

BASIC TOWER REQUIREMENTS for the BWC EXCEL WIND TURBINE

Customer supplied towers for the BWC EXCEL should meet the following requirements:

- Tower Height:** 60 ft (18 m) minimum, 80 ft (24 m) or higher recommended
Design Wind Speed: 120 mph (54 m/s)
Turbine Weight: 1200 lb (545 kg)
Turbine Thrust Load: 2400 lb (1090 kg) @ any wind \geq 40 mph (18 m/s)
Blade Clearance: The top 12 ft (3.5 m) of the tower must not extend beyond an 18 inch (0.46 m) radius from the tower centerline.
Tower Plumb Tolerance: Up to 0.25° tolerance from plumb allowed.
Tower Stiffness: Tilt at the top of the tower should be no more than 2.0° for consistent furling. Deflection of monopole towers at 50 mph should be no more than 1.0% of tower height; at 120 mph no more than 2.5% of tower height. (For a 120 ft tower this would be 14.4 in and 36.0 in, respectively.) Overly flexible towers can cause vibration and/or fatigue problems. A civil engineer should approve the tower.

Blade Frequency:

First Flap Frequency for 10 kw (Not Rotating)			Blade Length	
Tested: 8/4/2011				
Ferrite	3.012	Hz	128	in.
Neo	2.703	Hz	134	in.

Turbine Mounting:

- Provisions shall be made for mounting a furling winch, strain relief for tower wiring, tower climbing, anti-fall equipment and access holes where appropriate.
- The top of the tower shall be designed to allow the connection of the power cable and furling cable to the turbine via the two 2.3" diameter holes in the turbine's tower adapter plate.
- A connection shall be made between the turbine furling cable and the tower furling winch by using a tower furling cable assembly (11508-x), a 3/16" stainless steel thimble (HM3003) and two 3/16" stainless steel malleable clips (HM3002-B).
 - Furling cable, thimble, and clips must be purchased separately.
 - Monopole towers provided by American Resource & Energy (ARE) will require different hardware to mount the furling assembly. The required hardware list is as follows:

ARE Furling Cable Hardware List

Item Number	Item Description	Qty.	Unit
HA0005	WINCH XL FURL - MONOPOLE TWR	1	EA
11601-PLT	WINCH DRIVE HANDLE	1	EA
HB6016	BOLT 3/8"-16x 1-1/2",HH,G5,S.S	3	EA
HW6003	WASHER 3/8 USS FLAT SS	6	EA
HW6002	WASHER 3/8 SPLIT LOCK SS	3	EA
HN6001	NUT 3/8-16 HEX SS	3	EA

- Tower connection shall be made using either nine 5/8" bolts or six 3/4" bolts using the pattern illustrated below:

