

# Fabrication Instructions For Smith Fibercast® 12" Through 72" Branch T-Miters With Vinyl Ester Resin

**INTRODUCTION** Following these Fabrication Instructions will enable you to make leak free, long lasting joints on Smith Fibercast Large Diameter Branch T-Miter Piping.

**It is important that you read these instructions completely and follow all of the procedures very carefully.** Please contact your local Smith Fibercast authorized distributor if you have questions, or need clarification, regarding these Instructions. Thank you for using Smith Fibercast products.

## **SAFETY PRECAUTIONS**

The Resin, Adhesive and Catalyst you will use in making the installation are **HIGHLY FLAMMABLE!** It is critical to your personal safety that you isolate your work area from any source of open flames. Remember that the fumes from these materials are also **FLAMMABLE** and can travel or build up in poorly ventilated areas. **WARNING:** The Catalyst contains **METHYL ETHYL KETONE PEROXIDE (MEKP)**. MEKP is a strong oxidizing agent, and it is critical that you observe proper safety measures when using products containing MEKP:

- Always wear chemical splash goggles for eye protection when using the Resin, Adhesive or Catalyst. If eye contact should occur, flush immediately with water and call your physician.
- Always wear impermeable gloves to avoid direct skin contact with the Resin, Adhesive or Catalyst. If

direct contact should occur, wash immediately with soap and water.

- Never cover a container of mixed Resin and Catalyst or Adhesive and Catalyst.
- Material Safety Data Sheets (MSDS) are available upon request.

## **CONTENTS OF FIBERCAST**

### **T-MITER KITS**

The contents of your Field Weld Kit will vary according to the diameter and pressure ratings of the pipe. Please see the Kit Contents for a detailed listing of the contents.



### **STORAGE OF SMITH FIBERCAST T-MITER KITS**

Do not store Smith Fibercast T-Miter Kit Resin at temperatures above 90°F. Maximum storage life for the Resin is three months at 90°F and five months at 80°F. Storing Resin at temperatures below 40°F is recommended.

If refrigerated, the Resin should be allowed to slowly rise to room temperature for several hours prior to usage. **DO NOT REFRIGERATE THE FIBERGLASS**, as condensate may wet the glass and inhibit the bond of the Resin. The fiberglass must be stored in a clean dry place.

## **FIELD WELD ENVIRONMENT**

Surfaces to be Field Welded must be thoroughly sanded, clean, dry, oil-free, and in the correct temperature range to ensure a proper bond.

Field Weld procedures are based on temperature ranges of 60°F to 90°F. For Field Welds where conditions exceed these ranges, follow the Cold Weather and Hot Weather Installation tips. The recommended temperature limits of the Resin, Adhesives, and surfaces to be Field Welded, must be maintained in order to assure proper curing of the T-Miter joints.

All bonding surfaces and materials for Field Welds must remain completely dry and at temperatures above 60°F. **NOTE:** Air Temperature is not the only factor affecting cure times. **EXAMPLE:** When the air temperature is 60°F and a pipe is exposed to direct sunlight, surface temperatures of the pipe may approach 100°F or higher. Conversely, at 60°F, a pipe exposed to a cold wind and no sunlight will affect adhesives as if conditions were colder.

## **COLD WEATHER INSTALLATION TIPS(Below 60°F)**

The curing time for Field Welds is directly related to the temperature. Colder temperatures can result in uncured T-Miter joints.

The following steps should be used when applying a T-Miter joint in cold weather:

1. Field Weld Kits should be placed in a warm room for 6 to 12 hours before application so they reach temperatures of 70°F to 80°F. THE RESIN, ADHESIVE, AND CATALYST SHOULD NOT BE APPLIED AT TEMPERATURES IN EXCESS OF 100°F.

2. Fabricate piping into sub-assemblies in an inside area when possible. A small portable heated shelter can also be used.

3. Warm the pipe ends and fittings before joint assembly.

4. Use a heat gun or space heater to start joint cure. Hold the nozzle of the gun 8" to 12" away from the joint, and slowly rotate the heat over the joint until a tack-free surface is obtained.

