



ICC-SWCC
3060 Saturn Street, Suite 100
Brea, CA 92821
t: 888.ICC.SAFE (422.7233)
t: 562.699.0543
f: 562.695.4694
www.smallwindcertification.org

ICC-SWCC™

SUMMARY REPORT SWCC-10-20

Manufacturer: **Xzeres Wind Corporation**
Wind Turbine Model: **Skystream 3.7**
(240 VAC, 1-phase, 60 Hz)
Certification Number: **SWCC-10-20**

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



This report summarizes the results of testing and certification of the Xzeres Wind Corporation Skystream 3.7 in accordance with AWEA Standard 9.1-2009. The Skystream 3.7 is a 3-blade, downwind, horizontal axis wind turbine with a swept area of 10.9 m².

Power Performance testing was performed by WINDTEST in Kaiser-Wilhelm-Koog, Germany from November 14, 2008 to March 22, 2009. Acoustic testing was performed by WINDTEST in Kaiser-Wilhelm-Koog, Germany on August 13, 2009. The Acoustic data was re-analyzed by the National Renewable Energy Lab (NREL) to conform to the AWEA Standard. Safety and Function testing was performed by NREL in 2005 and 2008. Duration testing was conducted at the USDA/ARS facility in Bushland, Texas from January 29, 2007 to March 31, 2008. This turbine has also been granted certification to the Microgeneration Certification Scheme by BRE Global Limited as well as a Statement of Compliance for the turbine design to IEC 61400-2:2006 from Germanischer Lloyd.

1. Turbine Ratings

The Skystream 3.7 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.

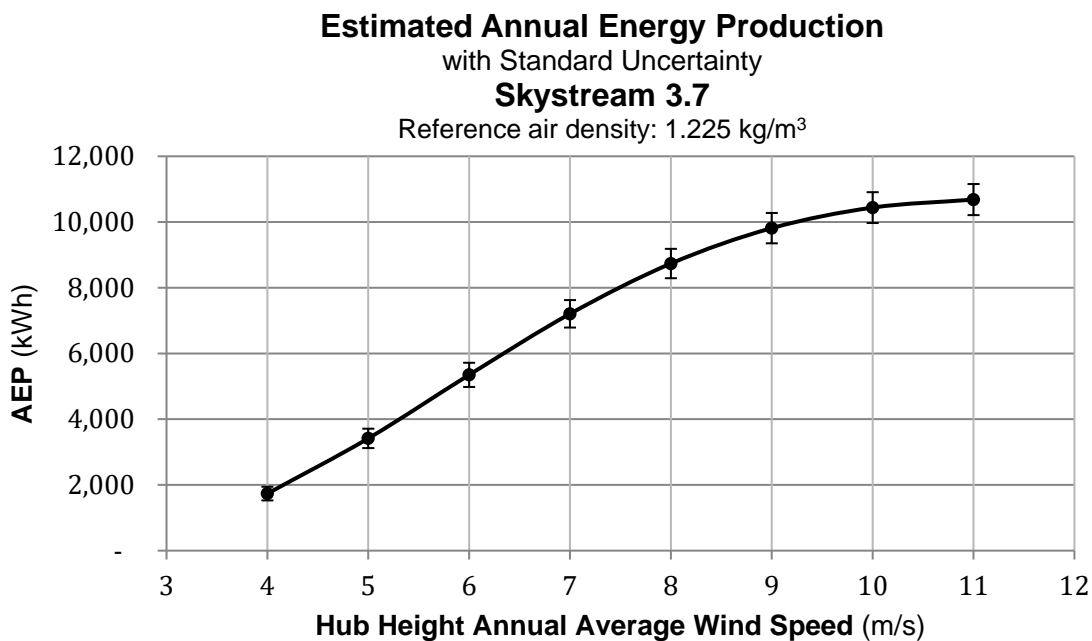
AWEA Rated Annual Energy @ 5 m/s	3,420 kWh
AWEA Rated Sound Level	41.2 dB(A)
AWEA Rated Power @ 11 m/s	2.1 kW
Peak Power @ 14 m/s	2.4 kW

