SUBSTATION CONNECTORS

INSTALLATION INSTRUCTIONS

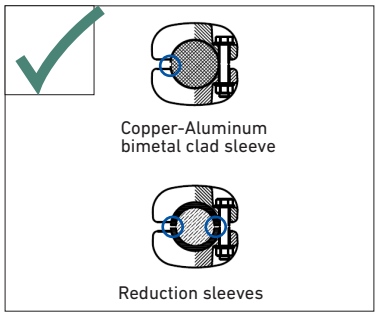
⚠ IMPORTANT SAFETY INFORMATION

READ AND COMPLETELY UNDERSTAND ALL INSTRUCTIONS BEFORE INSTALLING PRODUCT. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY OR DEATH.

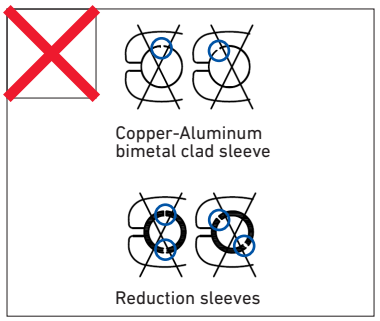
This product is intended for use by trained technicians only. This product should not be used by anyone who is not familiar with and not trained to use it. When working in the area of energized lines, extra care should be taken to prevent accidental electrical contact. Be sure to wear proper safety equipment per your company protocol. These instructions are not intended to supersede any company construction or safety standards. These instructions are offered only to illustrate safe installation for the individual. PLP products are intended for the specified application only. Do not modify this product under any circumstances. Do not reuse or reinstall any PLP product unless that capability is expressly indicated in the product's Installation Instructions. For proper performance and personal safety, be sure to select the proper PLP product before installation. PLP products are precision devices. To ensure proper performance, they should be stored in cartons under cover and handled carefully.

ADDITIONAL INFORMATION

- Store the connectors dry/clean before installation.
- The reliability and low-resistance of any electrical contact depends strongly on the preparation and installation accuracy.
- Standard connectors are not designed for reinstallation or reopening.



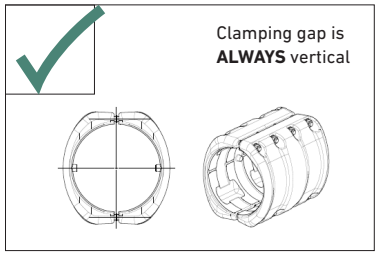
Correctly Installed Copper-Aluminum bimetal clad sleeve & reduction sleeves



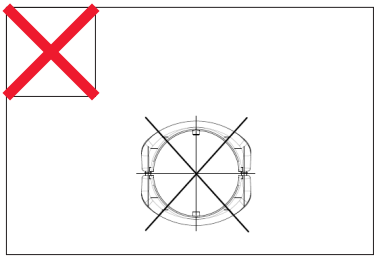
Incorrectly Installed Copper-Aluminum bimetal clad sleeve & reduction sleeves

Final inspection of spacer clamps for ≥ 245 kV

After installation on stranded conductors, inspect the hatched area and outside surface of the conductor for deformation, burrs, and other abnormalities to ensure they are not present and removed appropriately.



Correctly Installed tube coupler



Incorrectly Installed tube coupler

SP3685

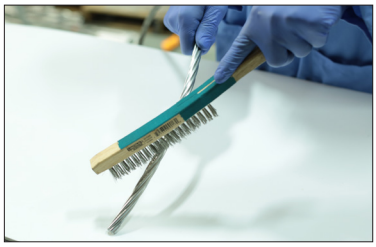
BOLTED CONNECTORS

ALUMINUM CONDUCTOR TO ALUMINUM CONNECTOR

1A Verify the correct connector type/size for the required diameter(s) and inspect the connector/conductor for any damage. **DO NOT** install the fitting if damage is found on any component.

2A Clean all contact surfaces of the conductor and connector with a clean stainless steel wire brush and/or emery to remove the oxidation film.

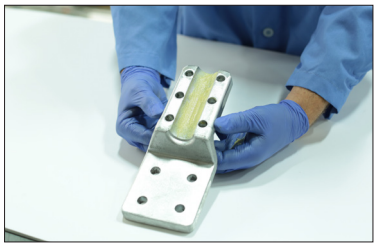
NOTE: Plated contact surfaces should be cleaned with a mild abrasive, being careful not to remove any plating.



