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1.1 **Introduction.**

Many standard oilfield installation techniques are used to install fiberglass pipe. The key to a successful installation is the attention paid to the assembly of each joint connection. This Installation Guide provides a procedure to follow and emphasizes the necessity of correctly applying the recommended thread sealant to both the male and female threads, adjoining the connections in alignment without cross-threading or galling, and applying the optimum torque and specified thread stand-off. The importance of not burying the thread connections prior to testing is also emphasized, since the time, cost and unlikelihood of finding and repairing a leak is substantially increased if buried.

(F.A.C.T. is only responsible for a product factory defect. See Section 2, Warranty.)

F.A.C.T. requires that an experienced, well trained and competent fiberglass pipe installer be used in all F.A.C.T. pipe installations. Rarely will a F.A.C.T. representative be on site for the purpose of advising the installation crew. F.A.C.T. will however offer training for the installation crew or crews at the F.A.C.T. factory in Wichita, KS.

1.1.1 **Initial Parameters.** Prior to starting an installation, the following parameters must be established:

Type of service.

Buried or above ground installation.

Fittings required.

Proper tools, including make-up wrenches and torque wrenches, required lubricant, sealant, and other determined accessories.

1.1.2 **Pre-Bid or Pre-Installation Meeting.** Prior to bidding or installation, a meeting with the installation crew should be held to:

Review proper handling and storage of all pipe and related products.

Review proper installation procedures.

Qualify the crew on equipment (power tongs, strap wrenches, torque wrenches etc.) to be used.

Review the installation schedule.

1.1.3 **Role of F.A.C.T.** A F.A.C.T. representative will be available for assistance via phone during the installation if necessary.

1.2 **Receipt, Handling and Inspection.**

1.2.1 **Transportation.**

- Domestic U.S.A. or inland shipments require dedicated (fiberglass only) flatbed trailers. Pipe hanging off trailer or transporting pipe on racks above a small rack can cause potential impact damage to pipe. Tie downs should be located near the dunnage. Use only straps and not chains.
- International shipments require dedicated (fiberglass only) 40' open top or high cube containers loaded at the factory.
- Containers should not be unloaded at the port of destination. If a container cannot be transported inland,

pipe will need to be crated at factory. Crates can be installed inside containers for removal at a port of destination for subsequent transportation inland.

1.2.2 **Receiving Load Inspection.**

- Check quantity and type for deviation.
- Check for load shifting, missing dunnage or thread protectors.
- Check for excessive bending from over tightened straps.
- Check for impact damage caused from abrasion or blows with sharp objects.
- Quarantine or obviously mark any product that appears damaged. Do not use or install.
- Notify F.A.C.T. or other seller promptly of any discrepancies.

1.2.3 **Unloading.**

- Forklifts are commonly used for off-loading bundles, use a spotter to avoid damage.
- Use spreader bars and slings for off-loading with a crane.
- Never allow pipe to roll off a trailer to racks or ground.

1.2.4 **Storage.**

- Set pipe on a surface free of sharp objects.
- Leave separator boards between pipe layers.
- If pipe racks are used, strip them with lumber and evenly space four pipes abreast to avoid permanent bending, make sure pipe is protected to prevent damage from sharp edges.
- Thread protectors must remain in place to prevent damage and UV exposure.

1.2.5 **Ultraviolet Effects.**

- Ultraviolet effects on pipe are limited to surface discoloration. Eventually, “Fiber blooming” will occur if left exposed to the sun long enough, but degradation is limited to only the outer .005”-.010” wall of the pipe. The surface effect of ultraviolet is minimal and does not reduce the long term performance of F.A.C.T. fiberglass pipe.

1.3 **Buried Installations.**

1.3.1 **Ditch Preparation.**

- Burying fiberglass pipe is recommended instead of above ground installation.
- Bury pipe a minimum of 3 feet deep and below frosts line depth. Ditch bottom must be level such that the pipe does not support backfill. Compact with sandy or fine soil. Extra precautions should be taken in rocky conditions.

1.3.2 **Joining Connections Above Ground.**

- Avoid over-bending pipe when lowered into the ditch.
- Use straps (never chains) for lowering pipe.

1.3.3 **Joining Connections in the Ditch.**

- The ditch width must accommodate full movement of the strap wrenches at the connections. This may require bell holes.

1.3.4 **Road Crossings.**

- Road crossings require steel conduit, abrasion centralizers and end seals.
- Protect pipe at the entry and exit of conduit against settling shear and from sharp edges.
- Avoid over-bending pipe to enter or exit conduits. Use a gradual elevation changes or fittings.
- Stabilize soil beneath conduit to minimize settling.
- Sand bags may be used to eliminate pipe movement due to pressure or temperature changes.

1.3.5 **Backfill.**

- Use loose select backfill free of rocks and large tree roots 12” around pipe.
- Do not backfill over connections until water testing is completed.
- Do not backfill a ditch with standing water.

