



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S1936 R
	Date of issue	25 May 2012

Company	Kingspan Renewables Ltd.	Country	Northern Ireland; Unite
Brand (optional)	0	Website	www.kingspansolar.com
Street, number	180 Gilford Road	E-mail	info@kingspansolar.com
Postal Code	BT 63 5LF	Tel.	+44 (0)28 3836 4500
City	Portadown, Co. Armagh	Fax	+44 (0)28 3836 4501

Collector Type (flat plate / evacuate tubular / un-glazed)	Evacuated tubular collector
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Integration in the roof possible ?	No
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Collector name	Aperture area (A _a) [m ²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A _G) [m ²]	Power output per collector unit G = 1000 W/m ² T _m -T _a :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
varisol HP90	0.11	1965	71	80	0.14	81	79	75	70	65
varisol HP90 (for 10 tubes)	1.06	1965	710	80	1.40	809	791	749	701	646
varisol HP90 (for 20 tubes)	2.13	1965	1420	80	2.79	1617	1581	1498	1402	1292
varisol HP90 (for 30 tubes)	3.19	1965	2130	80	4.19	2426	2372	2248	2103	1939
varisol HP90 (for 40 tubes)	4.26	1965	2840	80	5.58	3235	3162	2997	2804	2585
varisol HP90 (for 50 tubes)	5.32	1965	3550	80	6.98	4043	3953	3746	3506	3231

Collector efficiency parameters related to aperture area (A_a) Type of fluid and flow rate see note 1	η _{0a}	0.760	-
	a _{1a}	1.621	W/(m ² K)
	a _{2a}	0.008	W/(m ² K ²)

Stagnation temperature - Weather conditions see note 2	t _{stg}	100	°C
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Effective thermal capacity	C _{eff} = C/A _a	4.74	kJ/(m ² K)
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Max. operation pressure - see note 3	p _{max}	600	kPa
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Incidence angle modifiers K _θ (θ)	G _{DIF} /G _{TOT}		θ _T / θ _L	50°	10°	20°	30°	40°	60°	70°
	min	max								
	G _{DIF} /G _{TOT} : min&max - while measuring				0.96	1.00	1.02	1.06	1.05	0.88
				0.97	1.00	1.00	0.99	0.98	0.94	0.89

Optional values

Testing Laboratory	TÜV Energie und Umwelt GmbH
Website	www.eco-tuv.de
Test report id. number	21218850_P_HP90; 21218850_R
Date of test report	25 May 2012 (both)
Perf. test method	EN 12975-2 6.3 (outdoor)

Comments of testing laboratory :
 This collector is using a temperature limiter for stagnation protection. The starting point of this limiter is at about 70°C, so the results for Output Power at 50K and 70 K as well as the annual collector output at 75°C collector mean temperature could be lower. With the existing efficiency curves, it is not possible to describe the special characteristic of this collector for the full temperature range.
 The special construction allows to put a various number of tubes together. The tube itself could be seen as collector.

Note 1	Fluid	Water	Flow rate	0.024 kg/s per m ²	<p>TÜV Rheinland Energie und Umwelt GmbH Am Grünen Stein D - 51105 Köln</p>
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	Certificate No.	011-7S1936 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	
varisol HP90	136	116	96	121	102	83	82	67	52	89	72	56	
varisol HP90 (for 10 tubes)	1356	1162	960	1214	1024	829	820	667	524	885	721	565	
varisol HP90 (for 20 tubes)	2711	2323	1921	2428	2048	1657	1641	1333	1049	1771	1441	1129	
varisol HP90 (for 30 tubes)	4067	3485	2881	3642	3072	2486	2461	2000	1573	2656	2162	1694	
varisol HP90 (for 40 tubes)	5422	4646	3841	4857	4096	3315	3281	2666	2097	3541	2882	2258	
varisol HP90 (for 50 tubes)	6778	5808	4802	6071	5120	4143	4102	3333	2622	4427	3603	2823	

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	G _{tot} kWh/m ²	T _a °C	Collector orientation or tracking mode
Athens	38	1765	18.5	South, 25°
Davos	47	1714	3.2	South, 30°
Stockholm	59	1166	7.5	South, 45°
Würzburg	50	1244	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 3.5, 2012.01.13 Calculation program version: 3.07, October 2011 (SP)
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