3A Apply a generous amount of filler compound with particles[1] [i.e., PLP Filler Compound (PFC)] onto all contact surfaces of the conductor/connector.

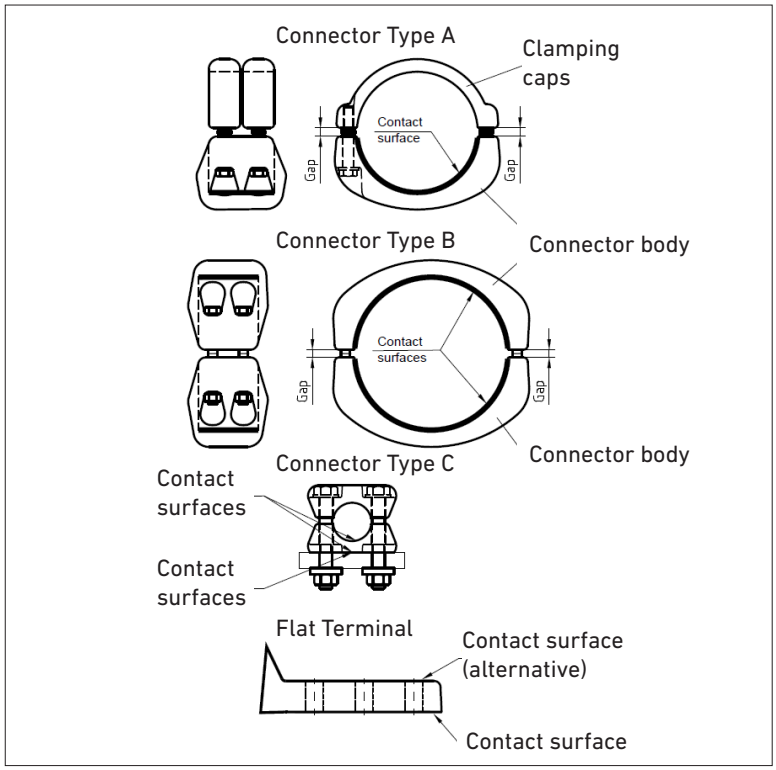
NOTE: Apply the filler compound within minutes of completing cleaning.

[1] Filler compound **with** suspended particles should be used in all applications involving a conductor/cable. Filler compound **without** suspended particles should be used on flat-to-flat surfaces such as rigid pipe conductor and terminal pads.



4A Bring the connector and conductor/terminal in the proper installation position (maintain equal gap distance on both sides to Figure 1) and hand-tighten the bolts.

Figure 1

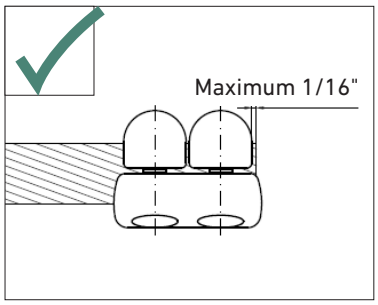


4A Follow Figure 2A for the installation of conductor ends.

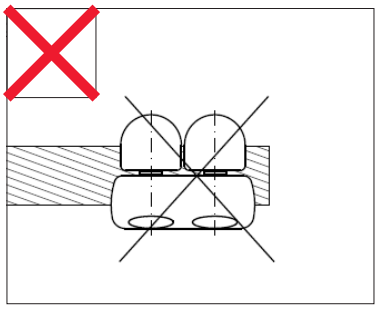
Follow Figure 2B for washer and nut installation.

Follow Figure 2C for washer and nut installation.

