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ICC-SWCC™ SUMMARY REPORT SWCC-23-07

CERTIFICATION HOLDER: SkyWind Energy GmbH.
Bayernstrasse 3
30855 Langenhagen,
Germany
www.myskywind.com

MODEL: SkyWind NG

CERTIFICATION NUMBER: SWCC-23-07

This certification is only valid for the 0.6kW configuration. The above-identified Small Wind Turbine was issued certification SWCC 23-07 under the ICC–SWCC Small Wind Turbine Certification Program to the ACP 101-1 – 2021, Small Wind Turbine Standard on **June 24, 2025**.

ICC-SWCC certifications are subject to annual review and renewal. To confirm current certification status and view the certificate of certification, visit: www.smallwindcertification.org.

This ICC-SWCC Summary Report is intended to augment the certification document by providing additional details on the test results for the SkyWind NG that were evaluated for certification in accordance with the *ACP 101-1 – 2021, Small Wind Turbine Standard*. All field tests for certification were conducted at Windward Engineering's test facility near Spanish Fork, UT from June 2024 to October 2024.

The SkyWind NG is a 2-blade, downwind, horizontal axis wind turbine with a swept rotor area of 1.77 m^2 manufactured by SkyWind Energy GmbH. The tested configuration had a single-phase, 120 VAC output and utilized a TEG-1000G-WDL inverter. It was mounted atop a 22.1 m (238 ft) monopole-telescopic tower manufactured by SkyWind Energy GmbH.

Rotor Configuration:	Horizontal (HAWT)	Overspeed Control:	Eddie Current, Stall
Number of Blades:	2	Yaw Configuration:	Passive, downwind
Rotor Diameter:	1.5 m	Pitch Control:	Fixed
Rotor Swept Area:	1.77 m^2	Power Form:	120 VAC, 1-phase, 60 Hz
Cut-In Wind Speed:	5 m/s	Maximum Overcurrent Protection:	30 Amps
Cut-Out Wind Speed:	16 m/s	Inverter:	TEG-1000G-WDL

1. PERFORMANCE RATINGS

Standardized turbine performance ratings are determined from the laboratory test data in accordance with the methods in the ACP 101-1-2021 standard. Performance is quantified for the following parameters:

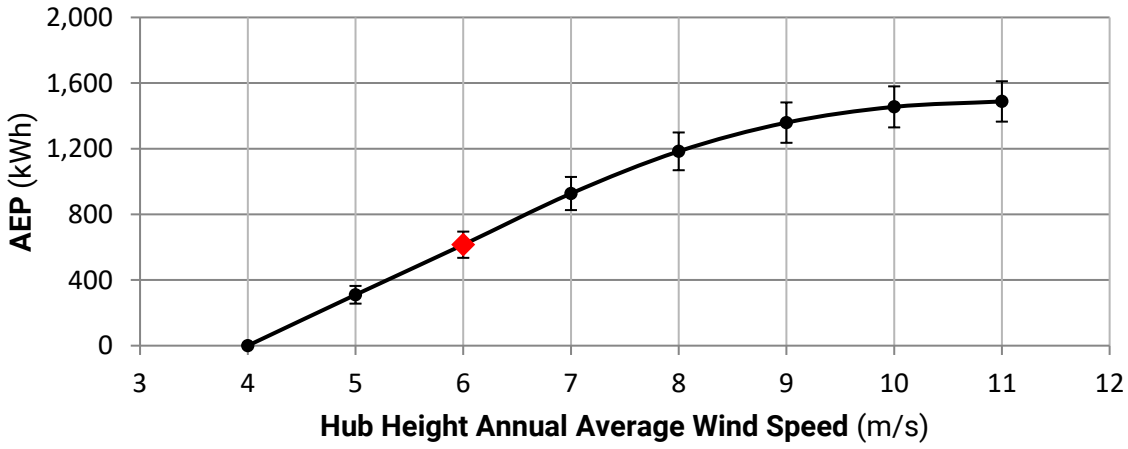
- Estimated Annual Energy Production
- Instantaneous Power Production

ACP Ratings are provided at reference conditions defined in the standard to allow for comparison between certified turbines. This Summary Report provides performance values under additional conditions in tabular and graphical forms to facilitate product selection and system design. In all cases, actual performance will vary depending on site conditions for installed turbines.

Estimated Annual Energy Production

The ACP standard prescribes calculation of estimated annual energy production utilizing the power curve measured by means of power performance testing in the field per Section 2 and IEC 61400-12-1, ed. 2. The estimated annual energy production is calculated by applying a Rayleigh wind speed distribution to the power curve over one year and assuming 100% availability at sea level. Air density at sea level is assumed to be 1.225 kg/m^3.

