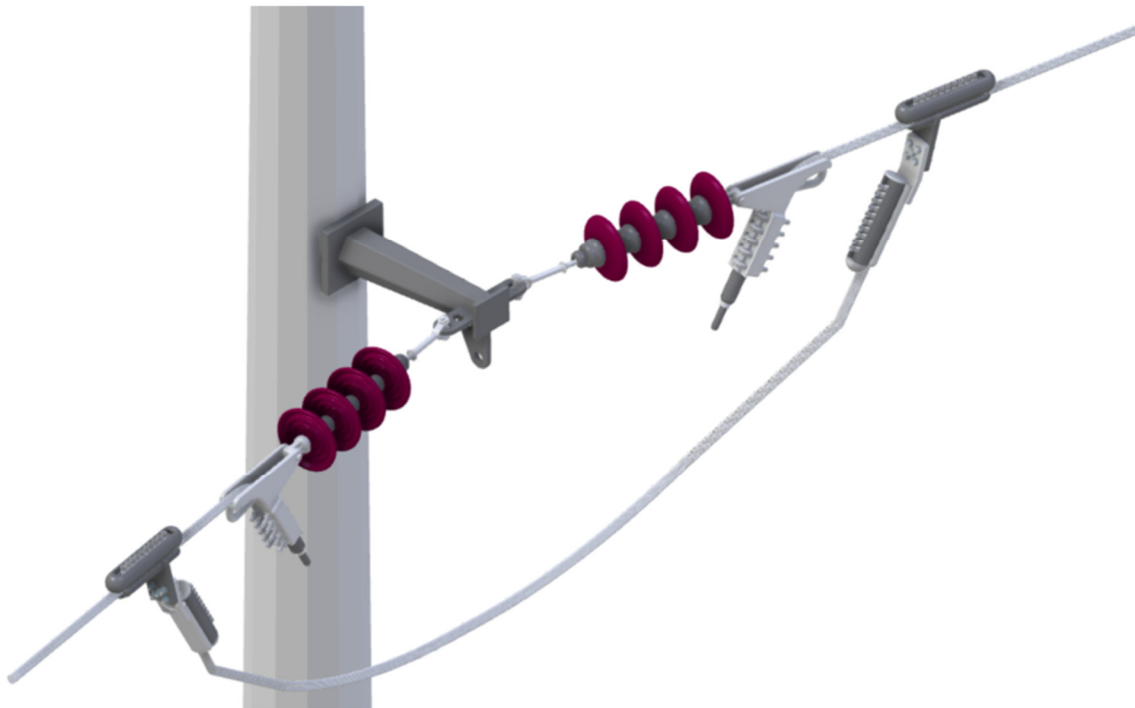


ClampStar® “Q2D”

Quadrant Clamp to Full Tension Conversion Kit for ACSS Conductors

Recommended Installation Instructions



- **Safety Precautions**



- These instructions **do not** claim to cover all details or variations in equipment or installation, nor to provide for all possible conditions concerning installation, operation or maintenance of this equipment. If further information is desired or if particular problems are encountered which are not sufficiently covered in the instruction, contact Classic Connectors Inc. at the above address or telephone numbers.
- Conductor must be clean (wire brushed), straight, in lay and free of burrs to ensure proper installation and long-term performance.
- **Designed** for full tension applications on ACSS Conductors.
- **Designed** for a maximum operating temperature of 250 °C.
- **Do not** reuse Clampstar® assemblies or components.
- Clampstar® assemblies come individually packages in sealed plastic bags with their cable grooves factory-loaded with proprietary inhibitor compound. The Assembly shall be kept in the sealed container prior to installation to prevent dust/dirt contamination. Additional inhibitor is not required and alternate inhibitor compounds shall not be used.
- This installation instruction is written for applications on both energized and de-energized conductors, and assumes only qualified individuals with appropriate training and certification will be performing the work. It is **not intended** to serve as a "Safety Procedure." All "Safety Procedures", clearances and methods, as adopted by the user utility, shall be strictly followed. Installation on energized conductors is the same procedure with practices and procedures dictated by the utility to be employed.

