



<b>Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results</b>					<b>Licence Number</b>		<b>OEM 10003/1</b>							
					<b>Date issued</b>		<b>2019-01-07</b>							
					<b>Issued by</b>		<b>DQS HELLAS</b>							
<b>Licence holder</b>		<b>CHARALAMPIDOU MARIA Co</b>			<b>Country</b>		<b>Greece</b>							
<b>Brand (optional)</b>		<b>PLANETSOL</b>			<b>Web</b>		<b>www.planetsol.gr</b>							
<b>Street, Number</b>		<b>Chiou 3</b>			<b>E-mail</b>		<b>info@planetsol.gr</b>							
<b>Postcode, City</b>		<b>12351 Ag. Barbara</b>			<b>Tel</b>		<b>+30 210 5694516</b>							
<b>Collector Type</b>					<b>Flat plate collector, glazed</b>									
<b>Collector name</b>					<b>Power output per collector</b> Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup> ϑm - ϑa									
					0 K	10 K	30 K	50 K	70 K	50 K				
					W	W	W	W	W	W				
PLS EPI 20 KNV					1.113	1.060	932	774	586	774				
PLS EPI 30 KNV					1.433	1.365	1.200	997	755	997				
PLS EPI 25 KNV					1.470	1.400	1.231	1.023	774	1.023				
PLS EPI 16 KNV					1.648	1.570	1.380	1.146	868	1.146				
PLS EPI 54 KNV					1.857	1.769	1.556	1.292	978	1.292				
<b>Power output per m<sup>2</sup> gross area</b>					<b>735</b>	<b>700</b>	<b>616</b>	<b>511</b>	<b>387</b>	<b>511</b>				
<b>Performance parameters test method</b>					<b>Steady state - outdoor</b>									
<b>Performance parameters (related to AG)</b>					η <sub>0,hem</sub>	a <sub>1</sub>	a <sub>2</sub>							
<b>Units</b>					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
<b>Test results</b>					<b>0,735</b>	<b>3,240</b>	<b>0,025</b>							
<b>Incidence angle modifier test method</b>					<b>Steady state - outdoor</b>									
<b>Bi-directional incidence angle modifiers</b>					<b>No</b>									
<b>Incidence angle modifier</b>					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Transversal</b>					K <sub>θT, coll</sub>					<b>0,93</b>			<b>0,00</b>	
<b>Longitudinal</b>					K <sub>θL, coll</sub>					<b>0,93</b>			<b>0,00</b>	
<b>Heat transfer medium for testing</b>					<b>Water</b>									
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					dm/dt		<b>0,021</b>	kg/(sm <sup>2</sup> )						
<b>Maximum temperature difference for thermal performance calculations</b>					(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>		<b>50</b>	K						
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; ϑ<sub>a</sub> = 30 °C)</b>					ϑ <sub>stg</sub>		<b>146</b>	°C						
<b>Effective thermal capacity, incl. fluid (per gross area, A<sub>G</sub>)</b>					C/m <sup>2</sup>		<b>10,7</b>	kJ/(Km <sup>2</sup> )						
<b>Maximum operating temperature</b>					ϑ <sub>max, op</sub>		<b>100</b>	°C						
<b>Maximum operating pressure</b>					p <sub>max, op</sub>		<b>1000</b>	kPa						
<b>Testing laboratory</b>					<b>NCSR "DEMOKRITOS"</b>			<b>www.solar.demokritos.gr</b>						
<b>Test report(s)</b>					4191DE1, 4192DE1 4193DE1 1247DE1			<b>Dated</b>		11/10/2016 25/10/2016 8/5/2017				
<b>Comments of testing laboratory</b>					Datasheet version: 5.01, 2016-03-01									
<b>Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +30 210 6233493-4 , Fax: +30 210 6233495, http://www.dqshellas.gr, e-mail: ioannisalexidou@dqshellas.gr</b>														



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	OEM 10003/1
	Issued	2019-01-07

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
Collector name	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
PLS EPI 20 KNV		1.760	1.234	743	1.333	879	485	985	620	335	1.070	670	356
PLS EPI 30 KNV		2.266	1.590	957	1.717	1.132	625	1.268	798	432	1.378	862	459
PLS EPI 25 KNV		2.324	1.631	981	1.761	1.161	641	1.301	819	443	1.413	885	471
PLS EPI 16 KNV		2.606	1.828	1.100	1.974	1.302	719	1.458	918	497	1.584	992	528
PLS EPI 54 KNV		2.937	2.060	1.240	2.225	1.467	810	1.643	1.035	560	1.785	1.118	595
Annual output per m <sup>2</sup> gross area		1.162	815	491	881	581	321	650	409	221	707	442	235
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	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	2400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information			
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
PLS EPI 20 KNV	1,51	Collector efficiency ( $\eta_{col}$ )	57 %
PLS EPI 30 KNV	1,95	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.	
PLS EPI 25 KNV	2,00		
PLS EPI 16 KNV	2,24		
PLS EPI 54 KNV	2,53		
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
		Zero-loss efficiency ( $\eta_0$ )	0,735 --
		First-order coefficient ( $a_1$ )	3,24 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0,025 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,93 --
		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.	