Figure 2A

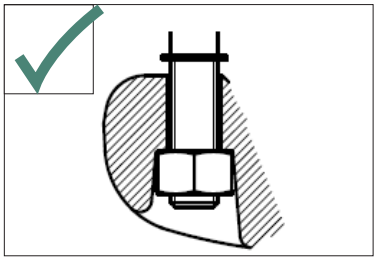


Correctly Installed conductor ends

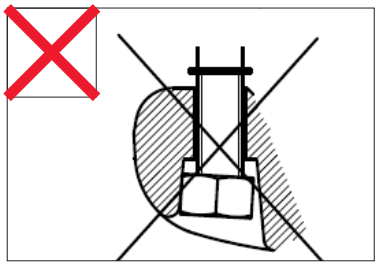


Incorrectly Installed conductor ends

Figure 2B

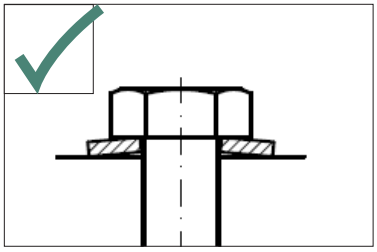


Correctly Installed nuts in hex pockets

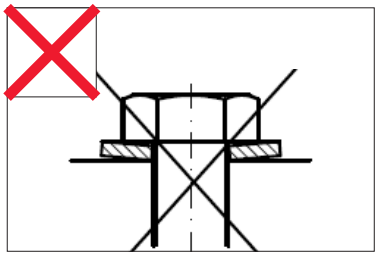


Incorrectly Installed nuts in hex pockets

Figure 2C



Correctly Installed spring washers



Incorrectly Installed spring washers

5A

Follow Figure 3 for detailed adjustment of busbar position in expansion connectors. Dimension "Lo" for installation at 68° F temperature is usually given in the expansion connector drawings.

Corrective dimension "Lx" to be calculated according to Figure 4 depending on the actual temperature and busbar length.

The effective installation position "L" to be calculated as L = Lo + Lx.

Follow Figure 4 for detailed adjustment of busbar position in expansion connectors.

Figure 3

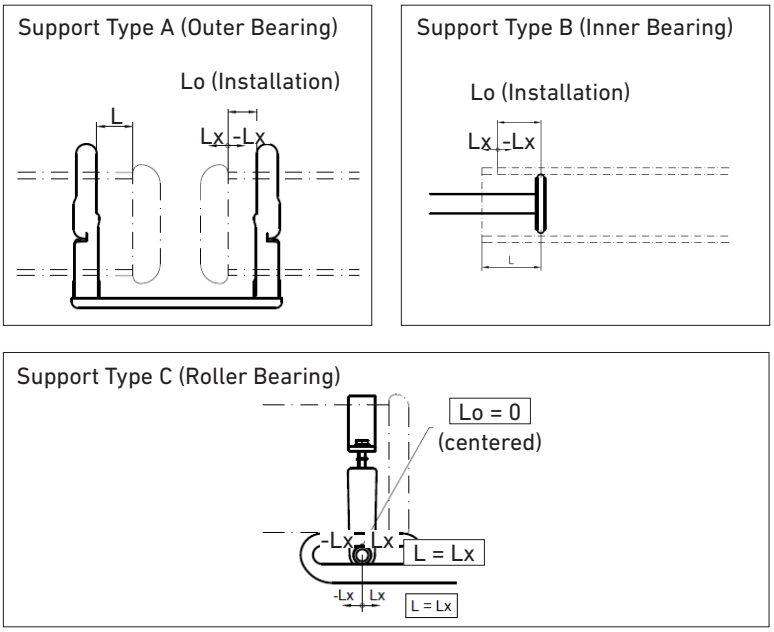
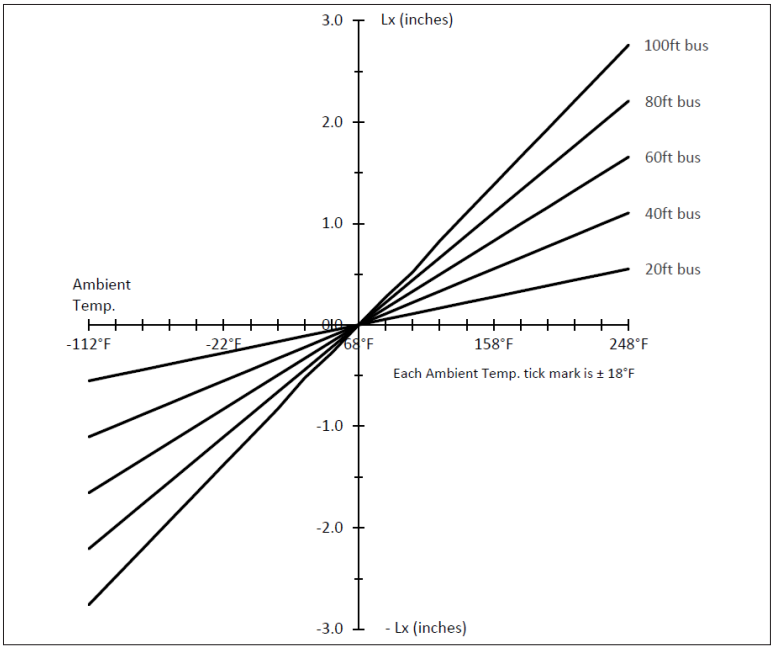
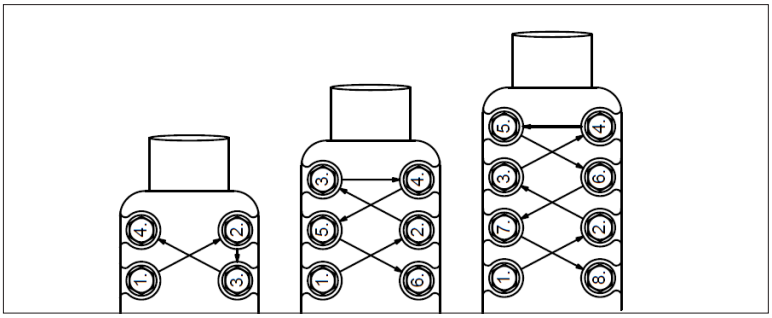


