


<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>						<b>Licence Number</b>		<b>011-7S1493 F</b>			
						<b>Issued</b>		<b>2016-06-09</b>			
<b>Company holding the</b>		<b>DIMAS SA</b>				<b>Country</b>		<b>Greece</b>			
<b>Brand (optional)</b>						<b>Website</b>		<b>www.dimas-solar.gr</b>			
<b>Street, street number</b>		<b>2nd km Argos – Nafplion road</b>				<b>E-mail</b>		<b>info@dimas-solar.gr</b>			
<b>Postal Code / City, province</b>		<b>21200 Argos</b>				<b>Tel/Fax</b>		<b>+30 27510 20920 / -62671</b>			
<b>Collector Type (flat plate glazed/un-glazed; evacuate tubular)</b>						<b>Flat plate collector - glazed</b>					
<b>Thermal / photo voltaic hybrid collector? (PVT collector)</b>						<b>No</b>					
<b>Integration in the roof possible ? (manufacturers declaration)</b>						<b>No</b>					
	<b>Collector name</b>	<b>Aperture area (Aa)</b> m <sup>2</sup>	<b>Gross length</b> mm	<b>Gross width</b> mm	<b>Gross height</b> mm	<b>Gross area (AG)</b> m <sup>2</sup>	<b>Power output per collector module</b>				
							<b>G = 1000 W/m<sup>2</sup></b>				
							<b>Tm-Ta</b>				
							<b>0 K</b>	<b>10 K</b>	<b>30 K</b>	<b>50 K</b>	<b>70 K</b>
							<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>
<b>SOL+29</b>		<b>2.71</b>	<b>2 006</b>	<b>1 457</b>	<b>103</b>	<b>2.92</b>	<b>2 154</b>	<b>2 053</b>	<b>1 833</b>	<b>1 588</b>	<b>1 320</b>
<b>SOL+25*</b>		<b>2.33</b>	<b>2 006</b>	<b>1 257</b>	<b>103</b>	<b>2.52</b>	<b>1 852</b>	<b>1 765</b>	<b>1 576</b>	<b>1 366</b>	<b>1 135</b>
<b>SOL+23*</b>		<b>2.03</b>	<b>1 893</b>	<b>1 183</b>	<b>103</b>	<b>2.24</b>	<b>1 614</b>	<b>1 538</b>	<b>1 373</b>	<b>1 190</b>	<b>989</b>
<b>SOL+20</b>		<b>1.83</b>	<b>2 006</b>	<b>1 007</b>	<b>103</b>	<b>2.02</b>	<b>1 455</b>	<b>1 386</b>	<b>1 238</b>	<b>1 073</b>	<b>892</b>
<b>Performance test method</b>		<b>Glazed liquid heating collector - steady state - outdoor</b>									
<b>Performance parameters related to aperture area</b>		$\eta_0$	a1	a2							
<b>Units</b>		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
<b>Test results - Flow rate and fluid see note 1</b>		<b>0.795</b>	<b>3.627</b>	<b>0.011</b>							
<b>Bi-directional incidence angle modifiers?</b>		<b>No</b> <i>K<math>\theta</math> values are obligatory for 50°.</i>									
<b>Incidence angle modifiers K<math>\theta</math>(<math>\theta</math>)</b>		<b>Angle</b>	<b>10°</b>	<b>20°</b>	<b>30°</b>	<b>40°</b>	<b>50°</b>	<b>60°</b>	<b>70°</b>	<b>80°</b>	<b>90°</b>
		<b>K<math>\theta</math>(<math>\theta</math>)</b>	<b>1.00</b>	<b>0.99</b>	<b>0.98</b>	<b>0.97</b>	<b>0.94</b>	<b>0.89</b>	<b>0.79</b>	<b>0.47</b>	<b>0.00</b>
<b>Incidence angle modifier not bi-directional - leave fields blank</b>											
<b>Stagnation temperature - Weather conditions see note 2</b>						<b>Tstg</b>		<b>185</b>		<b>°C</b>	
<b>Effective thermal capacity</b>						<b>ceff = C/Ag</b>		<b>11.22</b>		<b>kJ/(m<sup>2</sup>K)</b>	
<b>Max. intended operation temperature - see note 3</b>						<b>Tmax,op</b>				<b>°C</b>	
<b>Max. operation pressure - see note 3</b>						<b>pmax,op</b>		<b>1600</b>		<b>kPa</b>	
<b>Pressure drop table - for a collector family, the values shall be for the module with highest <math>\Delta P</math> per m<sup>2</sup> aperture area</b>											
<b>Flow rate</b>	kg/(s m <sup>2</sup> )	-	-	-	-	-	-	-	-	-	-
<b>Pressure drop, <math>\Delta P</math></b>	Pa	-	-	-	-	-	-	-	-	-	-
<b>Optional weather data</b>		<b>Location</b>				<b>Link</b>					
<b>Testing Laboratory</b>		<b>TZS, ITW University Stuttgart</b>									
<b>Website</b>		<b>http://www.itw.uni-stuttgart.de</b>									
<b>Test report id. number</b>						<b>10COL931/1, 10COL932/1, 10COL932Q/1</b>		<b>Date of test report</b>		<b>2013.08.01</b>	
<b>During the test GDIF/GTOT was always between</b>		<b>0</b>		<b>and</b>		<b>1</b>					
<b>Comments of testing laboratory:</b>											
<i>*dimensions according to manufacturer</i>											
This data sheet replaces the data sheet issued on 11.04.2011											
The data sheet is issued on the newest version 4.06.											
<b>Note 1</b>		<b>Flow rate</b>	<b>0.020</b>	kg/(s m <sup>2</sup> )	<b>Fluid</b>	<b>Water</b>					
<b>Note 2</b>		<b>Irradiance, G = 1000 W/m<sup>2</sup>; Ambient temperature, Ta=30 °C</b>									
<b>Note 3</b>		<b>Given by manufacturer</b>									
						 <small>Forschungs- und Testzentrum für Solaranlagen        Institut für Photovoltaik (F. Ag.)/Statistik        Universität Stuttgart        Pfaffenwaldring 8, 70569 Stuttgart (Vaihingen)</small>					
						Datasheet version: 4.06, 2014-01-15					
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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S1493 F
	Issued	09.06.2016

Annual collector output kWh/module														
Collector name	Location and collector temperature (T <sub>m</sub> )													
	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		
SOL+29	3 430	2 481	1 666	2 624	1 848	1 203	1 928	1 285	803	2 095	1 388	853		
SOL+25	2 949	2 133	1 433	2 256	1 589	1 034	1 658	1 105	691	1 801	1 194	734		
SOL+23	2 569	1 858	1 248	1 965	1 385	901	1 444	962	602	1 569	1 040	639		
SOL+20	2 316	1 675	1 125	1 772	1 248	812	1 302	868	542	1 414	937	576		

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	G <sub>tot</sub> kWh/m <sup>2</sup>	T <sub>a</sub> °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

G <sub>tot</sub>	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
T <sub>a</sub>	Mean annual ambient air temperature	°C
T <sub>m</sub>	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (T<sub>m</sub>). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

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	ScenoCalc version: Ver. 4.06 (Jan, 2014)