


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2831 R				
					Date issued		2018-07-20				
					Issued by		DIN CERTCO				
Licence holder	Ritter Energie- und Umwelttechnik GmbH & Co. KG				Country	Deutschland					
Brand (optional)	Ritter XL Solar				Web	www.ritter-gruppe.de					
Street, Number	Kuchenäcker 2				E-mail	info@ritter-gruppe.de					
Postcode, City	72135 Dettenhausen				Tel	+49 715 753 591 270					
Collector Type					Evacuated tubular collector						
Collector name					Power output per collector Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup> ; u = 3 m/s ̘ <sub>m</sub> - ̘ <sub>a</sub>						
					Gross area (A <sub>G</sub> )	Gross length	Gross width	Gross height	0 K	10 K	30 K
	m <sup>2</sup>	mm	mm	mm	W	W	W	W	W	W	
<a href="#">XL 15/26</a>	2.63	1 616	1 627	122	1 531	1 519	1 483	1 427	1 352	1 109	
<a href="#">XL 15/39</a>	3.93	1 616	2 432	122	2 287	2 270	2 215	2 132	2 021	1 657	
<a href="#">XL 19/33</a>	3.31	2 033	1 627	122	1 926	1 912	1 866	1 796	1 702	1 395	
Power output per m <sup>2</sup> gross area					582	578	564	543	514	422	
Performance parameters test method		Quasi dynamic									
Performance parameters (related to AG)		̘ <sub>0,b</sub>	c1	c2	c3	c4	c6	Kd			
Units		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	s/m	-			
Test results		0.581	0.339	0.009	0.000	0.000	0.000	1.011			
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 <sub>̘T, coll</sub>	1.01	1.02	1.03	1.03	0.99	1.08	1.31	0.66	0.00
Longitudinal		K <sub>̘L, coll</sub>	0.98	0.96	0.94	0.91	0.88	0.76	0.71	0.36	0.00
Heat transfer medium for testing					Water						
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.020	kg/(sm <sup>2</sup> )				
Maximum temperature difference for thermal performance calculations					(̘ <sub>m</sub> -̘ <sub>a</sub> ) <sub>max</sub>	116	K				
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ̘ <sub>a</sub> = 30 °C)					̘ <sub>stg</sub>	332	°C				
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )					C/m <sup>2</sup>	8.62	kJ/(Km <sup>2</sup> )				
Maximum operating temperature					̘ <sub>max, op</sub>	160	°C				
Maximum operating pressure					p <sub>max, op</sub>	1000	kPa				
Testing laboratory		TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de					
Test report(s)		17COL1417 14COL1032Q/2				Dated		20.06.2018 20.06.2018			
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01						
This data sheet replaces the data sheet issued 2018-07-11. The collector name XL 15/33 was corected to XL 15/39. Thermal performance was tested according to EN ISO 9806:2017 Thermal performace parameters are taken from test report 17COL1417					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)						
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											

<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S2831 R</b>
	<b>Issued</b>	<b>2018-07-11</b>

**Annual collector output in kWh/collector at mean fluid temperature  $\vartheta_m$ , based on ISO 9806:2013 test results**

Standard Locations Collector name	$\vartheta_m$	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
XL 15/26		2 668	2 496	2 227	2 360	2 133	1 838	1 708	1 527	1 298	1 833	1 646	1 403
XL 15/39		3 986	3 730	3 327	3 527	3 187	2 747	2 552	2 281	1 940	2 738	2 460	2 096
XL 19/33		3 357	3 141	2 802	2 971	2 684	2 313	2 149	1 921	1 634	2 306	2 072	1 765
Annual output per m <sup>2</sup> gross area		1 014	949	847	897	811	699	649	580	494	697	626	533
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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  $\vartheta_m$  (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](http://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	3000	Pa
Maximum tested negative load	2400	Pa
Hail resistance using ice balls (diameter)	35	mm

**Energy Labelling Information**

	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
XL 15/26	2.63	Collector efficiency ( $\eta_{col}$ )	55 %
XL 15/39	3.93	Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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.	
XL 19/33	3.31		
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
		Zero-loss efficiency ( $\eta_0$ )	0.582 --
		First-order coefficient ( $a_1$ )	0.34 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.009 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.94 --
		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.	