Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	**Certificate No.**	**OEM 9926/3/6**
	Date of issue	10/3/2017

Company	Tivok Energy Middle East Pty. Ltd	**Country**		Australia
Brand (optional)		**Website**		
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Postal Code	2020	**Tel.**	+61	2 8084 7905
City	Mascot NSW	**Fax**	+61	

Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
Integration in the roof possible ?	Yes

Collector name	Aperture area (Aa) [m²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (AG) [m²]	Power output per collector unit G = 1000 W/m² Tm-Ta : 0 K [W]	10 K [W]	30 K [W]	50 K [W]	70 K [W]
TM-FP 2000	1,80	2.050	1.010	90	2,07	1.332	1.241	1.045	830	597
TM-FP 2500	2,33	2.050	1.280	90	2,62	1.724	1.606	1.352	1.074	772

Collector efficiency parameters related to aperture area (Aa) Note 1	η_{0a}	0,74	-
	a_{1a}	4,94	W/(m²K)
	a_{2a}	0,0128	W/(m²K²)
Stagnation temperature - Note 2	t_{stg}	135,40	°C
Effective thermal capacity	$c_{eff} = C/A_a$	11,9	kJ/(m²K)
Max. operation pressure - Note 3	p_{max}	700	kPa

Incidence angle modifiers $K_\theta(\theta)$

G_{DIF}/G_{TOT} min	G_{DIF}/G_{TOT} max	θ_T / θ_l	50°	*10°*	*20°*	*30°*	*40°*	*60°*	*70°*
		$K_\theta(\theta_T)$	0,89	*1,00*	*1,00*	*0,98*		*0,79*	
0,11	0,22	$K_\theta(\theta_L)$	0,89	*1,00*	*1,00*	*0,98*		*0,79*	

G_{DIF}/G_{TOT}: min&max - while measuring — ***Optional values***

Testing Laboratory	Demokritos
Website	www.solar.demokritos.gr
Test report id. number	1213DE1L, 1214DE1S, 4118DQ1
Date of test report	30/7/2012
Perf. test method	EN 12975-2 6.1.4 (outdoor/außen/extérieur)

Comments of testing laboratory :

Example data sheet

Note 1	**Test conditions**	**Fluid**	Water	**Flow rate**	0,20	kg/s per m²
Note 2	**Irradiance, Gs=1000 W/m²** **Ambient temperature , Ta=30 °C**					
Note 3	**Given by manufacturer**					

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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	OEM 9926/3/6
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Annual collector output kWh / Jährliche Kollektor Leistung kWh / Energie annuelle produite par le capteur

	Location and collector temperature (Tm)														
	Athens			Davos			Stockholm			Würzburg					
Collector name	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
TM-FP 2000	2.288	1.494	871	1.790	1.134	643	1.189	692	345	1.318	765	396			
TM-FP 2500	2.962	1.934	1.128	2.317	1.468	833	1.539	895	446	1.706	990	513			

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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VERSION 3.4, 30-11-2011
Calculation program version:
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