5. Use Smith Fibercast heat blankets or a space heater to cure the joint according to the Cure Times Chart on Page 5.

6. To accelerate cure times in cold weather, use up to 22 ml of Catalyst per quart of Resin.

#### **HOT WEATHER INSTALLATION TIPS (Above 90°F)**

Hot weather conditions will reduce the working time of the mixed Resin or Adhesive. The following steps are recommended when fabricating in hot weather:

1. To increase pot life in hot weather, reduce Catalyst to no less than 13 ml per quart of Resin.

2. Avoid direct sunlight on the joining surfaces of the Resin, Adhesive, Catalyst and Fiberglass.

3. Cool containers of Resin, Adhesive and Catalyst in an ice chest with ice.

4. Plan and organize the job to reduce working time.

**SITE EQUIPMENT** Each T-Miter Kit contains the correct amount of materials for the size of joint specified on the Kit. In addition to the material supplied in each Kit, the following items should be on hand:

1. Clean, dry rags or paper towels.
2. Impermeable gloves.
3. Chemical splash goggles.
4. Drum or disc sander, with 36 to 60 grit abrasive. 36 to 60 grit emery cloth may also be used for

hand sanding. Do not use flapper wheels or belt sanders.

5. Layout table for Fiberglass.

6. Extra cardboard, heavy paper or aluminum foil to use as a cover for the layout table.

7. A space heater, Smith Fibercast heat gun or heat blanket may be required.

#### **TOOLS FOR CUTTING SMITH FIBERCAST PIPE**

Smith Fibercast Pipe should be at least 55°F before cutting and may be cut with several acceptable tools, including:

1. Circular power saw with an aluminum oxide abrasive blade, a grit edged carbide blade, or a diamond blade. Do Not use toothed blades as they may damage the pipe corrosion barrier.

2. Band saw with 16-22 teeth /inch at speeds of 200' 600' per minute.

3. Saber saw with grit edged carbide blade.

4. Chop saw with aluminum oxide blade.

5. Hack saw with 22-28 teeth per inch.

#### **STEPS FOR CUTTING SMITH FIBERCAST PIPE**

1. Measure the pipe, remembering to allow for fitting dimensions.

2. Scribe a cutting guide around the pipe with a contour marker or other device to ensure a proper fit.

3. Hold the pipe firmly. If chain vises or other mechanical holding devices are used, care should be taken to prevent crushing or point loading the pipe.

4. Saw the branch and main pipe as smoothly as possible. Coarse sawing with the wrong tool can result in damage to the chemically resistant inner surface of the pipe.

5. Trial fit the pipe to ensure proper makeup with minimal gaps between the branch and main pipes.

#### **SURFACE/END PREPARATION**

**NOTE: It is essential to good fabrication that pipe and fitting surfaces be sanded, clean, dry and free of oil, grease and solvent contamination.**

1. Prepare both ends of the pipe, or pipe and fitting to be joined

together, by sanding the bonding surfaces with 36 to 60 grit abrasive (See Site Equipment, Item 4).

The sanded area should be completely roughened and extend 1/2 " beyond the widest layer of Fiberglass that will be applied.

EXAMPLE: For a 16" T-Miter Branch. The widest layer of Fiberglass is 10", therefore, sand the pipe ends to a distance of 5 1/2 " from each cut end.

2. Never sand the joint surfaces more than two (2) hours before making the joint.

3. Wipe the sanded area with a clean, dry, lint-free cloth and avoid touching the surfaces with bare hands or dirty gloves. Do not use solvents.

#### **INTERIOR SURFACE PREPARATION**

For 24" and larger piping, use a die grinder to sand the interior surface of the pipe at least 3" from the joint ends. This will provide a proper bonding surface for applying the Veil, Mat and Resin to the interior surface of the pipe.

#### **SEALING AND SECURING THE PIPE ENDS** CAUTION: Follow Safety Precautions on Page 1.

The Weldfast CL-200 Adhesive included in the Kit is provided to coat the sawed ends of the branch pipe, the hole in the main pipe, and to stabilize the joint to prevent movement before applying the layers of Fiberglass reinforcement. Mix according to the instructions in the Weldfast Kit.

Apply a thin layer of mixed Weldfast to the outside of the cut opening edge of the main pipe for the branch pipe to sit on, the hole in the main pipe, and to cut the edge of the branch pipe.

