

# Q-Cage Superchargers

For AM / MW Antennas

LBA Product Bulletin

Excellence in RF Systems Since 1963

## What is a Q-Cage™

The LBA Technology Q-Cage™ is a cost effective way to increase power handling capacity and improve impedance characteristics of series-fed vertical radiators. Through use of Q-Cage™ systems, the bandwidth of existing short antenna towers can be improved without tower replacement. This permits the use of shorter towers for IBOC and DRM digital transmission. Applied to high power medium wave antenna towers, the Q-Cage™ reduces voltage stresses on insulators and antenna tuning units.

The LBA Q-Cage™ system may be installed on any structurally suitable guyed, series-fed tower. It features the same low wind load, heavy duty construction found in the popular LBA TuniPole™ folded unipole systems, proven in use by thousands of MW/AM stations worldwide. The installed cost of the Q-Cage™ is far less than that of an equivalent cross-section tower.

The Q-Cage™ is designed and fabricated to fit your tower. It uses utility grade high conductivity, corrosion-resistant components. No tower modifications are required, and installation is fast and uses only light tools and rigging. The system does not obstruct tower climbing activities. No tuning is required, and maintenance is only that required of traditional tower components.

## What the Q-Cage™ Does for You

The Q-Cage™ operates by increasing the effective radius of the tower. This causes the Q and characteristic impedance (Z) to decrease as the L/D ratio is lowered. As a result, the operating impedance and bandwidth improve, and operating RF voltages decrease. As a bonus, the physical arrangement of the radiator cables reduces the voltage gradient on the guy wire insulators near the tower, further improving power handling capability of the tower.

Of course, these improvements all decrease current and voltage handling requirements at the ATU, on the base insulator, and tower lighting transformer. The cost savings in a new facility or upgrade can be dramatic. This is particularly compelling where two or more stations are diplexed on one tower. LBA will be happy to evaluate specific cases and recommend the optimum antenna system combination.

## Typical Specifications

Each Q-Cage™ is customized to the application, so characteristics will vary. Typical for a QC-400 mounted on a 26" (660 mm) face 390 foot (119 m) tower operating at 100 KW and 747 kHz are:

Impedance	86 +j101 ohms
Peak RF voltage	14.5 kV @ 125% modulation
Length	390 feet (119 m)
QC cross-section	20 feet (6 m)
Effective tower cross-section	5 feet (4.6 m)
Radiator cables	6 each, 0.4 in (10 mm)
Wind survival (no ice)	125 mph (200kph)
Weight (download)	1560# (700 kg)
Wind load (no ice)	3100# (1400 kg) distributed



Q-Cage™

## Case Study Using a Q-Cage™

It was desired to improve the power handling capability of a Rohn 65G 390' (119 m) tower with a face width of 26" (670 mm) operating at 100,000 watts (125% mod.) at 630 kHz. A second transmitter was to be diplexed at 747 kHz. LBA determined that this could best be done with a Model QC-400-6 Q-Cage™ installation. By modeling the systems using NEC-4, this comparison can be made:

	<u>630 kHz</u>	<u>Rohn 65G</u>	<u>Rohn 65G with QC-400</u>
Effective tower radius		9.4" (240 mm)	96" (2440 mm)
Effective L/D ratio		250	25
Base impedance		39 +j51	43 +j16
Base current		50.6 A	48.2 A
Peak base volts		10,500 V	7,100 V
Voltage reduction		0%	32%
	<u>747 kHz</u>		
Base impedance		73 +j195	86
+j101			
Base current		37.0 A	34.1 A
Peak base volts		24,700 V	14,500 V
Voltage reduction		0%	41%
	<u>630 + 747 kHz</u>		
Base current		62.7 A	59.0 A
Peak base volts		35,200 V	21,600 V
Voltage reduction		0%	39%

In this case, the 200 KW diplexed voltages with the Q-Cage™ were actually less than the voltages experienced in the existing 747 kHz single frequency operation. Thus, the entire cost and delay of tower renovation/replacement could be saved by employing the Q-Cage™.

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