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Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate		Licence Number	011-7S1238 R
		Issued	2013-10-04

Company holding the	Kingspan Environmental Ltd.		Country	United Kingdom
Brand (optional)			Website	www.kingspansolar.com
Street, street number	180 Gilford Road		E-mail	info@kingspansolar.com
Postal Code / City, province	BT63 5LF	Portadown	Tel/Fax	44 28 3836 4500 / 4501

Collector Type (flat plate glazed/un-glazed; evacuate tubular)	Evacuated tubular collector
Thermal / photo voltaic hybid collector? (PVT collector)	No
Integration in the roof possible ? (manufacturers declaration)	No

Collector name	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector module Gb = 850 W/m²; Gd = 150 W/m² Tm-Ta 0 K	10 K	30 K	50 K	70 K
	m²	mm	mm	mm	m²	W	W	W	W	W
Varisol DF (single tube)	0.11	1 965	71	80	**0.14**	82	81	77	71	63
Varisol DF (for 10 tubes)	1.05	1 965	710	80	**1.40**	823	809	768	707	627

Performance test method	Liquid heating collector - quasi-dynamic - outdoor								
Performance parameters related to aperture	η0b	c1	c2	c3	c4	c6	Kθd		
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	s/m	-		
Test results - Flow rate and fluid see note 1	0.775	1.061	0.023	0.000	0.000	0.000	1.075		

Bi-directional incidence angle	Yes	*Kϑ values are obligatory for 50°.*								
Incidence angle modifiers Kθ(θL) longitudinal direction	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
	Kθ(θL)	1.00	0.99	0.98	0.97	0.94	0.90	0.80	0.40	0.00
Incidence angle modifiers Kθ(θT) transversal direction	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
	Kθ(θT)	1.02	1.04	1.06	1.04	0.96	0.79	0.53	0.27	0.00

Stagnation temperature - Weather conditions see note 2	Tstg	240.4	°C
Effective thermal capacity	ceff = C/Ag	21.51	kJ/(m²K)
Max. intende operation temperature - see note 3	Tmax,op	n.n.	°C
Max. operation pressure - see note 3	pmax,op	600	kPa

Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area

Flow rate	kg/(s m²)									
Pressure drop, ΔP	Pa									

Optional weather data	Location		Link	
Testing Laboratory	TÜV Rheinland Energie und Umwelt GmbH			
Website	www.tuv.com/st			
Test report id. number	21212126_P/R_Report		Date of test report	2010.05.25

During the test GDIF/GTOT was always between	0.16	and	0.82

Comments of testing laboratory:

ENGLISH: The reviewed collector type is a so called "custom made" collector. All combinations from ten up to 150 serial connected tubes are possible. For the Performance test a 10 tube collector and for reliability test a 30 tube collector was used. The total gross area of the collector is the sum of the single tubes with an gross area of 0,14 m²/tube.

Note 1	Flow rate	0.017	kg/(s m²)	Fluid	Water
Note 2	Irradiance, G = 1000 W/m²; Ambient temperature , Ta=30 °C				
Note 3	Given by manufacturer				

TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
D - 51105 Köln

Datasheet version: 4.04, 2013-04-22

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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S1238 R
	Issued	04.10.2013

Annual collector output kWh/module

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
Varisol DF (single tube)	144	126	100	123	101	76	89	71	52	96	78	57
Varisol DF (for 10 tubes)	1 443	1 256	996	1 235	1 013	760	886	713	520	962	780	568

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

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx.

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Datasheet version: 4.04, 2013-04-22
ScenoCalc version: Ver. 4.04 (Jun, 2013)