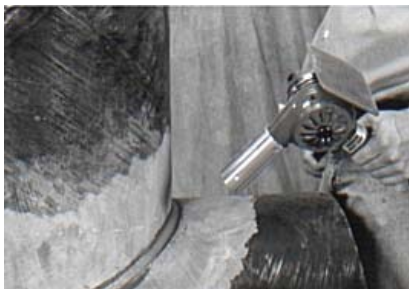


Place the adhesive end of the branch pipe onto the open cut edge of the main pipe.

Use the wooden stirring stick to smooth the adhesive and make a small 45° beveled fillet along the edges of the joint. Make both the inside and outside as smooth as possible.



Cure the Weldfast Adhesive according to the Weldfast instructions. Heat may be applied to accelerate cure times.



Sand and smooth the hardened fillet and joint interior with 36 to 60 grit abrasive.

**MIXING THE STANDARD LAY-UP RESIN** CAUTION: Follow the Safety Precautions on Page 1.

1. Measure the recommended amount of Catalyst using the Measuring Beaker (see the Cure Times Chart).

2. Pour the measured Catalyst into 1 quart of Resin and stir until completely blended. When the Resin is properly blended, the color will be a consistent shade of green and it will start to foam.

The standard mix of catalyzed Resin is 16 ml of Catalyst for each quart of Resin. After the first quart of Resin is mixed and a layer of Fiberglass has been applied, it may be evident that the ratio of Catalyst should be changed to allow more or less working time. If more working time is required, use as little as 13 ml of Catalyst to each quart of Resin. This will

normally double the pot life and the curing time.

If a quicker cure is required, use up to 22 ml of Catalyst for each quart of Resin. This will shorten the pot life and the cure time.

**IMPORTANT NOTE!** Never use less than 13 ml or more than 22 ml of Catalyst for each quart of Resin. "Smoking" or "crazing" of a joint indicates an over-catalyzed Resin. Joints made with over-catalyzed Resin will be structurally weak, provide poor chemical resistance and should not be used.

### **INSIDE JOINT WELD (24" Diameter and Larger Pipe)**

Inside joint welds are very important to the structural integrity of the pipe. When possible, always make inside joint welds when joining large diameter T-Miter piping, using the following procedures:

1. In addition to the standard sanding of the bonding surfaces, also sand to remove the remaining "lip" of excess adhesive and any uneven edges of the cut edge of the pipe. Wipe dust away with a clean dry cloth.

2. Wet the sanded surface of the piping interior with a light coat of catalyzed Resin.

3. Arrange the materials on a flat surface or table top. Pre-wet two layers of 4" wide Fiberglass Mat and one layer of Veil. Be sure the Veil is the top layer.

4. Apply the pre-wetted layers, centering the glass over the joint. The mat goes against the pipe wall with the veil exposed to the fluid stream.

### **CORROSION BARRIER (Smaller Than 24" Diameter Piping)**

If an inside joint weld cannot be made, a corrosion barrier must be made on the exterior joining surfaces of the piping, using the following procedures:



1. Wet the sanded surface of the piping exterior with a light coat of catalyzed Resin.

2. Arranging the materials on a flat surface or table top, pre-wet two layers of 4" wide Fiberglass Mat, and one layer of Veil. Be sure the Veil is the top layer.

3. Apply the pre-wetted layers, centering the glass over the joint. Be sure the Veil is against the pipe.

### **APPLYING FIBERGLASS TO OUTSIDE JOINT WELD**

The sanded pipe and fitting joint surface must be pre-wet with catalyzed Resin prior to starting the lay-up.



Note: Fab-Mat for Large T-Miters is cut in quarters.

Start with the smallest size of Fab-Mat. Pre-wet, on a table or flat surface, the woven roving side with catalyzed Resin. Flip it over to the mat side and add more Resin.

To make the Fab-Mat contour to the bend of the joint, pick up the pre-wetted layer of Fiberglass and wad it up slightly to break it down. Then straighten it out, center it over the joint and apply.



