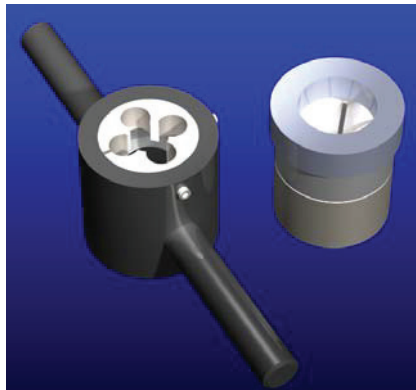


FLUOR-O-FLO® PTFE NPT Piping System Installation Instructions

Schedule 80

The following information is intended to assist users of the FLUOR-O-FLO® PTFE NPT Piping System in achieving trouble free installation of system components using our Installation Tool Kit. This bulletin covers the following aspects of installation:



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The best way to install our FLUOR-O-FLO® PTFE NPT Piping System is by using our manual Installation Kit designed for that purpose. Our observations and feedback from job-sites leads us to recommend against using power threading equipment.

This guide is designed to be used with our installation kits and covers all aspects of the installation.

Also available:
FLUOR-O-FLO® PTFE Piping System

- Sales Bulletin
- Product Specifications
- Pressure Ratings
- Installation Tool Kits Sales Bulletin

Cutting and Chamfering Pipe

Cutting: PTFE (also referred to as TFE) pipe may be cut by any normal pipe cutting technique such as saw, pipe cutter, etc. Ends should be square, and the OD chamfered slightly to enable clean start-up of threading die.

Chamfering: The accuracy of the chamfer is not critical. The following rules can be used for guidance (the chamfer is designed to be a minimum of one thread depth, but not so much as to lose more than 1-1/2 threads of engagement).

- As noted above, our observations and feedback from job-sites leads us to recommend against using power threading equipment. To help ensure a leak-proof joint we recommend manual threading tools (such as MICROMOLD's installation kits) that have guide sleeves to keep the pipe aligned with the threading die.
- Our chamfering tools do not accommodate 1/8" and 1/4" nominal pipe sizes. We suggest chamfering these up to 1/16" by hand, for example, with sandpaper or a file.
- 3/8" pipe from 1/8" to 3/8" nominal pipe size should be chamfered with our tool a minimum of 1/16", generally no more than 3/32".
- Pipe from 1/2" through 2" should be chamfered with our tool a minimum of 3/32", generally no more than 1/8".
- Pipe from 2-1/2" nominal and over should be chamfered a minimum of 1/8", generally no more than 5/32".

Threading Pipe

- If possible, gently secure the pipe in a vise. Otherwise, hold the pipe and prevent it from rotating while threading.
- Push straight on the handles, avoiding side pressure. Advance the die so that its trailing face is flush with the end of pipe.
- Rotate the tool clockwise continuously using the handles until the thread is completed. Do not stop or reverse rotational direction.
- To provide support and prevent distortion of the pipe, it helps to install a snug, not tight fitting, plug in the end to be threaded.
- Carefully brush off any chips or ribbons of PTFE or other contaminants that may be adhering to the threads. Failure to do so will result in leaky joints.
- The die is set properly at the factory. Although usually not necessary, should die adjustment be needed, contact the factory.



Joints Using PTFE Based Paste Sealant

Teflon® PTFE Paste Sealant:

We strongly recommend use of a PTFE based paste sealant. There are two products we recommend:

- Formula-8® manufactured by Fluoramics, Inc., Mahwah, NJ – 800-922-0075. A tube of this sealant is normally included with our installation kit and additional tubes are available through distributors. The manufacturer indicates this sealant is
 - o Non-toxic, non-contaminating, and inert to most chemicals except strong alkalis
 - o Usable over a wide range of temperatures from -400°F to +500°FHowever, it is not approved for applications requiring FDA conformance.
- Never-Seez® White Food Grade paste sealant with PTFE. This sealant is made by Bostik, Inc., Middleton, MA – 800-726-7845. The manufacturer indicates that this sealant
 - o Meets FDA requirements where incidental food contact is possible
 - o Is approved by the U. S. Department of Agriculture for use in establishments operating under the Federal Meat and Poultry Products Inspection Program
 - o Certified per NSF H-1 for food industry lubricants.

If pipe is to be threaded in the field, it important to follow the instructions above for chamfering and threading. Then use the following procedures:

- Apply the paste over all the male threads.
- Gently, hand-tighten the joints making sure the parts are not cross threaded. (Hand-tighten does not mean to go as far as a strong person can go. Just make it snug.) Then continue to tighten for one full turn. Small sizes can be done by hand. Use of emery paper can be helpful to avoid slippage. For larger sizes a strap wrench is helpful. Be careful since excessive tightening can result in leaky joints.
- Re-tightening: Wait one full day and then retighten one full turn. Make sure the system is not under pressure when tightening threads.



