

## WRSS Wraparound Repair Sleeve Installation Instructions

### 1.0 General Product Information

This practice provides information regarding the description and use of Raychem's WRSS wraparound repair sleeves. The WRSS sleeve incorporates a reinforced, heat-shrinkable wraparound sleeve coated internally with a hot-melt adhesive to provide a water- and pressure-tight seal to the cable jacket. The sleeve is intended for use on pressurized or unpressurized air-core or filled cables with lead or polyethylene sheaths.

In addition to copper cable repair, WRSS sleeves can be used on fiber optic cables with a polyethylene sheath, or for sheath or jacket repair on hard-line coaxial cables.

### 2.0 Precautionary Statements

The WRSS sleeve is applied with a torch. Use extreme caution when handling an open-flame torch. Observe the torch manufacturer's and/or your company's approved safety procedures.

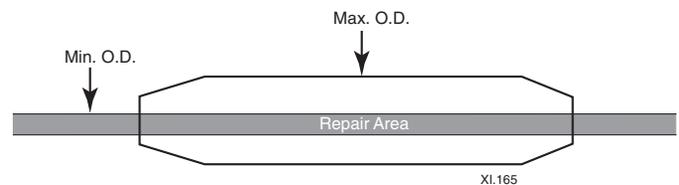
### 3.0 Kit Components

The WRSS kit is comprised of these components:

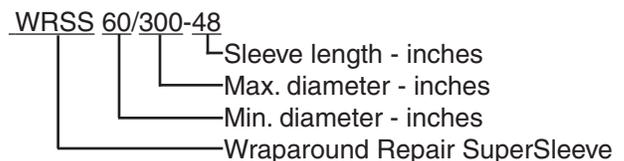
- 48" heat-shrinkable sleeve
- Channels
- Retention clips
- Cleaning tissues
- Abrasive strips
- Installation instructions

### 4.0 Size Selection Chart

Measure the minimum and maximum diameter over which the WRSS sleeve is to be applied, as shown below. Select the proper size sleeve from the following chart. For repairs requiring less than a full-length sleeve, the WRSS can be cut to length, as described in Section 6.1.



Description	Diameter Use Range (inches)
WRSS 35/170	0.35 - 1.70
WRSS 60/30	0.60 - 3.00
WRSS120/500	1.20 - 5.00



### 5.0 General Installation Notes

1. Pressurized cable must be vented with a PAF-II flange kit, or bled to zero pressure before and during the application of the WRSS sleeve. (Installation instructions for the PAF-II kit are included in Section 6.5 of this practice.) If the cable were pressurized during installation, escaping air could form tunnels in the hot sleeve adhesive and cause a leak. The cable can be repressurized when the sleeve and channel are cool to the touch of an ungloved hand.
2. Protect adjacent poles and cables from the torch flame. A Raychem AD-1460 fiberglass heat-shield pad can be used for this protection.

- Use temporary bonding procedures where required.
- The WRSS sleeve should be installed when the work area is above 0°F (-18°C).
- Do not place the WRSS sleeve on a wet cable. Thoroughly dry the wet cable and ensure that no water comes in contact with the repair area during sleeve installation.
- Use only approved connectors and bonding hardware.

**Note: If necessary, cover adjacent materials or equipment with a Raychem AD-1460 Heat Shield Pad before firing up the torch.**

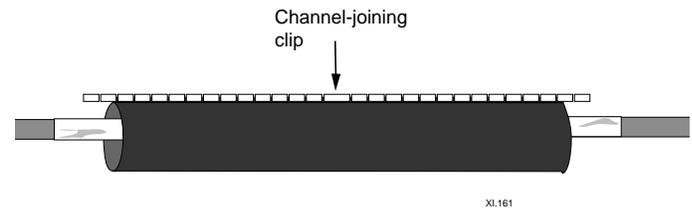
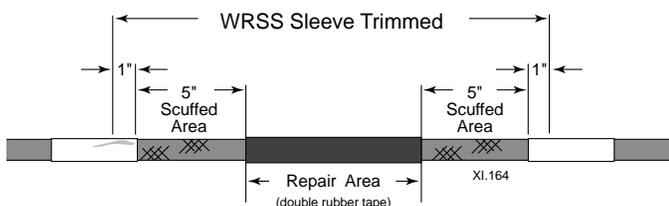
- Using an approved torch, flame-brush the scuffed area of the polyethylene jacket for about five seconds.
- Reposition and assemble the WRSS sleeve. Place the retention clip in the center of the sleeve's rails to hold the sleeve in position, then slide a channel from each end toward the center of the sleeve and over the retention clip. At least .5" of channel should extend beyond each end of the sleeve.

