



Recommended Specification for Ceramic Epoxy

All ductile iron and/ or steel pipe and fittings shall be free from any contamination or previous linings including asphalt or cement lining. All surfaces shall be prepared by blasting to a near white surface condition.

Lining Material:

The lining material shall be a true amine cured 100% solids hybrid novolac epoxy material containing a minimum of 20% by volume ceramic filler. The lining material must meet or exceed all of the following:

1. **Abrasion Resistance** – Per ASTM D4060-90 test method: Using CS-17 wheels with a 1,000 gram load for 1,000 cycles. Weight loss yields less than .33 grams.
2. **Adhesion** – ASTM D4541: Adhesion shall be greater than 2,000 psi
3. **Cathodic Disbondment** – ASTM G95-87 (1.5 volts @ 77 degrees F.): Results will yield no more than 0.5mm disbondment after 30 a day test.
4. **Dielectric Strength** – Per ASTM D149-91 shall be higher than 600 volts per mil.
5. **Immersion Resistance/ Testing**
 - a. 50% sulfuric acid, no effect after 2 years
 - b. 25% sodium hydroxide, 140 degrees F., no effect after 2 years
 - c. Distilled water, 160 degrees F., no effect after 2 years
 - d. Tap water, 120 degrees F., no undercutting after 2 years
6. **Impact Resistance** – ASTM D2794-92 shall be 120 in.lbs. or greater
7. **Permeability** – A permeability rating of 0.00 when tested according to the procedure described in method “A” of ASTM E96-93, Procedure A, with a test duration of 30 days.
8. **Salt Spray** – ASTM B117-85, results of 0.00 undercutting after 2 years.
9. **Shore D Hardness** – ASTM D2240, shall be greater than 75

Inspection

1. The lining and/ or coating thickness shall be checked using a magnetic thickness guage. The thickness testing shall be done using the method outlined in SSPC PA-2 “Film Thickness Rating”. Finished dry film thickness shall be 40 mils nominal, 35 mils minimum in the barrel of the pipe, and 6 mils minimum, 10 mils maximum in the bell and 6” of the spigot end. To maintain proper system integrity, the lining material used in the bell and on the spigot ends shall be the same material as applied to the

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pipe barrel. **A standard prime paint or bituminous paint applied to the bell and spigot ends is NOT acceptable.**

2. The lining shall be tested for pinholes and other discontinuities according to the requirements of accepted industry standards, including:

ASTM D5162-01

NACE RP0188-99

SSPC Vol. 1, Paragraph XIV

According to these listed standards, “linings applied at a thickness greater than 20 mils (.020”) should be tested for discontinuities or holidays using a high voltage test unit. Voltage setting should be **100 times the lining thickness, or 100-125 volts per mil of thickness**”. Therefore, the **recommended test voltage shall be a minimum of 4,000 volts** for the pipe barrel. The bell and spigot areas shall be tested using a low voltage, non-destructive wet sponge holiday detection device. Any defects shall be repaired and re-tested prior to shipment. When documentation of testing is required, it must be stated in the specifications or on the customer’s purchase order at the time the order is placed. When testing is not required either by the project specifications, or by the customer’s purchase order, standard in-house quality control procedures will be applicable.

3. When required by either the specifications or the customer’s purchase order, each pipe joint and/ or fitting shall be marked with the date of application of the lining and/or coating system along with its numeric sequence of application on that date and records will be maintained by the applicator of work performed.

Certification

The applicator must supply a letter of certification attesting to the fact that the surface preparation, application of the lining material, and testing of the lining is in strict accordance with the specification and that the lining material meets all performance requirements. Applicator must also certify that they have a minimum 5 years experience in the application of high performance coatings and linings.

The standard of quality is SP-2000 Ceramic Epoxy, a **true** amine cured hybrid novolac epoxy lining material or approved equal.

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Handling

Pipe and fittings must be handled only from the outside. No forks, chains, straps, hooks, etc. shall come in contact with the inside of the pipe and/or fittings. Pipe and/or fittings that have been coated on the outside with the Ceramic Epoxy material shall not be handled with any metallic lifting devices such as forks, chains, cables, etc. Only nylon straps or similar lifting devices are to be used.

Welding of lined pipe and fittings is **not** recommended.

8/2003