1.3.6 **Line Crossing.**

- Line crossings must be protected from abrasion.
- Install the pipe under existing lines whenever possible.
- Leave a minimum of 6” between lines.

1.4 Above Ground Installations.

1.4.1 Support Spacing.

- Maximum spacing for continuous spans of liquids @75°F with specific Gravity of 1.0 (See Table Below)

SIZE	2 3/8"	2 7/8"	3 1/2"	4 1/2"	6"
SPAN	11'	12'	13'	15'	18'

1.4.2 Wear Saddles.

- Wear Saddles must be used to protect the circumference of the pipe against pipe movement due to temperature change or pulsation abrasion.

1.5 Thread Connections.

1.5.1 Cleaning and Inspection.

- Thread protectors must be left in place until ready for joining pipe.
- Clean threads with wire brush if necessary.

1.5.2 Make-up Tools. Make-up tools are designed to provide uniform 360° compression on the pipe while applying the required make-up torque. Strap wrenches are required for proper make-up.

1.5.3 F.A.C.T. Thread Sealant for Line Pipe.

FACT sealants have been formulated and tested to achieve the best performance of our products. Any other sealants have not been approved by FACT.

- F.A.C.T. Gray polysulfide thread sealant is a state of the art sealant and is effective in use on high pressure 8rd threaded piping systems. This sealant is a polysulfide that slow cures to a rubber like consistency. This sealant has Teflon particles of different sizes to enhance the sealing properties and does not require curing to be effective in sealing threads that are properly engaged.

Do not use Teflon Tape with this sealant!

- F.A.C.T. Tubing sealant is also an excellent petroleum based sealant and is effective on high pressure 8rd threaded piping systems. This sealant has Teflon particles of different sizes to enhance the sealing properties as well as superior friction resistance when disassembly is necessary.

Do not use Teflon Tape with this sealant!

- Apply the sealant evenly with spatula or large tongue depressor to both the **pin** and **box** threads and cover the entire thread area making sure it has filled the threads. Be sure to keep both ends free of any contamination of dirt, etc.

1.5.4 **Joining Procedure.** (for 2, 2 ½, 3 and 4 inch 8rd pipe)

- Support pipe behind both the box end and pin end to allow tool movement and leveling. Alignment is very important for full thread engagement and to avoid cross-threading.
- Center and align male into female and gently insert until full engagement is felt then rotate by hand.
- Maintain alignment and tighten by hand. On larger diameter/heavier pipe it may be necessary to use your torque strap wrench along with hand tightening.

Should have a 5 to 7 thread stand-off. **(Note: Pipe should engage freely to prevent wiping thread sealant)** If you do not have a 5 to 7 thread standoff (threads showing) after hand tightening, you have most likely cross threaded the connection (the torque wrench will most likely have clicked at final pressure before the 5 to 7 threads are left showing. If this happens, take the connection apart, clean the threads and then re-apply the sealant to both and try again.

- The F.A.C.T. torque wrench is utilized on the male upset and a strap wrench on the female upset. Preset the specified optimum torque on the F.A.C.T. torque wrench as per the chart herein. Once the optimum torque is reached the torque wrench will click. Stop applying torque and observe the thread stand-off. If the specified stand-off of 1 to 3 threads is not reached, unscrew the joint, clean and re-apply thread sealant and duplicate procedure. If full make up is not achieved set the joint aside and continue with a new joint (also contact a F.A.C.T. representative).

1.5.5 **Requirements.**

THREAD SIZE	TORQUE (FT. LBS.)	FULL MAKE UP	F.A.C.T. SEALANT
	OPTIMUM	STAND OFF	JOINTS/GALLON
2 3/8" 8RD	175	2 Threads +/-1	100
2 7/8 " 8RD	200	2 Threads +/-1	80
3 1/2 " 8RD	250	2 Threads +/-1	65
4 1/2" 8RD	350	2 Threads +/-1	35

1.6 **Bell and Spigot Connections**

1.6.1 **Preparation.** A strong adhesive joint requires clean bonding surfaces. The bonding surfaces must be free of oily fingerprints, dirt, oils, grease, and other contaminants. Freshly tapered spigots or factory fresh spigots and bells do not require cleaning unless visibly contaminated. Soil or dirt may be removed by washing with water. Surfaces may be cleaned with acetone or methyl ethyl ketone. Once the surfaces have been cleaned, do not contaminate them by touching with hands, laying pipe in the dirt, etc... The surfaces should be dry and freshly sanded before applying adhesive. Warning: Acetone and Methyl Ethyl Ketone are extremely flammable. When using these solvents, do not smoke or use near an open flame.