## 6.0 Installation Instructions

### 6.1 Installation on Polyethylene Sheath Cable - No Sheath Removal

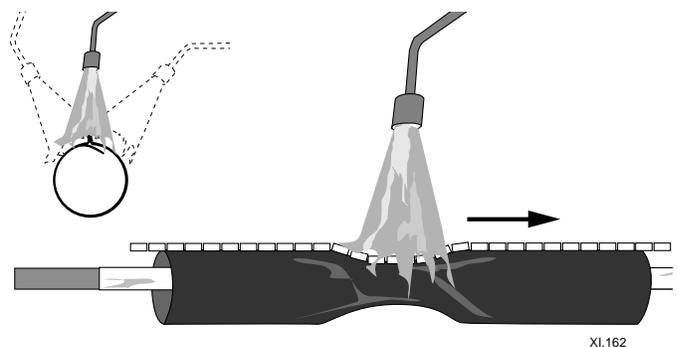
**Note: Pressurized cable must be vented using Raychem's PAF-II (see Section 6.5) or bled to zero pressure before the installation process. Maintain zero pressure until the sleeve is cool to the touch.**

- In the repair area, trim any badly distorted sheath from the cable. Clean approximately 10" of cable sheath on each side of the repair area with the supplied cleaning tissues. Scuff 5" of cable jacket on each side of the repair opening using the supplied abrasive strips. Be sure to scuff the entire circumference of the cable.
- Wrap double-rubber tape (or an equivalent tape) around the damaged part of the cable to protect it during the recovery of the WRSS sleeve. Using minimal tension, apply a half-lapped layer of double-rubber tape beginning at one end of the damaged area and finishing at the other end. Relax tension on the last wrap to prevent unwinding.
- Wrap one and a half laps of 4"-wide aluminum tape around the cable beyond the scuffed portions as shown in the figure below. Smooth the aluminum tape to the cable with a blunt object.
- Position the sleeve so that it covers the repair area, centering it over the damage. The sleeve should cover 1" of aluminum tape on each side of the repair area. If the sleeve is too long, mark it and cut it with tabbing shears, diagonal cutters, or snips. Set the sleeve aside.



**Note: On aerial cable, position the sleeve so that the channel will not be directly in contact with other cables.**

- If it is necessary to shorten a channel, flex it at the desired joint until it breaks. Cut off the sharp protrusions at the point of breakage, and dull the edges with a file. Always slide the smooth, factory-formed end of the channel on first.
- Adjust the torch flame and preheat the sleeve evenly along both sides of the rail/channel until this area begins to shrink. Always keep the torch moving.
- If possible, start shrinking the sleeve at the center and work toward each end. If this method is not possible, start shrinking at one end and work toward the other.



10. Apply heat until the sleeve is completely shrunk and the heat-sensitive paint is converted. Continue heating the rail/channel area for another 5 seconds/foot. A white line should be visible between the segments underneath the channel. If, at any point, the white line is not visible, heat the closure until the white line appears to ensure full closure recovery.
11. While the sleeve is still hot, use a blunt object to lightly press the channel, making it conform to the transition areas at each side of the repair area.
12. Installation is complete when:
  - All green thermochromic paint on the sleeve has converted from green to black, and
  - Melted adhesive is visible at each end of the sleeve, and
  - A continuous white line is visible between the segments of the channel.