2. Tabulated Annual Energy Production (AEP)

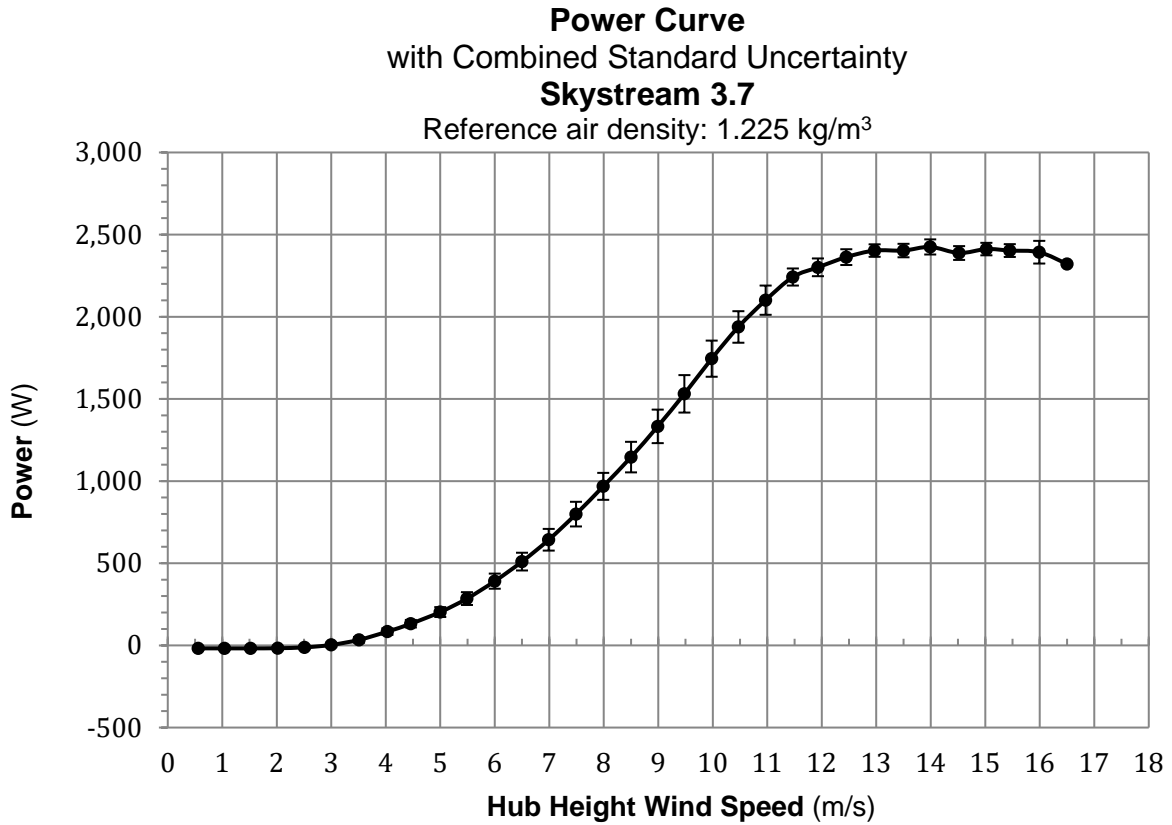
Database A; corrected to a sea level air density of 1.225 kg/m³

Hub Height Annual Average Wind Speed (m/s)	AEP Measured (kWh)	Standard Uncertainty in AEP (kWh)	Standard Uncertainty in AEP (%)	AEP Extrapolated (kWh)
4	1,736	208	12.0	1,736
5	3,416	295	8.6	3,416
6	5,349	368	6.9	5,349
7	7,207	418	5.8	7,207
8	8,737	447	5.1	8,737
9	9,814	462	4.7	9,814
10	10,439	469	4.5	10,439
11	10,683	473	4.4	10,683

3. Annual Energy Production Curve



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	-18	-	468	0	11	11
2	1.04	-18	-	1204	0.0	10.0	10.0
3	1.52	-18	-	2082	0.0	10.0	10.0
4	2.02	-17	-	3471	0.0	10.0	10.0
5	2.51	-12	-	5236	0.0	10.0	10.0
6	3.00	3	0.02	6353	0.0	11.0	11.0
7	3.51	34	0.12	6465	0.0	13.0	13.0
8	4.03	84	0.20	9502	0.0	17.0	17.0
9	4.46	132	0.23	9778	0.0	20.0	20.0
10	5.00	203	0.25	6018	1.0	23.0	23.0
11	5.49	285	0.26	5407	1.0	30.0	30.0
12	6.00	391	0.28	4924	1.0	39.0	39.0
13	6.50	510	0.28	4619	2.0	46.0	46.0

