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SWCC Summary Report

Manufacturer: **Kingspan Environmental Ltd.**

Wind Turbine Model: **KW6** (240 VAC, 1-phase, 60 Hz)

Certification Number: **SWCC-11-04**



The above-identified Small Wind Turbine is certified by the Solar Rating & Certification Corporation - Small Wind Certification Program to be in conformance with the AWEA *Small Wind Turbine Performance and Safety Standard* (AWEA Standard 9.1 – 2009). For the SWCC Certificate visit: www.smallwindcertification.org

This report summarizes the results of testing and certification of the Kingspan Environmental KW6 in accordance with AWEA Standard 9.1-2009. The KW6 is a 3-blade, downwind, horizontal axis wind turbine with a swept area of 23.7 m². The tested and certified system was comprised of the KW6 turbine on a 9 m (29.5 ft) monopole tower, an SMA Wind Interface and Aurora Power One 6 kW grid tie inverter. Power Performance, Duration and Safety & Function testing were conducted by TUV-NEL at their Myres Hill test site in East Kilbride, Scotland. Power Performance testing was conducted from February 1, 2011 to February 7, 2011. Duration testing was conducted from February 1, 2011 to August 2, 2011. Acoustic testing was performed on June 16, 2011 by Sgurr Energy in Lumb, Lancashire, UK. This turbine has been granted certification to the Microgeneration Certification Scheme by TUV-NEL (Certification number TUV 0008).

1. Turbine Ratings

The KW6 performance testing was conducted in accordance with Section 2 of AWEA Standard 9.1-2009. The resulting turbine ratings, tabulated graphical Annual Energy Production (AEP), and graphical and tabulated power curve are given below.

AWEA Rated Annual Energy @ 5 m/s	8,950 kWh
AWEA Rated Sound Level	43.1 dB(A)
AWEA Rated Power @ 11 m/s	5.2 kW
Peak Power @ 17 m/s	6.1 kW

2. Tabulated Annual Energy Production (AEP)

Corrected to a sea level air density of 1.225 kg/m³

Hub Height Annual Average Wind Speed (m/s)	AEP Measured (kWh)	Standard Uncertainty in AEP (kWh)	Standard Uncertainty in AEP (%)	AEP Extrapolated (kWh)
4	4,629	1,352	29.2	4,629
5	8,949	1,540	17.2	8,949
6	13,882	1,689	12.2	13,882
7	18,777	1,775	9.5	18,779
8	23,228	1,812	7.8	23,249
9	27,012	1,818	6.7	27,093
10	30,012	1,806	6.0	30,221
11	32,193	1,782	5.5	32,600

