Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence number	011-7S1946 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)	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]
Thermomax DF 400 20	2.15	1 954	1 416	93	2.77	1 649	1 619	1 551	1 474	1 389
Thermomax DF 400 30	3.22	1 954	2 125	93	4.15	2 473	2 428	2 327	2 212	2 083

Collector efficiency parameters related to aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0.768	-
	a_{1a}	1.36	W/(m²K)
	a_{2a}	0.0053	W/(m²K²)
Stagnation temperature - Weather conditions see note 2	t_{stg}	313	°C
Effective thermal capacity	$c_{eff} = C/A_a$	8	kJ/(m²K)
Max. operation pressure - see note 3	p_{max}	800	kPa

Incidence angle modifiers $K_\theta(\theta)$			θ_T / θ_L	50°	10°	20°	30°	40°	60°
	$K_{\theta d}$	0.88	$K_\theta(\theta_T)$	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
					Optional values				

Testing Laboratory	Institut für Solarenergieforschung Hameln
Website	www.isfh.de
Test report id. number	46-12/KD; 90-12/KQ
Date of test report	08.06.2012; 06.07.2012
Perf. test method	EN 12975-2 6.1.5 (indoor)

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**					

Institut für Solarenergieforschung GmbH
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D-31860 Emmerthal
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VERSION 3.6, 2012.01.20

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence number	011-7S1946 R
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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			
Thermomax DF 400 20	2 724	2 401	2 073	2 474	2 162	1 846	1 671	1 413	1 175	1 795	1 519	1 259			
Thermomax DF 400 30	4 079	3 597	3 104	3 705	3 238	2 765	2 503	2 116	1 759	2 689	2 274	1 886			

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:
3.07, October 2011 (SP)