



**Petersen**  
Products Company

# Pipe Plug Operating Instructions

Petersen Products Company

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## PERSONNEL SAFETY

1. Due to the many possible variables these general instructions must be adapted by a competent professional engineer for each specific project. Instructions and training must be provided to all users and workers on the job.
2. If your pipe plug has a Safety and User Manual, be sure to read and understand it.
3. Properly wear and use all required Personal Protective Equipment (PPE) and Safety equipment, for your application. Common items include eye protection, hardhat, gloves, safety shoes, hearing protection, and protective clothing.
4. Determine if the area is considered a Confined Space. Refer to Occupational Safety and Health Administration (OSHA) (29CFR 1910.146), Safe Confined Space Entry. Follow all federal, local and site specific codes, standards and regulations.

## 2. Basic Rules for Using Any Pipe Plug

- A. Select a Pipe plug manufactured for the actual size, pressure, temperature, and chemical requirements of your application. Consult PPC engineering for more information.
- B. Release the back pressure or equalize pressure on both sides of the pipe plug before installing, deflating and removing.
- C. **NEVER** exceed the maximum rated head pressure for the Pipe plug measured at the pipe invert. See Calculation Formulas.
- D. Use accurate calibrated pressure gauges that agree for measuring the pipeline head pressure.
- E. Mechanical and Molded Rubber Plugs are generally used for testing because fabricated Multi-Flex® style plugs may allow some seepage unless customized for a positive seal.
- F. Before and after use, thoroughly inspect the Pipe plug for surface tears, cuts or any other damage.
- G. **NEVER** use a Pipe plug in a pipe size different from the recommended usage range.