Figure 4



6A Tighten the bolts symmetrically to the specified torque using a torque wrench with an alternating and crosswire pattern.

NOTE: Follow the torque values engraved on the connector bodies and the general torque settings for hex bolts and nuts in the tables. If using waxed or lubricated hardware, contact PLP for proper torque values.



Recommended Torque Settings for Imperial Hex Bolt Fasteners

Material	lb-ft						
	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"
Aluminum	-	-	14	20	25	40	54
Galvanized Steel Stainless Steel Silicon Bronze	7	15	20	30	40	55	87

Recommended Torque Settings for Metric Hex Bolt Fasteners

Material	Nm						
	M8	M10	M12	M14	M16	M18	M20
Aluminum	-	30	50	60	75	90	100
Galvanized Steel Stainless Steel Silicon Bronze	25	49	85	135	210	300	425

7A For Non-EHV power connectors, excess filler compound may be left as is or lightly smoothed along the contact line. For EHV power connectors, all excess filler compound must be completely removed.

COMPRESSION CONNECTORS

CLOSED BARREL, ALUMINUM CONDUCTOR TO ALUMINUM CONNECTOR

1B Verify the correct connector type/size for the required diameter(s) and inspect the connector/conductor for any damage. **DO NOT** install the fitting if damage is found on any component.

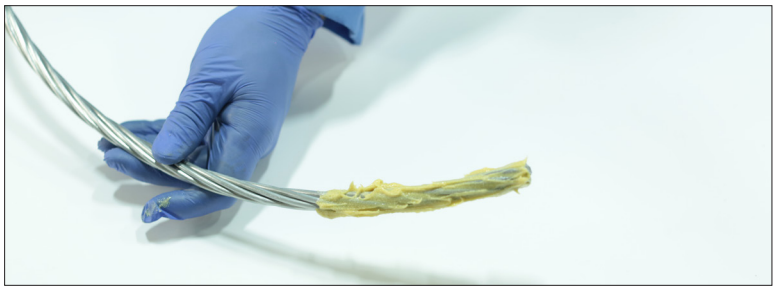
2B Insert conductor into connector until the end of conductor reaches the bottom of the barrel. Mark the conductor where it comes out of the mouth of the barrel.

3B With a clean stainless steel wire brush, thoroughly clean the conductor from the mark made in Step 2B to the end. Do not attempt to clean the inside of closed barrel connectors.

4B Apply a generous amount of filler compound with particles[1] [i.e., PLP Filler Compound (PFC)] into the connector barrel and onto the conductor.

NOTE: Apply the filler compound within minutes of completing cleaning and ensure that excess filler compound will protrude from the connector barrel when the conductor is inserted/compressed.

[1] Filler compound **with** suspended particles should be used in all applications involving a conductor/cable. Filler compound **without** suspended particles should be used on flat-to-flat surfaces such as rigid pipe conductor and terminal pads.



5B Select the correct compression die based on the connector markings & manufacturer recommendations. Ensure that the compression dies are not damaged prior to use.

CAUTION

Over compressing a connection can damage cable strands and cause the connector to fail. Under compressing can cause a loose connection that will also lead to failure.

