

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate		Licence number	011-75060 R
		Date of issue	07.11.2013
Company holding the licence	Kingspan Environmental Ltd.	Country	United Kingdom
Brand (optional)	Thermomax	Website	www.kingspanenviro.co.uk
Street, number	180 Gilford Road	E-mail	web@kingspanenviro.co.uk
Postal Code	BT63 5LF	Tel.	+44 (0)28 3836 4400
City	Portadown	Fax	+44 (0)28 3836 4445
Collector Type (flat plate / evacuate tubular / un-glazed)		Evacuated tubular collector	
Integration in the roof possible ?		No	

Collector name	Aperture area (Aa) [m ²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (Ag) [m ²]	Power output per collector unit G = 1000 W/m ² Tm-Ta :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
Thermomax DF 100 10	1.07	1 996	709	97	1.42	827	811	775	735	689
Thermomax DF 100 20	2.15	1 996	1 418	97	2.83	1 662	1 630	1 558	1 476	1 384
Thermomax DF 100 30	3.23	1 996	2 127	97	4.25	2 497	2 449	2 341	2 217	2 079

Collector efficiency parameters related to aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0.773	-
	a_{1a}	1.43	W/(m ² K)
	a_{2a}	0.006	W/(m ² K ²)

Stagnation temperature - Weather conditions see note 2	t_{stg}	286	°C
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Effective thermal capacity	$c_{eff} = C/Aa$	9.3	kJ/(m ² K)
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Max. operation pressure - see note 3	p_{max}	800	kPa
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Incidence angle modifiers $K_{\theta}(\theta)$	$K_{\theta d}$	0.88	θ_r / θ_L 50°		10°	20°	30°	40°	60°
			$K_{\theta}(\theta_r)$	0.99	1.00	1.02	1.04	1.05	0.85
			$K_{\theta}(\theta_L)$	0.92	1.00	0.99	0.98	0.96	0.86
<i>Optional values</i>									

Testing Laboratory	Institut für Solarenergieforschung Hameln
Website	www.isfh.de
Test report id. number	106-06/D3; 107-06/D3; 108-06/Q3; 19-09/KD
Date of test report	09.03.09; 09.03.09; 09.03.09; 05.06.09
Perf. test method	EN 12975-2 6.1.5 (indoor/innen/intérieur)

Comments of testing laboratory :

Note 1	Fluid	Water	Flow rate	0.020 kg/s per m ²		
Note 2	Irradiance, G_s=1000 W/m²; Ambient temperature , Ta=30 °C					
Note 3	Given by manufacturer					



Annual collector output based on EN 12975 Test Results,
annex to Solar KEYMARK Certificate

Licence number

011-7S060 R

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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
Thermomax DF 100 10	1 359	1 189	1 014	1 230	1 065	896	831	695	569	893	748	610
Thermomax DF 100 20	2 732	2 390	2 037	2 472	2 139	1 800	1 671	1 397	1 144	1 795	1 502	1 226
Thermomax DF 100 30	4 104	3 590	3 061	3 714	3 214	2 704	2 510	2 098	1 719	2 697	2 257	1 842

Collector mounting: Fixed or tracking

Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	G _{tot} kWh/m ²	T _a °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°

G _{tot}	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	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>)