FIBERGLASS CONTAINMENT
Required Documents

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INSTALLATION INSTRUCTIONS
FRP Containment Pipe H-Wrap Field Closure
(Vinylester Resin)

In order to install the containment pipe closure, PermAlert will furnish the following:
• Fiberglass bi-ply mat
• Unpromoted resin
• Cab-o-sil
• Laminating Roller
• Catalyst (MEKP)
• Promoter Dispenser
• Catalyst Promoter (DMA & Cobalt)
• Closure Sleeves
• Backing Rings
• Catalyst Dispenser

The installing contractor must furnish the following:
• Grinder and Wheel
• Disposable Mixing Pail (1 gal.)
• Acetone
• Heavy-duty Rubber Gloves
• Wooden Mixing Paddles
• Wire Brush
• Dry Rags
• Plastic Drop Cloths
• Sheet of Plywood
• Paint Brushes (3"

Note:
1. Insure that all field closure kit materials are properly stored:
   A. Keep all kit materials in their original shipping containers. Store these materials in a trailer or mechanical room. This trailer or mechanical room should be well ventilated. Keep all materials away from any open flames, sparks, or extreme heat.
   B. Store the resin and catalyst at 60° to 85° F. Do not store resin and catalyst above 100° F.
2. Take only enough materials to the site for the number of closures that will be made up in one working shift.

WARNING
Material Safety Data Sheets (MSDS), for each of the components described in this manual should be reviewed for safety precautions and protective equipment requirements.
Installation Instructions

1. Measure and cut 4 lengths of bi-ply mat equal to 1\(\frac{1}{4}\) times the circumference of the containment closure sleeve. Bi-ply to be 8" wide. These are for the two circumferential lay-ups. Example: 20.5" x 3.14" x 1.25" = 80" long.

2. Measure and cut 2 lengths of bi-ply 8" wide by 20" long. These are for the horizontal lay-ups across the seam.

Note: It is recommended that the bi-ply for many joints be prepared at one time and wrapped separately.

3. Slide the FRP split sleeve over the containment pipe and position it to one side of the product pipe field joint.

4. Joint, test and insulate (if required) the product pipe(s).

5. Insert and position the backing rings by squeezing the rings so the edges butt up together. See figure 1.

6. Slide and position the FRP split sleeve over the containment pipe gap. Make sure the longitudinal sleeve split is at the 12 o'clock position. See figure 2.

FRP Containment Pipe H-Wrap Field Closure

7. Abrade the conduit and closure sleeve seams a minimum of 6 inches on each side of the seam. For field installation purposes, the use of an electric grinder with a grinding disc is suitable.

8. PermAlert provides a Promoter Dispenser for measuring promoter. The resin is shipped unpromoted to increase shelf life. See figure 3.

   **Figure 3**

   ![PROMOTER DISPENSER](image)

   - **BEAKER**
   - **SCREW CAP**
   - **STORAGE BOTTLE**

9. Unscrew the cap of the storage bottle and replace it with a funnel. Pour DMA into the storage bottle until it is about \(\frac{3}{4}\) full. Do not fill it all the way. See figure 4.

   **Figure 4**

   ![DMA Shipping CONTAINER](image)

   - **FILL \(\frac{3}{4}\) OF BOTTLE**

10. Remove the funnel and screw the cap back on tightly. Attached to the cap is the delivery tube. Slide the beaker onto the delivery tube. See figure 5.

   **Figure 5**

   - **DELIVERY TUBE**
11. To measure out a full beaker of DMA, slide the beaker all the way down. Squeeze the bottle until DMA fills the beaker. Release pressure on the bottle and the excess DMA will return to the bottle. See figure 6.

![Figure 6](image)

12. To measure out a fraction of a beaker, slide the beaker so the delivery tube hole is at the desired level. Squeeze and release as described for a full beaker. See figure 7.

![Figure 7](image)

Note: Do not mix DMA and cobalt prior to mixing with resin. They must be added separately.

13. Open the 5 gallon pail of resin and add one (1) ounce of DMA and (1) ounce of cobalt per gallon of resin. (1 oz. = 30 cc's)

- 5 gal requires 150 cc of DMA
- 150 cc of Cobalt

- 3 gal requires 90 cc of DMA
- 90 cc of Cobalt

Note: Do not add DMA and Cobalt to more resin than will be used in one working shift.

14. Mix a batch of caulking compound by adding one part promoted resin to one part cab-o-sil. PermAlert recommends mixing a large batch before doing any field joint closures. See figure 8. Combine until a thick paste forms. Cover tightly between use.