The certificate, consumer label and this report display the Reference Annual Energy Production which is the AEP value at 6 m/s (13.4 mph), wind speed, for comparison between turbines. This report also provides a table and graph of annual energy production values over a range of annual average wind speeds at hub height as shown below. The ACP Reference Annual Energy Production is **615 kWh/year at a hub height wind speed of 6 m/s** and is highlighted in red below.



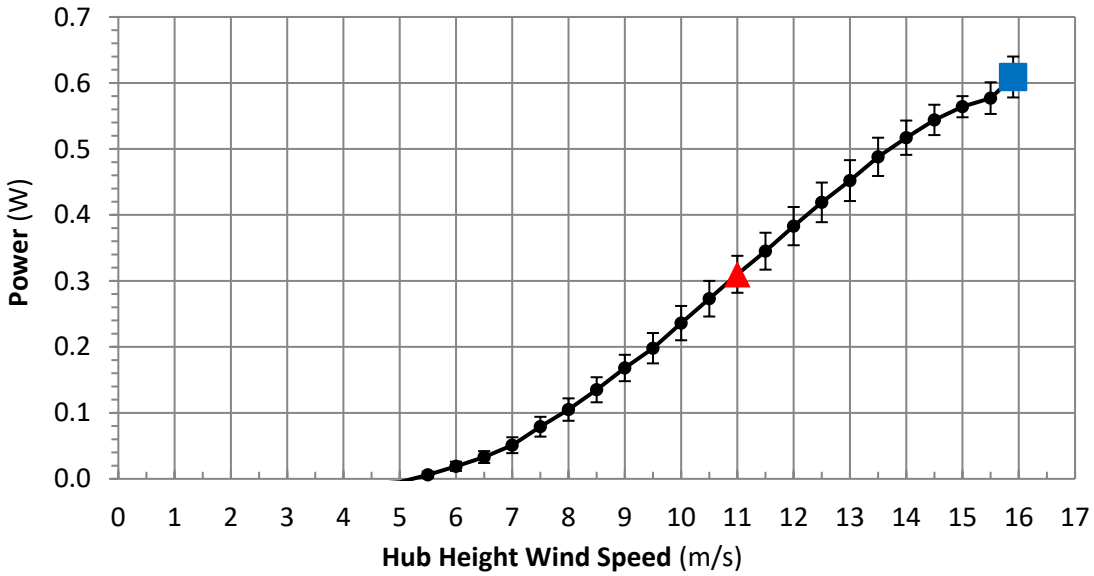
Annual Ave. Wind Speed at Hub Height (m/s)	AEP Measured (kWh)	Standard Uncertainty (kWh)	Standard Uncertainty (%)	AEP Extrapolated (kWh)
4	-	-	-	-
5	310	54	17%	310
6	615	80	13%	**615**
7	927	101	11%	927
8	1,184	115	10%	1,184
9	1,359	123	9%	1,359
10	1,455	125	9%	1,455
11	1,488	123	8%	1,488

Power Production

The ACP standard establishes the methods for Power Performance Testing in Section 2 of the standard, which references IEC 61400-12-1, ed. 3 (including Annex H). The result of that testing is a measured power curve which is corrected to sea level conditions. This is shown as a function of wind speed at hub height, for the turbine below.

The certificate, consumer label and this report display the ACP Reference Power Production which is set by the standard at 11 m/s (24.6 mph) at sea-level. This report also provides a graph of the power production curve over a range of wind speeds at hub height as shown below. For this turbine, the ACP Reference Power Production is **0.310 kW at a hub height wind speed 11 m/s**, and is highlighted below with a red triangle.

The ACP Peak Power is defined as the highest binned power of the filled wind speed in the peak power range defined in Section 4.1.3. It is given at the Peak Power Wind Speed. For this turbine, the ACP Peak Power is **0.609 kW at a peak power wind speed of 16 m/s at hub height**. It is highlighted below with the blue square.



