

# TECH TIPS

FROM NASSCO

TECH TIPS BY NASSCO IS A BI-MONTHLY ARTICLE ON TRENDS, BEST PRACTICES AND INDUSTRY ADVICE FROM NASSCO'S TRENCHLESS TECHNOLOGY MEMBERSHIP PROFESSIONALS.

## PIPE PLUG SAFETY

By NASSCO Member Tad Powell, P.E. Associate, Hazen and Sawyer

Sewer pipe plugs are usually cylinder-shaped devices inserted into pipelines and inflated against the walls of the pipe to temporarily stop flow. Sections of pipe are then isolated for repair or rehabilitation. Plugs vary in size, shape, material composition and pressure rating to accommodate almost any pipeline configuration. They are typically inflated with air, water, or nitrogen. Nitrogen, being an inert gas, is often used when isolating gas lines to eliminate the possibility of an explosive mixture occurring and is also a suitable choice for use with sewer gases.



An inherent danger exists with all inflatable products. Whether a pipe plug is being used by an employee for the very first time or is used on a daily basis, the safety risk is always there and should be assessed for each installation. Employees must adhere to all applicable confined space entry regulations prior to doing any pipe plug installation. The primary risk is the plug dislodging or rupturing, creating a violent release of water pressure that can cause severe injury or death. The plug, or pieces of the plug, can also become dangerous projectiles. Pipe plugs are commonly required in the vicinity of pipeline workers, so safety is of the utmost importance.

Understanding the general procedures and risks associated with installing pipe plugs is the first step toward safely working with and around plugs. While every job will require special precautions, the following steps are a general guideline to follow:

1. Measure the inside pipe diameter, then inspect and clean the pipeline where the plug will be installed. Typically plugs are installed at least one pipe diameter length into the pipe with no part of the plug protruding from the pipe.
2. Determine the type and size of plug required. Some factors include the pipeline configuration, ingress/ egress of the deflated plug, and the amount of back pressure (the pressure of the flow the plug is holding back).
3. Become familiar with the selected plug and review all manufacturer's instructions. Examine the plug and associated equipment for damage and wear. The manufacturer will detail the installation and use procedures.
4. Blocking or bracing may be required to prevent the movement or complete dislodgement of the plug. Plug manufacturers and/or certified engineers should be consulted.
5. Use a properly calibrated gauge when inflating the plug. Only inflate the plug to its maximum inflation rating. Inflation kits allow for personnel to be in a safe location while the plug is being inflated.

6. Never exceed the maximum back pressure. Always research potential risks that could increase the back pressure during plug operation.
7. Under-inflation can be as dangerous as over-inflation. Under-inflating may cause the plug to slip and become dislodged due to not adequately holding the back pressure.
8. Once installation is complete, the plug pressure should be monitored regularly via the use of gauges. Workers should be able to monitor gauges from a safe location.
9. Deflating and removing the pipe plug should only be attempted when all the back pressure has been relieved. If enough back pressure exists when the plug is deflated it will lose contact with the pipe walls and release, potentially causing bodily harm and/or damage to the plug.
10. Just as with inflation, the deflation process should occur at a safe distance. Typically, plugs are installed in manholes or similar access structures. Plug failures produce a conical shaped 'blast zone' which gets larger the further away from the plug or manhole access.
11. Remove any blocking and then safely remove the plug.
12. Re-inspect and clean the plug so it will be ready for the next use. Store the plug per the manufacturer's recommendations.

These guidelines should serve as an overview to help users understand the potential dangers associated with the use of inflatable pipe plugs. Forces increase dramatically as pressure and pipe diameter increase. For example, the axial force applied by back pressure on a 16-inch diameter plug is four times the force on an 8-inch diameter plug for any given back pressure. The rated back pressures are calculated assuming the plugs are in clean, dry pipes, so any sort of debris in the pipe will lower coefficients of friction and decrease the rated available back pressure. Each work site is unique and comes with its own challenges, so installing and using pipe plugs should always be assessed on an individual basis.