- **Introduction**

A quadrant clamp, also referred to as a "strain clamp," as defined by IEEE C135.100 functions as an anchor point for mechanical strain, allowing the phase conductor to remain unbroken as it passes through. Because it does not interrupt the conductor, it is not part of the electrical current path.

In contrast, a deadend is designed to support the conductor under strain and terminate a phase conductor at a structure. It also enables current transfer to another connection point, typically through a bolted pad or similar connectors, making it a critical component of the current path. Consequently, most deadends are temperature-rated up to 93°C, determined by the annealing point of the aluminum material.

Quadrant clamps are mechanically rated to handle up to 60% of the conductor's Rated Breaking Strength (RBS) and are designed primarily for use with ACSR conductors. They are not recommended for ACSS conductors, as their design cannot achieve a full-tension rating. The soft aluminum strands of ACSS prevent adequate compression and grip on the core, leading to insufficient tension support. Our Quadrant Clamp to Full Tension Conversion Kit (Q2D) will allow applications on ACSS conductors.

The Quadrant Clamp to Full Tension Conversion Kit consists of 2 main assemblies: a Mechanical Portion and an Electrical Portion. The mechanical portion consists of a compression sleeve and an aluminum cup joined together into one part a Mechanical Anchor Kit (MAK). The compression sleeve is designed to slide over the exposed steel core and the aluminum cup over the aluminum strands. A retaining ring has been incorporated in between the sleeve and cup so that the MAK stays in place after installing over conductor thereby freeing both lineman's hand. The compression sleeve must be crimped with the properly sized die before installation can be completed. The Electrical Portion consists of a Primary Transfer Connector (PTC) and a Jumper Terminal Extrusion (JTE). Both the PTC & JTE consists of a head and a body with a 15-degree angled pad welded to them. They are supplied with torque limiting fasteners designed to shear at the appropriate torque level. They have proven very accurate, even with power drivers.

The PTC and JTE are preloaded from the factory in the conductor grooves, and under the keepers with a proprietary CC² Inhibitor Compound. This inhibitor is specifically formulated for this application to withstand temperatures up to 250°C. **No other inhibitor is to be used.**

All fasteners can be tightened using either a T-60 Torx® or ¾” (19mm) socket. Both PTC & JTE assemblies are shipped with the keepers open to allow assembly without further adjustment. Each keeper is equipped with torque limiting fasteners. When the hex head shears, during installation, further adjustment of the fastener shall not be made.

