



**Summary of EN 12975 Test Results,
annex to Solar KEYMARK Certificate**

Certificate No. 011-7S544 F
Date of issue 31-01-2013

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Collector Type (flat plate / evacuate tubular / un-glazed) Flat plate 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]
ES1V/2,0S; ES1V/2,0B	1.863	2.007	1.006	85	2.019	1.490	1.422	1.266	1.085	879

Collector efficiency parameters related to aperture area (A_a) Type of fluid and flow rate see note 1	η_{0a}	0.800	-
	a _{1a}	3.498	W/(m ² K)
	a _{2a}	0.017	W/(m ² K ²)

Stagnation temperature - Weather conditions see note 2 t_{stg} 163 °C

Effective thermal capacity C_{eff} = C/A_a 10.64 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	K _θ (θ _T)	0.89	1.00	0.99	0.97	0.94	0.81	0.63
	G _{DIF} /G _{TOT} : min&max - while measuring		K _θ (θ _L)	0.89	1.00	0.99	0.97	0.94	0.81	0.63
						<i>Optional values</i>				

Testing Laboratory	TÜV Energie und Umwelt GmbH
Website	www.eco-tuv.de
Test report id. number	21209466b; 21221078_EN_P
Date of test report	29-06-2010; 31-01-2013
Perf. test method	EN 12975-2 6.1.5 (indoor)

Comments of testing laboratory :

The only difference for S and B is a silver or dark brown coated aluminium frame.

Note 1	Fluid Water	Flow rate 0.022 kg/s per m ²	 TÜV Rheinland Energie und Umwelt GmbH Am Graefen Stein D - 51105 Köln
Note 2	Irradiance, G_s=1000 W/m² Ambient temperature , T_a=30 °C		
Note 3	Given by manufacturer		



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S544 F
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Annual collector output kWh														
Collector name	Location and collector temperature (T _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		
ES1V/2,0S; ES1V/2,0B	2 155	1 455	879	1 708	1 102	624	1 179	725	403	1 283	780	426		

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

Overview of locations				
Location	Latitude °	Gtot kWh/m ²	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 ²
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_m). 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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	VERSION 3.5, 2012.01.13
	Calculation program version:
	3.07, October 2011 (SP)