

## ClampStar® Safe-T-Link Tether Installation Instructions for Deadends

### General Safety Considerations:

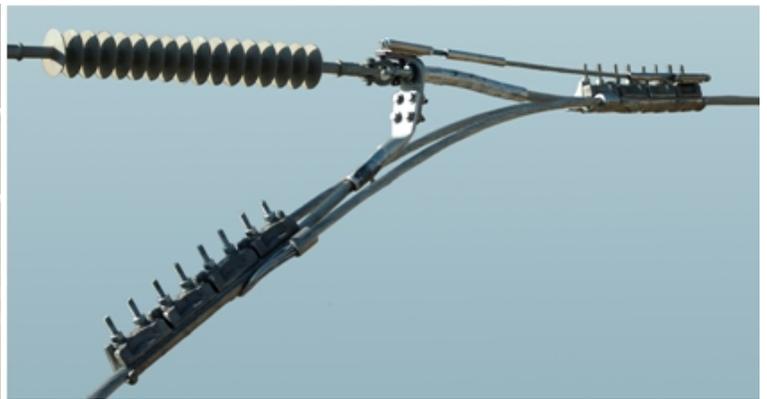
A general inspection of the line components should be made prior to commencing the procedure. Visually check associated linkages to assure there are no missing cotter pins, nuts, or other fastener components which could allow some part of the system to slip or disengage while work is being performed. Also look for excessive wear in clevis attachments which could break, and take suitable precaution to arrest any unexpected movements.

If the work is being done on an energized line, all safety procedures required for live line maintenance are to be followed according to your specific utility's safety standards, and all equipment is to be subjected to the appropriate pre-use inspections.

As with any live-line work, be aware of arc flash possibilities. The mechanical integrity of Connectors that are operating at significant temperatures above the conductor to which they are connected may be in question. It is advisable to utilize a MAC jumper which would serve to carry momentary current to prevent an arc flash in the immediate work zone should a catastrophic failure occur.

### General Description of Installation:

The ClampStar unit is designed to carry the full current load of the largest conductor it will accommodate. On a deadend application, the restoration of mechanical integrity is accomplished with the Safe-T-Link tether. This is a steel cable with threaded rods attached to each end, which are inserted into receivers on brackets, one attached to the steel eye component of the deadend and the other attached to the ClampStar unit, preferably on the innermost keeper, (the one in this photo is not on the innermost keeper as it should be – the available tether was too long).



The purpose of the tether is to “arrest” any possible elongation of the original deadend, not to relieve the present tension, other than perhaps a few hundred pounds – just enough to make the tether “taught” removing any slack. Thus, for any elongation to occur to the original connector, the existing tension would have to increase enough to overcome the tether first.

### **Components Required**

- (1) Tether Attachment Bracket for the Deadend Eye.
- (2) Tether Attachment Bracket for the ClampStar
- (3) Safe-T-Link Tether with jam nuts and lock nuts.
- (4) CSF or CSS series ClampStar of appropriate size for the conductor.
- (5) IK-500 ClampStar Installation Kit.
- (6) Corona Shields as required for the voltage level of the line.

### **Recommended Tools**

- (1) Two clamp-sticks or “shotgun sticks” of appropriate length for the line voltage.
- (2) Universal Stick with ½ square drive swivel socket adapter.
- (3) ¾” Deep Well Socket
- (4) Impact Gun (Battery type is easiest, or hydraulic) along with an insulated extension (the yellow stick on the rattle gun on the right of the photo) with the drive and socket adapters. (This is not mandatory – just makes the job easier).



- (5) Just for good measure, you may wish to have a “swivel – ratchet” as well, and hope you have enough access not to need it!





It is always helpful to have a second bucket if possible for the extra hands! I would really recommend it for this application if at all possible – especially your first time on a live deadend.

### **General Step by Step Instructions (following safety preparations):**

- (1) Install the Tether Bracket on the ClampStar (on the ground – before going aerial).



- (a) Spin the nuts of the innermost keeper down, exposing the top threads of the bolt.
- (b) Remove the O-rings and keep them, to replace them later.
- (c) Remove the nuts and washers.



- (d) Place the bracket on top of the keeper with the tube up, using the inner holes so the tube is aligned with and approximately centered over the conductor groove.

At the final installed stage it will look like this:



- (e) Place flat washers, then Belleville Washers on top of bracket, and replace the nuts.
  - (f) Spin the nuts down enough to replace the O-rings. (They keep the nuts from coming off during installation!) Better if they are down 3-4 threads like the one on the right in the photo – particularly the ones on each end – as that will be appreciated when the corona shields.
- (2) Install the Tether Bracket on the Deadend Eye.

