

Securing Coaxial Cable in a Monopole

By John Garing

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For today's expanding PCS/PCN and cellular installations, tower appearance, price, and practicality of systems designs have become critical in the decision-making process. Because of land and installation costs and local ordinances, many wireless operator companies choose monopole towers over traditional towers for cellular, PCS, and paging applications.



Figure 1: A self-supporting monopole tower, such as this step-tapered version, is a typical choice for light cellular and PCS/PCN and light microwave applications.

Monopoles are self-supporting, tapered pole structures manufactured from galvanized steel. The modular design employs tubular sections that incorporate "hidden" flanges at each transition point, resulting in an aesthetically pleasing profile. The slim profile is helpful when complying with local laws and zoning board regulations and is often preferred by architectural review boards and gov-

ernmental agencies over the more intrusive profile of traditional towers.

Economic Advantages

A monopole uses less land than a guyed or traditional self-supporting tower, making it an ideal choice for cellular and telecommunications applications in high cost, metropolitan and suburban areas. Smaller land requirements can translate to less overall system start-up expense. Monopoles also have the advantage of easy erection, which saves time and money on installation crews, but the enclosed structure can make hoisting cable more difficult.

Monopole Preinstallation Data

Before installing a monopole, certain data needs to be collected. The tower vendor will supply twist and sway calculations for a specific installation. Monopoles must conform to EIA 222 standard or UBC and local codes, where applicable. To ensure proper footing, soil samples should be taken and analyzed. Once this analysis is completed, the tower should be erected according to the manufacturer's recommended techniques, and cable installation can proceed.

Installation Tips

Hoisting the Cable

A major difference between monopoles and traditional towers is that the coaxial cables run to the top of the tower inside the enclosed structure of the monopole. While this adds the advantage of less wind loading, it does require important precautions during installation.

Great caution should be used while hoisting cable, typically foam-dielectric coaxial cable, inside of the monopole. It is important not to snag the lead end of the cable run on the inte-

rior of the monopole; this can result in damage to the main feeder and create greater reflected power and noise.

Damaging the cable while hoisting may require rework. In extreme cases, entire cable runs may need to be replaced, resulting in greater time required for installation and higher overall cost.

Selecting an appropriate hoisting grip will greatly reduce the risk of damage when lifting the cable inside the monopole.

Types of Hoisting Grips

A hoisting grip must be chosen before lifting cable inside of the monopole. There are two main types of industry hoisting grips for coaxial foam cable: non-laced and laced.



Figure 2: A non-laced hoisting grip is a one-piece unit that slips over the transmission line and applies tension to prevent slippage during and after installation. This support/hoisting grip is shown with the calibrated clamp that locks the grip into place and with the crimping tool for installing the clamp.

The non-laced grip hoists the cable and is designed to remain attached to the tower for additional weight support after installation.

The laced grip pulls the cable upward but is not designed to support the weight of the cable after installation. It will function as support for the cable when a calibrated clamp is attached to the bottom of the grip's interwoven mesh.

Securing the Cable

A non-laced, calibrated clamp hoisting grip is recommended for installation in a monopole because it is designed to use the calibrated clamp around the bottom of the hoisting grip. The non-laced hoisting grip should be slid over the cable before attaching the connectors.

Due to the interior design of the monopole, traditional cable hangers cannot be used. There is, however, a hook in the upper portion of the monopole that a non-laced, calibrated clamp hoisting grip can work in conjunction with, in order to support the weight of the cable.

The clamp is tightened around the bottom of the hoisting grip with a special tool to firmly compress the hoisting grip to the cable without damaging it. The calibrated clamp, non-laced hoisting grip is specifically designed to support the weight of the cable as well as hoist it. It is important to order the proper size non-laced clamping hoisting grip because they are size-specific to the coaxial cable used.

A laced hoisting grip can be used when a calibrated clamp is placed around the bottom of the grip for additional support. The calibrated clamp must be ordered separately. A laced hoisting grip with an additional calibrated clamp is needed when the cable arrives at the installation site with interface connectors already

attached. The grip with the calibrated clamp is used for after installation cable support.