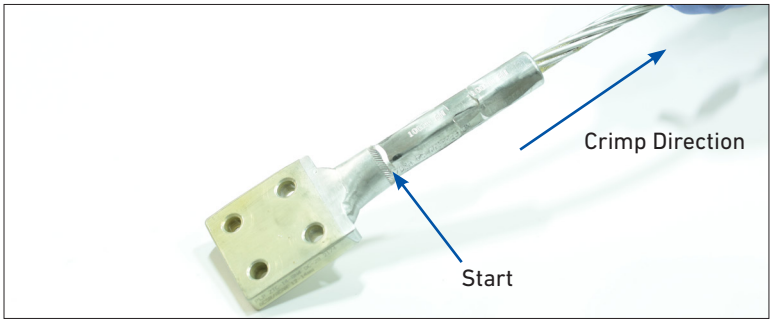
6B Make certain the conductor is fully inserted into the connector using the mark made in Step 2B.

For Short Barrel Single Compression Installation

Apply the first compression at the end of the barrel nearest to the pad on the line marked START. Confirm the recommended outside diameter is attained after each compression.

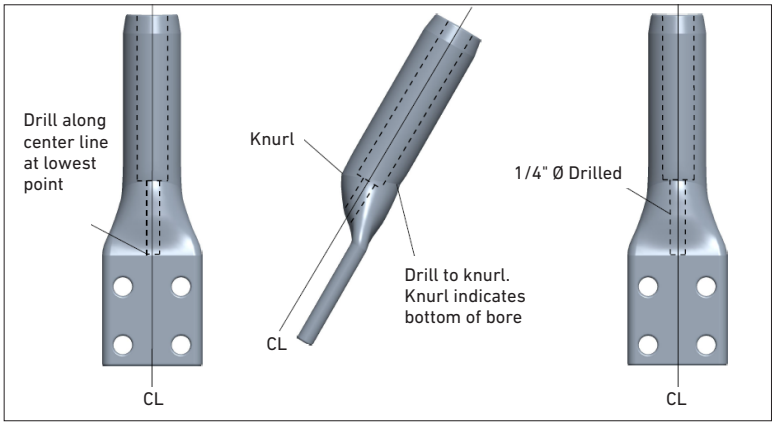
For Long Barrel Multiple Compression Installation

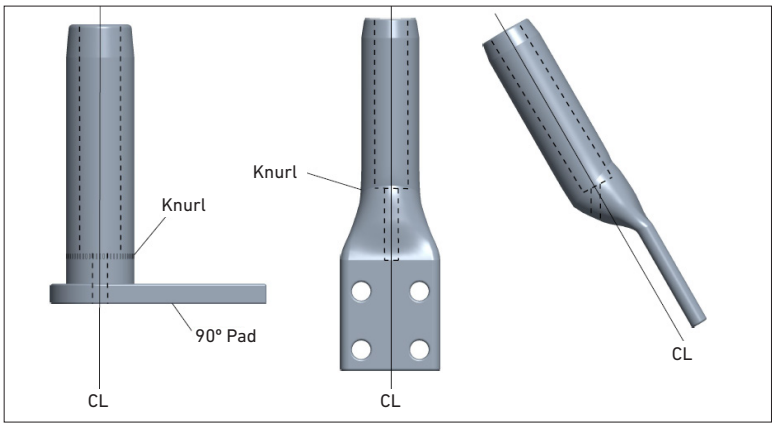
Apply the first compression at the end of the barrel nearest to the pad on the line marked START and continue compression crimps toward the mouth of the barrel being careful to overlap the previous compressions by approximately 1/4" - 1/2" and rotate/alternate the compression tool position 180 degrees between each compression crimp so that flat surfaces notch. Confirm the recommended outside diameter is attained after each compression.



7B Clean off all excess filler compound leaving a smooth fillet where the conductor exits the mouth of the now compressed conductor barrel.

8B If the connector is subject to moisture accumulation/freezing and installed such that the barrel may collect water, a 1/4" diameter weep hole may be drilled from the lowest point of the barrel into the barrel bore. This will allow for water to escape to avoid ice expansion & prevent connector failure. The installer assumes responsibility to verify the appropriate weep hole location. See examples.





9B File/sand off all flash formed by the compression tool so that the barrel of the connector is smooth.