## 6.2 Installation on Lead Sheath Cable - No Sheath Removal

WRSS sleeves are installed on lead sheath cable following the same procedures to install the sleeves on polyethylene cable (Section 6.1) with these exceptions:

- No aluminum tape is required on the cable.
- Heat the lead sheath uniformly until it is very warm to the touch before assembling the WRSS sleeve over the repair area.

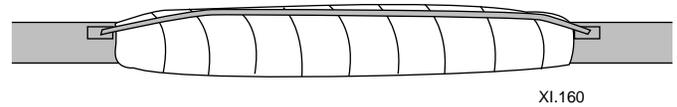
## 6.3 Trouble Opening on Lead Sheath Cable

1. Install a temporary bond. If necessary, make the trouble opening.
2. Repair conductors in accordance with locally approved practice.
3. Cover the opening as follows:

Pulp insulation: Apply desiccant and wrap with two half-lapped layers of muslin.

PIC: Wrap with two half-lapped layers of polyethylene tape.

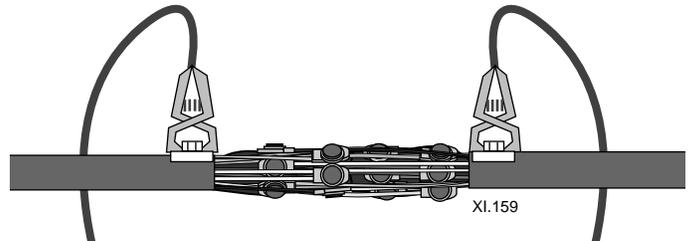
4. Install the permanent bond.



5. Starting at the center of the repair area, wrap the trouble opening with two half-lapped layers of 2"-wide DR tape using minimum tension. Extend the tape about 1" onto the lead sheath, being certain to cover the permanent bond.
6. Prepare the cable and install the sleeve as described in Sections 6.2 and 6.1.

## 6.4 Trouble Opening on Polyethylene Sheath Cable

1. Make the trouble opening and install the bonding clamps and temporary bond.



2. Repair conductors in accordance with locally approved practice.
3. Cover the opening as follows:

Pulp insulation: Apply desiccant and wrap with two half-lapped layers of muslin.

PIC: Wrap with two half-lapped layers of polyethylene tape.

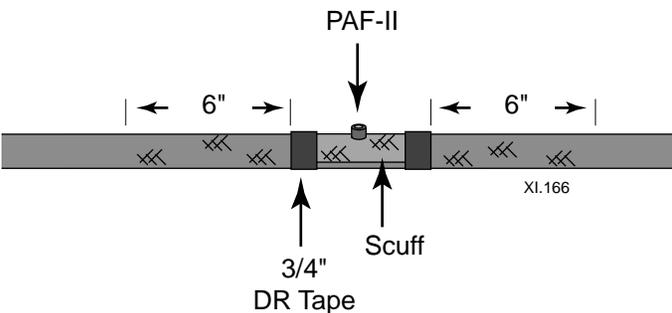
4. Install the permanent bond.
5. Cut off any excess bond stud and file the sharp edges. Cover the clamps with two layers of 2"-wide DR tape using minimal tension.
6. Starting at the center of the repair area, wrap the trouble opening with two half-lapped layers of 2"-wide DR tape using minimum tension. Extend the tape about 1" onto the lead sheath, being certain to cover the permanent bond.

7. Prepare the cable and install the sleeve as described in Section 6.1. The sleeve should be positioned so that the channel is on the opposite side of the repair from the bond clamps.

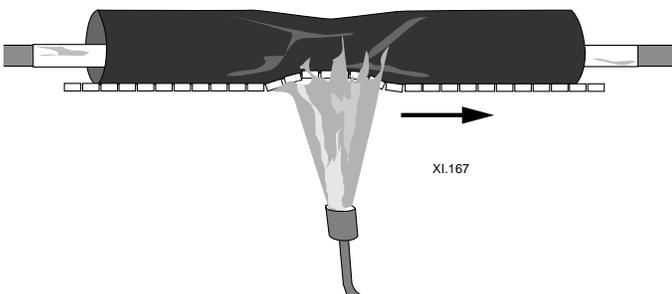
### 6.5 Pressure Access Flange (PAF-II) Installation

