Fused loadbreak elbow connector installation instructions

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Contents

Safety for life

Eaton's Cooper Power series products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment, and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as arc flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment. G103.3

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage. G101.0

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage. G122.3

⚠ WARNING

Capacitive Test Point Operating Instructions: Use only voltage indicating instruments specifically designed for test points. Use of conventional voltage sensing devices may provide false "No Voltage" indications.

The test point must be dry and free of contaminants when checking for voltage. After indication is taken: clean, dry, and lubricate the test point cap with silicone grease and assemble to the test point.

Always consider the termination to be energized until the test point "No Voltage" indication is confirmed by other means. Failure to comply could result in death or severe personal injury.

⚠ WARNING

All associated apparatus must be de-energized during any hands-on installation or maintenance. Failure to comply could result in death, severe personal injury and equipment damage.

Product information

Introduction

Eaton's Cooper Power™ series 200 A, 15, 25, and 28 kV Class fused loadbreak elbow connectors combines a fully-shielded and insulated plug-in termination with full-range current-limiting fuse protection. The fused loadbreak elbow connector provides a convenient and cost effective means to adding fused protection to underground distribution systems, for connecting underground cables to transformers, switching cabinets and junctions equipped with 200 A, 15, 25, and 28 kV Class loadbreak bushings manufactured to IEEE Std 386™ standard.

Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment

Additional information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. When additional information is desired to satisfy a problem not covered sufficiently for the user's purpose, please contact your Eaton representative.

Acceptance and initial inspection

Each fused loadbreak elbow connector is completely inspected and tested at the factory. It is in good condition when accepted by the carrier for shipment. Upon receipt of the fused loadbreak elbow connector, inspect the connector thoroughly for damage and loss of parts incurred during shipment. If damage or loss is discovered, file a claim with the carrier immediately.

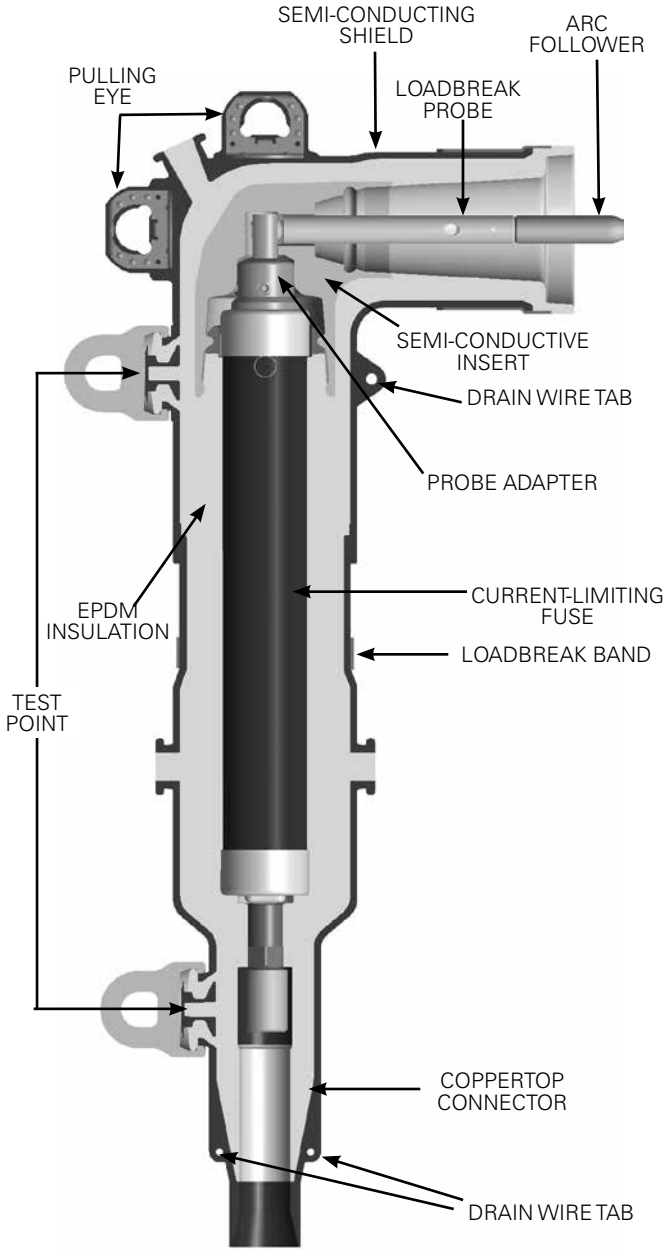


Figure 1. Line illustration of 25 kV Class fused elbow.

Handling and storage

If the fused loadbreak elbow connector is to be stored for an appreciable time before installation, provide a clean, dry storage area. Locate the replacement fuse so as to minimize the possibility of physical damage.

Quality standards

ISO 9001 Certified Quality Management System

Installation procedures

Cable stripping and scoring tools, available from various tool manufacturers, are recommended for use when installing fused loadbreak elbows. After preparing the cable, the fused loadbreak elbow housing is pushed onto the cable. The current-limiting fuse is threaded into the coppertop connector and the loadbreak probe is installed into the probe adapter using tools provided. Use a clampstick to perform loadmake and loadbreak operations. ***(See page 9 for Operating Procedures.)***

Complete elbow kit includes:

- Fused Loadbreak Elbow Body
- Current-Limiting Fuse Sold Separately
- Coppertop Compression Connector
- Probe Adapter
- Loadbreak Probe
- Probe Installation Tool
- 1/8" Hex Wrench
- 3/16" Hex Wrench Supplied with Fuse Sold Separately
- Silicone Lubricant
- Installation Instruction Sheet

Tools/Accessories needed:

- Tape Measure
- Wire Brush
- Knife
- Cable Stripping Tool
- Crimping Tool and Dies
- Cable Cleaner
- Cable Cutters
- Emery Cloth
- Clampstick
- Personal Protection Equipment
- Vinyl Tape

Preparation of concentric neutral cable

Note: Stripbacks shown in these instructions for concentric neutral cable are the same for tape shielded and drain wire cables. Refer to shield adapter kit being used for metallic shield stripbacks.

