating temperature					θ _{max, op}	100	°C							
Maximum operating pressure					p _{max, op}	0	kPa							
Testing laboratory					TÜV Rheinland Energy GmbH			http://www.tuv.com/solarpower						
Test report(s)					21206678a 21210187a			Dated		08.10.2009 08.10.2009				
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01									
The original evaluation was based on aperture area. The former basic values for the Q-B-J-1-90/3.90/0 with 2.70 m ² aperture area had been: a _{te0a} =0.765; a _{1a} =1.66 and a _{2a} =0 The collector is operating open to atmosphere!					 Genau. Richtig.  TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln S									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S207 R
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on EN 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
Q-B-J-1-54/2.30/0		2 527	2 236	1 974	2 140	1 881	1 655	1 553	1 329	1 144	1 673	1 432	1 231
Q-B-J-1-60/2.60/0		2 780	2 459	2 171	2 354	2 069	1 820	1 708	1 462	1 258	1 840	1 575	1 354
Q-B-J-1-78/3.38/0		3 542	3 134	2 767	3 000	2 636	2 320	2 176	1 863	1 603	2 345	2 007	1 725
Q-B-J-1-90/3.90/0		3 868	3 422	3 021	3 275	2 879	2 533	2 376	2 034	1 750	2 561	2 192	1 884
Annual output per m ² gross area		782	692	611	663	582	512	481	412	354	518	443	381
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)	--
Maximum tested positive load	Pa
Maximum tested negative load	Pa
Hail resistance using steel ball (maximum drop height)	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
Q-B-J-1-54/2.30/0	3.23	Collector efficiency (η_{col})	38 %
Q-B-J-1-60/2.60/0	3.55	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.	
Q-B-J-1-78/3.38/0	4.53		
Q-B-J-1-90/3.90/0	4.94		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.414 --
		First-order coefficient (a_1)	0.91 W/(m ² K)
		Second-order coefficient (a_2)	0.000 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.18 --
		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.	