
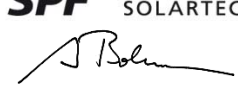


Annex to Solar Keymark Certificate - Summary of EN 12975-2 Test Results						Licence Number		011-7S1865 R					
						Date issued		2016-09-13					
						Issued by							
Licence holder		ACV Polska sp. z.o.o.				Country		Poland					
Brand (optional)		--				Web		www.acv.com					
Street, Number		ul. Witosa 3				E-mail		polska.info@acv.com					
Postcode, City		87-800, Wloclawek				Tel		+48 544125600					
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 = 1000 W/m ² ϑ _m - ϑ _a								
					0 K	10 K	30 K	50 K	70 K	100 K			
					W	W	W	W	W	W			
BPS-58-1800-10 / Heat Pipe 10	1.77	1'990	887	180	587	572	532	478	410	282			
BPS-58-1800-22 / Heat Pipe 22	3.68	1'990	1'847	180	1'269	1'237	1'150	1'033	886	608			
BPS-58-1800-30 / Heat Pipe 30	4.95	1'990	2'487	180	1'730	1'687	1'568	1'409	1'208	830			
Power output per m ² gross area					350	341	317	285	244	168			
Performance parameters test method		Steady state - outdoor											
Performance parameters (aperture area)		η _{0,hem}	a ₁	a ₂									
Units		-	W/(m ² K)	W/(m ² K ²)									
Test results		0.618	1.377	0.018									
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 _{GT, coll}	1.01	1.02	1.06	1.15	1.45	1.46	1.26	0.65	0.00		
Longitudinal		K _{GL, coll}	1.00	0.99	1.02	0.97	0.95	0.91	0.83	0.59	0.00		
Heat transfer medium for testing		Water											
Flow rate for testing (per gross area, A _G)		dm/dt	0.019	kg/(sm ²)									
Maximum temperature difference for thermal performance calculations		(ϑ _m -ϑ _a) _{max}	100	K									
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)		ϑ _{stg}	187	°C									
Effective thermal capacity, incl. fluid (per gross area, A _G)		C/m ²	3.059	kJ/(Km ²)									
Maximum operating temperature		ϑ _{max, op}	--	°C									
Maximum operating pressure		p _{max, op}	600	kPa									
Testing laboratory		SPF, CH-8640 Rapperswil				www.spf.ch							
Test report(s)		KT08_15_5 C917LPEN-A1 C917QPEN-A1				Dated		18.06.2013 08.04.2013 08.04.2013					
Comments of testing laboratory		Datashet version: 5.01, 2016-03-01											
--		 INSTITUT FÜR SOLARTECHNIK 											
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													

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S1865 R
	Issued	2016-09-13

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on EN 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
BPS-58-1800-10 / Heat Pipe 10		1'105	925	705	911	721	518	669	519	364	723	563	393
BPS-58-1800-22 / Heat Pipe 22		2'388	1'999	1'523	1'970	1'557	1'120	1'447	1'121	787	1'563	1'216	848
BPS-58-1800-30 / Heat Pipe 30		3'257	2'726	2'078	2'686	2'124	1'527	1'973	1'528	1'073	2'132	1'658	1'157
Annual output per m ² aperture area		1'163	974	742	959	758	546	705	546	383	761	592	413
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 12975-2 under the following conditions:		
No valid climate reference class	--	--
Maximum tested positive load	1000	Pa
Maximum tested negative load	1000	Pa
Hail resistance using steel ball (maximum drop height)	--	m

Energy Labelling Information				
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
BPS-58-1800-10 / Heat Pipe 10	0.95	Collector efficiency (η_{col})	53	%
BPS-58-1800-22 / Heat Pipe 22	2.05	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.		
BPS-58-1800-30 / Heat Pipe 30	2.80			
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
		Zero-loss efficiency (η_0)	0.618	--
		First-order coefficient (a_1)	1.38	W/(m ² K)
		Second-order coefficient (a_2)	0.018	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.12	--
		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.		