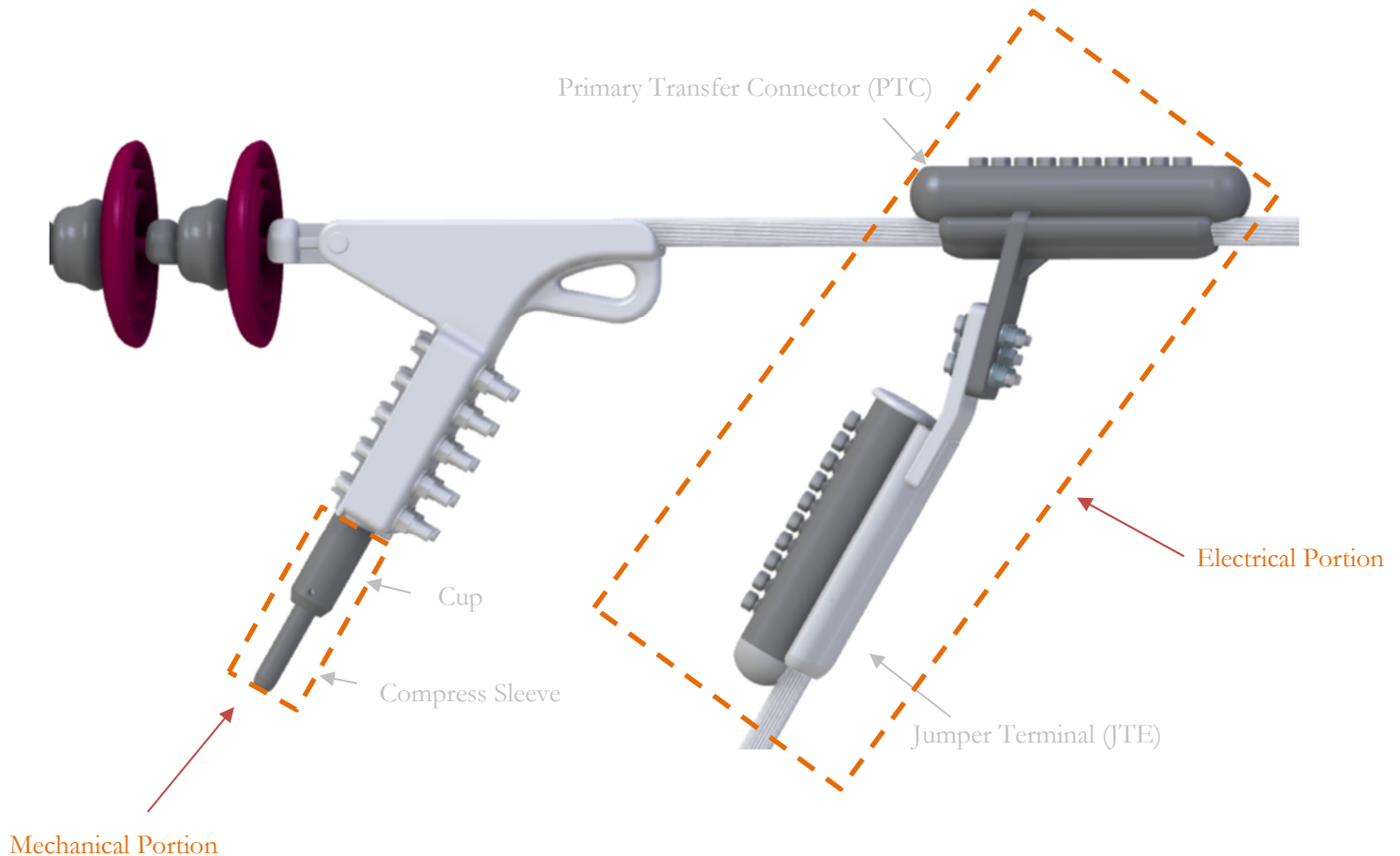


Figure 1: Q2D Description

• **Tools and Equipment Required**

- Quadrant Clamp to Full Tension Conversion kit (appropriate for conductor size and material)
- Cable cutters
- Wire brush
- Measuring tape
- Power driver or Rattle gun
- ¾” or 19 mm socket
- T60 Torx Bit (1/2” Drive)
- Electrical tape
- Crimping tools
- Crimping dies
- Aluminum strands trimming tool

- **Installation Steps - Mechanical Portion**

1. **Verify Conductor Size:** Ensure the correct Clampstar® has been chosen, and is appropriate for the application. The package label includes the part number and conductor range. That, along with additional information, is marked into the Clampstar® components.
1. **Clean Conductor:** Using a stainless-steel wire brush (v-brush type recommended), thoroughly clean a 12-inch (304.8 mm) section of conductor beyond the mouth of the clamp regardless of the conductor's condition.
2. **Determine Conductor Cut Length:** Place the MAK against the mouth of quadrant clamp on the jumper side and then cut the conductor to the same length as the MAK which should a minimum of 8.5 inches (216 mm).
3. **Remove Trimming Tool Collar Handle:** Remove handle so that it will not collide with the quadrant clamp. It is important to butt the trimming tool collar up against the mouth of the quadrant clamp. This determines the location for stripping the outer Aluminum strands.

