" Suggested Glass Lining Specification/ Submittal"
SG-14 Green and MEH-32 Blue Glass Linings

The glass lining applied to pipe and fittings shall be vitreous material which is hard, smooth, continuous and formulated to prevent the adherence of grease in sludge and scum lines, and to resist the adherence of crystalline metal salt deposits (Struvite and Vivionite) to sludge and centrate lines in sewage and wastewater treatment plants. It shall be applied to properly prepared pipe and fittings using accepted industry standards, and shall be tested per applicable **ASTM, NACE** and **SSPC** standards.

Lining Material:
The lining material shall consist of vitreous and inorganic material applied to the internal surfaces that have been prepared by blasting. The lining shall be applied in a minimum of two (2) coats, separately applied and separately fired. The items shall be exposed to a maturing temperature of approximately 1400 degrees F., at which point the vitreous and inorganic materials melt and fuse to the base metal, forming an integral molecular bond with the base metal surface. Subsequent coatings will be processed in a similar manner, forcing an integral molecular bond with the base coat. The entire finished coating shall be a minimum of 10 mils (.010") as tested with a micro test or other acceptable dry film thickness gauge. The finished lining shall be able to withstand a strain of 0.001 inch/inch (the yield point of the base metal) without damage to the glass. The lining shall be of a light, bright color to allow visual detection of defects more easily prior to electronic holiday detection testing.

The lining shall have a hardness of 5-6 on the MOHS scale, and a density of 2.5-3.0 grams per cubic centimeter as measured by **ASTM D-792**. The glass lining shall be capable of withstanding an instantaneous thermal shock of 350 degrees F. differential without crazing, blistering or spalling. It shall be resistant to corrosion of between PH-3 and PH-10 at 125 degrees F. There shall be no visible loss of surface gloss to the lining after immersing a production sample in an 8% sulfuric acid solution at 148 degrees F. for a period of 10 minutes. When tested according to **ASTM C-283**, it shall show a weight loss of not more than 3 milligrams per square inch.

Testing and Certification:
Per the recommended industry standards under **ASTM D-5162-01, NACE RP 0188-99, and SSPC Coating Manual, Volume 1, Section XIV**, the glass lining shall be tested by "low voltage, wet sponge, non-destructive holiday detection unit", with only isolated voids permitted due to casting anomalies. Test procedure and acceptance criteria shall be per the attachment "MP-9.2, Porcelain Enamel Continuity Testing", and documentation shall be furnished with each shipment of material listing the test results by identifying "mark" or "tag" numbers.

The finished glass lined pipe shall not deviate more than 0.0125 inch per foot of length from a centerline perpendicular to the square pipe end or flange face.

When applied to steel fabrications, all internal welds must be ground smooth and any voids or slag holes must be ground out, re-welded and ground smooth prior to blasting.

The applicator shall have a minimum of 5 years of successful experience in the application of **high temperature** glass and porcelain coatings for the wastewater and sewage treatment industry. **All glass lining of pipe and fittings should be from one manufacturer.**

All handling and/or lifting of glass lined pipe and fittings must be done on the exterior only. Avoid lifting internally with hooks, forks or chains at any time.

Welding on glass-lined pipe is not recommended. Wall collars, restrained joint weld ends, etc. should be weld applied prior to glass lining. Tapping should also be done prior to glass lining.

Glass lined pipe can be successfully cut for field closure pieces using an abrasive wheel type cutting device. The cut end should be cleaned and coated using epoxy repair material available from the glass lining manufacturer.

The standard for quality shall be VITCO SG-14, Fast Fabricators/ Waterworks Manufacturing MEH-32, or approved equal.