Once installed, the cable should enter the fused elbow connector in a straight line. Avoid a tight bend radius at the cable entrance of the fused elbow that causes the fused elbow to bend. See Figure 2.

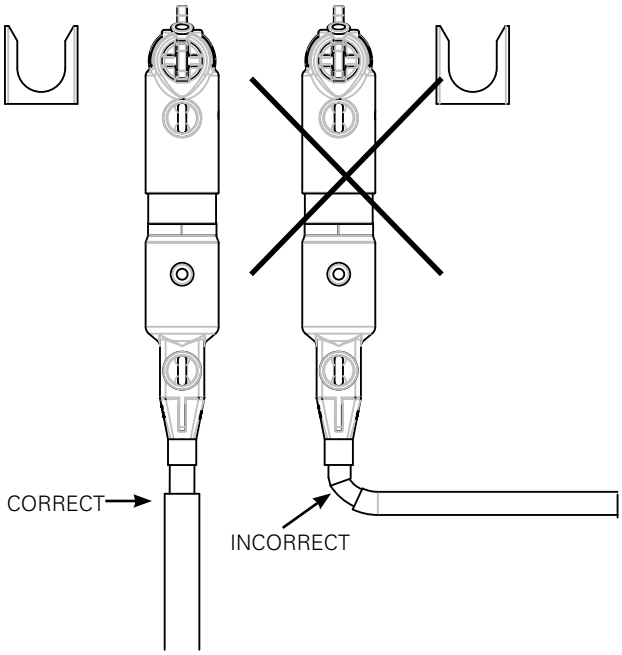
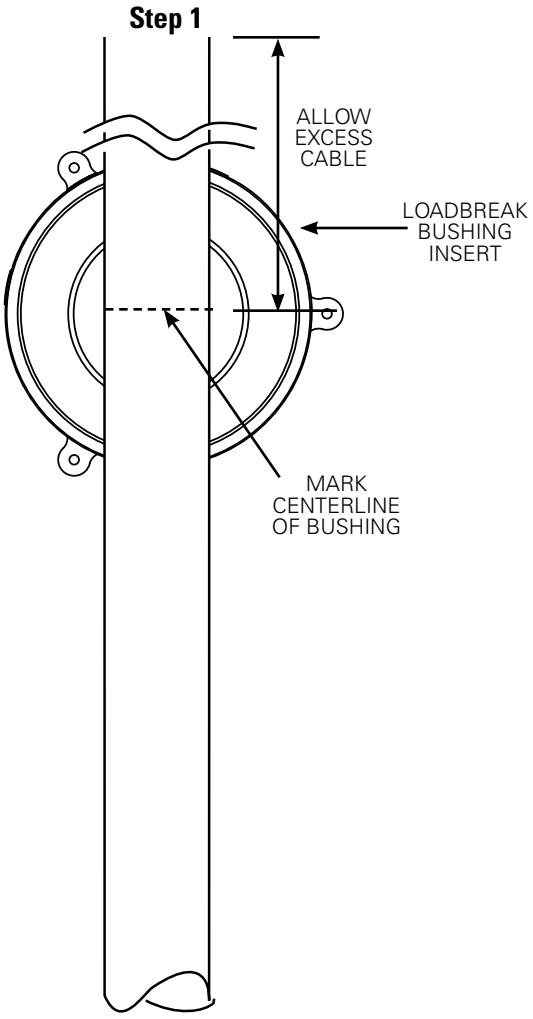
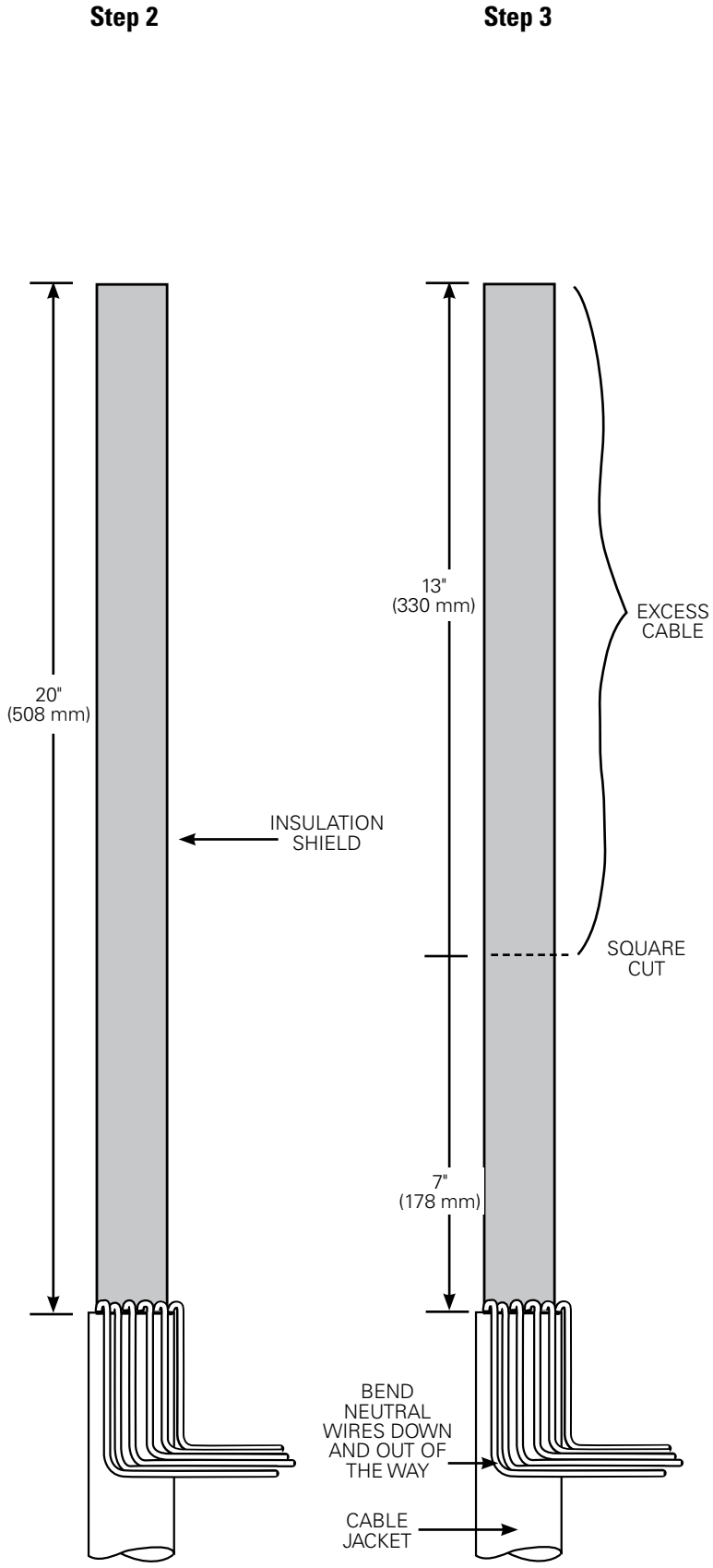


