



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate		Licence number	011-751793 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 HP 400 20	2.13	1 952	1 418	93	2.77	1 598	1 570	1 504	1 421	-
Thermomax HP 450 20	2.13	1 952	1 418	93	2.77	1 598	1 570	1 504	1 421	1 322
Thermomax HP 400 30	3.20	1 952	2 127	93	4.15	2 400	2 359	2 259	2 135	-
Thermomax HP 450 30	3.20	1 952	2 127	93	4.15	2 400	2 359	2 259	2 135	1 987

Collector efficiency parameters related to aperture area (Aa)	η_{0a}	0.750	-
Type of fluid and flow rate see note 1	a_{1a}	1.18	W/(m ² K)
	a_{2a}	0.010	W/(m ² K ²)

Stagnation temperature - Weather conditions see note 2	t_{stg}	167	°C
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Effective thermal capacity	$c_{eff} = C/Aa$	4.4	kJ/(m ² K)
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Max. operation pressure - see note 3	p_{max}	1000	kPa
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Incidence angle modifiers $K_{\theta}(\theta)$	$K_{\theta d}$	0.91	θ_r / θ_L		50°	10°	20°	30°	40°	60°
			$K_{\theta}(\theta T)$		0.99	1.01	1.02	1.04	1.04	0.90
			$K_{\theta}(\theta L)$		0.91	1.00	0.99	0.97	0.95	0.83
<i>Optional values</i>										

Testing Laboratory	Institut für Solarenergieforschung Hameln
Website	www.isfh.de
Test report id. number	123-11/KD; 67-11/KQ
Date of test report	30.11.2011; 01.12.2011
Perf. test method	EN 12975-2 6.1.5 (indoor/innen/intérieur)

Comments of testing laboratory :

The reported power output values are calculated for normal incidence.

For the Thermomax HP 400 the condenser of the evacuated tubes has a cut-off mechanism which starts operation at about 70°C and for the Thermomax HP 450 according to the manufacturer at about 130°C.

Die angegebenen Leistungswerte gelten für senkrechte Einstrahlung.

Der Kondensator der Vakuumröhren besitzt einen Abschaltmechanismus, der für den Thermomax HP 400 bei ca. 70°C beginnt anzusprechen und für den Thermomax HP 450 laut Herstellerangaben bei ca. 130°C.

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



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence number	011-7S1793 R
	Issued	07.11.2013

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 HP 400 20	2 671	2 352	-	2 430	2 096	-	1 645	1 375	-	1 765	1 479	-	
Thermomax HP 450 20	2 671	2 352	1 983	2 430	2 096	1 727	1 645	1 375	1 104	1 765	1 479	1 184	
Thermomax HP 400 30	3 957	3 484	-	3 600	3 106	-	2 437	2 038	-	2 615	2 191	-	
Thermomax HP 450 30	3 957	3 484	2 938	3 600	3 106	2 558	2 437	2 038	1 636	2 615	2 191	1 753	

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>)

DIN CERTCO • Alboinstraße 56 • 12103 Berlin Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de .	Datasheet version:
	VERSION 3.6, 2012.01.20
	Calculation program version:
	3.07, October 2011 (SP)