TÜVRheinland®
DIN CERTCO

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	**Certificate No.**	**011-7S2277 F**
	Date of issue	05-11-2013

Company	Solarpartner GmbH	**Country**		Switzerland
Brand (optional)	- - -	**Website**		www.solarpartner-systeme.ch
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City	Nesslau	**Fax**	+41	71 995 50 19

Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
Integration in the roof possible ?	No

	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector unit G = 1000 W/m² Tm-Ta : 0 K	10 K	30 K	50 K	70 K
Collector name	[m²]	[mm]	[mm]	[mm]	[m²]	[W]	[W]	[W]	[W]	[W]
Sopra	2.440	2 356	1 120	85	2.639	2 011	1 932	1 732	1 474	1 158

Collector efficiency parameters related to aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0.824	-
	a_{1a}	2.905	W/(m²K)
	a_{2a}	0.030	W/(m²K²)
Stagnation temperature - Weather conditions see note 2	t_{stg}	0	°C
Effective thermal capacity	$c_{eff} = C/A_a$	6.817	kJ/(m²K)
Max. operation pressure - see note 3	p_{max}	600	kPa

Incidence angle modifiers $K_\theta(\theta)$	G_{DIF}/G_{TOT} min	G_{DIF}/G_{TOT} max	θ_T / θ_L	50°	*10°*	*20°*	*30°*	*40°*	*60°*	*70°*
			$K_\theta(\theta_T)$	0.85	*1.00*	*0.98*	*0.96*	*0.92*	*0.73*	*0.49*
	0.057	0.157	$K_\theta(\theta_L)$	0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
G_{DIF}/G_{TOT}: min&max - while measuring					***Optional values***					

Testing Laboratory	TÜV Energie und Umwelt GmbH
Website	www.eco-tuv.de
Test report id. number	21223520_EN_P; 21223520_EN_R
Date of test report	all: 5 November 2013
Perf. test method	EN 12975-2 6.3 (outdoor)

Comments of testing laboratory :

Note 1	**Fluid**	Water	**Flow rate**	0.022	kg/s per m²
Note 2	**Irradiance, Gs=1000 W/m²** **Ambient temperature , Ta=30 °C**				
Note 3	**Given by manufacturer**				

TÜV Rheinland Energie und Umwelt GmbH
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VERSION 3.5, 2012.01.13

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S2277 F
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Annual collector output kWh

	Location and collector temperature (Tm)														
	Athens			Davos			Stockholm			Würzburg					
Collector name	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C			
Sopra	2 714	1 981	1 321	2 242	1 573	995	1 535	1 029	635	1 665	1 110	673			

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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Datasheet version:
VERSION 3.5, 2012.01.13
Calculation program version:
3.07, October 2011 (SP)