



Slip Splice Monopoles

This PAN will focus on slip splice poles that are designed, maintained and installed in compliance with the ANSI/TIA 222 Standard. The means and methods for the installation of these types of structures shall be in compliance with the ANSI/ASSP A10.48, ANSI/TIA 322 Standards as well as other regulations, standards, or requirements that may apply.

We will not be discussing temporary life lines, anchor brackets, and attachment points. These critical components of a fall protection plan are covered in other reference documents. There are various means and methods that apply to the erection of a pole. This PAN does not intend to address these issues but to focus on the importance of the splice being achieved as designed.



Finished Slip Joint

What is a Slip Splice?

Slip splice is a joint that, through friction, allows for the connection to be achieved between any two pole

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sections providing that the splice has met the design requirements established by the ANSI/TIA 222 standard and the manufacturers design tolerances. The joint length is based on 1.5 times the inside diameter of the upper pole section and must have a tight, uniform fit throughout the entire overlap which is ensured by jacking the sections together. If this tight, uniform fit is not achieved, forces can cause underside settling of the pole, and in extreme cases could cause pole failure.

Proper Sequencing

Before delving into jacking sections together, it is critical that all components of the structure are inspected to ensure they meet their designed specifications for a proper designed pole including:

- Foundation size and exposure above grade match drawings;
- Proper embedment depth of the anchor rods per the foundation design;
- Bottom anchor rod nut height meets designed height and are level (typically 1.5x bolt diameter);
- All threads are clean of concrete;
- Anchor rods installed in proper location and orientation (centered on the caisson within manufacturers tolerance);
- Any signs of rust, cracking or spalling of the concrete; and
- Concrete edge is finished with a bevel.

The base section of a monopole is the most critical section of the tower. Once the leveling nuts are properly set, the base section is installed on the foundation and leveling nuts. It is essential that the base be leveled compliant with the manufacturer's requirements as this is the only effective means to establish the plumb on the tower and is critical prior to stacking additional sections. Once the tower is plumb, the base anchor rods are to have the hardware all installed and brought to a "snug tight" condition, as defined in ANSI/TIA 222 4.9.9, "All anchor rod nuts (top and leveling nuts) shall be tightened to a snug tight condition. Top nuts shall be rotated, with the leveling nut secured an additional 1/3 third turn for anchor rods 2.5 in. [38 mm] or less

ASSEMBLY OF SLIPJOINTS

The pole sections should be assembled near the structure's foundation. The main components of the structure should be blocked up off the ground such that the centerline of each piece is level and plumb to the others. Care should be taken to lay the pole such that all items to be bolted or otherwise assembled to the pole can be connected without interference from the blocking. The lower pole section should be laid out first. The next joining pole section should be slipped on to the lower section as far as possible to facilitate the speed of the jacking operation. Each section must be aligned to each other using the match marking of the pieces as shown in figure A.



FIGURE A

in diameter and an additional 1/6 turn for anchor rod diameters greater than 1.5 in. [38 mm]. Appropriate washers shall be used above and below oversized flange plate holes. Nut locking devices are not required for properly tightened anchor rod nuts." This step must occur prior to adding the additional sections as it will keep the tower plumb.

Next, we turn to the first slip splice and its importance. Prior to lifting any sections, the maximum and minimum overlap tolerances should be marked on the pole sections. These tolerances serve as a guide for the contractor to ensure a minimum overlap distance has been met. If a minimum distance is not achievable with jacking, the manufacturer's design engineer must be contacted. If the maximum distance is exceeded before or after jacking, the pole still may meet TIA 222

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Slip Joint Jacking Bolt and Inspection Hole

and manufacturers specifications, however the manufacturer's design engineer should be contacted with exact measurements of the overlap distance to verify structural engineering.

Why is Jacking Necessary?

Jacking sections together is the only method able to validate the sections are snug tight and meet overall pole structural design. Depending on the weight of the upper sections is NOT acceptable. If sections are not jacked together, the monopole will not achieve its full structural capacity, will be vulnerable to damage, and has the potential to settle causing the safety climb wire rope to become slacked. This may cause damage to the wire rope itself. In addition, there are numerous cases of the lines on the inside of poles being damaged when the pole does finally settle and the lines kink on the bottom part of the pole.

Each section must be jacked together, to obtain a tight even joint, regardless of the initial overlap distance, prior to the stacking of the next section to ensure the tower remains plumb and can handle the additional forces that will be placed onto the joint. Jacking forces must be increased until no additional movement of the joint occurs, regardless of whether the overlap distance meets the minimum splice length specified.

Many manufactures are open to having a conversation with the contractors on their rigging plans and attachment devices for the rigging equipment to the pole for the purposes of jacking to achieve the required friction. There are several ways to achieve jacking; proper rigging plans and methods of procedure should be created and reviewed by a qualified person.

It is recommended that the distance of splice at time of stack and post jacking be documented to record the jacking distance that was achieved.

The TIA design standard is recognized by the IBC (International Building Code). Structures designed and installed in compliance with the standard and their design requirements will perform properly for the location, loading and environment that they are installed in. Our industry has a sound design standard and this allows the organizations that utilize these structures to have confidence in their network design knowing that a properly designed, installed and maintained structure will provide the performance expected.

ⁱ A slip splice pole can be assembled on the ground and then raised with one pick, but this requires a rigging plan adaption and a proper lift plan for the lift that should provide a mechanism or other means to prevent the pole sections from separating during the lift. Jacking is still required. ■