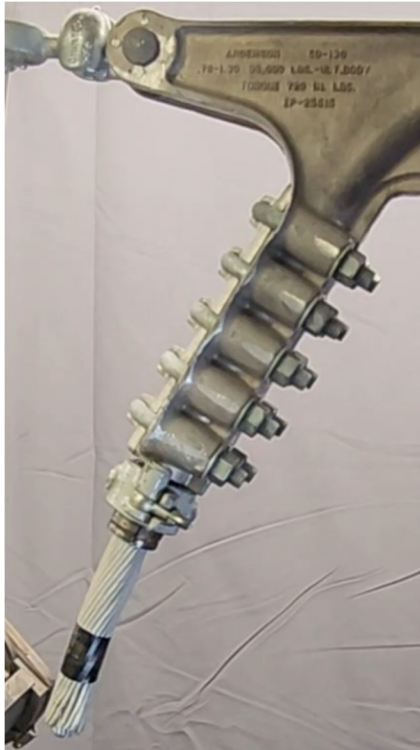


Figure 2: Trimming Tool Collar Install

4. **Trimming Tool Installation:** Mount the trimming tool on the conductor and cut the outer strands. Once the outer strands are cut, remove them to expose the steel core. Remove the trimming tool collar after the core is exposed.

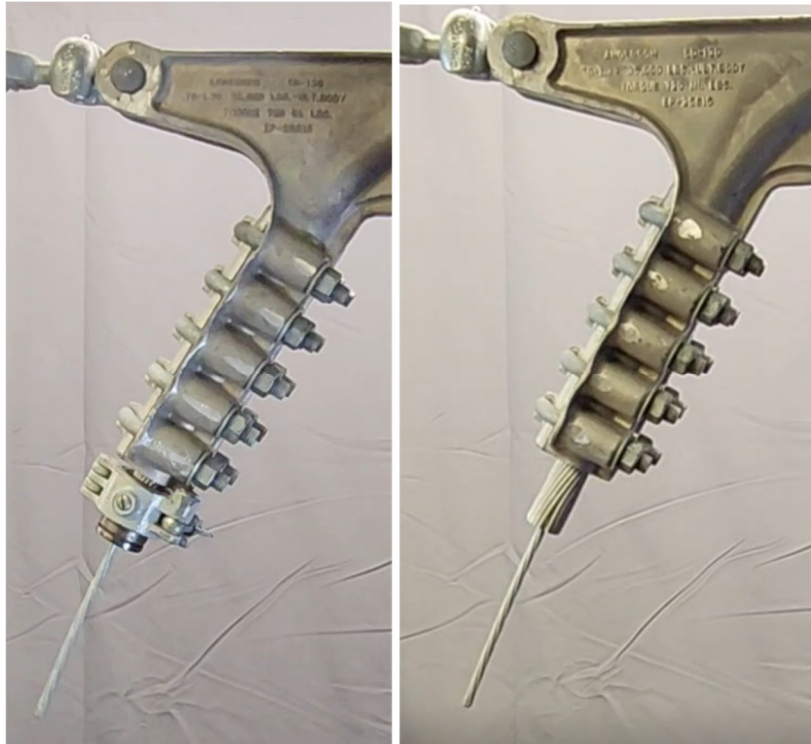


Figure 3: Core Stripping & Trimming Tool Removal

5. **Plastic Crimp Spacer Installation:** Place the spacer over the compression sleeve before inserting the MAK into the crimp tool. The spacer forces the crimp tool to position itself at the initial crimp location.