![Figure 8](image)

Caulking

1 Part Promoted Resin 1 Part CAB-O-SIL

15. PermAlert provides a Catalyst Dispenser for measuring catalyst. The catalyst is used in the fiberglass hand lay-up and the caulking compound. See figure 9.

![Figure 9](image)

CATALYST DISPENSER

BEAKER

SCREW CAP

STORAGE BOTTLE

16. Place 2 cups of caulking compound into a small mixing pail. Add the proper quantity of catalyst (see Table A). Mix the caulking compound and catalyst thoroughly. See figure 10.

![Figure 10](image)
17. Caulk all the seams around the closure sleeve. See figure 11. Allow the caulking mixture to cure thoroughly.

Figure 11

18. Remove the excess caulking by sanding so that the entire field closure surface is smooth. Clean the entire area with acetone, leaving no residue on the surface. See figure 12.

Figure 12

19. Abrade the complete surface again to present a flat, dull surface for the bi-ply to adhere to.

20. Place a sheet of 4 mil thick plastic on a sheet of plywood. This plastic and plywood should be a minimum of 6 inches longer and 6 inches wider than the longest cut piece of fiberglass to be wetted out. See figure 13.

Figure 13

21. Pour promoted resin from the shipping container into a mixing container. (See the resin quantities Table B attached.) See figure 14.

Note: The resin should be kept at a minimum of 60° F for several hours prior to use.

Figure 14

22. Add the MEKP catalyst to the promoted resin in the mixing container and thoroughly mix. A useful mixing tool is a low speed drill with a formed wire as a bit. (See the catalyst quantities Table A attached.)

23. Pour $\frac{1}{3}$ of the resin onto the plastic sheet. Spread the resin out so that it is 4 inches longer and 2 inches wider than the bi-ply that is to be wetted out. See figure 15.
24. Lay a piece of bi-ply onto the sheet with woven roving side face down. Center the bi-ply on the sheet. See figure 16.

25. Pour ⅓ of the remaining resin onto the bi-ply. Spread the resin over the entire bi-ply surface using the metal roller supplied by Perma-Pipe.

Note: Use only the finned metal roller. Anything else could damage the chop mat side of the bi-ply.

Move the roller back and forth on the bi-ply until it appears transparent. Lay a second piece of bi-ply onto the first piece, "woven roving" side face down. Pour the remaining resin onto the bi-ply. Roll out the top piece until it appears transparent. Roll all excess resin from the bi-ply. See figure 17.

26. Lay edge 1 of the hand lay-up onto the closure sleeve over the seam. Continue to hold edge 2 in place. See figure 18.

27. Place the wetted bi-ply around the closure sleeve. Ensure that the bi-ply is centered so that it overlaps equally on both sides. Lay one edge of the hand lay-up onto the sleeve. Continue to hold the other edge. Roll the first edge with the finned metal roller to roll all trapped air out from under the bi-ply wrap. Start from the bottom and roll toward the top. Do not let the bi-ply sag away from the sleeve at the bottom. Continue to roll the wrap until it begins to set up.

Note: Once the glass begins to set up, do not continue to roll it with the finned metal roller.

28. Move the roller along the hand lay-up from point (A) to (B) pushing out any trapped air. Repeat from (A) to (B) along the entire hand lay-up width. Begin in the middle and move to the edges. See figure 19.
29. Lay down edge 2 overlapping edge 1. Move roller down along the hand lay-up from point (A) to (C) pushing any air to the bottom. See figure 20.

30. Continue moving roller up from point (C) to (D) pulling any air to the top. See figure 21.

32. Repeat the last three steps along the entire width of the hand lay-up. Begin in the middle and move to the edges. See figure 23.

33. Place a hand lay-up along the longitudinal seam as shown. Use roller to press the hand lay-up side ways to force the air to the edges. See figure 24.

31. Move roller from point (D to (E) pulling any air out of the hand lay-up. See figure 22.

34. Once the resin reaches its peak exotherm, mix a small amount of promoted resin with MEKP catalyst and paint the entire bi-ply wrap. Be sure to paint all the seams. This will give the wrap a good, clean, smooth finish, and will help ensure a water tight seal.

35. Place the finned metal roller and any other resin covered tool in a pail of acetone after each field joint closure has been wrapped. Clean all tools thoroughly at the end of each shift.
36. Let the bi-ply cure for a minimum of 24 hours.

37. In order to properly install the containment pipe field closure, these procedures must be followed. Any deviation must be approved by PermAlert's Field Service Representative.