Corrected to a sea level air density of 1.225 kg/m³					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**
-	*m/s*	*W*	-	-	*W*	*W*	*W*
1	0.6	-0.008	-34.7	21	0.000	0.000	0.000
2	1.0	-0.008	-6.99	30	0.000	0.000	0.000
3	1.5	-0.008	-2.36	33	0.000	0.000	0.000
4	2.0	-0.008	-0.91	35	0.000	0.000	0.000
5	2.5	-0.008	-0.47	52	0.000	0.000	0.000
6	3.0	-0.008	-0.28	68	0.000	0.000	0.000
7	3.6	-0.008	-0.17	90	0.000	0.000	0.000
8	4.0	-0.008	-0.12	153	0.000	0.000	0.000
9	4.5	-0.008	-0.08	222	0.000	0.001	0.001
10	5.0	-0.005	-0.04	228	0.000	0.003	0.003
11	5.5	0.006	0.04	224	0.001	0.005	0.005
12	6.0	0.019	0.08	253	0.001	0.006	0.007
13	6.5	0.033	0.11	251	0.001	0.009	0.009
14	7.0	0.051	0.14	219	0.002	0.012	0.012
15	7.5	0.079	0.17	219	0.002	0.015	0.015
16	8.0	0.105	0.19	206	0.002	0.017	0.017
17	8.5	0.135	0.20	229	0.002	0.019	0.019
18	9.0	0.168	0.21	242	0.002	0.020	0.020
19	9.5	0.198	0.21	258	0.002	0.023	0.023
20	10.0	0.236	0.22	282	0.001	0.026	0.026
21	10.5	0.273	0.22	450	0.001	0.027	0.027
22	11.0	**0.310**	0.22	377	0.001	0.028	0.028
23	11.5	0.345	0.21	310	0.001	0.028	0.028
24	12.0	0.383	0.20	366	0.001	0.029	0.029
25	12.5	0.419	0.20	396	0.001	0.029	0.030
26	13.0	0.452	0.19	359	0.001	0.031	0.031
27	13.5	0.488	0.18	300	0.002	0.029	0.029
28	14.0	0.517	0.17	219	0.002	0.026	0.026
29	14.5	0.544	0.17	108	0.003	0.022	0.023
30	15.0	0.564	0.15	69	0.004	0.016	0.016
31	15.5	0.577	0.14	27	0.006	0.024	0.024
32	15.9	**0.609**	0.14	10	0.007	0.030	0.031

2. QUALIFICATION TESTING AND EVALUATION

In addition to testing of the performance of the turbine, the ACP 101-1 standard requires that each turbine undergo testing to confirm the safety, functionality and durability of the turbine. Turbines also undergo an evaluations of the overall safety of structural and mechanical systems. These tests and evaluations do not result in ratings or metrics, but must be passed in order to achieve certification. Each is described briefly below.

DURATION TESTING

The SkyWind NG successfully completed duration testing for an IEC Class II Small Wind Turbine in accordance with Section 6 of the standard. This references the testing method prescribed in IEC 61400-2 with modifications. The testing was performed from June 6, 2024 to October 1, 2024. The observed maximum 3-second wind gust recorded during the test was 24.9 m/s (55.7 mph). At wind speeds above 17 m/s, the power was zero. The 1-minute average temperature ranged from 8°C to 38°C (47 to 101°F) during the duration testing. The average turbulence intensity at 15 m/s was 7.7%. The total power production time for the duration testing was 1175 hours, 51 h of which were categorized as high-wind hours (>15 m/s).

MECHANICAL STRENGTH ANALYSIS

The mechanical strength analyses conducted for the Skywind NG were evaluated by ICC-SWCC and found to be in conformance with IEC 61400-2 as modified by Section 5, ACP 101-1 – 2021 for an IEC Class II Small Wind Turbine. This includes loads analysis by means of aeroelastic modeling. The Simplified Load Model (SLM) was calculated with a lifetime of 20 years.

Description	Value	Units	Symbol
Design life of the turbine	20	Years	
	631152000	s	T_d
Number of Fatigue Cycles	1.37E+10	n/a	N_i
Number of Cycles to Failure as a Function of Stress (Shaft)	inf	n/a	N_shaft
Number of Cycles to Failure as a Function of Stress (Blade)	inf	n/a	N_blade

Description	Equivalent Stress [MPa]	Factored equivalent stress [MPa]	Stress reserve factor	Conclusion
Load Case A - Fatigue Loads on Blades and Rotor Shaft				
Blades	10.63	10.63	2.54	SAFE
Shaft	13.19	13.19	6.06	SAFE
Load Case B - Blade and Rotor Shaft Loads during Yaw				
Blades	18.48	55.44	3.75	SAFE
Shaft	78.78	236.33	1.13	SAFE
Load Case C - Yaw Error Load on Blades				
Blades	60.24	180.71	1.15	SAFE
Load Case D - Maximum Thrust on Shaft				
Shaft	0.61	1.82	114.31	SAFE
Load Case E - Maximum Rotational Speed				
Blades	4.11	12.34	16.83	SAFE
Shaft	10.74	32.22	8.28	SAFE
Load Case F - Short at Load Connection				
Blades	0.33	0.99	209.67	SAFE
Shaft	10.68	32.03	8.32	SAFE
Load Case G - Shutdown Braking				
Blades	n/a	n/a	n/a	n/a
Shaft	n/a	n/a	n/a	n/a
Load Case H - Parked Wind Loads during Idling				
Blades	44.09	132.28	1.57	SAFE
Shaft	1.74	5.21	51.14	SAFE

SAFETY AND FUNCTION TESTING

Safety and Function testing was found to be in conformance with Section 4, ACP 101-1 – 2021. This includes verification of the function of critical control and protection system functions and power limitation.