Use Raychem's PAF-II Pressure Access Flange (supplied in a separate kit) to provide a pressure access point or to vent a cable before installing a WRSS sleeve. To install the PAF-II, follow these steps:

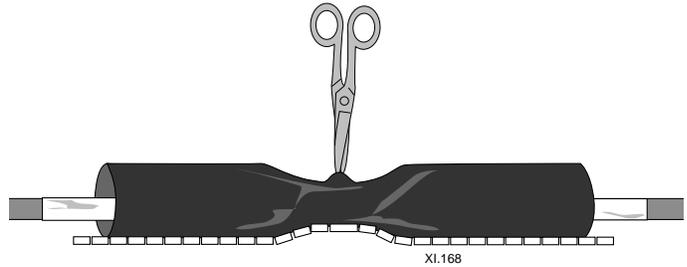
1. Select a site for the flange 90° from any bonding hardware. Using a cable drill or sheath knife, cut an access port through the cable jacket and shield, exposing the conductors. Be careful to avoid damaging the conductors or their insulation.
2. Place the PAF-II over the port with the valve seat centered over the port. Secure the PAF-II to the cable with one lap of glass tape or .75"-wide DR tape. The tape should overlap each end of the flange by .25".
3. Clean and abrade the PAF and at least 6" cable on each side of the PAF using the supplied cleaning tissues and abrasive strips. Assemble the sleeve as described in Section 6.1.



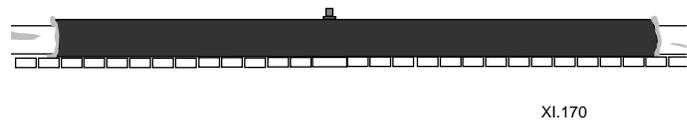
4. After installing the sleeve, rotate the channel 180° from the PAF. Adjust the torch flame and preheat both sides of the rail/channel area until it begins to shrink. Always keep the torch moving.



5. Heat the body of the sleeve around the PAF, continuing to shrink the sleeve until the contour of the PAF is visible through the sleeve. Use snips to cut a small hole in the sleeve at the center of the protruding flange.



6. Continue to heat the sleeve so that the flange throat passes through the hole in the sleeve and the sleeve draws down around the flange. If necessary, use a blunt object to seal the sleeve around the base of the flange throat. Complete the recovery of the sleeve as described in Section 6.1.



7. When the channel is cool to the touch, install a valve or plug in the PAF-II per local practice. The cable can then be moved or repressurized.

### 6.6 Inter-Sheath Dam on Double-Sheath Cable

1. Ring cut and remove a 7" length of outer cable sheath. Remove exposed metal shield and file away any sharp edges.
2. Install bonding clamps and install a temporary bond per local practice.
3. With the supplied cleaning tissues and abrasive strip, clean and abrade the exposed inner cable sheath.
4. Adjust the torch and flame-brush the cleaned, abraded area for 5 seconds.
5. Install the permanent bond. Do not use a braided or insulated bond. The bond must be long enough so that it can be bent to conform to the surface of the inner sheath.

- Remove the release paper from two ADP adhesive pads (available in a separate kit). Position the pads under the bond lengthwise to extend across the sheath opening. The adhesive pad can be held in place using .5"-wide tape at the center.
- Secure the bond to the inner sheath at the center and at each end of the opening using .75"-wide DR tape.



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- Prepare the cable and install the sleeve as described in Section 6.1.

### 6.7 Auxiliary Tape Wrap Repair

- If all existing tape is removed, use .75"-wide DR tape to form a transition from the auxiliary sleeve to the cable jackets.
- If all existing tape is not removed, and if at least 5" of auxiliary sleeve and cable jacket are exposed, treat the taped area as a trouble opening and proceed as described in Section 6.4, Steps 6 and 7.

