

TECH TIPS

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

FOLDED PIPE TRENCHLESS LINING TECHNOLOGIES PROVIDE CHOICES FOR CONSUMERS

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Among the many pipe lining techniques available in the market today, Folded Pipe technologies include products that are factory manufactured, reshaped into a reduced cross-section for shipping and installation purposes, pulled into an existing pipeline, then processed with steam and pressure to form a new pipe within the old pipe. Folded technologies typically incorporate thermoplastic materials that can be heated and processed in the field, using the existing pipeline as the form. These lining technologies can be installed for sewer and culvert applications in sizes ranging in size from 6" to 30", with the most popular in the 6" to 12" range. Larger sizes have been successfully installed to rehabilitate drainage culverts and potable water lines. Installations are performed by trained installation crews experienced in each specific technology.



HDPE FOLDED SEWER AND DRAIN PIPE

HDPE folded pipe materials for sewer and drain pipe applications are also referred to as a Deformed and Reformed technology. The liner is manufactured as a round pipe in a factory, then deformed into a reduced cross-section, installed into an existing pipeline and then reformed to fit tight within the host pipe. In order to ensure a correct fit and no post-installation movement of the liner, a precise re-forming procedure is performed by the contractor after installation into an existing pipeline. The procedure takes into consideration installation stresses and stretch of the HDPE liner during installation as well as temperature shrinkage stresses created during cool down of the HDPE after installation.

The liner is typically sized a little smaller than the host pipe to ensure a tight fit which limits the amount of stretching required, thereby providing a consistent wall thickness. Typically the house service connections on sewer pipes are reconnected robotically, requiring no excavation, and the product's design and installation are in accordance with ASTM standards F-1533 and F-1606, respectively.

HDPE FOLDED POTABLE WATER PIPE

HDPE folded pipe materials for potable water applications from 4" to 48" can be accomplished using a pressure rated PE 100 product which can be installed around sweeping bends and have a pressure capability of 150 + psi. The selected HDPE pipe is typically fused together in long lengths even though shorter lengths can be accommodated, if necessary. Once fused together, the pipe is mechanically re-shaped, resulting in a reduction of its cross-sectional area before being inserted into the existing host pipeline. Once inserted, the HDPE is pressurized and re-rounded to fit tight within the existing pipeline. End and service connection fittings are installed onto the new pipe and all required excavations are backfilled to complete the installation.

PVC FOLDED PIPE FOR SEWER APPLICATIONS

There are several PVC folded pipe materials that are referred to as Folded/Formed Poly Pipe Type A and Folded Poly Pipe. Fold and Form PVC technologies are typically manufactured round then folded and formed into a reduced cross-section such as "U", "C", "H" or "Flat" shape. The PVC pipe is manufactured in a factory, to ASTM standards F-1871 for Folded/Formed Poly Pipe Type A, modified PVC and F-1504 for Folded Poly Pipe high strength PVC, then coiled,

in long lengths, for shipment to the project site for installation. Manufactured in sizes from 4" to 30", it is most commonly installed in 6" to 12" sizes. The PVC liner is typically pre-heated in a pipe warmer, installed through a manhole opening into an existing pipeline, then formed to fit tight inside the existing pipeline using steam and pressure. For each of the technologies, service connections, temporarily sealed by the inserted pipe, are identified as a "dimple" and then reopened robotically to restore service to the connected homes. Installations are performed in accordance with ASTM standards F-1867 and F-1947.

UNDERSTANDING HOW POLYMER FOLDED PIPE TECHNOLOGY WORKS

The installation of a polymer folded pipe into an existing pipeline requires that the material be sufficiently flexible to allow easy installation and to prevent damage to the material. These polymer products have a characteristic known as a glass transition temperature (Tg). When a polymer or plastic is in its hard and brittle state, like glass, it is considered to be below its Tg and, similarly, if the plastic is soft and pliable it is above its Tg.

Three (3) plastic types are used with the Folded Pipe technology, including High Density Polyethylene (HDPE), Plasticized PVC, and PVC. Each of these plastics have a defined Tg. HDPE has a Tg of -190° F to -210° F, so it is typically above its established Tg, or pliable when used at ambient temperatures. A folded HDPE liner can therefore be installed at ambient temperatures without the addition of heat. Once installed in the host pipe the HDPE material is then heated to near melt temperature (250°F+-) to form the plastic material into the inside shape of the host pipeline, then the plastic is cooled to ambient temperature before releasing the internal pressure.

Plasticized PVC or PVC may have a Tg of 140° F to 170° F or higher, depending on product formulation. This temperature is significantly above normal ambient, therefore folded plasticized PVC or PVC liner must be heated to above its glass transition temperature, or to its pliable state, for installation into the host pipe. Once the PVC liner is in place, temperatures are maintained above its Tg and pressure is introduced to expand the liner to the ID of the host pipe. The plastic is then cooled to below Tg, or about 100° F, before releasing the internal pressure.

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