1.6.2 **Joining and Bonding Procedure.**

1. Using a clean paint brush, apply a thin, uniform coat of adhesive completely coating both bonding surfaces of the joint. First coat the bell and then the spigot.
2. Align and lock the joint by inserting the spigot into the bell until the tapered surfaces touch. Then while pushing, turn the joint until it locks tight. Normally ½ to 1 turn is needed. Hold in locked position until excess adhesive squeezes out. For large diameter turning pipe may not be practical, so align the pipe and push until tapered surfaces touch. A driving force must be used to lock the joint such as a piece of hard wood (4" x 4") and a hammer.
3. Allow 24 hours to fully cure @ 70°F. Cure time may be reduced by heating the joints with heat collars. Temperatures below 45°F will need heat collars to assist cure. Allow @ 20-30 minutes for heat collars to initiate cure. When joints are fully cured the assemblies may be handled, pressurized or hydro tested per F.A.C.T. recommendations.
4. FACT provided adhesives have been tested to achieve the best performance of our products. Any other adhesives have not been approved by FACT. **(Read instructions before using.)**

1.6.3 Adhesive Kits

50 ML KIT		200 ML KIT	400 ML KIT
PIPE SIZE	JOINTS/KIT	JOINTS/KIT	JOINTS/KIT
2"	4	16	32
3"	3	11	22
4"	2	8	16
6"	-	3	6

1.7 **Line Proof Testing.**

1.7.1 **Frequency.** Pressure testing is recommended on all lines to insure line integrity. The first test must occur before 2000 feet of pipe is installed. Thereafter, test in segments which are as small as practical.

1.7.2 **Preparation.**

- Backfill must be sufficient to minimize pipe movement with 2 feet on either side of the connection left exposed for joint inspection.
- Soft pigs must be provided to fit the inside diameter of the pipe. Pigs are used to displace the air when filling the pipe with fresh water. Gas and air should not be used for testing.
- Test equipment must be capable of monitoring pressure and temperature as a function of time and test must be set to bleed air from both ends of the line and at high points in the line.
- Testing at freezing or sub-freezing temperatures may require the mixing of up to 50% methyl alcohol with the fresh water.

1.7.3 **Test Equipment.**

- Fiberglass to steel flange combination of appropriate ANSI rating and thread size.
- Spiral wound flange gaskets.
- Pressure gauges.
- Check valves.
- Quick disconnects.
- Pressure and temperature chart recorder.
- Air pump.
- Electrical source or generator.
- Fresh water.
- Heavy duty quick disconnects hoses.
- Soft pigs.

1.7.4 **Testing.**

- Place two soft pigs in the line at the lowest elevation, one behind the other.
- Pump the pig through the line by pushing it with fresh water.
- Bleed the air at the highest elevation of the line since trapped air will become compressed during testing and will give erroneous results.
- If water appears before the pig, air may be trapped in the line.

- Beware of water temperature versus line temperature; always let line temperature stabilize before testing.
- Once air is removed, begin slowly elevating the system to desired test pressure. **(Do not exceed rated pressure of lowest rated component of the system).**
- Test for 2 to 4 hours at pressure.
- Inspect the line during the test by walking the line and visually inspecting for leakage, over bending and evidence of damage.
- Variations in ambient temperature will cause fluctuations in pressure over an extended test.
- If operating pressure varies more than 20% consult a F.A.C.T. representative.

1.8 **Limited Warranty and Exclusions.**

F.A.C.T. warrants products manufactured and sold by it will be free from defects in material and workmanship at time of delivery. This warranty extends only to the original purchaser from F.A.C.T. or a F.A.C.T. authorized commercial reseller. Any product defect must be reported to F.A.C.T. within thirty days following delivery to the purchaser and the product promptly made available to F.A.C.T. for inspection upon request. The purchaser's sole remedy in the event of defect shall be replacement of the defective product with new comparable product without charge to the purchaser with shipping to be paid by F.A.C.T...

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER ACKNOWLEDGES THAT IT IS NOT RELYING ON F.A.C.T.'S SKILL OR JUDGMENT IN SELECTING PRODUCT SUITABLE FOR A PARTICULAR PURPOSE. F.A.C.T. SHALL HAVE NO RESPONSIBILITY FOR PRODUCT USED OR INSTALLED OTHER THAN IN ACCORDANCE WITH F.A.C.T.'S INSTRUCTIONS. F.A.C.T. MAKES NO WARRANTIES IN RESPECT TO PRODUCT NOT MANUFACTURED BY IT. THE PURCHASER OF THE PRODUCT EXPRESSLY WAIVES ANY RIGHT IT MIGHT HAVE TO CONSEQUENTIAL OR INCIDENTAL DAMAGES RESULTING FROM A DEFECT OR OTHERWISE. ANY ACTION OR ARBITRATION CONCERNING THE PRODUCT MUST BE BROUGHT IN SEDGWICK COUNTY, KANSAS. THE LIMITED WARRANTY PROVIDED HEREBY IS PURCHASER'S SOLE AND EXCLUSIVE REMEDY.