## 3. Inflatable Pipe Plug Rules for Operation

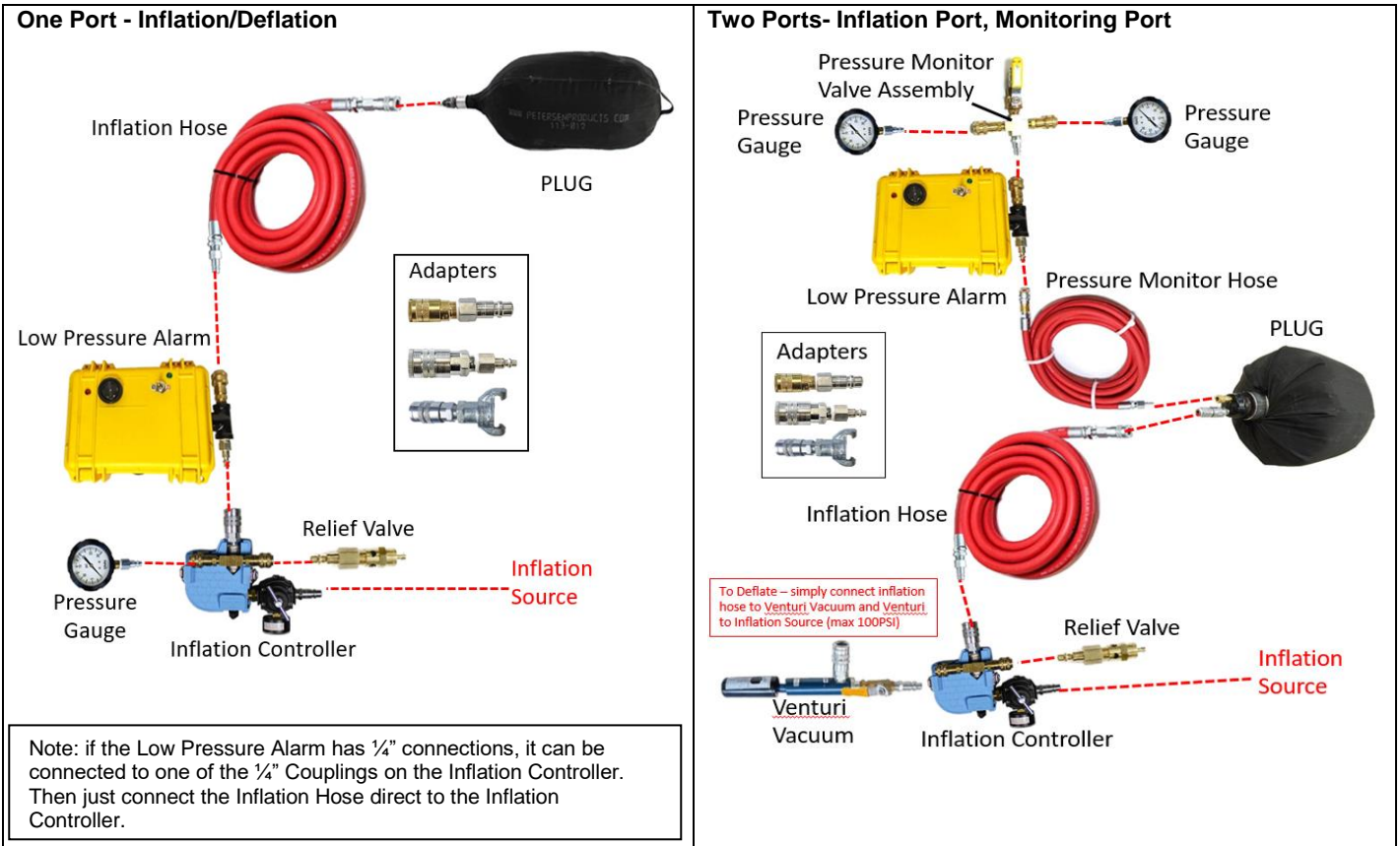
- A. **NEVER** inflate an inflatable plug outside of a pipe beyond 5% of rated pressure or 5 psi, whichever is less.
- B. Use a Kevlar or protective sleeve to help protect the plug if debris in the pipeline cannot be removed.
- C. Check airline connections and hoses to make sure they are not damaged or leaking.
- D. Always use two accurate pressure gauges that are in good working order for monitoring the plug inflation pressure.
- E. Generally inflate molded rubber and smaller Pipe plugs with air or an inert gas. Since gases are compressible it is often advisable to inflate larger diameter Pipe plugs with water.
- F. Petersen Multi-Flex® Pipe plug must be inflated to at least twice the pipeline pressure but not more than the rated pressure. Inflate Molded Rubber Pipe plugs up to the rated pressure to properly expand the rubber.
- G. When connecting a pipe plug to a pressure source, use a bleeding type pressure regulator and relief valve to maintain the correct pressure with changing temperature and head pressure.
- H. Inflate the plug slowly to carefully build up the pressure to the maximum rated inflation pressure. Check the inflation pressure every 15 minutes until the pressure stabilizes and then at least hourly thereafter.
- I. **NEVER** remove the hoses until all pipeline head pressure is released and the Pipe plug completely deflated.
- J. Deflate the Pipe plug completely before removing from the pipeline.

## 4. PIPE PLUG INFLATION

### 4.1 Air or Nitrogen Inflation:

When the Pipe plug is inflated with air or inert gas read the inflation pressure directly from the air pressure gauge regardless of Pipe plug and gauge elevation.

### Petersen Air Inflation Component Connections



### 4.2 Water Inflation:

**NOTE: When using water inflation, the pressure gauge reading needs to be corrected based on the plug depth.**

Water inflation is preferable in larger and higher pressure Pipe plugs because it is not compressible and reduces the risk of explosion.

When inflating a plug with a liquid, calculating the actual inflation pressure at the invert is critically important.