Joins Using Thread Seal Tape

In general, we recommend using a PTFE based paste for sealing most FOF NPT connections. Instructions for use of paste sealant follow and if adhered to, leak tight joints can be accomplished quite easily.

However, there are a few applications for which a paste sealant may not qualify. For example, while the pastes are compatible with most chemicals, there are a few that attack the solvent carrier used in the sealant (primarily strong alkalis). Also, the pastes may not qualify for certain applications requiring FDA conformance.

In the event paste is not suitable, virgin PTFE pipe joint sealing tape may be used. However, with sealing tape obtaining leak tight joints can be challenging. The installer needs to adhere especially carefully to the instructions below for the application of PTFE thread tape.

- If pipe is to be threaded in the field, it is important to follow the instructions above for chamfering and threading.
- For PTFE to PTFE joints the following procedures have been tested and work well:
 - Clean the threads: Make sure that the joints are absolutely clean and free from dirt or strings left over from threading
 - Wrap the tape: Wrap ½" wide thread tape as follows:
 - ◆ Hold the male NPT thread facing toward you
 - ◆ Start wrapping tightly about one full thread from the end in the clockwise direction. Keep the edge of the tape parallel to the face of the fitting.
 - ◆ Make three tight wraps each covering the previous wrap. Again, keep the tape edge parallel to the face of the fitting. Do not overlap the wraps so they cover additional threads.
 - Joining the parts: Gently, hand-tighten the joints making sure the parts are not cross threaded. (Again, hand-tighten does not mean to go as far as a strong person can go. Just make it snug.) Then continue to tighten for one full turn. Small sizes can be done by hand. Use of emery paper can be helpful to avoid slippage. For larger sizes a strap wrench is helpful. Be careful since excessive tightening can result in leaky joints.
 - Re-tightening: Wait one full day and then retighten one full turn. Make sure the system is not under pressure when tightening threads.
- For PTFE to metal pipe joints, follow the same procedure as above, but use four wraps. Again, wait one full day and then retighten one full turn.

NOTE: Never use thread tape and paste sealant together.

Testing the Joints

Testing of joints before placing in service is always a good idea; for potentially hazardous applications it is absolutely essential.

- Systems to be used in gas service, and those exposed only to low pressures may be tested with low-pressure (5 psi) air using liquid soap at all joints to detect leaks identified by soap bubbles.
- Systems to be used at or near rated pressures should be hydrostatically tested at pressures 1.5 times the highest pressure to which they will be exposed, but in no case, higher than 1.5 times higher than the rated pressure of the pipe.

Pipe Support

PTFE has a lower tensile strength than metals or most other plastics, so hanger supports must be placed closer together than with other materials. The simplest solution is often to place the pipe on a continuous support such as stainless steel or PVC plastic angle or channel.



Thermal Expansion

PTFE has an unusually high coefficient of thermal expansion. For example, when heated from 50°F to 77°F, an unconstrained 100 foot length of PTFE pipe will lengthen almost 7 inches, 30 times more than steel. Installations should be designed accordingly. Approximate linear expansion of PTFE pipe, in units of inches of expansion per 10°F temperature change per 100 feet of pipe, is as follows:

| Temperature Range (°F) | Coefficient of Linear Expansion (in. /10°F/ 100 feet) |
|------------------------|---|
| -300° to 50° | 0.4 |
| 50° to 68° | 1.1 |
| 68° to 77° | 5.3 |
| 77° to 500° | 1.2 |

Bulkhead Fittings / Tank Adapters

Tank Wall Hole

The diameter of the hole through the tank wall should be equal to, or up to 1/32" larger than the nominal Body OD. Do not exceed this size or the o-ring may not seal properly.

Inserting the Fitting

The fitting, together with the o-ring, should be installed from the inside of the tank.

Sealing Surface

The o-ring sealing surface should be smooth and free from sharp edges, burrs and deep scratches. Ideally, it should have a 20 micro-inch or smoother finish although depending upon the characteristics of the surface, the o-ring will often achieve a seal against rougher surfaces.

Tightening the Nut

When tightening the nut, bring it to the point at which the o-ring seal is just in contact with the tank wall. Then tighten it approximately as shown in the following table:

| Nominal Pipe Size | Tighten Unit |
|-------------------|---------------|
| 1/8" - 1/2" | 2/3 of a Turn |
| 3/4" - 2-1/2" | 1/2 of a Turn |
| 3" - 4" | 1/3 of a Turn |

Achieving the Seal

Sealing to a less than smooth surface with Teflon® FEP or PFA encapsulated o-rings is different from sealing with rubber o-rings. A rubber o-ring will immediately deform into surface imperfections; Teflon® takes time. Thus, the o-ring may leak when installed. To correct this situation, allow the o-ring to settle in place overnight. This allows the Teflon® to cold-flow into the voids. Alternatively, you can heat the o-ring, allowing it to flow more quickly. If a seal is not achieved, it may help to take-up a little more on the nut.

