

“Glass Lining Specification”

Valves

US Pipe Fabrication SG-14®

ASTM B1000-21 Compliant

This specification is for the glass lining as applied to plug valves and check valves using accepted industry standards and is tested per US Pipe Fabrication procedures referencing applicable ASTM, NACE, SSPC and NAPF standards, and is fully compliant with ASTM B1000-21, the latest national standard specific to glass lined pipe and fittings.

Lining Material:

The glass lining applied to pipe and fittings shall be hard, smooth, continuous vitreous material which is formulated to prevent the adherence of grease in sludge and scum lines, and to resist the adherence of crystalline metal salt deposits (Struvite and Vivianite) to sludge and centrate lines in sewage and wastewater treatment plants.

The glass portion of the lining, the frit(s) used in the formulation, as supplied from the manufacturer, shall have a density of 2.5 to 3.0 grams per cubic centimeter as measured by ASTM D-792.

Lining Process:

The slip (mixed slurry) shall be prepared according to documented procedures. Pertinent quality control characteristics including specific gravity (SG) and pick-up shall be recorded.

The slip shall be applied to the freshly blasted substrate within 8 hours of blasting.

The slip shall be applied to a minimum wet film thickness (WFT) to provide the desired dry film thickness (DFT).

The freshly applied slip shall be thoroughly dried prior to the firing process.

The coated product shall be fired according to documented procedures. Times and temperatures should reflect those needed to provide the physical and corrosion results desired. Pertinent quality control characteristics including oven temperature and time at temperature should be recorded

The fired lining shall be inspected.

Lining Characteristics:

The lining shall be of a light, bright color to allow visual detection of defects more easily prior to electronic holiday detection testing. Glass linings are not intended to be Holiday free, but to prevent the build-up of grease, scum, and crystalline metal salt deposits.

The entire finished coating shall have an average minimum of 10 mils (0.010 inch) as tested with an acceptable Type I or Type II dry film thickness gage as described in ASTM D7091.

The finished lining shall be able to withstand a strain of 0.001 inch/inch of the base metal without visible damage to the glass.

The glass lining shall have a minimum hardness of 5 on the Moh's hardness scale.

The lining shall be capable of withstanding an instantaneous thermal shock from ambient + 350°F to ambient without visible crazing, blistering or spalling.

The lining shall be resistant to corrosion by an HCl solution adjusted to a PH of 3 at 125°F and a NaOH solution adjusted to a PH of 10 at 125°F. Demonstration of this shall be by a weight loss of not more than 3 milligrams per square inch when exposed for 30 minutes.

There shall be negligible visible loss of surface gloss to the lining after immersing a cut production sample in an 8% by weight sulfuric acid solution at 148°F for a period of 10 minutes.

Testing and Certification:

Qualification Testing

Laboratory Testing Results of representative production samples shall be available for review. These include:

- a. Strain testing of the base material to 0.001 inch/inch.
- b. Hardness of the lining using the Moh's scratch hardness scale.
- c. Thermal shock testing of a 350°F differential from ambient.
- d. Weight loss when exposed to a solution of HCl adjusted to PH of 3 at 125°F for 30 minutes.
- e. Weight loss when exposed to a solution of NaOH adjusted to PH of 10 at 125°F for 30 minutes.
- f. Surface gloss condition when a cut piece is exposed to an 8% by weight solution of H₂SO₄ at 148°F for 10 minutes.

Routine Quality Testing

Valve components (body and cap) shall be inspected prior to shipment back to the valve manufacturer for final assembly and pressure test. Completed valves should again be tested by the valve manufacturer prior to shipment to the project. Inspection at both the glass lining facility, and of the finished valve shall include:

- a. A minimum of 10 mil average lining thickness as tested with a Type I or Type II dry film thickness gage as described in ASTM D7091.
- b. Allowable holiday indications using the low voltage damp sponge testing apparatus described in ASTM D5162 and in accordance with NACE RP 0188-99 are given in the Table below. Testing should be done using a Tinker and Rasor 67.5 volt holiday and pinhole detector. Pinholes listed are detectable by spark test. Any pinholes visible to the naked eye that expose the bare metal are cause for rejection.

<i>Valve Diameter</i>	<i>Pinholes (Maximum)</i>
4" - 8"	3 - 5 per valve
10" - 18"	5 - 8 per valve
20" and larger	8 - 10 per valve

Miscellaneous:

The applicator shall have a minimum of five (5) years of successful experience in the application of high temperature glass and porcelain coatings for the wastewater and sewage treatment industry.

Welding on glass-lined pipe shall not be performed.

The standard for quality shall be U.S. Pipe Fabrication SG-14®