14	6.99	643	0.29	4570	2.0	54.0	54.0
15	7.49	799	0.29	4194	3.0	66.0	66.0
16	7.99	968	0.29	3534	3.0	75.0	75.0
17	8.50	1,146	0.28	3093	3.0	82.0	82.0
18	8.99	1,333	0.28	2543	3.0	93.0	93.0
19	9.48	1,531	0.27	1688	4.0	102.0	102.0
20	9.98	1,745	0.27	959	6.0	113.0	114.0
21	10.47	1,938	0.26	553	7.0	110.0	110.0
22	10.97	2,101	0.24	335	8.0	96.0	96.0
23	11.47	2,242	0.23	182	9.0	88.0	89.0
24	11.93	2,301	0.21	105	10.0	51.0	52.0
25	12.45	2,363	0.19	47	21.0	50.0	54.0
26	12.97	2,403	0.17	27	21.0	43.0	48.0
27	13.50	2,403	0.15	25	15.0	35.0	38.0
28	13.99	2,425	0.14	33	14.0	39.0	41.0
29	14.52	2,388	0.12	37	17.0	43.0	46.0
30	15.02	2,412	0.11	38	13.0	39.0	42.0
31	15.45	2,403	0.10	32	11.0	36.0	38.0
32	15.99	2,393	0.09	14	17.0	36.0	39.0
33	16.50	2,321	0.08	12	19.0	66.0	69.0

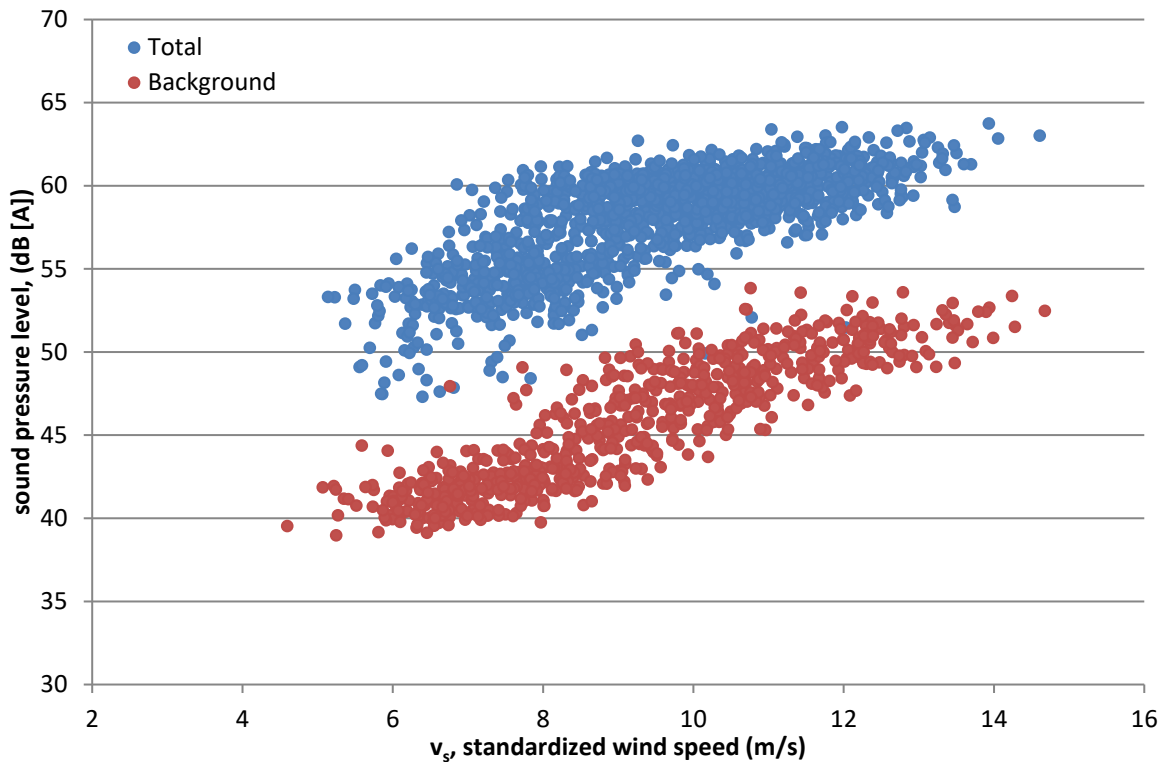
6. Tabulated Acoustic Data

The Skystream 3.7 was tested in accordance with Section 3 of AWEA Standard 9.1-2009. The tabulated sound pressure and sound power levels are provided for specific wind speed bins.

Wind Speed at 10m Height	Background Corrected Sound Pressure Level	Apparent Sound Power Level	Combined Uncertainty
<i>m/s</i>	<i>dB(A)</i>	<i>dB(A)</i>	<i>dB(A)</i>
6	80.7	2.4	80.7
7	83.4	2.4	83.4
8	85.5	2.4	85.5
9	87.3	2.4	87.3
10	87.9	1.6	87.9
11	88.3	1.5	88.3

7. Graphical Acoustic Data

The 10-second averaged sound pressure levels measured are provided as a function of standardized wind speed.



