


<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>						<b>Licence Number</b>		<b>011-7S2611 F</b>							
						<b>Issued</b>		<b>2016-05-24</b>							
<b>Company holding the</b>			<b>CMG SOLARI SRL</b>			<b>Country</b>		<b>Italien</b>							
<b>Brand (optional)</b>						<b>Website</b>		<b>www.cmgsolari.it</b>							
<b>Street, street number</b>			<b>C. da VORE n.1 - Z.I.</b>			<b>E-mail</b>		<b>info@cmgsolari.it</b>							
<b>Postal Code / City, province</b>			<b>73040/Melissano</b>			<b>Tel/Fax</b>		<b>+34/8330581428</b>							
<b>Collector Type (flat plate glazed/un-glazed; evacuate tubular)</b>						<b>Flat plate collector - glazed</b>									
Thermal / photo voltaic hybrid collector? (PVT collector)						No									
Integration in the roof possible ? (manufacturers declaration)						No									
						<b>Power output per collector module</b>									
						G = 1000 W/m <sup>2</sup>									
						Tm-Ta									
						0 K	10 K	30 K	50 K	70 K					
<b>Collector name</b>						<b>m<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>mm</b>	<b>m<sup>2</sup></b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>
Excel 2900						2.71	2 006	1 457	103	2.92	2 154	2 053	1 833	1 588	1 320
Excel 2500*						2.33	2 006	1 257	103	2.52	1 852	1 765	1 576	1 366	1 135
Excel 2300*						2.03	1 893	1 183	103	2.24	1 614	1 538	1 373	1 190	989
Excel 2000						1.83	2 006	1 007	103	2.02	1 455	1 386	1 238	1 073	892
<b>Performance test method</b>						<b>Glazed liquid heating collector - steady state - outdoor</b>									
<b>Performance parameters related to aperture</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>						0.795	3.627	0.011							
<b>Bi-directional incidence angle</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>						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
						K $\theta$ ( $\theta$ )	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00
<b>Incidence angle modifier not bi-directional - leave fields blank</b>															
<b>Stagnation temperature - Weather conditions see note 2</b>						Tstg		185		°C					
<b>Effective thermal capacity</b>						ceff = C/Ag		11.22		kJ/(m <sup>2</sup> K)					
<b>Max. intended operation temperature - see note 3</b>						Tmax,op				°C					
<b>Max. operation pressure - see note 3</b>						pmax,op		1600		kPa					
<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>		Location			Link										
<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>		10COL931/10EM03, 10COL932/10EM03, 10COL932Q/10EM03					<b>Date of test report</b>			2016.05.24					
During the test GDIF/GTOT was always between		0		and		1									
<b>Comments of testing laboratory:</b>															
* dimensions according to manufacturer															
<b>Note 1</b>	<b>Flow rate</b>	0.020	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>														
															
						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	011-7S2611 F
	Issued	24.05.2016

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		
Excel 2900	3 430	2 481	1 666	2 624	1 848	1 203	1 928	1 285	803	2 095	1 388	853		
Excel 2500	2 949	2 133	1 433	2 256	1 589	1 034	1 658	1 105	691	1 801	1 194	734		
Excel 2300	2 569	1 858	1 248	1 965	1 385	901	1 444	962	602	1 569	1 040	639		
Excel 2000	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>.