Hoisting Grip Tension

In the past, some installers have used the laced hoisting grip without a calibrated clamp for monopole applications, and have experienced downward cable slippage as a result. This occurs because the laced hoisting grip only functions properly with constant tension on the grip. When tension is lost, the cable has a tendency to slip downward, causing stress on the top jumpers and antennas. With the anchoring effect of the calibrated clamp, the grip serves as additional support for the coaxial foam cable.

Applying the Hoisting Grip

When a calibrated clamp is used with a hoisting grip in a monopole application, special attachment precautions are needed. If the grip is non-laced, it should be slid onto the cable before attaching the top connector to the cable. Once this connector is attached, some calculations need to be made before clamping down the laced or non-laced hoisting grip.

Three measurements need to be taken and added together.

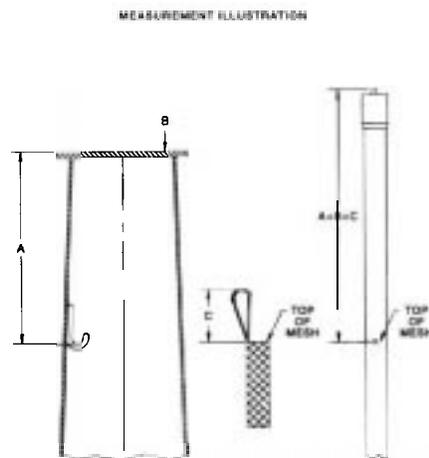


Figure 3: Illustration shows interior hook and support measurements that must be made before clamping down the hoisting grip.

First, the distance from the top exit of the monopole to the interior hook should be measured, if not provided by the manufacturer. This is much easier when done on the ground before the tower is erected.

Second, the distance from the top mesh of the hoisting grip to the top of the hoisting hook should also be measured.

Third, the length of cable protruding from the top exit of the monopole should be calculated.

These three distances added together give the distance from the top of the coaxial cable connector to the point where the top of the hoisting grip's mesh should be located after attachment. When the location is found, the hoisting grip can then be clamped down according to manufacturer's instructions. If the calculation demonstrates an insufficient length of leader cable, an additional hoisting grip may be required lower on the cable being hoisted.

The cable is now ready to be hoisted. The manufacturer of the monopole will provide recommended techniques for raising the coaxial foam cable inside a particular tower.

Hoisting Grip Clamps

Calibrated clamps for hoisting grips are very product-specific. Because of the variety of actual diameters of coaxial cable from various vendors, a calibrated clamp hoisting grip from one vendor may not work properly on another vendor's cable. Cable vendors should be asked if calibrated clamp hoisting grips for the different sizes of coaxial cable are offered.

Laced hoisting grips are offered in a variety of sizes. When using a laced hoisting grip for monopole support, the cable size and the need for a calibrated clamp with the laced hoisting

grip should be specified.

Hangers and Accessories

After the main feeder has been secured to the monopole with a calibrated clamp hoisting grip on the interior hook, additional support for the coaxial cable comes from cable hangers on the cable bridge and additional hangers on the top platform of the monopole.



Figure 4: Top of a monopole showing angle adapters, standard hangers, butyl and vinyl tape weatherproofing, and ground kits on a monopole platform.

There is a variety of hangers and hanger accessories available. Time should be spent in planning the top and bottom hanger configurations for each specific installation. This platform shows angle adapters, standard hangers, threaded rod support kits, and snap-in hangers. Cables are also weatherproofed.

Figure 5 shows a bridge between a monopole and an equipment shelter. At the lower center of the photo there is a copper grounding plate.

Conclusion

The monopole is a cost-effective tower for PCS, cellular and paging



Figure 5: A cable bridge between a monopole and an equipment shelter. Accessories shown are entry port to the building, grounding bar, snap-in hangers, cable bridge support kit, and butyl and vinyl tape weatherproofing with ground kits.

applications when proper pre-installation data is gathered, correct accessories are used to anchor the cable runs, and all necessary preplanning and precautions are taken into consid-

eration.

For further information, you may contact John Garing via e-mail at john.garing@andrew.com ▲

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