Cold Tie Installation

1. Scope

This work practice describes how to perform a cold hand tie to attach a bare conductor to a line post insulator in the Looped Radial distribution system.

A cold hand tie is also referred to as a primary tie.

For hot (sissy) hand tie installation refer to SCL 0100.33.

For neutral hand tie installation refer to SCL 0100.35.

2. Application

This work practice is for Seattle City Light (SCL) lineworkers who tie conductors to line post insulators by hand in the Looped Radial distribution system.

Cold hand ties are used on F-neck insulators and both bare aluminum and copper conductor.

3. Definitions

Button: Wire that is wrapped tightly onto the conductor where the wire is almost vertical for the entire revolution. Each button should be touching the other.

Twist: Wire that is laid around the conductor where you go up straight up and then down at a 45-degree angle per revolution.

Loop: Wire that is trained back so that the end of the wire is contacting itself.

4. Discussion

There are multiple variations of cold ties as shown in Table 4.

Table 4. Types of Cold Ties

Material	Location	Conductor Size(s) (AWG/kcmil)	Tie Wire Size (Solid, AWG)	Tie Wire Length (ft)
Aluminum	Top	397.5	#4	10
Aluminum	Side	397.5	#4	10
Copper	Top	4/0, 2/0	#4	8
Copper	Side	4/0, 2/0	#4	8
Copper	Top	#4, #2	#6	4
Copper	Side	#4, #2	#6	4

Cold ties are bare wire.

Cold ties are performed by hand on deenergized conductors.

Cold ties are performed in the air from a bucket.

The tie wire that will be used will be made of the same material as the conductor that is being tied to the insulator.

When tying down stranded conductor, the tie wire shall be wrapped in the same direction as the strands of the conductor.

Side ties are performed the same as top ties except with a 90-degree rotation where the side is treated like the top.

5. Tying Procedures

Proper PPE shall be worn when performing tie installations. Hand and eye protection are particularly important.

5.1 Stranded Conductor

Step 1. Cut or obtain tie wire of the material and length shown in Table 4.

Step 2. Bend tie wire of proper size and length around the back of the insulator under the conductor (above the conductor on a side tie) forming a "U". Both legs of the tie wire should be equal length after bending.

Step 3. Holding the tie wire tightly against insulator, throw one (1) tight close wrap (button) around the conductor on each side of the insulator, keeping the wraps snugly against the insulator.

Step 4. Cross the two legs in front and bend wire around insulator under the conductor

Step 5. Holding the tie wire tightly against insulator, throw two (2) more tight close wraps (buttons) around the conductor on each side of the insulator, keeping the wraps snugly against the insulator.

Step 6. Cross the two legs behind the insulator and bend wire around insulator under the conductor.

Step 7. Holding the tie wire tightly against insulator again, throw three (3) more tight close wraps (buttons) around the conductor on each side of the insulator, keeping the wraps snugly against the insulator.

Step 8. Continue to wrap five (5) more times with twists going up vertically and across at 45 degrees.

Step 9. Perform two (2) tight wraps (buttons).

Step 10. Complete the tie by forming a loop with the end contacting the conductor.

5.2 Solid Conductor

Step 1. Cut or obtain tie wire of the length shown in Table 4.

Step 2. Start the tie by placing the middle of wire diagonally across the conductor on top of the insulator at the 2 and 7 o'clock positions when looking straight down on the insulator.

Step 3. Take the side at the 7 o'clock position and bend it under the conductor and clockwise around the far side of the insulator. Bring it under the conductor and wrapping up and then around the conductor at a 45-degree angle away from the insulator to complete 5 to 7 twists. Create a loop back on itself with the remaining wire.

Step 4. Take the side at the 2 o'clock position and bend it under the conductor and clockwise around the near side of the insulator. Bring it under the conductor and wrapping up and then around the conductor at a 45-degree angle away from the insulator to complete 5 to 7 twists. Create a loop back on itself with the remaining wire.

6. References

SCL Work Practice 0100.33; "Hot Tie Installation"

SCL Work Practice 0100.35; "Neutral Tie Installation"

7. Sources

Alexander, James; SCL Crew Chief and subject matter expert for 0100.31

Anderson, Jeff; SCL Craft Instructor of Apprenticeship and subject matter expert for 0100.31

Lu, Curtis; Standards Engineer and originator of 0100.31

SCL Construction Standard D15-2.1; (canceled) "Hand Wrapped Spool Ties for Copper or Aluminum Poly Covered Conductors, Single Tie"