Figure 4: Plastic Spacer Install

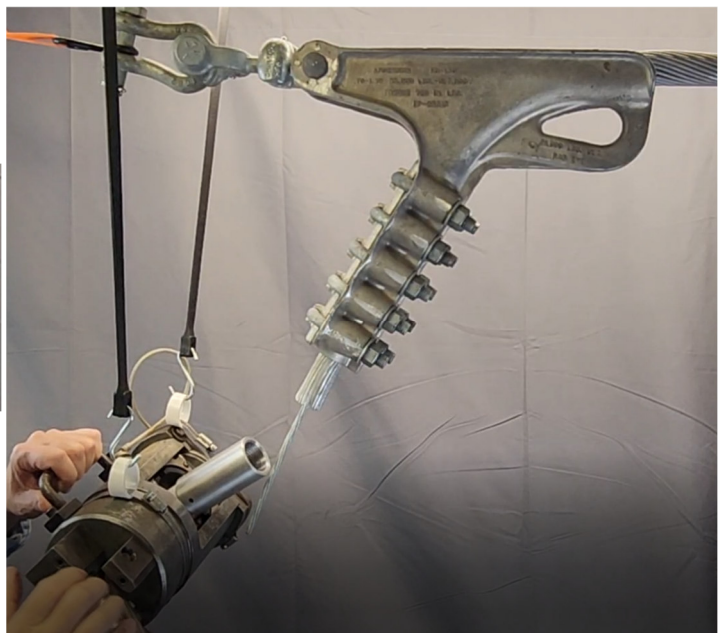


Figure 5: MAK & Spacer Install into Tool

- Initial Crimp:** Slide the compression tool along with the MAK onto the conductor. Before activating the tool, make sure that the spacer butts against the mouth of the crimping tool on one end and the bottom of the cup on the other end. Apply the first crimp and withdraw the crimp tool and remove the spacer. It is recommended to provide a lubricant for the dies during the crimping process. The polyethylene bag, which the MAK is shipped in, is the optimal choice. Cut a short piece and wrap around the compression sleeve. Use electric tape to attach to sleeve and keep in place.

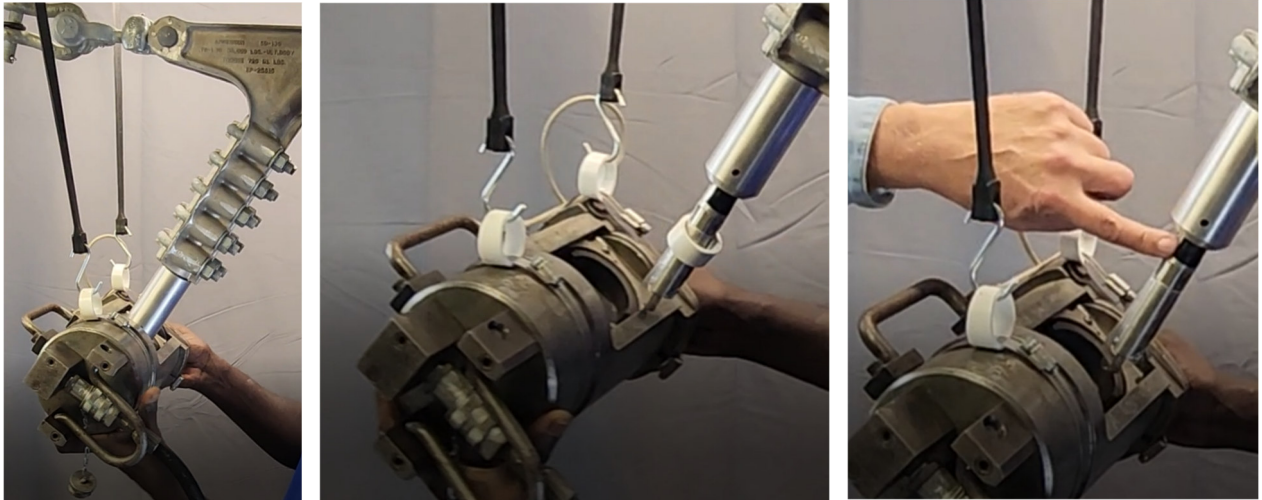


Figure 6: Initial Crimp & Plastic Spacer Removal

- Second Crimp:** The second compression will be located above the initial compression forcing the compression sleeve to expand, and securely seat the cup firmly against the mouth of quadrant clamp. This assures the assembly is tight and not subject to vibration.
- Complete Crimping Process:** Complete the crimping process beginning below the initial crimp location, until the sleeve is fully crimped. A minimum of 6 crimps is required and overlapping is allowed. This quadrant deadend is now rated as a full tension connection. Duplicate the step 1 through 9 on the other side of the tower and ensure the installation matches the finished illustration in the introduction paragraph.

