

<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>		<b>Certificate No.</b>	<b>011-7S1243 R</b>
		Date of issue	21.05.2010
<b>Company</b>	Spring Solar Ltd.	<b>Country</b>	Hungary
<b>Brand (optional)</b>		<b>Website</b>	<a href="http://www.springsolar.hu">www.springsolar.hu</a>
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<b>City</b>	Seregélyes-Jánosmajor	<b>Fax</b>	+36 22 501 264
<b>Collector Type</b> (flat plate / evacuate tubular / un-glazed)		Evacuated tubular collector	
<b>Integration in the roof possible ?</b>		No	

Collector name	Aperture area (A <sub>a</sub> ) [m <sup>2</sup> ]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A <sub>G</sub> ) [m <sup>2</sup> ]	Power output per collector unit G = 1000 W/m <sup>2</sup> T <sub>m</sub> -T <sub>a</sub> :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
SK8-CPC	1.25	1645	905	96	1.49	800	789	760	720	668
SK12-CPC	1.88	1 645	1 345	96	2.21	1 203	1 187	1 143	1 082	1 005

<b>Collector efficiency parameters related to aperture area (A<sub>a</sub>)</b> Type of fluid and flow rate see note 1	η <sub>0a</sub>	0.640	-
	a <sub>1a</sub>	0.736	W/(m <sup>2</sup> K)
	a <sub>2a</sub>	0.011	W/(m <sup>2</sup> K <sup>2</sup> )

<b>Stagnation temperature</b> - Weather conditions see note 2	t <sub>stg</sub>	286	°C
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<b>Effective thermal capacity</b>	C <sub>eff</sub> = C/A <sub>a</sub>	30.96	kJ/(m <sup>2</sup> K)
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<b>Max. operation pressure</b> - see note 3	p <sub>max</sub>	1000	kPa
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Incidence angle modifiers K <sub>θ</sub> (θ)	G <sub>DIF</sub> /G <sub>TOT</sub>		θ <sub>T</sub> / θ <sub>L</sub>	50°	10°	20°	30°	40°	60°	70°
	min	max	K <sub>θ</sub> (θ <sub>T</sub> )	1.05	1.02	1.03	1.04	1.04	1.21	1.39
	-	-	K <sub>θ</sub> (θ <sub>L</sub> )	0.87	1.00	0.99	0.96	0.93	0.77	0.61
G <sub>DIF</sub> /G <sub>TOT</sub> : min&max - while measuring					<b>Optional values</b>					

<b>Testing Laboratory</b>	TZS, ITW University of Stuttgart
<b>Website</b>	<a href="http://www.tzs.uni-stuttgart.de">www.tzs.uni-stuttgart.de</a>
<b>Test report id. number</b>	09COL844, 09COL844Q/1, 09COL843
<b>Date of test report</b>	21.05.2010
<b>Perf. test method</b>	EN 12975-2 6.1.4 (outdoor)

**Comments of testing laboratory :**

Note 1	Fluid	Water	Flow rate	0.024	kg/s per m <sup>2</sup>	 <p>Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Solarthermie Universität Stuttgart Pfaulshalden 6, 70569 Stuttgart (Vaihingen)</p>
Note 2	Irradiance, G <sub>s</sub> =1000 W/m <sup>2</sup>					
Note 3	Ambient temperature, T <sub>a</sub> =30 °C					
	Given by manufacturer					



**Annual collector output based on EN 12975 Test Results,  
annex to Solar KEYMARK Certificate**

**Certificate No.**

**011-7S1243 R**

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**Annual collector output kWh**

**Location and collector temperature (T<sub>m</sub>)**

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
SK8-CPC	1402	1265	1082	1296	1139	947	881	755	612	943	810	657
SK12-CPC	2 109	1 903	1 627	1 949	1 713	1 424	1 325	1 136	920	1 418	1 218	988

**Collector mounting: Fixed or tracking**

Fixed; slope = latitude - 15° (rounded to nearest 5°)

**Overview of locations**

Location	Latitude °	Gtot kWh/m <sup>2</sup>	Ta °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°

Gtot	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

Calculation of the annual collector performance is done by the official Solar Keymark spreadsheet tool. Hour by hour the collector output is calculated according to the efficiency parameters from the Keymark test using constant collector operating temperature (T<sub>m</sub>). Detailed description with all equations used is available from the Solar Keymark web site (direct link: <http://www.estif.org/solarkeymark/annexb1.php>)

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Datasheet version:

VERSION 3.6, 2012.01.13

Calculation program version:

3.07, October 2011 (SP)