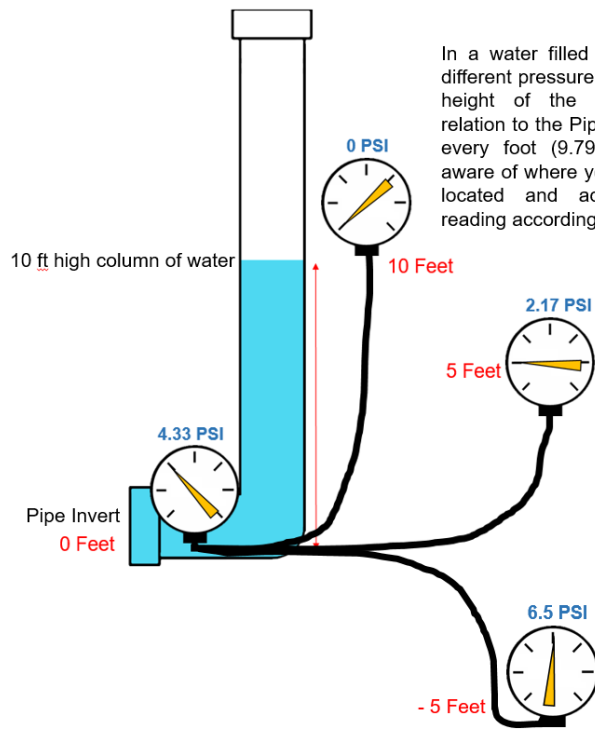
Inflate a Pipe plug immediately with water if the pipeline is at least 1/2 full of water. If not, it must be first be filled with air and then the air displaced with water.

Obtain the approximate number of gallons of water required to fill the plug from the factory to estimate when to stop filling with water. The gallon capacity is only an estimate but the maximum pressure should not be exceeded.

(1) To monitor the inflation pressure with an air hose:

(a) When water is used to fill the plug, air is sometimes used to maintain the inflation pressure.

(b) To monitor the Inflation pressure with an air hose add to the air pressure gauge reading 1.42 psi per meter (.433 psi/foot) that the air hose connection on the Plug is above the invert. The air hose must be purged of all water.



In a water filled hose, you will get a different pressure reading based on the height of the Pressure Gauge in relation to the Pipe Invert. 0.433 psi for every foot (9.79kPa per meter). Be aware of where your pressure gauge is located and adjust your pressure reading accordingly.

(c) Verify the air hose does not have liquid in it by filling the hose completely with air. If partially filled with liquid, the pressure reading will not be valid.

(2) To monitor the inflation pressure with a water hose:

(a) Add to the water pressure gauge reading 0.433 psi/foot (9.79kPa per meter) that the Plug water pressure gauge is above the invert. The water hose and plug must be completely filled with water. Bleed off any air in the hose.

(b) Never exceed the maximum rated plug inflation and head pressure at the pipeline invert.

### 4.3 Special:

Grout filling Multi-Flex™ Pipe plug is permissible. Contact PPC engineering for more information.

## 5. Calculating the Total Force that a Pipe Plug must Restrain

**F = S x P**

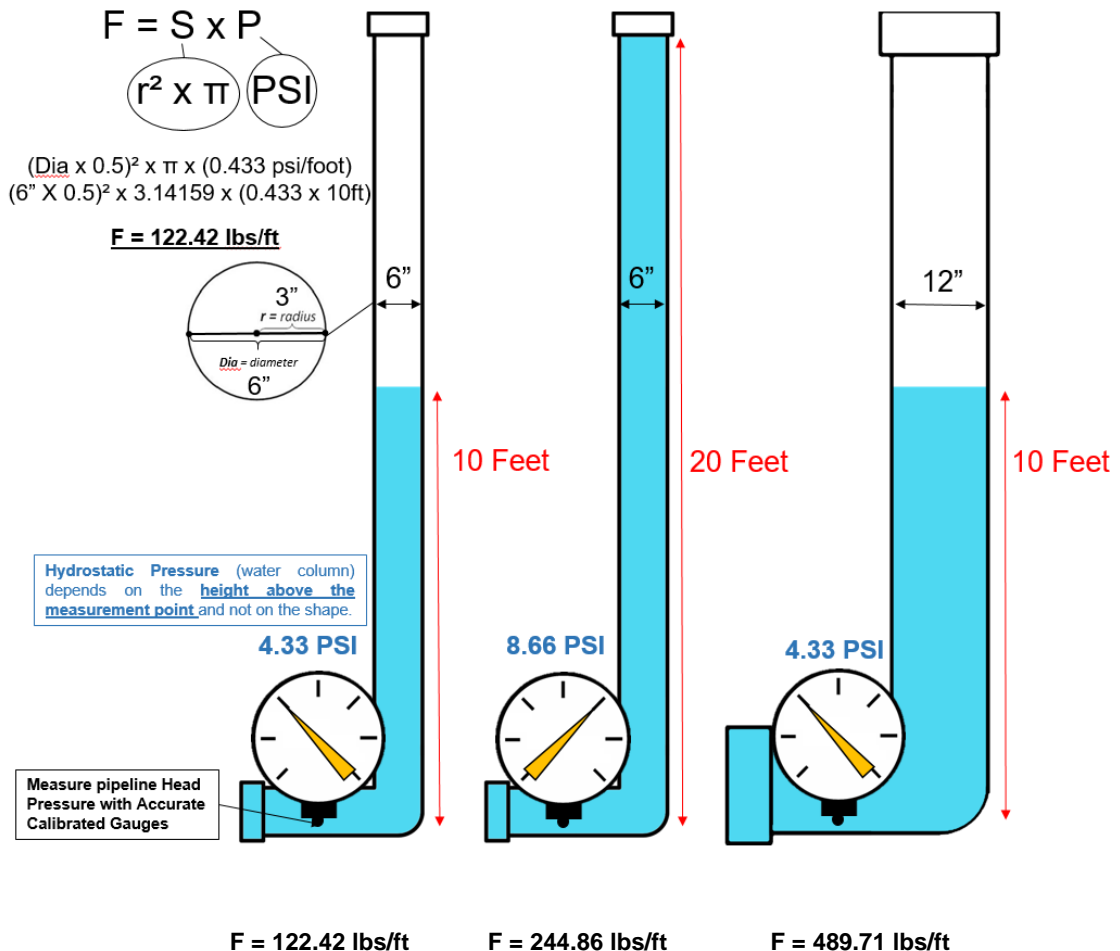
F = force on the Pipe plug (lbs. per ft.), pipe plug slipping force