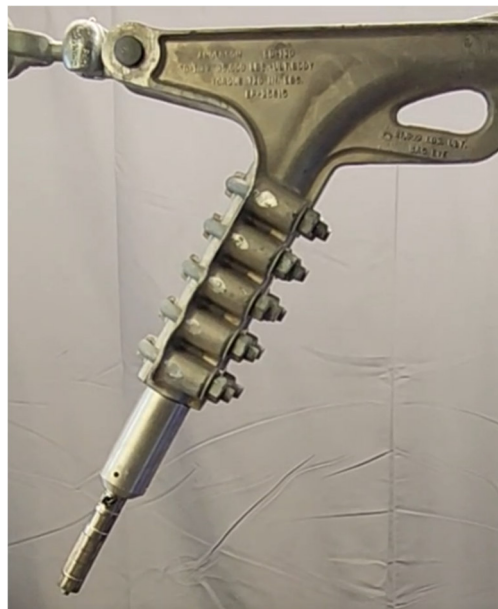


Figure 7: MAK Installation Complete

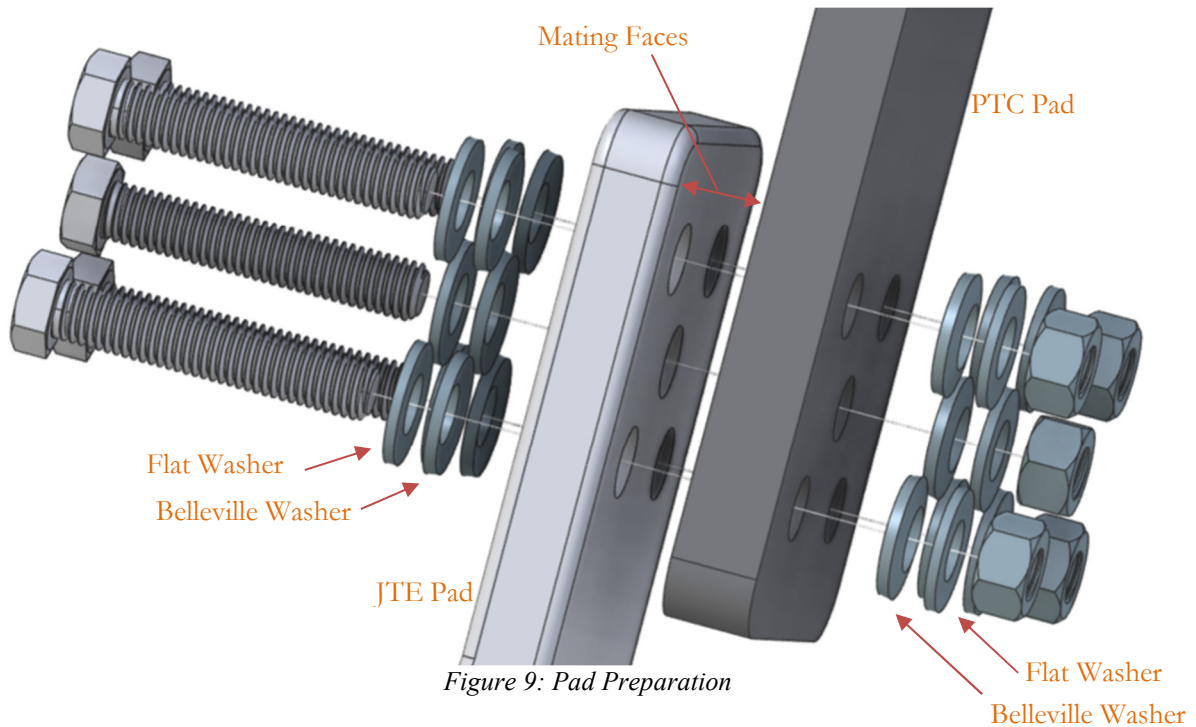
- **Installation Steps - Electrical Portion**