WELDED CONNECTORS

ALUMINUM CONDUCTOR/TUBE TO ALUMINUM CONNECTOR

PLP recommends the following welding methods for installing aluminum weldment fittings to aluminum bus pipe and/or aluminum wire:

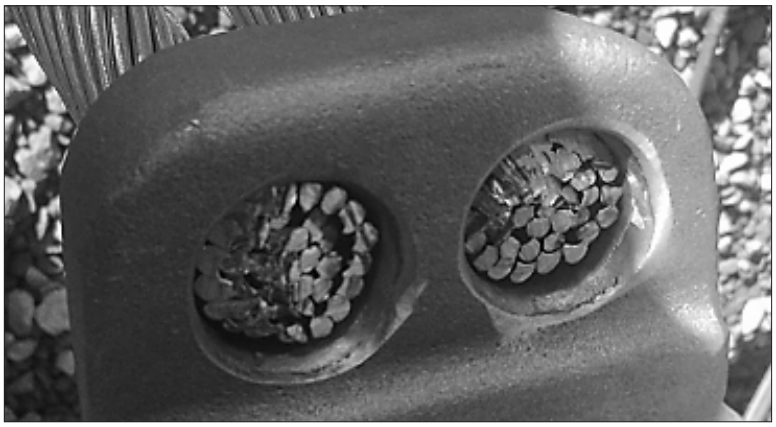
Welding Apparatus: TIG or MIG
Filler Rod (Welding Wire): 4043 Aluminum Alloy
Shielding Gas: Argon, Helium, or combination of both

WELDED CABLE CONNECTIONS

1C Verify the correct connector type/size for the required diameter(s) and inspect the connector/conductor for any damage. **DO NOT** install the fitting if damage is found on any component.

2C Remove all oxides, grease, oil, and moisture from the surfaces that are to be welded. With a clean stainless steel wire brush, thoroughly clean the welding surfaces of both the conductor and the connector.

3C Slide the conductor into the weldment cavity on the connector until it is within 1/8" to 3/16" of the rear of the cavity.



4C Before welding the connection, a test weld should be made on an aluminum casting to verify weld settings.

5C Begin welding the inner wall of the casting and move toward the center of the conductor in a circular pattern.

NOTE: The weld starting/ending position is generally up to the welder. The two key requirements for a good weld are:

(1) To ensure all conductor strands are welded together for the best connection.

(2) The weld should be smooth and free of splatter/ sharp edges or anything that could cause corona.

6C Use a stainless steel wire brush on the original weld if more than one pass is needed. For EHV applications, grind and clean the weld as needed to leave a smooth finish.

NOTE: The final judgment of welding should be left to the project supervisor and/or engineer.

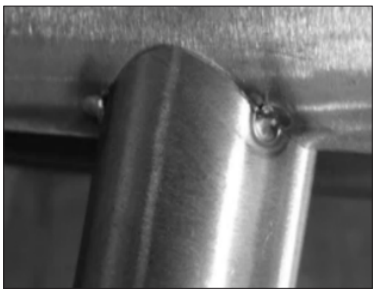
WELDED TUBULAR CONNECTIONS

1D Verify the correct connector type/size for the required diameter(s) and inspect the connector/conductor for any damage. **DO NOT** install the fitting if damage is found on any component.

2D Remove all oxides, grease, oil, and moisture from the surfaces that are to be welded. With a clean stainless steel wire brush, thoroughly clean the welding surfaces of both the conductor and the connector.

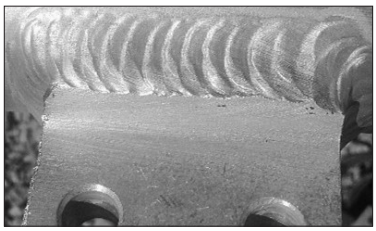
3D Before welding the connection, a test weld should be made on an aluminum casting to verify weld settings.

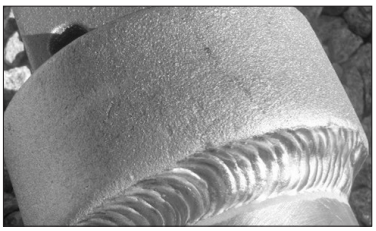
4D It is recommended that the tubular bus be positioned in the weldment cavity and tack welded before final welding.



5D Begin the final weld by burning into the original weld then passing over the entire contact surface.

NOTE: When possible, welds should encompass the entire perimeter of the connector, excluding bus supports and end plugs where tack welds may be sufficient.





6D Use a stainless steel wire brush on the original weld if more than one pass is needed. For EHV applications, grind and clean the weld as needed to leave a smooth corona free finish.

NOTE: The final judgment of welding should be left to the project supervisor and/or engineer.

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