### 6.8 Long-length Cable Repair (Overlapping WRSS Sleeves)

- If more than one WRSS sleeve is required to repair a damaged section of cable, install the WRSS as instructed in section 6.0 subset 6.1 over the damaged section of cable.
- Overlap a second sleeve on each end of the central (first) sleeve by 3 inches (3.7 cm) and follow the same instructions as above.

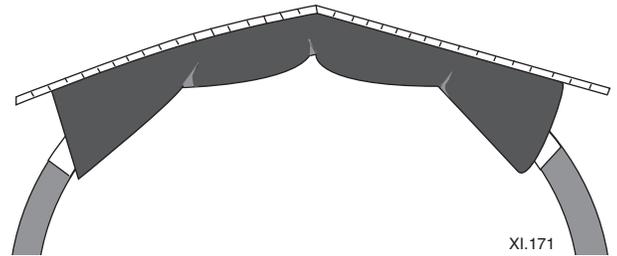
**Note:** *The channels on the sleeves on either side of the first sleeve should be rotated 180 degrees so they are facing the opposite direction.*

**Note:** *You will always have an odd number of sleeves when repair completed.*

### 6.9 Repair on a 90° Cable Bend

- Prepare the cable sheath as described in Section 6.1.

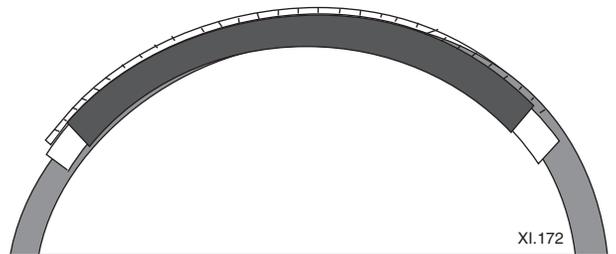
- Place the sleeve on the cable so that the rail and channel area is on the outside of the bend. Leave approximately 3" of channel extending beyond each end of the sleeve.



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- Tape each end of the channel down onto the cable, conforming the sleeve to the cable bend.
- Continue with the installation as outlined in Section 6.1.

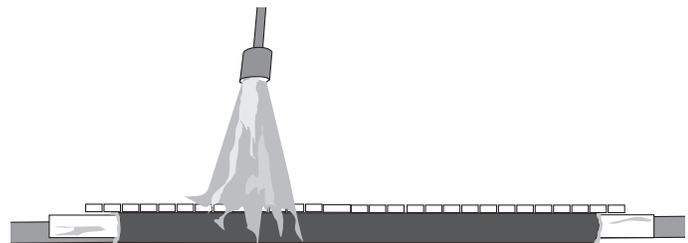
**Note:** *Though some wrinkling may develop on the inside loop of the bend, the performance of the repair sleeve will not be affected.*



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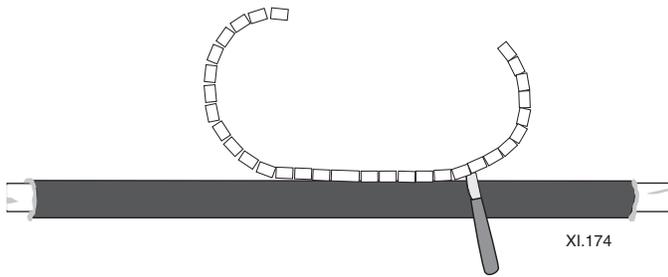
### 7.0 WRSS Removal Instructions

- For pressurized cable, vent the cable and bleed the pressure to zero. For ring or lashed cable, remove the cable supports and lashing wire to lower the WRSS sleeve from the strand.
- With the appropriate torch, reheat the entire sleeve. Check adhesive softening with a blunt object along the heated area.



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3. Immediately after reheating the sleeve, use a sharp sheath knife to cut along the entire length of one side of the rail and channel.



4. Grasp the edge of the channel with pliers and peel the sleeve off the cable.
5. It is not necessary to remove the adhesive from the cable. Adhesive should be kept clean if a new WRSS is to be applied.
6. A new WRSS sleeve may be applied over the original damage. Any solidified adhesive on the cable sheath will soften and blend into the adhesive of the new sleeve as the heat is applied.