S = ( $\pi \times r^2$ ) = pipe cross-sectional area (in<sup>2</sup>),  $\pi$  = 3.14159, r is the Radius or ½ the diameter (inches)

P = pipeline pressure (psi), water column height must be converted to a force over area

As an example, a 10 foot water column converts to a back pressure of 4.33 psi (29.3 kPa). The configuration or liquid surface area does not affect pressure, only elevation.

Pressures exerted on a Pipe plug are the same for liquid, water or air. Ten (10) psi of water is the same as ten (10) psi of air as one example. **Use extreme caution!** Pressures from gases such as air and nitrogen are compressible and store energy, making them far more dangerous than water. As a result, the Pipe plug has a much greater force when discharging a slipping Pipe plug since gas will expand to its original atmospheric volume upon release.



## 6. MAINTENANCE AND CARE

- a) Deflate the plug completely. If water inflation is used pump out the water or hang vertically and drain. Water will not damage the plug but it will make it harder to reuse.
- b) Clean the plug. Use laundry type detergent if necessary and rinse with clean water.
- c) Store in a clean dry area out of sunlight.
- d) SBR molded rubber plugs may be sprayed with silicone to help slow deterioration over time. Natural rubber components are especially susceptible to deterioration from aging.
- e) Multi-Flex® Plugs use synthetic materials that have a much longer life in normal atmosphere.
- f) Multi-Flex® Plugs may be inflation tested outside of a pipeline for leaks to no more than 5% of the rated inflation pressure or 5 psi, whichever is less.
- g) Multi-Flex® Plugs may have air trapped between their multiple plies thus while a soap bubble test may indicate a leak in pipe or hose connection, bubbles on the outer ply may indicate air escaping between the plies immediately after inflation.
- h) Multi-Flex® Plug leak test requires monitoring the inflation pressure over time after the pressure has stabilized.

### INSPECT PLUG FOR SIGNIFICANT WEAR OR DAMAGE



**CUTS**



**ABRASIONS**



**PUNCTURES**



**BULGES**



**LOOSE OR DAMAGED FITTINGS**



**COMPONENTS AND LEAKS**

**Do Not Use the Product if there is significant wear or damage. Return to Petersen for evaluation.**

Petersen has the equipment for inflation, deflation, and pressure monitoring for all Inflatable Pipe plug Systems

Contact Petersen with any questions or suggestions about the use of any Petersen Product.