TÜVRheinland®
DIN CERTCO

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S2183 F
	Date of issue	24-06-2013

Company	Winkler Solar GmbH	**Country**		Austria
Brand (optional)	Winkler	**Website**		www.winklersolar.com
Street, number	Räterweg 17	**E-mail**		solar@winklersolar.con
Postal Code	6800	**Tel.**	+43	(0)5522 76139
City	Feldkirch	**Fax**	+43	(0)5522 76121

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

Collector name	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
	[m²]	[mm]	[mm]	[mm]	[m²]	[W]	[W]	[W]	[W]	[W]
Metrosol 20	1.867	1 675	1 200	55	2.010	1 445	1 365	1 188	988	766
Metrosol 25	2.348	2 090	1 200	45	2.508	9 692	9 732	9 732	9 732	9 732

Collector efficiency parameters related to aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0.774	-
	a_{1a}	4.145	W/(m²K)
	a_{2a}	0.015	W/(m²K²)
Stagnation temperature - Weather conditions see note 2	t_{stg}	182.1	°C
Effective thermal capacity	$c_{eff} = C/A_a$	5.23	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°
			$K_\theta(\theta_T)$	0.86	1.00	0.98	0.96	0.92	0.74	0.51
	0.16	0.89	$K_\theta(\theta_L)$	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	TUV Energie und Umwelt GmbH
Website	www.eco-tuv.de
Test report id. number	21221539_EN_P_MS20; 21221539_EN_R_MS25
Date of test report	24-06-2013
Perf. test method	EN 12975-2 6.1.5 (indoor)

Comments of testing laboratory :

Note 1	**Fluid**	Water	**Flow rate**	0.026	**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
Am Grauen Stein
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VERSION 3.5, 2012.01.13

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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S2183 F
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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
Metrosol 20	2 131	1 418	846	1 679	1 076	605	1 159	711	395	1 259	759	412
Metrosol 25	2 680	1 784	1 064	2 111	1 354	761	1 458	895	497	1 584	954	519

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)