8. Duration Testing

The Skystream 3.7 successfully completed a Duration Test for an IEC Class II Small Wind Turbine as established by section 5 of AWEA Standard 9.1-2009. The testing was performed from January 29, 2007 to March 31, 2008 with an Operational Time Fraction of 90.8 %.

9. Mechanical Strength Analysis

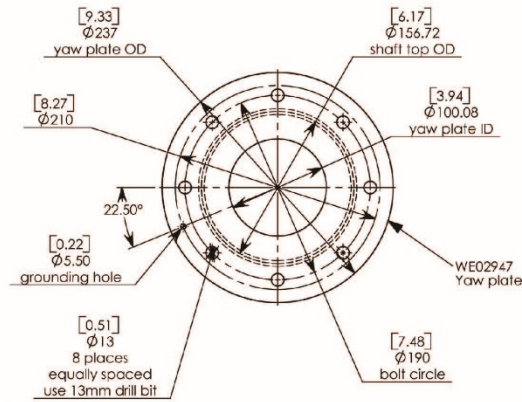
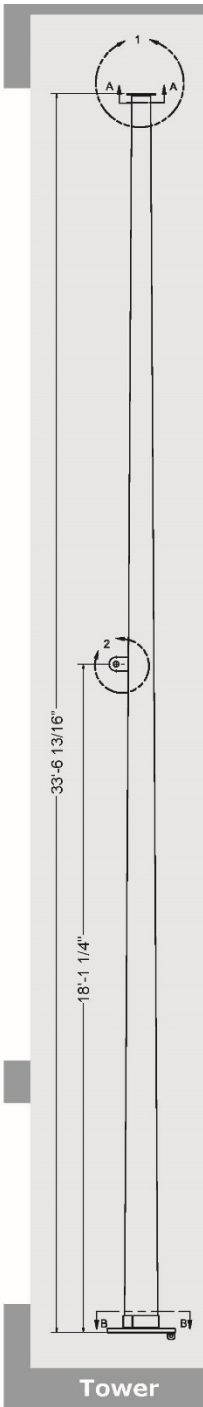
The mechanical strength analysis was found to be in conformance with IEC 61400-2 as modified by section 4 of AWEA Standard 9.1 – 2009 for an IEC Class II Small Wind Turbine.

10. Safety and Function testing

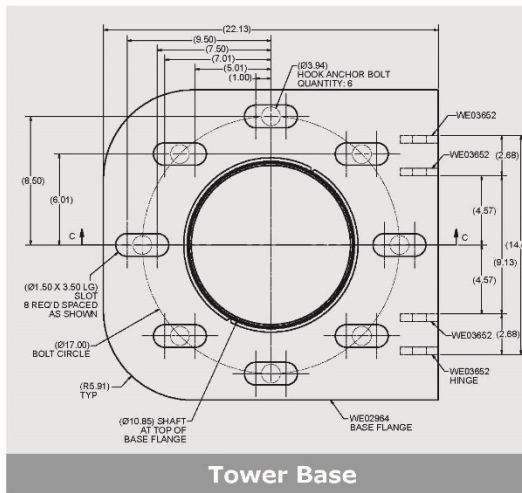
Safety and Function testing was found to be in conformance with sections 4.3 and 4.4 of AWEA Standard 9.1 – 2009.

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

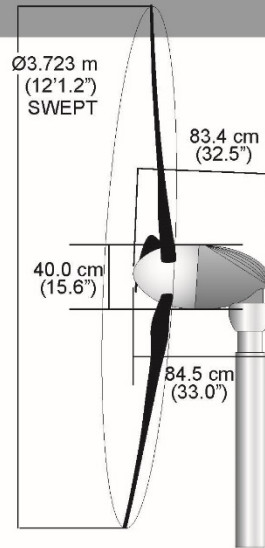
Skystream - 1.8 kW Wind Turbine



Tower Top



Tower Base



Dimensions

Prop Tip to Center of Tower: 780mm/30.7 in.
 Minimum Tip Clearance: 690mm/27.16 in.
 Max Tower Diameter at Tip: 171mm/6.75 in.

Wiring

Recommended Wire:
 90C (UL) Water Resistant or equivalent

Tower & Wind Generator Loading Specifications

Tower:	Freestanding Tapered Tubular Steel with Galvanized Finish
Tower Weight:	549 lbs/249.2 kg
Bottom of Tower Forces	
Center of Gravity:	400mm from center of tower
Axial Force:	3376 N (force due to tower and generator weight)
Overturing Bending Moment:	35611 Nm (includes wind loads)
Shear Force:	3851 N (includes wind loads)
Top of Tower Forces	
Thrust Load:	Average: 704
Design Shear Force:	2802 N (top of tower)
Peak Bending Moment:	1532 Nm
Downward Axial Force:	932 N (top of tower)

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