TECH TIPS FROM NASSCO

# CIPP Field Installation Quality Control

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It is generally accepted that Cured-in-Place Pipe (CIPP) is the most used trenchless pipeline rehabilitation system worldwide. CIPP, with its inception in the early 70s, has evolved with new ideas for service beyond gravity sewers. Felt and fabric enhancements, and polymer coatings and resin systems formulated for use in pressure pipe, potable water and gas have extended the technical envelope. Manufacturers have developed standards, training tools and quality assurance programs to enable the installation of their products to meet all represented physical properties and service environment conditions for the intended application.

Many organizations have developed standards that have contributed to the growth and acceptance of CIPP products as well as other trenchless systems. NASSCO, ASTM, AWWA, and ANSI, to name a few, have set the standards for design requirements, fit and finish, and so on. However, it is the installer who is responsible for correctly evaluating the site and determining if the technology intended for use is a good fit.

The installer typically submits to the customer (or customer representative) a detailed plan often referred to as a Performance Work Statement ("PWS"). The PWS details the installer's operations plan and how they will meet the customer's specifications and other contract related requirements. A good PWS will include a quality control plan that assures the owner that the installer understands the system manufacturer's requirements for a quality installation that meets or exceeds the intended service.

Quality control continues with the installer who must physically inspect, measure and evaluate site conditions to determine the material requirements. The installer relies on the manufacturer to build the tube to the exact diameter, length, and thickness dimensions, and verifies this before moving forward with wet-out or field operations. It's important to note that not all tube manufacturers build with the same cut tolerance, and that the tube is designed to stretch and fit tight to accommodate irregular pipe surfaces. Verifying the exact dimensional requirements can reduce surface anomalies, improve hydraulics and drive customer confidence.

**Spreader Bars**

Quality control must be adhered to in the wet-out process, and materials must be handled and stored consistent with the manufacturer's recommendations. CIPP tubes are resin carriers by design and represent 85% of the composite for traditional felt and roughly 50% for glass-reinforced liners. Following good quality control procedures that follow manufacturer-recommended saturation rates and resin metering will result in higher quality finished products. Both tube and resin manufacturers have published void volume ratios that provide guidance for specific resin types and tube configurations, as well as loading, storage and temperature requirements to provide catalyzed stability for resin saturated liners until they can be installed.

Good quality control must continue in the field with the installation, flow control in place, and pipe cleaned, inspected, and measured to confirm the liner delivered is correct. While setting up it is important to establish straight lines if possible. An over the hole, for example, is set up for the dry liner to pass through the wet-out station in a straight line and continue straight to the inversion tower, equipment, or pipe entry location with no offsets or bends to reduce stress and liner friction.

Liner friction can result in coating damage. If the damage is before resin saturation it can comprise the saturation efficiency, slowing the process and requiring additional work in locating and fixing leaks and dry spots. After wet-out it can compromise final composite strength, water tightness and may result in lifts, bubbles and other undesirable anomalies. Typically, the coating thickness range is 0.01 – 0.02 inches, although coating is not considered part of the finished CIPP thickness design. Its function is critical in contributing to water tightness and as a barrier between the uncured resin and the curing medium.

Liners delivered to the site in enclosed refrigerated trailers should also be set up in line with the pipe being rehabilitated. Pull in place or direct inversion methods should use roller bars or other devices to reduce stress and friction on the liner while positioning in place. Inspect the path the liner will traverse during installation, looking for sharp edges or projections from the liner storage container. Avoid dragging the liner on the ground, as sharp or pointed objects that can damage coating may be present but unseen, unless a barrier is placed between the liner and the ground, similar to the slip foil used by UV installers. Roller bars in manholes to redirect pulling forces (pull in place liners) avoid the liner dragging against the manhole frame or horizontal edge of the host pipe.

Sometimes it is necessary to assist or pull liner slack from the refrigerated truck or the end of a wet-out platform into the pipe being rehabilitated. Using a spreader bar is a great option instead of pull ropes wrapped around the liner, or lifting straps that can crush the liner, displace resin and destroy fiber orientation with GRP products. A good quality control plan will result in the highest quality product and drive stakeholder confidence in pipeline rehabilitation.

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