Design Specifications for the Atlantic Orient 15/50 60Hz 50kW Wind Turbine

SYSTEM

Type	Grid Connected
Configuration	Horizontal Axis
Rotor Diameter	15 m (49.2 ft)
Centerline Hub Height	25 m (82 ft)

PERFORMANCE PARAMETERS

Rated Electrical Power	50 kW @11.3 m/s (25.3 mph)
Wind Speed	@hub height 25 m (82 ft)
cut-in	4.6 m/s (10.2 mph)
shut-down (high wind)	22.4 m/s (50 mph)
peak (survival)	59.5 m/s (133 mph)
Calculated Annual Output	
@ 100 % availability	5.4 m/s (12 mph) 87,000 kWh
	6.7 m/s (15 mph) 153,000 kWh
	8.0 m/s (18 mph) 215,000 kWh

ROTOR

Type of Hub	Fixed Pitch
Rotor Diameter	15 m (49.2 ft)
Swept Area	177 m ²(1902 ft²)
Number of Blades	3
Rotor Solidity	0.077
Rotor Speed @ rated wind speed	65 rpm
Location Relative to Tower	Downwind
Cone Angle	6º
Tilt Angle	0º
Rotor Tip Speed	51 m/s (114 mph) @ 60 Hz
Design Tip Speed	6.1

BLADE

Length	7.2 m (23.7 ft)
Material	Wood/epoxy laminate
Airfoil (type)	NREL, Thick Series, modified
Twist	7° outer blade
Root Chord	457 mm (18 in) @ 4% 279 mm (11in)
Max Chord	749 mm (29.5 in) @ 39% 2925 mm (115 in)
Tip Chord	406 mm (16 in) @ 100 % 7500 mm (295 in)
Chord Taper Ratio	± 2:1
Overspeed Device	Electro-magnetic tip brake
Hub Attachment	Embedded female bolt receptors
Blade Weight	150 kg (330 lbs) approximate

GENERATOR

Type	3 phase/4 pole asynchronous
Rated Temperature	-25°c
Frequency (Hz)	60 Hz
Voltage (V)	480, 3 phase @ 60 Hz
kW @ Rated Wind Speed	50 kW
kW @ Peak Continuous	66 kW
Speed RPM (nominal)	1800 @ 60 Hz
Winding Configuration	Ungrounded WYE
Insulation	Class F
Enclosure	Totally Enclosed Air Over (TEAO)
Frame Size	365 TC
Mounting	Direct mount to transmission
Options	Arctic low temp. shafting (-40°c)

TRANSMISSION

Type	Planetary
Housing	Ductile iron-integrated casting
Ratio (rotor to gen. speed)	1 to 28.25 (60 Hz)
Rating, output horse power	88
Lubrication	Synthetic gear oil/non toxic
Filtration	Service filtration cartridge @ scheduled maintenance.
Heater (option)	Arctic version, electric

YAW SYSTEM

Normal	Free, rotates 360 degrees
Optional	Yaw damping-required when known conditions frequently exceed 50° yaw rate per second.

DRIVE TRAIN TOWER INTERFACE

Structural	Yaw bearing mounted on tower top casting
Electrical	Twist Cable

TOWER

Type	Galvanized 3 legged, bolted lattice , self-supporting
Tower Height	24.4 m (80 ft)
Options	18.3 m (60 ft), 30.5 m (100 ft), 36.6 m (120 ft) Tilt down 24.4 m (80 ft)

FOUNDATION

Type	Concrete or special
Anchor Bolts	Certified ASTMA-A-193-Grade B7

CONTROL SYSTEM

Type	PLC based
Control Inputs	Wind speed, generator shaft speed
Control Outputs	Line interconnection, brake deployment
Communications	Serial link to central computer for energy monitor and maintenance dispatch (optional
Enclosures	NEMA 1, NEMA 4 (optional)
Soft Start	Optional

ROTOR SPEED CONTROL

Production	Blade stall increases with increased wind velocity
Normal Start up	Aerodynamic, electrical boost if necessary
Shut-down	Control system simultaneously applies dynamic brake and deploys tip brakes. Parking brake brings rotor to standstill.

Back-up Overspeed Control: Centrifugally activated tip brakes deploy

BRAKE SYSTEM CONTROL

Fail-safe brakes automatically deploy when grid failure occurs.

APPROXIMATE SYSTEM DESIGN WEIGHTS

Tower	3,210 kgs	(7,080 lbs)
Rotor & Drivetrain	2,420 kgs	(5,340 lbs)
Weight on Foundation	5,630 kgs	(12,420 lbs)

DESIGN LIFE: 30 Years

DESIGN STANDARDS: Applicable Standards, AWEA, EIA and IEC

DOCUMENTATION:
Installation Guide and Operation & Maintenance Manual

SCHEDULED MAINTENANCE: Semi-annual or after severe events.

NOTE 1: Atlantic Orient Corporation and its affiliates are constantly working to improve their products, therefore, product specifications are subject to change without notice.

NOTE 2: Power curves show typical power available at the controller based on a combination of measured and calculated data. Annual energy is calculated using power curves and a Rayleigh wind speed distribution. Energy production may be greater or lesser dependent upon actual wind resources and site conditions, and will vary with wind turbine maintenance, altitude, temperature, topography and the proximity to other structures including wind turbines.

NOTE 3: For design options to accommodate severe climates or unusual circumstances please contact the corporate office in Norwich, Vermont USA

NOTE 4: For integration into high penetration wind-diesel systems and village electrification schemes contact the corporate office in Norwich, VT USA for technical support and systems design.

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