



Annex to Solar Keymark Certificate					Licence Number		011-7S2711 R																	
Summary of EN ISO 9806 Test Results					Issued		2016-10-13																	
Collector test standard			EN ISO 9806																					
Licence holder		WIKORA GmbH				Country		Germany																
Brand (optional)		--				Web		www.wikora.de																
Street, Number		Friedrichstr. 9				E-mail		contact@wikora.de																
Postcode, City		DE-89568 Hermaringen				Tel		+49 (07322) 96 05-0																
Collector Type					Evacuated tubular collector																			
					Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² $\vartheta_m - \vartheta_a$																			
					<table border="1"> <tr> <td></td> <td>0 K</td> <td>10 K</td> <td>30 K</td> <td>50 K</td> <td>70 K</td> <td>134 K</td> </tr> <tr> <td></td> <td>W</td> <td>W</td> <td>W</td> <td>W</td> <td>W</td> <td>W</td> </tr> </table>							0 K	10 K	30 K	50 K	70 K	134 K		W	W	W	W	W	W
	0 K	10 K	30 K	50 K	70 K	134 K																		
	W	W	W	W	W	W																		
Collector name					m ²	mm	mm	mm	W	W	W	W	W	W										
WIKOSUN HP 70-8					1.41	2'285	615	134	846	829	791	749	703	524										
WIKOSUN HP 70-16					2.78	2'285	1'215	134	1'668	1'634	1'560	1'478	1'386	1'032										
WIKOSUN HP 70-24					4.15	2'285	1'815	134	2'490	2'440	2'329	2'206	2'069	1'541										
Power output per m² gross area					600	588	561	532	499	371														
Performance parameters test method			Steady state - outdoor																					
Performance parameters (related to AG)			η _{0,hem}	a1	a2																			
Units			-	W/(m ² K)	W/(m ² K ²)																			
Test results			0.600	1.170	0.004																			
Incidence angle modifier test method			Steady state - outdoor																					
Bi-directional incidence angle modifiers			Yes																					
Incidence angle modifier			Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°												
Transversal			K _{θT, coll}	1.01	1.03	1.05	1.04	1.01	0.95	0.85	0.50	0.00												
Longitudinal			K _{θL, coll}	1.00	1.00	0.99	0.97	0.93	0.85	0.71	0.46	0.00												
Fluid for testing					Water-Glycole																			
Flow rate for testing (per gross area, AG)					dm/dt		0.021		kg/(sm ²)															
Maximum temperature difference for thermal performance calculations					(ϑ _m -ϑ _a) _{max}		134		K															
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)					ϑ _{stg}		269		°C															
Effective thermal capacity (per gross area, AG)					C/m ²		2.78		kJ/(Km ²)															
Maximum operating temperature					ϑ _{max, op}		140		°C															
Maximum operating pressure					p _{max, op}		600		kPa															
Testing laboratory			SPF, CH-8640 Rapperswil				www.solarenergy.ch																	
Test report(s)			C1707LPEN				Dated		06.10.2016															
			C1708LPEN						06.10.2016															
			C1708QPEN						06.10.2016															
Comments of testing laboratory					--																			



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	Issued	2016-10-13

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806 Test Results													
Collector name	Standard Locations 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
WIKOSUN HP 70-8		1'437	1'256	1'074	1'224	1'053	889	879	736	604	945	792	649
WIKOSUN HP 70-16		2'833	2'477	2'117	2'414	2'076	1'753	1'733	1'450	1'191	1'864	1'561	1'280
WIKOSUN HP 70-24		4'229	3'698	3'160	3'604	3'099	2'617	2'587	2'165	1'777	2'783	2'331	1'911
Annual output per m ² gross area		1'019	891	762	868	747	631	623	522	428	671	562	460
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 (July 2015). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc													

Additional Information		
Collector heat transfer medium	Liquid	
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 under the following conditions:		
Climate class (A, B or C)	A	--
Positive Mechanical Load	1000	Pa
Negative Mechanical Load	1000	Pa
Hail resistance using ice balls (diameter)	25	mm

Energy Labelling Information			
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
WIKOSUN HP 70-8	1.41	Collector efficiency (η_{col})	55 %
WIKOSUN HP 70-16	2.78	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.	
WIKOSUN HP 70-24	4.15		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.600 --
		First-order coefficient (a_1)	1.17 W/(m ² K)
		Second-order coefficient (a_2)	0.040 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.01 --
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.			