Carter Wind Energy

Specification Sheet
version 20180430

CWE Model 300-30.5

Description

The CWE Model 300-30.5 wind turbine is a unique, proven, portable, self-erecting wind turbine designed for remote, extreme environment locations that are not viable using conventional wind turbine technologies.

The CWE Model 300-30.5 wind turbine has proven reliable in harsh tropical and artic conditions. The turbine is compact and portable, with easy shipping. The complete turbine assembly is shipped quickly in standardized cargo containers anywhere in the world and can be erected in one day.

Recognized globally as an industry leader and pioneer of the two-blade wind turbine design, Carter Wind has over 800 turbines installed having accumulated tens of millions of operating hours.

Features

Two Bladed Downwind Teetering Rotor: Eliminates gyroscopic rotor loads and allows the rotor to achieve rotor lift equilibrium without inducing a moment into the main shaft when airflow between rotor blades is unbalanced or turbulent.

Unique Flexible Composite Blade Design: Carter's exclusive composite Flex Beam™ design is torsionally soft to allow blade pitch change, and flexible in the flatwise direction to allow the rotor blades to passively flex up to 60 degrees away from the tower during non-rotating, extreme wind loading events.

Self-erecting, Tilt-up, Guyed Tower: The Carter tilt-up turbine design does not require cranes for installation or maintenance and allows for maintenance to be performed safely on the ground. Additionally, the guyed tower requires substantially less excavation and concrete for foundations than typical wind turbines as well as less road infrastructure, as roads leading to the turbine need only support a truck.

Variable Speed Stall Regulated: Peak power output is controlled through aerodynamic stall using variable speed operation without additional equipment being required to change blade pitch with changing wind speeds to control power.

Proprietary Technology

The Carter wind turbine proprietary technology is most significant in that it produces 4 times the energy per pound of equipment weight versus the current state of the art three blade wind turbines.

The capital investment required to manufacture, transport, install, and maintain wind turbines, is a function of equipment weight. More energy with less equipment weight means a lower cost of energy.

The Carter wind turbine design operates on the same aerodynamic principles as conventional wind turbines, but achieves its superior energy to weight and reliability advantage by successfully integrating the enabling technologies of the helicopter industry.

Product Specifications

	CWE Model 300-30.5
Turbine Concept	
2- blade, down-wind rotor	
Guyed, self-erecting tubular tower	
Underslung teetering rotor hub with elastomeric dampening	
Stall regulated, variable pitch, variable speed rotor	
Operational Data	
Cut in wind speed	3.0 m/s
Cut out wind speed	40 m/s (adjustable)
Max Power	300 kW (10 min average)
at wind speed	12.5 m/s
Output Voltage & Frequency (3-phase)	380 V – 50 Hz or 480 V – 60 Hz
IEC 61400-1 Class Rating	**Class Ia**
Hub Height	45/50/70 m (148/164/230')
Rotor Diameter	30.5 m (100')
Rotation Speed	25-50 rpm
Max Wind Speed (average 10 min)	
Operating Position	70 m/s (156mph)
Lowered Position	+90 m/s (200mph)
Nacelle Specifications	
Gearbox	2-stage planetary, 36:1 – 60 Hz or 30:1 - 50 Hz
Generator	Induction, variable speed – rated power : 400 kW
Grid connection	Full-power (300 kW), IGBT-controlled AC-DC-AC 'back-to-back' type
Yaw	Electric drive, passive-active, with dampening and slip clutch, automatic cable untwisting
Emergency and Parking Brake	Aerodynamic and disc on high speed shaft, spring loaded, self-adjusting
Blades	
Material	Epoxy, fiberglass, foam sandwich, using infusion
Blade Design	Passive Offset Blade to hub conning using an internal composite flex beam design that is twisted to change blade pitch
Aerodynamic Design	Non-linear twist & taper using custom airfoils for high efficiency and low noise
Tower	
Type	Guyed (4 cables), tubular, tilt-up
Sections	5 x 11.5 m (5x38') - standard 50 m (164') hub height: tapered, telescoping, galvanized
Installation	Self-erection via electric winch, pulley block, and gin pole system
Anchors	Five - 1 m diameter (3') x 5 m (16') deep boreholes with steel reinforced concrete
Control Command System	
Power Control	Aerodynamic stall using variable speed
Shut down	Aerodynamic deep stall by varying speed or by full span twisting of composite blades
Automation Control	PLC control system
UPS (voltage outage)	18 Ah
Remote Supervision	remote access via TCP / IP internet and SCADA system

Safety System	
Over-speed	Fail-safe blade pitch up to aerodynamic stall and emergency disc brake
Blade	Full span blade pitch using centrifugal force, independent of power supply
Brake	Fail-safe spring loaded disc brake on high speed shaft independent of power supply

Extreme Condition Protection	
Corrosion	Galvanized tower & weldments + optional marine ant-corrosion protection
Generator tightness/insulation	IP55 / Class F
Hurricane resistance	IEC 61400-1a Class Rating + tilt down tower
Earthquake resistance	Flexible tower, blades, and guyed structure
Lightning Protection	Fully-integrated lightning protection (IEC-61400-24)
	Lightning arrester in nacelle (IEC 62305/61643-12)
Operating limits	Standard: -20 C to +40 C (-4 F to +104 F)
	Optional: -40 C to +50 C (-40 F to +122 F)

Weight & Dimensions	
Blades & Hub Assembly	1,200 kg (2646 lb.)
Tower & Gin Pole Assembly	8,000 kg (17,637 lb.)
Nacelle	3,300 kg (7,275 lb.)
Miscellaneous (control cabinet, guy cables, wire harness, etc.)	1,600 kg (3,527 lb.)
Total Weight	14,100 kg (31,085 lb.)
Total packed volume	1 x 53' HQ container or 2 x 40' HQ container

Power Curve

Wind speed (m/s) d=1.225 kg/m	Power curve (kW) 30.5m blades
0	0
1	0
2	0
3	3
4	14
5	28
6	51
7	80
8	113
9	151
10	208
11	275
12	295
13	300
14	300
15	300
Up to 25+	300

Production Estimate

Hub height wind speed (m/s)	Annual gross production (MWhr/year)
5	400
5.5	525
6	650
6.5	775
7	900
7.5	1025
8	1150
8.5	1275
9	1400
9.5	1525
10	1650

Certifications

This wind turbine is built to comply with ICE certification.

This wind turbine is designed in facilities certified to ISO9001 and manufactured in facilities certified to ISO9001 or ISO9002.

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