As each layer is applied, use your gloved hands to smooth out wrinkles and trapped air. The

cover mat (largest) is thinner than the other layers, so pre-wet it sparingly. Apply this cover layer by patting, not rubbing, making sure it covers all edges of previous layers. Use the 3" Paint Roller to remove wrinkles and trapped air (indicated by "white" spots). It may be necessary to use additional Resin as you are rolling out the finished layers. Wipe off any runs of Resin now, with the Roller, to reduce grinding time later.

Before the Resin gels it will run out of the uppermost layers, leaving them looking lighter in color. Use the roller and roll the Resin back up into these areas. If possible, rotate the large pipe so that the branch is now pointing down which will allow the Resin to run back onto the branch.

**MIXING AND APPLYING THE FINISH COAT** After all the layers of Fiberglass have been applied to the joint, and the joint has gelled or semi-hardened, apply a final coat of catalyzed Resin, using the 3" Paint Roller or a brush. This finish coating is in a separate container marked "Finish Coat Resin." The Resin should be catalyzed using the same procedure as for the standard lay-up Resin. If less than one quart of Finish Coat Resin is required, reduce the recommended amounts of Catalyst proportionately.

Application of the Finish Coat Resin is critical to developing a chemical resistant piping surface and joint.

**VE T-Miter Kit Cure Times Chart**

Temperature (Degrees)	Part "A" Shelf Life (Months)	Part "B" Shelf Life (Months)	Part "B" Catalyst Per Quart of Resin	Pot Life (Minutes)	Gel Time (Minutes)	Butt Weld Joints Cure Time (Hours)
40 – 50	6	12	N/R	N/R	N/R	N/R
50 – 60	5	12	N/R	N/R	N/R	N/R
60 – 70	3-4	12	16 ML	20-40	25-45	36 Hrs
70 – 80	3-4	12	16 ML	20-40	25-45	24 Hrs
80 – 90	2-3	9	16 ML	15-35	18-38	24 Hrs
90 – 100	1-2	4	13 ML	8-15	10-18	24 Hrs
200 & Greater	----	----	----	----	----	14"Dia-42"Dia – 2 Hrs 48"Dia-72"Dia – 4 Hrs

**JOINT CURE** The minimum required cure time is 36 hours at 60°F. Inadequate joint strength will result if the catalyzed Resin is cured at temperatures less than 60°F. Cure temperatures up to 200°F will accelerate cure time to two hours and increase joint strength. Heat cure is recommended for piping systems carrying fluids at temperatures above 120°F. Before pressurizing the piping system, or moving the piping, cure the joint (see Cure Times Chart).

**HYDROSTATIC TESTING** Smith Fibercast piping systems should be hydrostatically tested prior to being put into service. Avoid water hammer during testing to prevent serious damage to the piping system.

All anchors, guides, and supports must be in place prior to testing the line. Hydrostatically test the line as follows.

1. Water should be introduced at the lowest point in the test section and the air bled off through partially open valves or loose flanges at all the highest points. Slowly introduce water into the system to prevent water hammer. Slowly close the bleed points when all the air has been forced from the system.

2. Bring the system gradually up to the test pressure. Test pressure should not be more than 1 1/2 times the working pressure of the piping system, and must never exceed 1 1/2 times the rated operating pressure of the lowest rated component in the system.

3. When testing is completed open all of the high point air bleeds before draining the piping through the fill lines. This will prevent vacuum collapse of the pipe.

**COMPRESSED AIR / GAS TESTING** Compressed air or gas testing of Smith Fibercast piping systems is not recommended. When air or compressed gas is used for testing, tremendous amounts of energy can be stored in the system. If a failure occurs, the energy may be released catastrophically, which may result in property damage and personal injury.

When system contamination or fluid weight prevents the use of hydrostatic testing, use compressed air or gas testing with extreme caution. To reduce the risk of air testing, pressurize the system to no more than 15 psig.

When pressurizing the system with compressed air or gas, the area surrounding the piping must be cleared of personnel to prevent possible injury. Hold the pressure for one hour; then, reduce the pressure to 1/2 the original pressure. Personnel may then enter the area to perform "soap testing" of all the joints. If compressed air or gas testing is used, Smith Fibercast will not be responsible for any resulting injury to personnel or damage to property, including the piping system.

Compressed air or gas testing is done entirely at the discretion and complete risk of the customer, contractor and user.



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