Figure 2. Proper cable training.





Step 1
Cable Training

Position cable vertically so that it is centered on the apparatus bushing and parallel to the apparatus frontplate. Mark the cable at the centerline of the bushing allowing excess cable to provide adequate slack for operation. Make square cut at the centerline mark.

Step 2
Measure down from top of cable 20" (508 mm).

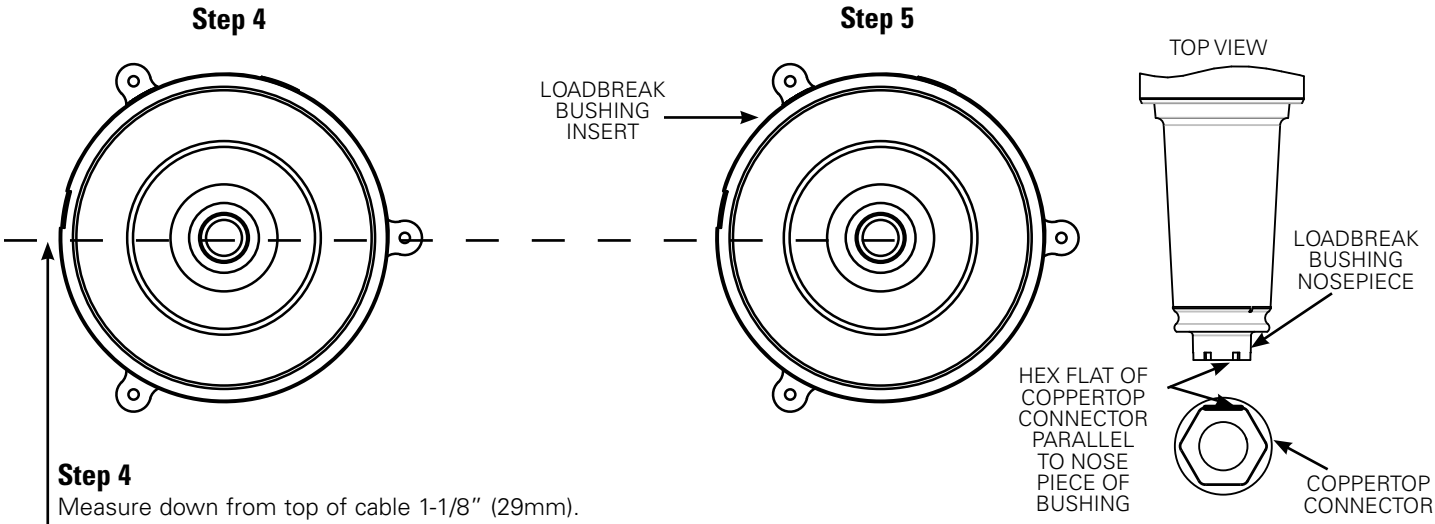
Remove cable jacket (if jacketed cable is used) to expose neutral wires.

Unwind neutral wires.

Bend neutral wires down and out of the way.

Step 3
Measure down 13" (330mm) from top of cable and make a square cut to remove excess cable.

Note: This step allows for the length of the fuse and ensures proper alignment to the centerline of the bushing.



Step 4

Measure down from top of cable 1-1/8″ (29mm).

Remove the insulation and conductor shield to expose the bare conductor. Take care not to nick the conductor.

Step 5

Clean the exposed conductor using a wire brush.

Place the coppertop (bimetalic) connector on the conductor.

