
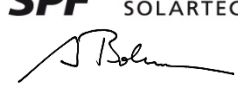


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		<b>011-7S2485 P</b>								
						Date issued		<b>2017-02-22</b>								
						Issued by										
Licence holder		<b>Meyer Burger AG</b>				Country		Switzerland								
Brand (optional)		-				Web		www.meyerburger.com								
Street, Number		Schorenstrasse 39				E-mail		info@meyerburger.com								
Postcode, City		CH-3645 Gwatt				Tel		+41 33 221 21 21								
Collector Type						Flat plate collector, unglazed										
Collector name					Gross area ( $A_G$ )		Gross length		Gross width		Gross height		Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> ; $\vartheta_m - \vartheta_a = 2K$ u (m/s)			
					m <sup>2</sup>	mm	mm	mm	1.0		1.5		3.0			
Hybrid 260/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 265/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 270/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 275/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 280/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 285/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 290/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 295/900 Black					1.64	991	1'656	32	699		666		567			
Hybrid 300/900 Black					1.64	991	1'656	32	699		666		567			
Power output per m <sup>2</sup> gross area									426		406		346			
Performance parameters test method						Steady state - outdoor										
Performance parameters (related to A <sub>G</sub> )						$\eta_0, \text{hem}$	b <sub>1</sub>	b <sub>2</sub>	b <sub>u</sub>	$\epsilon/\alpha$						
Units						-	W/(m <sup>2</sup> K)	Ws/(m <sup>3</sup> K)	s/m	-						
Test results						0.576	12.48	1.6320	0.064	0.850						
Incidence angle modifier test method						Steady state - outdoor										
Bi-directional incidence angle modifiers						No										
Incidence angle modifier						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal						$K_{\theta T, \text{coll}}$	1.00	1.00	0.99	0.98	0.95	0.87	0.68	0.37	0.00	
Longitudinal						$K_{\theta L, \text{coll}}$	1.00	1.00	0.99	0.98	0.95	0.87	0.68	0.37	0.00	
Heat transfer medium for testing						Water-Glycole										
Flow rate for testing (per gross area, A <sub>G</sub> )						dm/dt	0.022	kg/(sm <sup>2</sup> )								
Maximum temperature difference for thermal performance calculations						$(\vartheta_m - \vartheta_a)_{\text{max}}$	80	K								
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30^\circ\text{C}$ )						$\vartheta_{\text{stg}}$	69	°C								
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )						C/m <sup>2</sup>	16.3	kJ/(Km <sup>2</sup> )								
Maximum operating temperature						$\vartheta_{\text{max, op}}$	80	°C								
Maximum operating pressure						p <sub>max, op</sub>	600	kPa								
Testing laboratory						SPF, CH-8640 Rapperswil		www.spf.ch								
Test report(s) C1648LPEN C1648QPEN C1648add						Dated		24.03.2015								
								24.03.2015								
								20.02.2017								
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01										
Thermal performance parameters are given for the PV-module working with max. electrical power output ('MPP mode').						 <b>INSTITUT FÜR SOLARTECHNIK</b> 										
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<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S2485 P</b>
	<b>Issued</b>	<b>2017-02-22</b>

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

Standard Locations	$\vartheta_m$	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
Collector name													
Hybrid 260/900 Black		734	22		214			239	3		286	7	
Hybrid 265/900 Black		734	22		214			239	3		286	7	
Hybrid 270/900 Black		734	22		214			239	3		286	7	
Hybrid 275/900 Black		734	22		214			239	3		286	7	
Hybrid 280/900 Black		734	22		214			239	3		286	7	
Hybrid 285/900 Black		734	22		214			239	3		286	7	
Hybrid 290/900 Black		734	22		214			239	3		286	7	
Hybrid 295/900 Black		734	22		214			239	3		286	7	
Hybrid 300/900 Black		734	22		214			239	3		286	7	
Annual output per m <sup>2</sup> gross area		448	13		130			145	2		174	4	
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-Glycole	
Hybrid Thermal and Photo Voltaic collector	Yes	
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	5400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	35	m

**Energy Labelling Information**

	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
Hybrid 260/900 Black	1.64	Collector efficiency ( $\eta_{col}$ )	0 %
Hybrid 265/900 Black	1.64	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.	
Hybrid 270/900 Black	1.64		
Hybrid 275/900 Black	1.64		
Hybrid 280/900 Black	1.64		
Hybrid 285/900 Black	1.64		
Hybrid 290/900 Black	1.64		
Hybrid 295/900 Black	1.64		
Hybrid 300/900 Black	1.64		
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
		Zero-loss efficiency ( $\eta_0$ )	0.539 --
		First-order coefficient ( $a_1$ )	14.11 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.000 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.95 --
		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.	