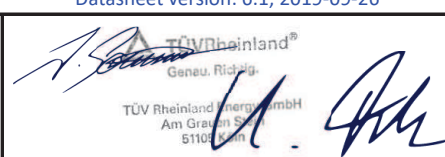


Annex to Solar Keymark Certificate					Licence Number		011-7S2331 R							
					Date issued		2020-02-03							
					Issued by		TÜV Rheinland Energy GmbH							
Licence holder		HAINING JU YANG NEW ENERGY			Country		P.R. China							
Brand (optional)		ONOSI			Web		www.onosisolar.com							
Street, Number		No.58 Beitang road, Puqiao Village			E-mail		onosi@onosisolar.com							
Postcode, City		314416 / Yuanhua, Haining, Zhejiang			Tel		+86 0573 - 87718300							
Collector Type					Evacuated tubular 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									
					0 K	10 K	30 K	50 K	70 K	100 K				
					m ²	mm	mm	mm	mm	mm	mm			
					W	W	W	W	W	W				
ONS-HPC01/14R-10					1.83	2 010	910	155	720	702	665	628	591	536
ONS-HPC01/14R-12					2.15	2 010	1 070	155	847	825	781	738	695	630
ONS-HPC01/14R-15					2.63	2 010	1 310	155	1 036	1 010	957	904	850	771
ONS-HPC01/14R-16					2.79	2 010	1 390	155	1 100	1 072	1 015	959	902	818
ONS-HPC01/14R-18					3.12	2 010	1 550	155	1 226	1 195	1 132	1 069	1 006	912
ONS-HPC01/14R-20					3.44	2 010	1 710	155	1 353	1 318	1 249	1 180	1 110	1 006
ONS-HPC01/14R-22					3.76	2 010	1 870	155	1 479	1 442	1 366	1 290	1 214	1 100
ONS-HPC01/14R-24					4.08	2 010	2 030	155	1 606	1 565	1 483	1 400	1 318	1 194
ONS-HPC01/14R-25					4.24	2 010	2 110	155	1 669	1 627	1 541	1 455	1 370	1 241
ONS-HPC01/14R-30					5.05	2 010	2 510	155	1 986	1 935	1 833	1 731	1 630	1 477
Power output per m ² gross area					394	384	363	343	323	293				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A _G)		η _{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		0.384	1.01	0.000	0.000	0.00	35 000	0.000	0.00	0.0E+00	1.17			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{GT, coll}	1.10	1.24	1.26	1.31	1.47	1.51	1.51	-	0.00			
Longitudinal		K _{GL, coll}	1.00	1.00	0.99	0.98	0.97	0.94	0.88	-	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 during thermal performance test		(θ _m -θ _a) _{max}	70	K										
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)		θ _{stg}	250	°C										
Maximum operating temperature		θ _{max, op}	99	°C										
Maximum operating pressure		p _{max, op}	600	kPa										
Testing laboratory		TÜV Rheinland (Shanghai) Co., Ltd.					http://www.tuv.com/solarenergy							
Test report(s)		154040684_EN_P_10_Report_Gao 154040684_EN_R_30_Report_Gao 154031403_EN_30_Report_Gao					Dated		20.03.2014 20.03.2014 28.11.2013					
Comments of testing laboratory		All input figures are taken out of the original test reports issued by TÜV Rheinland Shanghai. If necessary, the reference area and the corresponding figures are changed to gross area.												
														
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Annex to Solar Keymark Certificate							Licence Number		011-7S2331 R					
Supplementary Information							Issued		2020-02-03					
Annual collector output in kWh/collector at mean fluid temperature ϑ_m														
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg			
	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	
ONS-HPC01/14R-10		1 473	1 291	1 127	1 240	1 079	940	903	765	650	972	822	698	
ONS-HPC01/14R-12		1 732	1 517	1 325	1 458	1 269	1 105	1 062	899	764	1 142	966	820	
ONS-HPC01/14R-15		2 120	1 857	1 622	1 785	1 553	1 353	1 300	1 101	935	1 398	1 183	1 004	
ONS-HPC01/14R-16		2 249	1 971	1 721	1 894	1 648	1 435	1 379	1 168	992	1 483	1 255	1 065	
ONS-HPC01/14R-18		2 508	2 198	1 919	2 112	1 838	1 600	1 538	1 303	1 107	1 654	1 400	1 188	
ONS-HPC01/14R-20		2 767	2 425	2 118	2 330	2 027	1 765	1 697	1 437	1 221	1 825	1 544	1 310	
ONS-HPC01/14R-22		3 026	2 651	2 316	2 548	2 217	1 931	1 855	1 571	1 335	1 996	1 689	1 433	
ONS-HPC01/14R-24		3 285	2 878	2 514	2 766	2 407	2 096	2 014	1 706	1 449	2 166	1 833	1 556	
ONS-HPC01/14R-25		3 415	2 992	2 613	2 875	2 502	2 178	2 093	1 773	1 507	2 252	1 906	1 617	
ONS-HPC01/14R-30		4 062	3 559	3 108	3 420	2 976	2 591	2 490	2 109	1 792	2 679	2 267	1 923	
Annual output per m ² gross area		805	705	616	678	590	514	494	418	355	531	449	381	
Annual efficiency, η_a		46%	40%	35%	42%	36%	32%	42%	36%	30%	43%	36%	31%	
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	No													
The collector was tested successfully under the following conditions:														
Climate class (A+, A, B or C)												B	--	
G (W/m ²) >	900	ϑ_a (°C) >			15	H_x (MJ/m ²) >			540					
Maximum tested positive load												2400	Pa	
Maximum tested negative load												-	Pa	
Hail resistance using ice balls (diameter)												-	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 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)				
ONS-HPC01/14R-10	1.83						1-H-12S-C35,959			1.33				
ONS-HPC01/14R-12	2.15						1-H-12S-C35,1119			1.49				
ONS-HPC01/14R-15	2.63						1-H-12S-C35,1359			1.86				
ONS-HPC01/14R-16	2.79						1-H-12S-C35,1439			1.99				
ONS-HPC01/14R-18	3.12						1-H-12S-C35,1599			2..34				
ONS-HPC01/14R-20	3.44						1-H-12S-C35,1759			2.49				
ONS-HPC01/14R-22	3.76						1-H-12S-C35,1919			2.74				
ONS-HPC01/14R-24	4.08						1-H-12S-C35,2079			2.99				
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})	35%						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)			1.01				W/(m ² K)
							Second-order coefficient (a_2)			0.000				W/(m ² K ²)
							Incidence angle modifier IAM (50°)			1.27				--
							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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