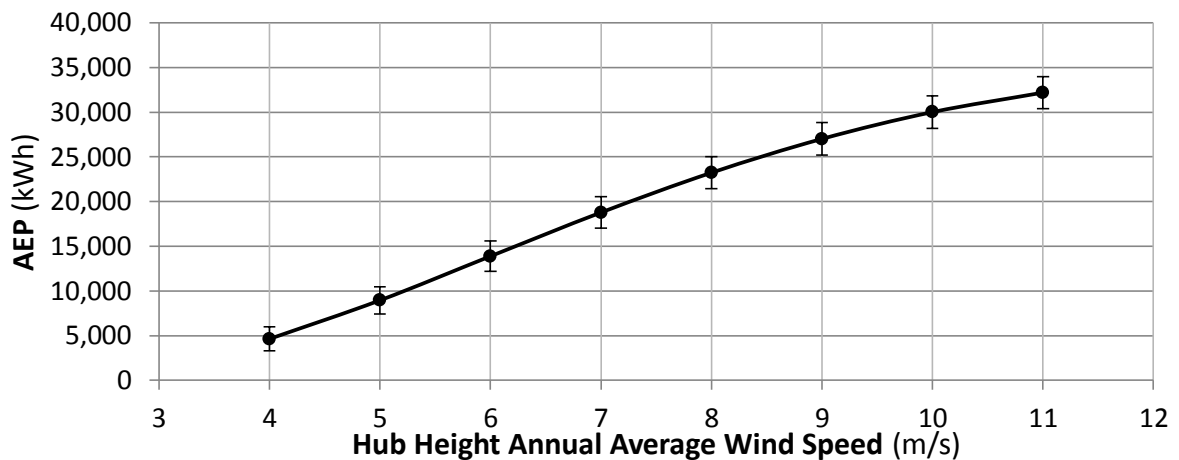
3. Annual Energy Production Curve

Estimated Annual Energy Production

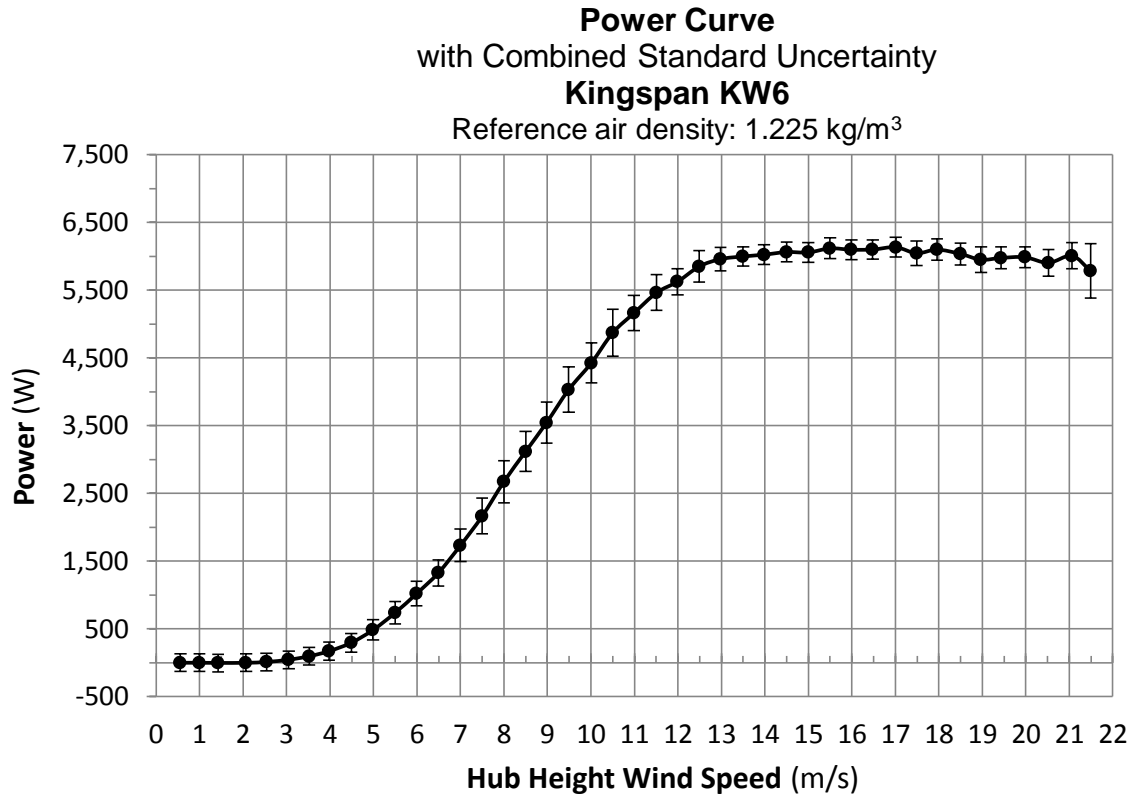
(AEP-measured) with Standard Uncertainty