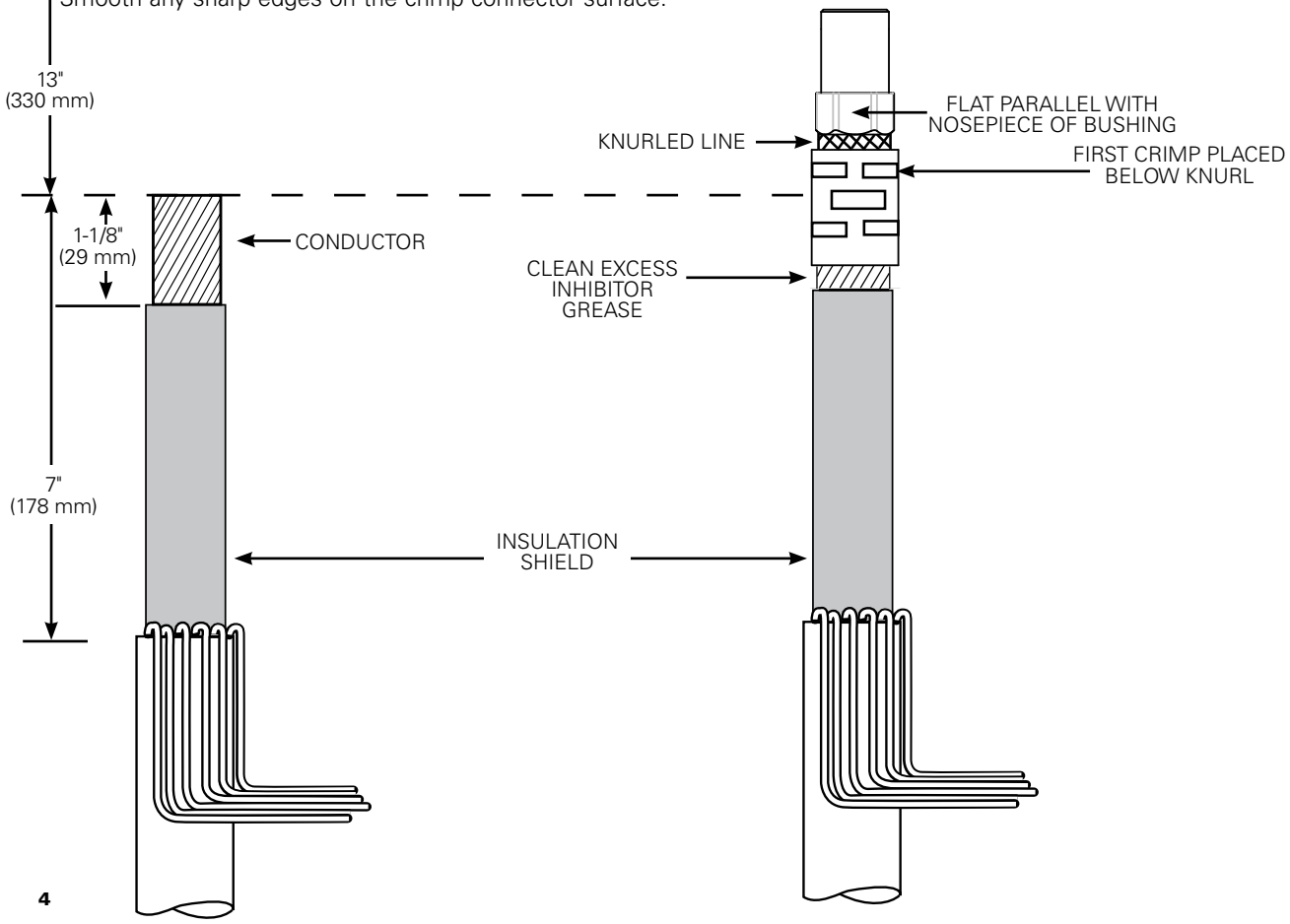
IMPORTANT

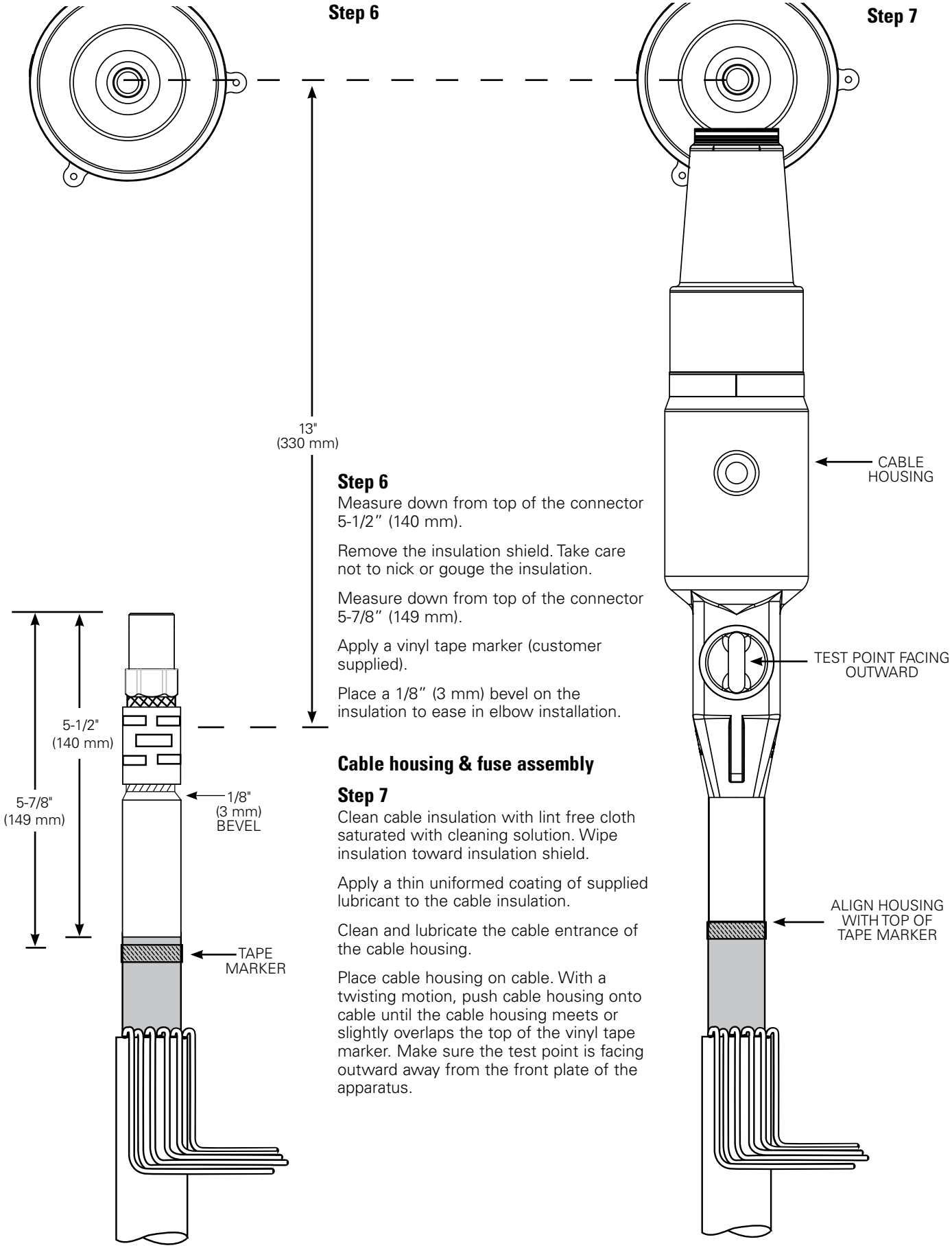
Make sure that one of the flats of the hex on the connector is parallel with the nosepiece of the bushing.

