



North American Society for Trenchless Technology  
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## **Coatings & Linings Quality Assurance / Quality Control**

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Coatings and sheet liners are used to provide corrosion protection, eliminate or control infiltration and inflow, prevent release of sewage and contain potable water and natural gas. Many of these materials can be used to structural renew severely deteriorated structures as well. Because of the plethora of coatings and lining technologies available, virtually every type of underground structure can be protected or renewed with at least one of the available systems.

### **Materials**

The various needs identified are solved with coating and lining systems exhibiting the specific characteristics necessary. The types of materials available include:

- Cementitious
- Epoxies
- Urethanes and Ureas
- Thermoset composites
- Thermoplastic sheet liners and panels

When considering the various coatings and linings on the market today, the specific or unique characteristics of the coating or lining technology identify their relevance for use. Some systems are designed with high mechanical properties that when properly installed significantly enhance structural strength.

Material Standards Reference:

### **Cementitious Standards**

- ASTM C-109 Compressive Strength of Hydraulic Cement Mortars
- ASTM C-882 Bond Strength by Slant Shear
- ACI 506 Specifications for Materials, Proportioning and Application of Shotcrete

### **Polymer Test Standards**

- Epoxies, Urethanes and Thermoset Composite Systems
- ASTM D790 – Flexural Properties

- ASTM D 695 – Compressive Strength
- ASTM D 638 – Tensile Properties
- ASTM D 1653 – Water Vapor Transmission
- ASTM D 543 – Resistance to Chemical Reagents

### Thermoplastic Test Standards

#### PVC

- ASTM D 1004 – Tear Resistance
- ASTM D 412 – Tensile Properties
- ASTM E 96 – Water Vapor Transmission

#### PE

- ASTM D 6693 – Tensile Properties
- ASTM E 96 – Water Vapor Transmission

### Installation

Coating and lining system are adhered to or anchored into the host structure. Therefore, proper surface preparation is essential, particularly for difficult to bond to underground concrete. Many methods are available and used, including low to high pressure water cleaning, high pressure water jetting, abrasive blasting, degreasing, acid etching, shotblasting and others. The mechanically anchored systems, such as sheet liners are installed in combination with either poured cement or polymer mastic materials.

Application methods include shotcrete, hand application, squeegee, traditional spray, plural component spray or spincast equipment. Variables such as weather, safety, confined spaces, product viscosity, humidity, moisture tolerance, pot life, dry film thickness, return-to-service, etc. determine the viable and most ideal methods for a particular product or project.

The formidable task of coordinating the myriad of variables into good complete coating specifications is worthless without proper application performance by a qualified applicator. Therefore, look for manufacturers that support contractors that have obtained the proper training and equipment to support quality field applications.

### Testing and Inspection

Testing and inspection of coatings and linings is another essential ingredient to ensure maximum performance of the installed system. Steps for inspection and processes include:

#### Inspection Checkpoints

- Pre-inspection
- Post site prep
- Materials check
- Equipment check

- Post-install
- Testing

Cementitious - Proper water to cement ratio, finishing and cure required during install. Thickness measurements and material usage records to verify specified coverage. Vacuum testing for manholes.

Polymers - Proper component ratio, mix and coverage. Wet and dry film thickness, spark testing to identify pinholes, adhesion testing.

Thermoplastic Liners - Proper anchoring of panels, welding of joints/seams and interface with existing materials.

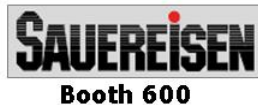
Inspector knowledge and training respective to the particular system being used can easily become the difference in project success. Organizations such as the National Association of Corrosion Engineers and Society of Protective Coatings offer training and certification courses. There are specially trained inspector consulting services available as well. Inspector services during the project and at the warranty inspection should provide adequate project documentation to analyze any defects and verify the integrity of the installed system.

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