TÜVRheinland®
DIN CERTCO

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence number	011-7S278 F
	Date of issue	22-11-2012

Company holding the licence	WESTFA Vertriebs- und Verwaltungs GmbH	**Country**		Germany
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Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
Integration in the roof possible ?	Yes

Collector name	Aperture area (Aa) [m²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (AG) [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]
INTEGRO 2500	2.335	2055	1227	106	2.521	1733	1671	1507	1288	1015
INTEGRO 5000	4.620	2055	2456	106	5.041	3428	3307	2982	2549	2008
INTEGRO 7500	6.930	2055	3684	106	7.570	5142	4960	4473	3824	3012
INTEGRO 10000	9.240	2055	4912	106	10.094	6856	6613	5965	5099	4015

Collector efficiency parameters related to aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0.742	-
	a_{1a}	2.3340	W/(m²K)
	a_{2a}	0.0294	W/(m²K²)
Stagnation temperature - Weather conditions see note 2	t_{stg}	206	°C
Effective thermal capacity	$c_{eff} = C/A_a$	6.593	kJ/(m²K)
Max. operation pressure - see note 3	p_{max}	1000	kPa

Incidence angle modifiers $K_\theta(\theta)$	G_{DIF}/G_{TOT} min	max	θ_T / θ_L	50°	10°	20°	30°	40°	60°	70°
	0.15	0.28	$K_\theta(\theta_T)$	0.949						
			$K_\theta(\theta_L)$	0.949						
G_{DIF}/G_{TOT}: min&max - while measuring					*Optional values*					

Testing Laboratory	IZES gGmbH, TZSB an der HTW
Website	www.izes.de/tzsb/
Test report id. number	KT07_03, KT07_05
Date of test report	11-10-2007
Perf. test method	EN 12975-2 6.1.4 (outdoor)

Comments of testing laboratory :

Abmaße der Kollektorgrößen aus Angaben des Herstellers / sizes of the collector sizes based on manufacturer information; Leistung je Kollektormodul (0 K - 70 K) mit Kollektorleistungsparametern des Kollektors INTEGRO 2500 (Prüfberichtsnummer: KT07_03) berechnet / the power output per collector unit (0 K - 70 K) is calculated based on the performance parameters of collector INTEGRO 2500 (test report number: KT07_03) .

Note 1	**Fluid**	Water	**Flow rate**	0.0103	kg/s per m²
Note 2	**Irradiance, Gs=1000 W/m²; Ambient temperature , Ta=30 °C**				
Note 3	**Given by manufacturer**				

tzsb Testzentrum Saarbrücken Altenkesseler Str. 17 Gebäude D2 66115 Saarbrücken

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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence number	011-7S278 F
	Issued	22-11-2012

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			
INTEGRO 2500	2813	2125	1379	2382	1672	978	1631	1104	640	1767	1199	683			
INTEGRO 5000	5567	4204	2728	4713	3308	1934	3228	2185	1266	3496	2372	1351			
INTEGRO 7500	8350	6306	4093	7070	4962	2902	4842	3277	1898	5244	3558	2027			
INTEGRO 10000	11133	8408	5457	9426	6615	3869	6456	4370	2531	6991	4744	2703			

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:
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Calculation program version:
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