Crimp the connector in place using a tool and die combination and minimum suggested number of crimps ( ) as shown in table 1 on page 10. Start crimping just below the knurled line and rotate each successive crimp to prevent bowing. Do not overlap crimps.

Clean excess inhibitor grease from bottom of copper-top connector wiping towards the threaded end of the connector.

Smooth any sharp edges on the crimp connector surface.





Step 6

Measure down from top of the connector 5-1/2″ (140 mm).

Remove the insulation shield. Take care not to nick or gouge the insulation.

Measure down from top of the connector 5-7/8″ (149 mm).

Apply a vinyl tape marker (customer supplied).

Place a 1/8″ (3 mm) bevel on the insulation to ease in elbow installation.

Cable housing & fuse assembly

Step 7

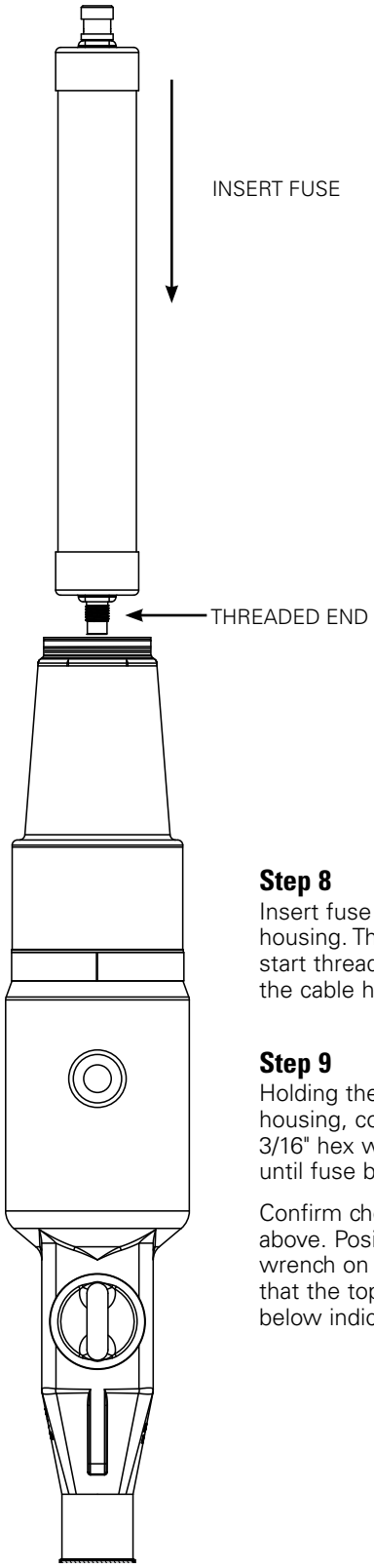
Clean cable insulation with lint free cloth saturated with cleaning solution. Wipe insulation toward insulation shield.

Apply a thin uniformed coating of supplied lubricant to the cable insulation.

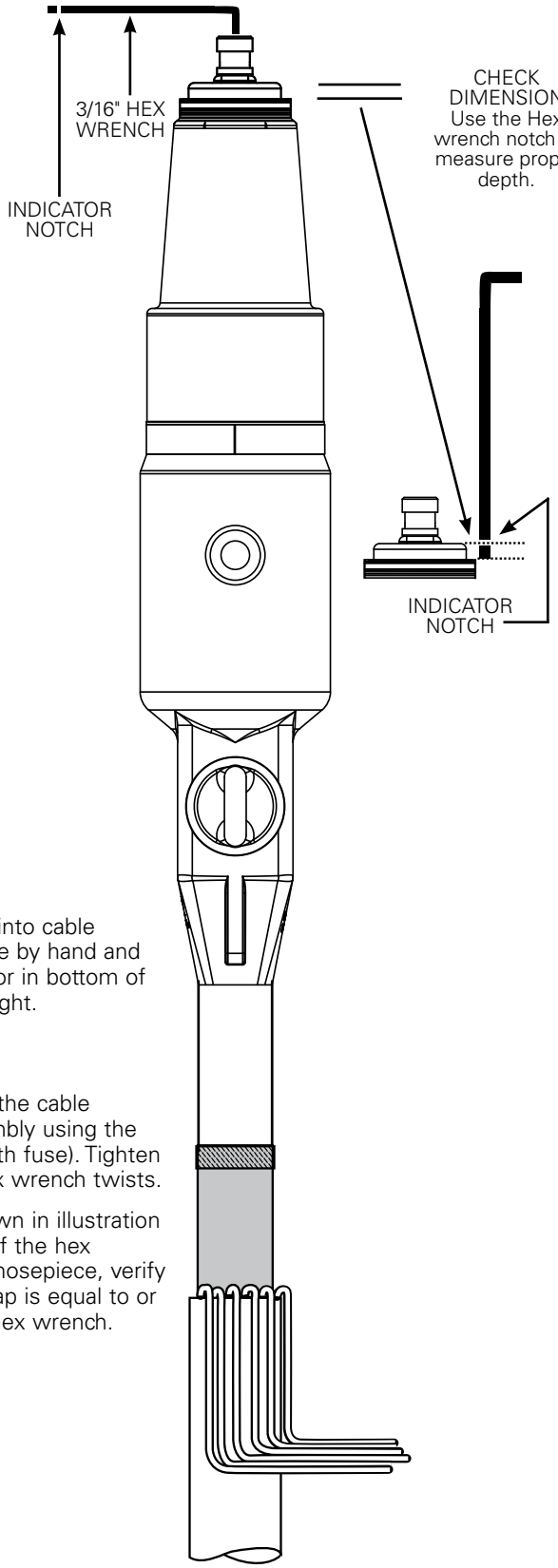
Clean and lubricate the cable entrance of the cable housing.

