


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S2198 F			
						Date issued		2018-10-22			
						Issued by		DIN CERTCO			
Licence holder	Dukometal SA					Country	Schweiz				
Brand (optional)	-					Web	www.favre-energie.ch				
Street, Number	Route de Porrentruy 80					E-mail	info@favre-energie.ch				
Postcode, City	2800 Delémont					Tel	+41 (0) 32 422 41 61				
Collector Type						Flat plate collector, glazed					
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 ∅ _m - ∅ _a						
					0 K W	10 K W	30 K W	50 K W	70 K W	104 K W	
PSH 2340H	2.34	2 000	1 170	83	1 665	1 582	1 402	1 203	986	574	
PSH 2340V	2.34	1 170	2 000	83	1 665	1 582	1 402	1 203	986	574	
Power output per m² gross area					711	676	599	514	421	245	
Performance parameters test method		Quasi dynamic									
Performance parameters (related to A_G)		η _{0,b}	c ₁	c ₂	c ₃	c ₄	c ₆	K _d			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results		0.712	3.441	0.010	0.000	0.000	0.000	0.994			
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 _{θT, coll}	1.00	1.00	1.00	1.00	0.97	0.89	0.71	0.36	0.00
Longitudinal		K _{θL, coll}	1.00	1.00	1.00	1.00	0.97	0.89	0.71	0.36	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		(∅ _m -∅ _a) _{max}	104		K						
Standard stagnation temperature (G = 1000 W/m²; ∅_a = 30 °C)		∅ _{stg}	197		°C						
Effective thermal capacity, incl. fluid (per gross area, A_G)		C/m ²	12		kJ/(Km ²)						
Maximum operating temperature		∅ _{max, op}	197		°C						
Maximum operating pressure		p _{max, op}	1000		kPa						
Testing laboratory		TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de					
Test report(s)		16COL1345OEM02 16COL1346QOEM02 18COLP20400834103OEM02				Dated		15.10.2018 15.10.2018 15.10.2018			
Comments of testing laboratory		Datasheet version: 5.01, 2016-03-01									
Documented performance parameters are taken from test report 16COL1345OEM02 (PSH 2340H)		 Forschungs- und Testzentrum für Solaranlagen <small>Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)</small>									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2198 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 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
PSH 2340H		2 750	1 974	1 310	2 092	1 459	934	1 535	1 011	621	1 679	1 101	667
PSH 2340V		2 750	1 974	1 310	2 092	1 459	934	1 535	1 011	621	1 679	1 101	667
Annual output per m ² gross area		1 175	844	560	894	623	399	656	432	265	718	471	285
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	3000	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}	
PSH 2340H	2.34	Collector efficiency (η_{col})	56 %
PSH 2340V	2.34	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)	0.711 --
		First-order coefficient (a_1)	3.44 W/(m ² K)
		Second-order coefficient (a_2)	0.010 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.97 --
		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.	