


Annex to Solar Keymark Certificate		Licence Number		<b>011-7S2940 F</b>								
		Date issued		<b>2019-07-11</b>								
		Issued by		TÜV Rheinland Energy GmbH								
Licence holder	Solarbayer GmbH			Country	Germany							
Brand (optional)	Solarbayer GmbH			Web	www.solarbayer.de							
Street, Number	Am Dörrenhof 22			E-mail	info@solarbayer.de							
Postcode, City	85131, Pollenfeld-Preith			Tel	+49 (0)8421 93598-0							
Collector Type	Flat plate collector											
Collector name	Gross height	Gross area (A <sub>G</sub> )	Gross length	Gross width	Aperture area (A <sub>a</sub> )	Power output per collector						
						G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s ∅ <sub>m</sub> - ∅ <sub>a</sub>						
	mm	m <sup>2</sup>	mm	mm	m <sup>2</sup>	0 K	10 K	30 K	50 K	70 K	100 K	
						W	W	W	W	W	W	
<b>Premium Flair AL 2.85</b>	85	2.85	2 373	1 200	2.52	2 019	1 920	1 696	1 438	1 146	643	
<b>Premium Flair AL 2.52</b>	85	2.52	2 100	1 200	2.22	1 785	1 698	1 500	1 272	1 013	569	
Power output per m <sup>2</sup> gross area						708	674	595	505	402	226	
Performance parameters test method		Steady state - indoor										
Performance parameters (related to A <sub>G</sub> )		η <sub>0</sub> , b	a1	a2	a3	a4	a5	a6	a7	a8	Kd	
Units		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-	
Test results		0.725	3.33	0.015	0.000	0.00	0	0.000	0.00	0.0E+00	0.85	
Incidence angle modifier test method		Quasi dynamic - outdoor										
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal		K <sub>GT, coll</sub>	1.00	0.99	0.97	0.95	0.90	0.83	0.67	0.34	0.00	
Longitudinal		K <sub>GL, coll</sub>	1.00	0.99	0.97	0.95	0.90	0.83	0.67	0.34	0.00	
Heat transfer medium for testing		Water										
Flow rate for testing (per gross area, A <sub>G</sub> )		dm/dt	0.019	kg/(sm <sup>2</sup> )								
Maximum temperature difference during thermal performance test		(∅ <sub>m</sub> -∅ <sub>a</sub> ) <sub>max</sub>	70	K								
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ∅ <sub>a</sub> = 30 °C)		∅ <sub>stg</sub>	190	°C								
Maximum operating temperature		∅ <sub>max, op</sub>	240	°C								
Maximum operating pressure		p <sub>max, op</sub>	600	kPa								
Testing laboratory		TÜV Rheinland Energy GmbH			www.tuv.com\solarenergy							
Test report(s)		21219827_P3_AIAI; 21219827_PO 21219827_R0_AICu 21247191.001			Dated		24.05.2013 24.05.2013 09.07.2019					
Comments of testing laboratory		The efficiency parameter were recalculated on gross area according to EN ISO 9806:2017.						Datasheet version: 6.0, 2018-10-30				
						 TÜVRheinland <sup>®</sup> Genauig. Richtig. TÜV Rheinland Energy GmbH Am Dörrenhof 22 85131, Pollenfeld-Preith Erlangen-Klein						
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<b>Supplementary Information</b>							<b>Issued</b>		<b>2019-07-11</b>				
<b>Annual collector output in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>													
<b>Standard Locations</b>		<b>Athens</b>			<b>Davos</b>			<b>Stockholm</b>			<b>Würzburg</b>		
<b>Collector name</b>	$\vartheta_m$	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>
Premium Flair AL 2.85		3 110	2 180	1 373	2 353	1 590	956	1 732	1 111	647	1 879	1 193	683
Premium Flair AL 2.52		2 750	1 928	1 214	2 080	1 406	845	1 531	982	572	1 661	1 054	604
Annual output per m <sup>2</sup> gross area		1 091	765	482	826	558	335	608	390	227	659	418	240
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. 6.0 (October 2018). A detailed description of the calculations is available at <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													
<b>Additional Information</b>													
Collector heat transfer medium							Water-Glycole						
The collector is deemed to be suitable for roof integration							Yes						
The collector was tested successfully under the following conditions:													
Climate class (A+, A, B or C)							B			--			
G (W/m <sup>2</sup> ) >		900		$\vartheta_a$ (°C) >		15		H <sub>x</sub> (MJ/m <sup>2</sup> ) >		540			
Maximum tested positive load							3000			Pa			
Maximum tested negative load							2000			Pa			
Hail resistance using steel ball (maximum drop height)							25			m			
<b>Additional collector attribute(s)</b>													
<input type="checkbox"/> Using external power source(s) for normal operation				<input type="checkbox"/> Active or passive measure(s) for self-protection									
<input type="checkbox"/> Co-generating thermal and electrical power				<input type="checkbox"/> Wind and/or infrared sensitive collector(s) (WISC)									
<input type="checkbox"/> Façade collector(s)													
<b>Energy Labelling Information</b>													
		Reference Area, A <sub>sol</sub> (m <sup>2</sup> )			Hydraulic Designation Code								
Premium Flair 2.85		2.85			1-H-1234S-8.2,25300-20,1169								
Premium Flair 2.52		2.52			1-H-1234S-8.2,22000-20,1169								
<b>Data required for CDR (EU) No 811/2013 - Reference Area A<sub>sol</sub></b>				<b>Data required for CDR (EU) No 812/2013 - Reference Area A<sub>sol</sub></b>									
Collector efficiency ( $\eta_{col}$ )				55%			Zero-loss efficiency ( $\eta_0$ )			0.71		--	
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 <sub>sol</sub> ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.				First-order coefficient (a <sub>1</sub> )			3.33			W/(m <sup>2</sup> K)			
				Second-order coefficient (a <sub>2</sub> )			0.015			W/(m <sup>2</sup> K <sup>2</sup> )			
				Incidence angle modifier IAM (50°)			0.89			--			
				Remark: The data given in this section are related to collector reference area (A <sub>sol</sub> ) 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.									
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