Place cable housing on cable. With a twisting motion, push cable housing onto cable until the cable housing meets or slightly overlaps the top of the vinyl tape marker. Make sure the test point is facing outward away from the front plate of the apparatus.

Step 8



Step 9



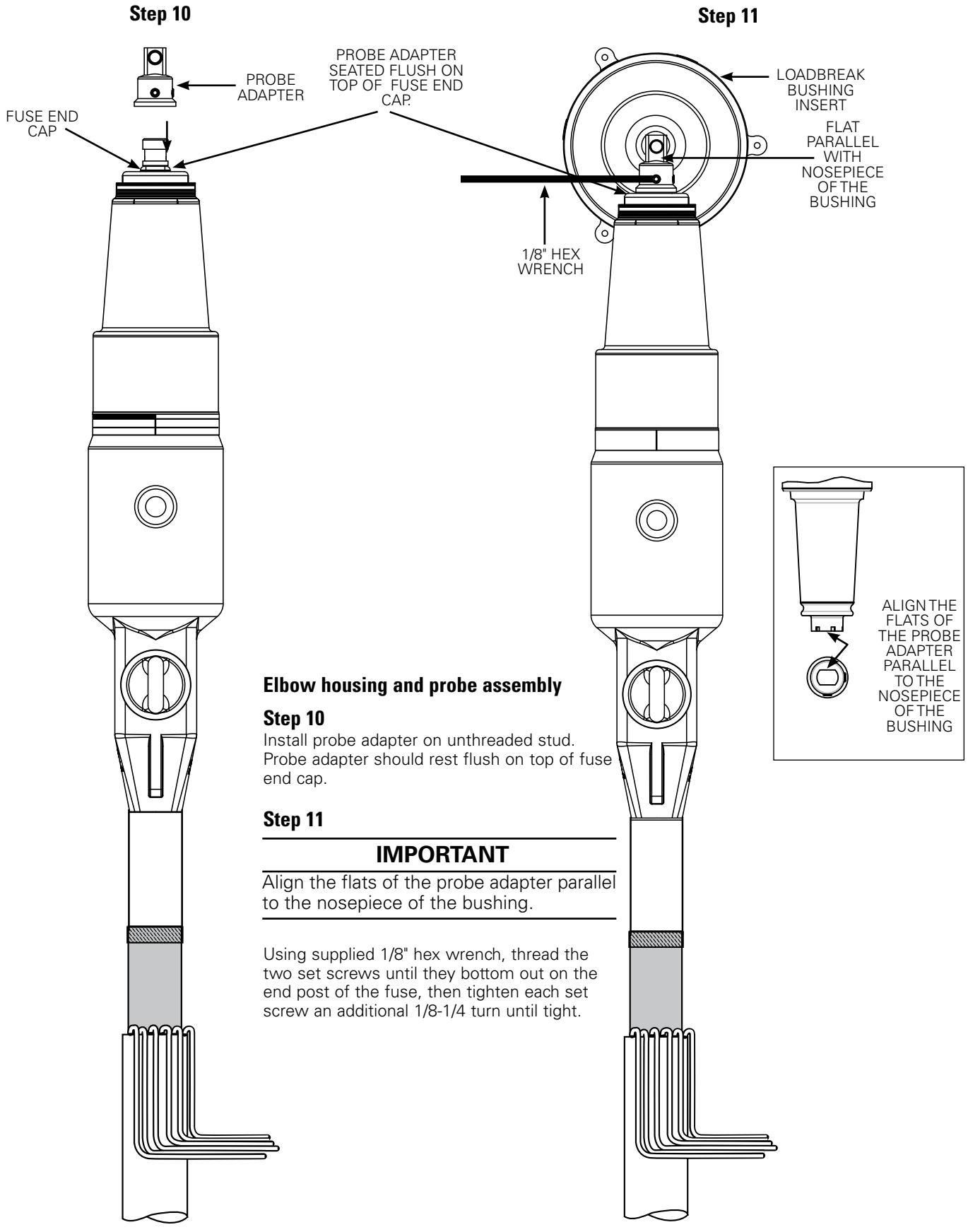
Step 8

Insert fuse threaded end first into cable housing. Thread fuse clockwise by hand and start threads into the connector in bottom of the cable housing until hand tight.

Step 9

Holding the square portion of the cable housing, complete fuse assembly using the 3/16" hex wrench (supplied with fuse). Tighten until fuse bottoms and the hex wrench twists.

Confirm check dimension shown in illustration above. Position the long end of the hex wrench on the cable housing nosepiece, verify that the top of the fuse end cap is equal to or below indicator notch on the hex wrench.



Elbow housing and probe assembly

Step 10

Install probe adapter on unthreaded stud. Probe adapter should rest flush on top of fuse end cap.