KW6

Reference air density: 1.225 kg/m³



4. Power Curve



5. Tabulated Power Curve

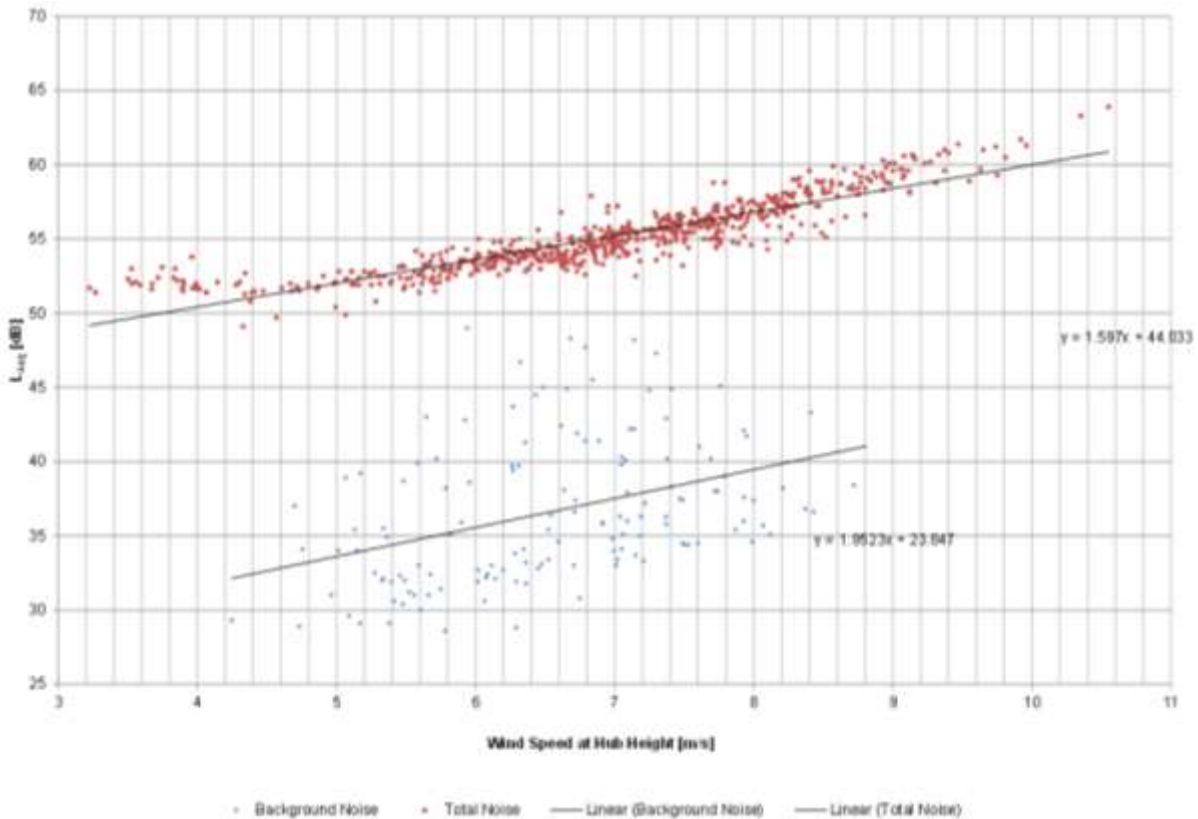
Corrected to a sea level air density of 1.225 kg/m ³					Category A	Category B	Combined
Bin No.	Hub Height Wind Speed	Power Output	Cp	1-minute samples	Standard Uncertainty, Si	Standard Uncertainty, Ui	Standard Uncertainty, Ci
	<i>m/s</i>	<i>Watts</i>			<i>Watts</i>	<i>Watts</i>	<i>Watts</i>
1	0.56	0	0.00	45	0	130	130
2	1.00	0	0.00	126	0	130	130
3	1.43	-2	-0.05	55	1	130	130
4	2.07	-1	0.00	26	1	130	130
5	2.54	12	0.05	63	1	130	130
6	3.05	45	0.11	192	1	130	130
7	3.52	96	0.15	447	1	131	131
8	3.98	172	0.19	404	2	133	133
9	4.49	296	0.22	358	4	137	137
10	4.99	485	0.27	401	6	149	149
11	5.50	739	0.30	320	9	166	166
12	5.99	1020	0.33	260	12	181	182
13	6.49	1326	0.33	260	14	193	193
14	7.00	1733	0.35	293	14	238	239
15	7.50	2165	0.35	299	16	264	264
16	8.00	2674	0.36	287	21	310	311
17	8.50	3121	0.35	304	20	294	294
18	8.98	3546	0.34	253	26	301	302
19	9.49	4033	0.32	222	26	332	333
20	10.01	4428	0.30	231	26	291	292
21	10.50	4870	0.29	262	23	345	346
22	10.99	5164	0.27	229	25	259	260
23	11.51	5464	0.25	266	19	263	264
24	11.99	5626	0.22	276	22	193	195
25	12.49	5851	0.21	263	14	231	232
26	12.98	5960	0.19	207	18	170	171
27	13.50	6000	0.17	190	20	144	146
28	13.98	6026	0.15	157	27	143	145
29	14.50	6064	0.14	142	24	145	147
30	15.00	6059	0.12	95	34	141	145
31	15.50	6119	0.11	94	19	153	155
32	15.99	6099	0.10	99	22	142	144
33	16.48	6102	0.09	78	31	141	144
34	17.01	6136	0.09	51	21	145	147
35	17.49	6047	0.08	90	36	175	178
36	17.96	6100	0.07	55	30	156	159
37	18.50	6037	0.07	48	41	157	162
38	18.97	5952	0.06	48	58	179	188
39	19.43	5978	0.06	27	72	145	162
40	19.98	5988	0.05	25	64	141	155
41	20.52	5906	0.05	12	99	173	199
42	21.06	6009	0.04	14	24	190	192
43	21.49	5787	0.04	15	99	387	400

6. Tabulated Acoustic Data

The KW6 was tested in accordance with Section 3 of AWEA Standard 9.1-2009. The tabulated Sound Power Level is provided for specific wind speed bins.

Wind Speed at 10m Height	Apparent Sound Power Level	Combined Uncertainty
m/s	dB(A)	dB(A)
6	81.7	1.73
7	83.1	1.83
8	85.1	1.86
9	87.5	1.87
10	90.2	1.78

7. Graphical Acoustic Data



8. Duration Testing

As a result of the particular wind distribution that occurred during the test period, it was not possible to demonstrate IEC Class I wind conditions. The Kingspan KW6 successfully completed a Duration Test for an IEC Class II small wind turbine with an Operational Time Fraction of 100%. The average turbulence intensity at 15 m/s (33.6 mph) was 14.1%. The highest recorded instantaneous wind speed was 35.3 m/s (79.0 mph).

9. Mechanical Strength Analysis

The mechanical strength analysis was found to be in conformance with IEC 61400-2 as modified by section 4 of AWEA Standard 9.1 – 2009 for an IEC Class II Small Wind Turbine.

10. Safety and Function testing

Safety and Function testing was found to be in conformance with sections 4.3 and 4.4 of AWEA Standard 9.1 – 2009.

11. Manufacturer Tower Design Requirements (SRCC is not responsible for any errors in the document below, which is provided by the manufacturer).