1. **Verify Conductor Size:** Ensure the correct Clampstar® has been chosen, and is appropriate for the application. The package label includes the part number and conductor range. That, along with additional information, is marked into the Clampstar® components.
2. **Clean Conductor:** Identify the location on the conductor where the clamping body of the unit will be positioned. Clean the conductor in a 2-inch (51 mm) section beyond the anticipated installation location to allow for proper final positioning of the unit. Use a clean stainless-steel wire brush to vigorously brush the conductor, roughening the surface that will come into contact with the unit. Do not use water or any other liquid.
3. **Prepare PTC Unit:** The unit will be shipped with a tie-wrap securing the head to the body. Carefully remove the unit from the sealed packaging, being cautious to avoid contamination of the pre-applied inhibitor. Remove the tie-wrap and slide the head off the body of the unit. The head will only slide in one direction.
4. **Landing the PTC:** Place the body of the PTC on top of the prepared conductor on the transmission line. The head should slide into only one end of the body. However, you can rotate the head in either direction to adjust the angle of the attachment pad as required. Slide the head into the body until it is fully engaged with the mechanical stops. The head should slide in easily by hand. The spherical end of the head is designed for corona protection and is made of lightweight material to reduce the unit's weight. It is not designed to withstand heavy impact from hammer blows.



Figure 8: PTC Head & body Installation

5. **Secure the Head in Position:** Once the head is fully engaged, rotate the PTC so that pad is oriented in the desired direction. Tighten the torque limiting fasteners by hand to hold the head in place. Tighten the fasteners in a linear order, matching the number of layers of aluminum stranding over the core of the conductor.
If the conductor has 3 layers of aluminum stranding over 7 steel core strands:
 - i) Apply torque to each fastener in succession.
 - ii) Apply torque two times for each fastener, then continue tightening until the head snaps off. The head will snap off at 55 lbf/ft (75Nm). Once the torque limiting fasteners snap off, the unit will be corona-free and functional up to 500kV.
6. **Prepare JTE Unit:** Carefully remove the unit from the sealed packaging, being cautious to avoid contamination of the pre-applied inhibitor.
7. **Prepare the PTC & JTE Pads:** Brush & scrub the mating faces of both the “PTC Pad” and the “JTE Pad” to roughen the surfaces where they will connect using a clean, dry stainless-steel wire brush. Apply CC² inhibitor to the mating faces of both pads. To improve connection, after applying the inhibitor, brush the mating faces again to help spread the inhibitor. Then, apply a bit more CC² inhibitor to enhance the connection quality.



8. **Install the PTC Pad and JTE Pad:** Align the bolt holes of the “PTC Pad” and “JTE Pad.” Install the necessary hardware to secure the two pads together. Aluminum bolts are recommended for use. If steel bolts are used, be sure to include Belleville Washers to prevent loosening. Equally tighten the fasteners to 45 lbf/ft (61Nm).
9. **Clean Jumper Conductor:** Identify the location on the conductor where the clamping body of the unit will be positioned. Clean the conductor in a 2-inch (51 mm) section beyond the anticipated insertion depth to allow for proper final positioning of the unit. Use a clean stainless-steel wire brush to vigorously brush the conductor, roughening the surface that will come into contact with the unit. Only dry brushing is required. Do not use water or any other liquid.
10. **Landing the JTE:** The head is welded to the body and is secured in place. The spherical end of the head is designed for corona protection and is made of lightweight material to reduce the unit's weight. It is not designed to withstand heavy impact from hammer blows.
11. **Conductor Install:** Insert jumper conductor into the JTE unit. Tighten the torque limiting fasteners by hand to hold the head in place. Tighten the fasteners in a linear order, matching the number of layers of aluminum stranding over the core of the conductor.
 - If the conductor has 3 layers of aluminum stranding over 7 steel core strands:
 - iii) Apply torque to each fastener in succession.
 - iv) Apply torque two times for each fastener, then continue tightening until the head snaps off. The head will snap off at 55 lbf/ft (75Nm). Once the torque limiting fasteners snap off, the unit will be corona-free and functional up to 500kV.
 Once everything is tightened and secure, duplicate step 1 through 11 on the other side of the tower and ensure the installation matches the finished illustration in the introduction paragraph. The finished installation should resemble the illustration on the first page.