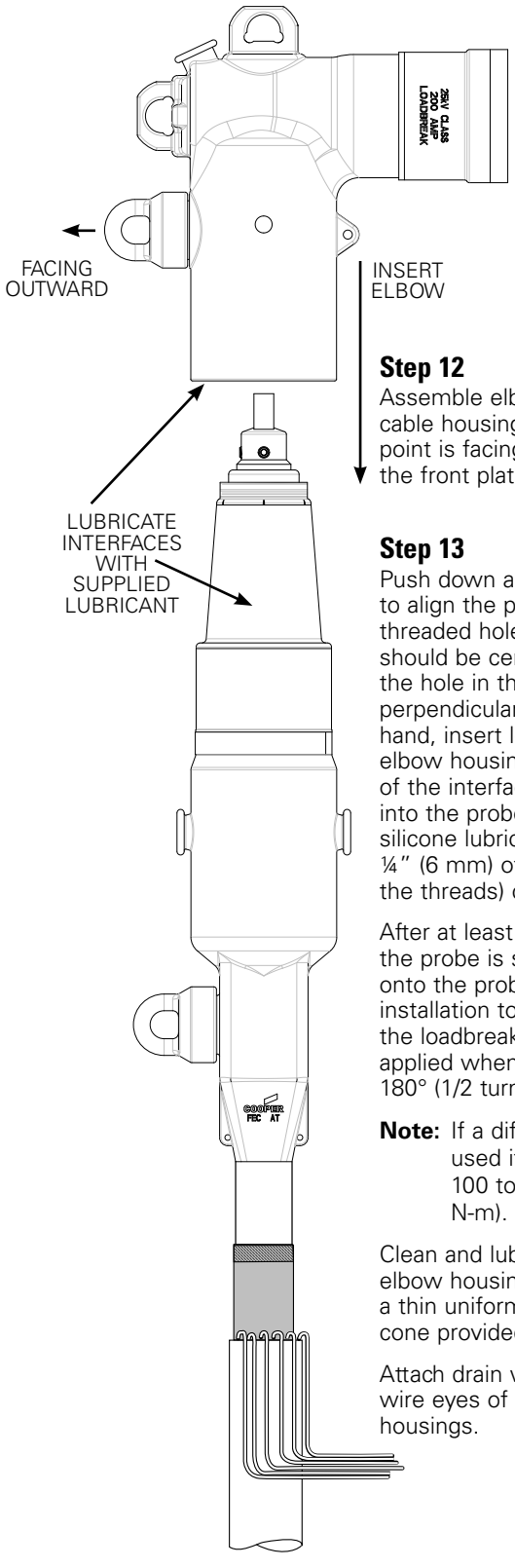
Step 11

IMPORTANT

Align the flats of the probe adapter parallel to the nosepiece of the bushing.

Using supplied 1/8" hex wrench, thread the two set screws until they bottom out on the end post of the fuse, then tighten each set screw an additional 1/8-1/4 turn until tight.

Step 12



Step 12

Assemble elbow housing onto the cable housing. Make sure the test point is facing outward away from the front plate of the apparatus.

Step 13

Push down and twist elbow housing to align the probe adapter. The threaded hole in the probe adapter should be centered with respect to the hole in the elbow housing and perpendicular to the probe axis. By hand, insert loadbreak probe into the elbow housing along the center axis of the interface and thread the probe into the probe adapter. A thin layer of silicone lubricant applied to the last ¼" (6 mm) of the probe body (not on the threads) can aid in installation.

After at least three turns or when the probe is seated (5-1/2 turns) onto the probe adapter, use provided installation tool to properly torque the loadbreak probe. Proper torque is applied when the tool twists at least 180° (1/2 turn).

Note: If a different installation tool is used it must apply a torque of 100 to 120 lbf-in (11.0 – 13.5 N-m).

Clean and lubricate bushing and elbow housing interfaces areas with a thin uniformed coating of the silicone provided.

Attach drain wire leads to the drain wire eyes of the cable and elbow housings.

