

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2743 F								
					Date issued		2017-04-13								
					Issued by		ISFH CalTeC								
Licence holder	Wagner Solar GmbH				Country	Germany									
Brand (optional)	-				Web	http://www.wagner-solar.com									
Street, Number	Sonnenallee 2				E-mail	info@wagner-solar.com									
Postcode, City	D-35274 Kirchhain				Tel	+49 64218007-0									
Collector Type					Flat plate collector, glazed										
Collector name					Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² ̑ _m - ̑ _a										
					Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	0 K W	10 K W	30 K W	50 K W	70 K W	85 K W	
EURO L20 MH AR					2.61	2 151	1 215	110	1 976	1 888	1 691	1 464	1 208	997	
Power output per m² gross area					757	723	648	561	463	382					
Performance parameters test method					Steady state - indoor										
Performance parameters (related to AG)					̑ _{0,hem}	a1	a2								
Units					-	W/(m ² K)	W/(m ² K ²)								
Test results					0.757	3.220	0.014								
Incidence angle modifier test method					Quasi dynamic - outdoor										
Bi-directional incidence angle modifiers					No										
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal					K _{̑T, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.38	0.00	
Longitudinal					K _{̑L, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.38	0.00	
Heat transfer medium for testing					Water										
Flow rate for testing (per gross area, A_G)					dm/dt	0.011		kg/(sm ²)							
Maximum temperature difference for thermal performance calculations					(̑ _m -̑ _a) _{max}	85		K							
Standard stagnation temperature (G = 1000 W/m²; ̑_a = 30 °C)					̑ _{stg}	211		°C							
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²	5.2		kJ/(Km ²)							
Maximum operating temperature					̑ _{max, op}	-		°C							
Maximum operating pressure					p _{max, op}	1000		kPa							
Testing laboratory					ISFH CalTeC				http://www.isfh.de						
Test report(s)					49-16/K				Dated		12.04.2016				
Comments of testing laboratory					none Datasheet version: 5.01, 2016-03-01 Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-31860 Emmerthal Tel.: 05151/999-100 Fax: 05151/999-500										
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2743 F
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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		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
EURO L20 MH AR		3 122	2 278	1 523	2 407	1 699	1 092	1 765	1 184	733	1 915	1 277	778
Annual output per m ² gross area		1 196	873	584	922	651	418	676	454	281	734	489	298
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)	B	--
Maximum tested positive load	5950	Pa
Maximum tested negative load	2750	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information				
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
EURO L20 MH AR	2.61	Collector efficiency (η_{col})	61	%
		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.		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
		Zero-loss efficiency (η_0)	0.757	--
		First-order coefficient (a_1)	3.22	W/(m ² K)
		Second-order coefficient (a_2)	0.014	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.93	--
		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.		