


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S1990 R							
					Date issued		2018-07-27							
					Issued by		DIN CERTCO							
Licence holder	Linuo Ritter International Co., Ltd.				Country	China								
Brand (optional)	-				Web	www.linuo-ritter-international.com								
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Postcode, City	250103, JINAN CITY, SHANDONG PROVINCE				Tel	+86 0531 8872 9920								
Collector Type					Evacuated tubular collector									
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	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 W	10 K W	30 K W	50 K W	70 K W	106 K W				
U 1521	2.18	1 640	1 327	103	974	948	888	819	742	581				
Power output per m² gross area					447	435	407	376	341	267				
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					0.439	1.170	0.005	0.000	0.000	0.000	1.120			
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}	1.03	1.05	1.18	1.31	1.55	1.47	1.43	0.72	0.00
Longitudinal					K _{θL, coll}	0.99	0.98	0.97	0.95	0.94	0.89	0.86	0.43	0.00
Heat transfer medium for testing					Water-Glycole									
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/m²; ϑ_a = 30 °C)					ϑ _{stg}	270		°C						
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²	59.116		kJ/(Km ²)						
Maximum operating temperature					ϑ _{max, op}	100		°C						
Maximum operating pressure					p _{max, op}	10000		kPa						
Testing laboratory					TZS, ITW University Stuttgart			www.itw.uni-stuttgart.de						
Test report(s)					17COL1382 17COL1382Q			Dated		27.07.2018 27.07.2018				
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01									
Documented performance parameters are taken from test report 17COL1382					 <p>TZS Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)</p>									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S1990 R
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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
U 1521		1 899	1 617	1 327	1 571	1 303	1 045	1 153	932	728	1 244	1 007	785
Annual output per m ² gross area		871	742	609	720	598	480	529	428	334	571	462	360
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)	A	--
Maximum tested positive load	2750	Pa
Maximum tested negative load	1500	Pa
Hail resistance using steel ball (maximum drop height)	0.4	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
U 1521	2.18	Collector efficiency (η_{col})	39 %
		<i>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/m², 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.</i>	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.447 --
		First-order coefficient (a_1)	1.17 W/(m ² K)
		Second-order coefficient (a_2)	0.005 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.24 --
		<i>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.</i>	