Step 13

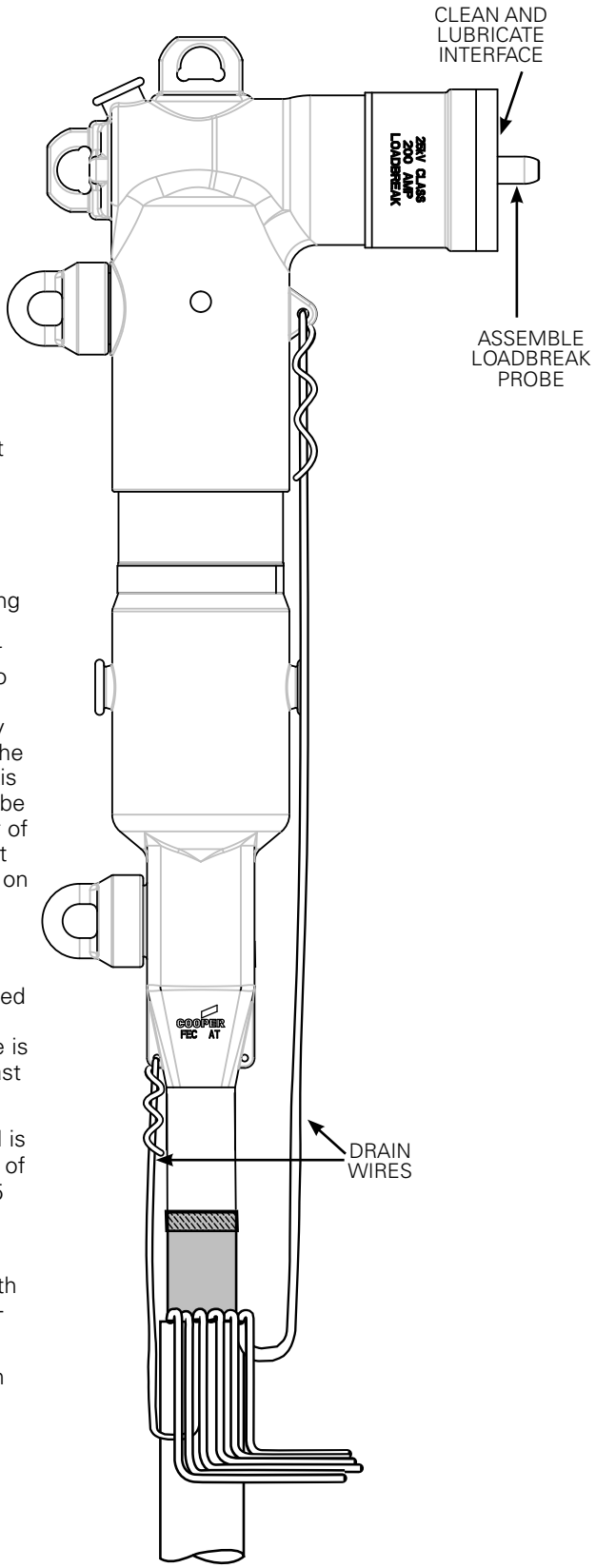


Table 1. Crimp Chart

CONNECTOR		**5/8" DIAMETER**					**3/4" DIAMETER**			
CONDUCTOR SIZE		NO. 4 THRU 2/0 STRANDED					3/0 - 4/0 STRANDED			
BURNDY®	TOOL	Y34	Y35 OR Y39		MD6		Y34	Y35 OR Y39		MD6
	DIE	A243 (2)	U243 (1)	UBG (2)	W243 (3)	WBG (1)	U247 (2)	U247 (2)	U467 (2)	W247 (2)
		A25AR (2)	U25ART (2)	U687 (2)	BG (3) NOSE	W687 (2)	A27AR (2)	U27ART (1)		
Thomas and Betts®	TOOL	UT-3	UT-5		UT-15		UT-5		UT-15	
	DIE	5/8" (4)	TV (4)		54 H (2)		TV (4)		66 (2)	
Kearney™	TOOL	0		WH2, WH3, BH4, WH4, PH2, PH13			0		WH2, WH3, BH4, WH4, PH2, PH13	
	DIE	5/8" NOSE (3)	9/16" (3)	9/16" (2)	572 (1)		737 (2)	747 (2)	737 (2)	747 (2)

( ) Minimum suggested number of crimps.

Operating procedures

⚠ WARNING

The operator should always use personal protective equipment (insulated gloves, clampstick and eye protection) whenever operating the fused loadbreak elbow. The operator should always be in the best possible operating position, providing firm footing and enabling a secure grasp of the clampstick, while maintaining positive control of the elbow before, during and immediately after operation. If there is any question regarding the operator's operating position, de-energize the elbow before operation. The operator should not be looking directly at the connector during the moment of circuit interruption or connection. Failure to comply could result in death or serious injury.

Do not connect two different phases of a multiple-phase system. Before closing a single-phase loop, make certain both ends of the loop are the same phase.

Loadmake operation

- Area must be clear of obstructions or contaminations that would interfere with the operation of the fused loadbreak elbow.
- Securely fasten a clampstick to the pulling eye of the fused loadbreak elbow.
- Place the fused loadbreak elbow over the bushing, inserting the white arc follower of the probe into the bushing approximately 2 1/2" (64 mm) until a slight resistance is felt. This will align and stabilize the fused loadbreak elbow.
- Turn your back to the bushing and grasp the clampstick securely and obtain good footing. Slam the fused loadbreak elbow onto the bushing with one quick and continuous motion.
- Turn around and apply a force to the clampstick to push the fused loadbreak elbow onto the bushing. A popping or snapping sound is often heard when this operation is performed.
- To check that the fused loadbreak elbow is properly latched apply a gentle pull force to the clampstick. When latched properly the fused loadbreak elbow will not slide back off of the bushing.
- As a last operation, push on the clampstick to seat the fused loadbreak elbow all the way onto the bushing again. This insures that the fused loadbreak elbow is latched and was not dislodged during the latching check in previous step above.

Fault close

1. It is not recommended that operations be made on known faults.
2. If a fault is experienced, the fused loadbreak elbow connector, probe, and the bushing must be replaced.

Loadbreak operation

- Area must be clear of obstructions or contaminants that would interfere with this operation.
- Use clampstick to secure standoff insulator or portable feedthru in bracket. Ground devices to system ground per appropriate Installation Instructions. All associated apparatus must also be grounded.
- Secure fused loadbreak elbow eye firmly onto clampstick and lock.
- Twist clampstick clockwise until the fused loadbreak elbow rotates slightly on bushing — about 1/4" (6 mm). This action will break any surface friction between outer surface of bushing and inner surface of fused loadbreak elbow.

- Withdraw fused loadbreak elbow from bushing with a fast, firm, straight motion. Minimum amount of travel of fused loadbreak elbow to break load is 9" (229 mm).
- Use clampstick to place fused loadbreak elbow on lubricated standoff insulator or portable feedthru. (Follow loadmake instructions.)
- Place an insulated protective cap with ground wire attached to system ground on any exposed energized bushing using clampstick. Follow the same operating procedures as for the fused loadbreak elbow as outlined above under Loadmake Operation.

Voltage test operation

The fused loadbreak elbow connector is equipped with two integral capacitance test points that can be used to establish whether or not the fuse has interrupted the circuit. The test point on the feed side of an open fuse will indicate a voltage while the test point on the load side will indicate no voltage. Both test points will indicate voltage if the fuse has not opened

Replacing a cleared fuse

See *Service Information MN132008EN 200 A Fused Loadbreak Elbow Connector Replacement Fuse Installation Instructions* included with replacement fuse.

⚠ WARNING

Capacitive Test Point Operating Instructions: Use only voltage indicating instruments specifically designed for test points. Use of conventional voltage sensing devices may provide false "No Voltage" indications.

The test point must be dry and free of contaminants when checking for voltage. After indication is taken: clean, dry, and lubricate the test point cap with silicone grease and assemble to the test point.

Always consider the termination to be energized until the test point "No Voltage" indication is confirmed by other means. Failure to comply could result in death or severe personal injury.

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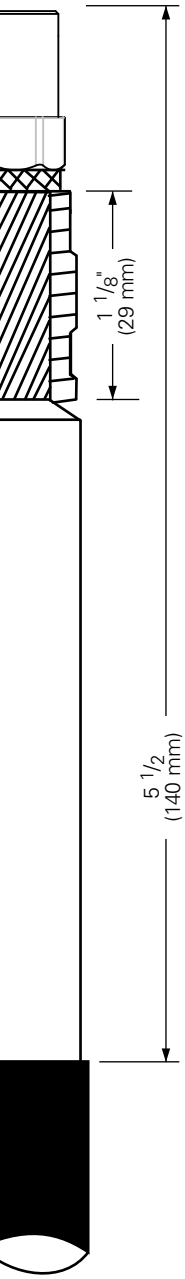

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