



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate		Certificate No.	011-7S2290 R
		Date of issue	10.01.2013
Company	Sinuta4Sun, Lda	Country	Portugal
Brand (optional)	--	Website	www.sinuta4sun.pt
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Collector Type (flat plate / evacuate tubular / un-glazed) **Evacuated tubular collector**

Integration in the roof possible ? **No**

Collector name	Aperture area (A _a) [m ²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A _g) [m ²]	Power output per collector unit G = 1000 W/m ² T _m -T _a :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
4Sun VAC20	1.89	1'990	1'403	153	2.79	1'236	1'200	1'122	1'033	934
4Sun VAC30	2.84	1'990	2'100	153	4.18	1'857	1'804	1'685	1'552	1'404

Collector efficiency parameters related to aperture area (A_a) Type of fluid and flow rate see note 1	η _{0a}	0.654	-
	a _{1a}	1.82	W/(m ² K)
	a _{2a}	0.0066	W/(m ² K ²)

Stagnation temperature - Weather conditions see note 2 **t_{stg}** **199** °C

Effective thermal capacity **C_{eff} = C/A_a** **14.2** kJ/(m²K)

Max. operation pressure - see note 3 **p_{max}** **600** kPa

Incidence angle modifiers K _θ (θ)	G _{DIF} /G _{TOT}		θ _T / θ _L	50°	10°	20°	30°	40°	60°	70°
	min	max								
	G _{DIF} /G _{TOT} : min&max - while measuring			K _θ (θ _L)	0.94	1.00	1.00	0.99	0.97	0.87

Optional values

Testing Laboratory	SPF, CH-8640 Rapperswil
Website	www.solarenergy.ch
Test report id. number	C1616LPEN, C1617LPEN, C1617QPEN
Date of test report	20.12.2013 / 20.12.2013 / 20.12.2013
Perf. test method	EN 12975-2 6.1.4 (outdoor)

Comments of testing laboratory :

Note 1	Fluid	Water-Glycole	Flow rate	0.019 kg/s per m ²	Dr. Andreas Bohren
Note 2	Irradiance, G_s=1000 W/m²				
Note 3	Ambient temperature, T_a=30 °C				
	Given by manufacturer				



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

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Annual collector output kWh

Collector name	Location and collector temperature (Tm)											
	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
4Sun VAC20	2'329	1'959	1'592	2'076	1'723	1'372	1'402	1'117	864	1'514	1'209	931
4Sun VAC30	3'500	2'944	2'392	3'119	2'589	2'062	2'107	1'678	1'298	2'275	1'817	1'399

Collector mounting: Fixed or tracking Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	Gtot kWh/m²	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/m²
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 (Tm). 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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