- (a.) On a horizontal eye, the bracket will have the extended portion with the hole to receive the end of the tether on top.

- (b.) NOTES: We do not have any photos of this at the moment (sorry) so this will be a descriptive attempt. Remove the two bolts from the bottom, leaving the single bolt on one side loosened to allow the bracket to be positioned on top of the eye, and a second person (preferably in a second bucket), using a universal stick, will insert the other two bolts from below and snug them. The bracket is designed to self center on the eye, with one bolt (the center bolt) passing through the eye. This center bolt should be tightened first, and then the outer two.



- (3) Insert the IK-500 (eye bolts) into the threaded holes behind the keeper posts on the ClampStar to attach the shotgun sticks so they are positioned on the opposite side of the keepers as shown in the following photo:





- (4) Assure all the keeper nuts are backed off to allow the conductor to slip into the groove – especially the inboard (innermost keeper – adjacent the receivers).
- (5) Prior to landing the ClampStar, dry brush the conductor surfaces in the areas where the ClampStar will be positioned.
- (6) Approach from underneath, as you would with a splice. It is typically easier to land onto the tension span first – (and here is where that second bucket comes in handy) – and tighten the nuts on the innermost keeper and the nose keeper – just enough that the ClampStar cannot slip back off of the conductor – loose enough that the unit can be slid back and forth a few inches to assist in landing the other end on the jumper conductor. (Note) it may be helpful, using two sticks, to pull on the jumper down low, and push between the attached stick and terminal to attempt to straighten out the conductor in the area where the ClampStar will be landed on the jumper conductor. (Note) it may be helpful, using two sticks, to pull on the jumper down low, and push between the attached stick and terminal to attempt to straighten out the conductor in the area where the ClampStar will be landed on the jumper conductor.
- (7) After getting the second end of the ClampStar on the jumper conductor, you should probably stop and have a beer now – (JUST KIDDING)! The hard part is over, once the nuts on the innermost keeper and the nose keeper are snugged – just enough that the ClampStar cannot slip back off of the conductor – loose enough that the unit can be moved a little.



- (8) The end on the tensioned conductor should be about 2-3 inches from the end of the deadend. – Don't tighten those keepers yet! The other keepers may be brought into close proximity of the conductor, but be sure the unit can still be moved a bit if necessary.
- (9) Be sure the jamb nuts on the tether are positioned in, next to the ferrules:



- 10) Reposition the bucket to prepare to install the tether, and using two ClampSticks, one on each end (sorry the photo has the bracket on the nose keeper – but you get the idea....



And slip the threaded ends of the Safe-T-Link Tether into each respective bracket.

- 11) It is difficult to tighten the Ny-Lock Insert lock nuts on the end of the tether beyond the reach of the deep well socket. ***This is why we wait to tighten those keepers.*** It may be necessary to reposition the ClampStar on the tensioned conductor to best accommodate the tether, which should be straight and in-line with the conductor, such that there is only about 2” of the threaded rod extending past the brackets. One end of the threaded rod can but cut off to better accommodate this, however, you will note the pilot nose on the end of the rods to facilitate starting the nuts with sticks will be gone.
- 12) Once the final position of the ClampStar is attained, the keepers on the tension span may be tightened. We recommend snugging all the nuts, then beginning at the nose, moderately tighten each nut in succession working back toward the insulator. Two or more successive passes will provide the best results, allowing the aluminum stranding to “settle in” a bit before the final pass where the top of the torque limiting nuts will shear off.
- 13) The second end, on the jumper conductor may now be positioned to provide reasonable bend radius to the conductor legs, and tightened in the same fashion.



- 14) At this stage, determine which end of the tether is the most readily accessed. Typically this will be on the span, but depending on voltage and insulator length, a person on the tower can be of assistance. Work the jamb-nut back against the bracket, and while one person grips the tether with a shotgun stick, the other can install and tighten the Ny-lock nut on the end of the tether.



- 15) The opposite end of the tether will now be tightened. Installing the Ny-lock nut on the end, and tightening to pull the slack from the tether. The intent is not to reduce the sag, only to pull the tether taught, with perhaps 500 – 1000 pounds of tension. This can be accomplished with the universal stick, as it should only take about 15- 20 foot-pounds of torque.
- 16) After the tether is tightened sufficiently, work the jamb-nut back against the bracket, and tighten the Ny-lock nut to achieve locking the system in place.
- 17) The corona shields are installed, placing them over the exposed bolts, and a single flanged lock nut is placed through the hole on each end, and tightened to clamp the shield against the top of the sheared torque nut. (Sorry – don't have a photo of installing on a deadend – this is on a 230kV splice, so it is underneath instead of on top).



- 18) Now – let's go get that beer!