38. After a complete cure of the containment pipe field joints, test the containment pipe per PermAlert's recommended test procedure.

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**Table A**

**Catalyst Quantities Chart**

*Estimated Gel Time = 15-25 minutes*

<table>
<thead>
<tr>
<th>Nominal Conduit Size</th>
<th>Qts/Two 8&quot; Pieces of Bi-ply</th>
<th>All measurements in cc's</th>
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<tr>
<td></td>
<td>60°F</td>
<td>70°F</td>
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<tr>
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</tr>
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<tr>
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</tr>
<tr>
<td>54</td>
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**Table B**

**Resin Quantities Chart**

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<tr>
<th>Nominal Conduit Size</th>
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<th>Nominal Conduit Size</th>
<th>Resin (QTS)</th>
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<td>22</td>
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<td>54</td>
<td>22.0</td>
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**Note:** These quantities are only a benchmark. Adjustments should be made as needed. To decrease the gel time, add more catalyst per gallon. To increase the gel time, decrease the amount of catalyst per gallon. The MEKP catalyst must be mixed thoroughly into the resin solution for these gel times to be obtained.
Occasionally, a section of the FRP containment pipe will be damaged during shipment or installation. An FRP containment pipe requires repair if the fiberglass strands are exposed or the wall has been chipped. Also, repair is required in cases where a leak may be detected at a containment pipe field joint. See Figure 1.

To perform proper repairs of damaged or leaking areas, an FRP repair procedure outlined below must be followed. Any deviation from the procedure must be approved by PermAlert's field service representative.

2. Cut two pieces of bi-ply, each large enough to cover the repair area. Prepare one quart of resin (see installation instructions). Pour one fourth (¼) of the resin onto the repair area and spread with a brush. See Figure 3.

1. Sand a 6" radius area around the leak or damaged area, using sandpaper or emory cloth. Wipe the area clean with acetone. See Figure 2.

3. Lay a piece of bi-ply, woven roving side facing down, onto the repair area. Pour one half (½) of the remaining resin onto the bi-ply. Roll out the bi-ply until it appears transparent. See Figure 4.
4. Lay a second piece of bi-ply onto the first piece, woven roving side facing down. Pour the remaining resin onto the bi-ply. Roll out until it appears transparent. See Figure 5.

5. Let the hand lay-up repair cure for at least 24 hours before retesting the containment. If a leak is found in a location other than a field joint, contact your PermAlert representative. See Figure 6.
INSTALLATION INSTRUCTIONS

Addendum

Cold Weather

As with most plastics, a low ambient temperature will adversely affect the curing of the resin.

Use the following tenting procedure for fabricating field closure in cold weather.

Fabricate a tent around each field joint. It should be large enough to enclose two men and the entire working area needed to fabricate the field closure. Tie down the tent so that cold drafts don't flow through the tent.

Heat the tent to a minimum temperature of 60°F using a heat source at one end of the tent. If a flame type heat source is used, it is recommended to mount it outside the trench. Duct work should be placed to direct the heat into the tent.

Provide ventilation in the tent to remove any fumes given off by the curing of the fiberglass hand lay-up.

The amount of catalyst may need to be increased depending on the ambient temperature and wind chill. The conduit will tend to be colder at the system grade, especially in deep trenches because of the shade from direct sunlight. The bottom of the conduit can also be significantly cooler than the top side. This may require tenting and/or a heat source. Contact your PERMA-PIPE representative if any problems arise.

Wipe off any frost on the conduit around the field joint area before any field joint closure fabrication.

When moving the conduit in cold weather, be especially careful to follow the proper handling guidelines.

Rain and Snow

Because the resin will not cure properly if contaminated by even small amounts of water, PERMA-PIPE does not recommend any field closure fabrication in a wet environment unless all the field joint materials and the conduit can be kept dry.

If field closure fabrication is done during rain, it is extremely important to keep the field joint and the field materials completely dry.

Before the fabrication of the closure, make sure the trench floor does not contain standing water. De-water the trench and inspect the ends of the conduit to make sure it's dry. If the conduit has been flooded, it must be dried following the proper drying guidelines.

The field closure area should be protected from rain by a suspended tarp or similar covering. The field joint area of the conduit should be wiped dry before any closure fabrication is begun. Keep the plastic-end bags on the conduit until welding the carrier pipes.

In many climates, a dew will form on the conduit early in the morning. Dew and any other moisture on the conduit at the field joint area must be wiped off before any field closure fabrication.