TÜVRheinland®
DIN CERTCO

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S1878 F
	Date of issue	05-03-2012

Company	General solar systems GmbH	**Country**		Austria
Brand (optional)	GK 3501-FL	**Website**		www.sonnenkraft.com
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Postal Code	9300	**Tel.**	+43	(0)4212-45010-441
City	St. Veit	**Fax**	+43	(0)4212-45010-447

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

Collector name	Aperture area (A_a) [m²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A_G) [m²]	Power output per collector unit G = 1000 W/m², Tm-Ta : 0 K [W]	10 K [W]	30 K [W]	50 K [W]	70 K [W]
SONNENKRAFT GK5-HP	4.64	2065	2443	113	5.04	3754	3614	3293	2917	2484
SONNENKRAFT GK10-HP	9.28	2065	4871	113	10.06	7508	7228	6587	5833	4969

Collector efficiency parameters related to aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0.81	-
	a_{1a}	2.86	W/(m²K)
	a_{2a}	0.02	W/(m²K²)
Stagnation temperature - Weather conditions see note 2	t_{stg}	199	°C
Effective thermal capacity	c_{eff} = C/Aa	6.33	kJ/(m²K)
Max. operation pressure - see note 3	p_{max}	1000	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°*
			$K_\theta(\theta_T)$	0.95	*1.00*	*0.99*	*0.99*	*0.97*	*0.90*	*0.81*
	0.12	0.99	$K_\theta(\theta_L)$	0.95	*1.00*	*0.99*	*0.99*	*0.97*	*0.90*	*0.81*
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	21218595_EN_P_GK5-HP_Report; 21218595_EN_R_GK5-HP_Report
Date of test report	07-03-2012
Perf. test method	EN 12975-2 6.3 (outdoor)

Comments of testing laboratory :

Note 1	**Fluid**	Water	**Flow rate**	0.020	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

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S1878 F
	Issued	05-03-2012

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			
SONNENKRAFT GK5-HP	6073	4662	3316	5147	3813	2578	3514	2488	1640	3803	2694	1747			
SONNENKRAFT GK10-HP	12146	9324	6631	10295	7626	5155	7027	4977	3280	7607	5387	3493			

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	1765	18.5	South, 25°
Davos	47	1714	3.2	South, 30°
Stockholm	59	1166	7.5	South, 45°
Würzburg	50	1244	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:
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Calculation program version:
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