



MCWANE PLANT & INDUSTRIAL GLASS-LINED PIPE & FITTINGS SUBMITTAL

1. GENERAL DESCRIPTION

MPI glass-lined ductile iron pipe and fittings are specifically engineered for wastewater treatment, industrial process, sludge, grease, and corrosive service applications where long-term resistance to chemical attack, abrasion, and material buildup is required. The vitreous glass lining creates a smooth, non-porous barrier that protects the ductile iron substrate while reducing the accumulation of grease, sludge, scum, biological growth, and mineral deposits, helping maintain hydraulic flow efficiency throughout the service life of the system.

2. APPLICABLE STANDARDS

Manufacturing, testing, and quality verification shall be performed in accordance with the latest applicable editions of the following standards:

- ASTM B1000 – Standard specification for glass lining of ductile iron components
- ASTM D792 – Density determination of glass lining materials
- ASTM D7091 – Non-destructive dry film thickness measurement
- ASTM D5162 – Discontinuity (holiday) testing of non-conductive coatings
- ASTM C283 – Chemical resistance evaluation of vitreous materials
- SSPC-PA2 – Coating thickness measurement and inspection procedures

3. BASE MATERIALS

- Pipe manufactured from ductile iron meeting or exceeding Class 53 requirements.
- Pipe and fittings are produced specifically for subsequent glass-lining application.
- Components are manufactured and processed under controlled quality procedures to ensure compatibility with the lining process.
- Single-source manufacturing provides accountability for material quality, lining integrity, and traceability.
- Standard size range is 4 in. through 24 in. diameter; additional sizes may be available upon request.

4. SURFACE PREPARATION

Prior to lining application, all components undergo a comprehensive surface preparation process to promote optimal glass adhesion and long-term performance.

- Removal of oils, grease, and surface contaminants.
- Inspection for casting irregularities, sharp upward protrusions, or surface imperfections.
- Grinding and smoothing of protrusions that could interfere with lining performance.
- Repair of acceptable defects using approved procedures.
- Abrasive blasting to create a proper surface profile suitable for glass application.

5. GLASS LINING MATERIAL

- Vitreous, inorganic glass lining permanently fused to the substrate through a controlled firing process.
- Typical density between 2.5 and 3.0 g/cm³.
- Highly resistant to a broad range of acids, bases, salts, and wastewater-related chemicals.
- Smooth, non-porous surface minimizes product adherence and biological buildup.
- Provides a hard, durable barrier that resists abrasion and corrosion while preserving flow characteristics.

6. APPLICATION PROCESS

The glass lining is applied using a controlled manufacturing process designed to ensure uniform coverage and consistent performance.

- Glass slurry is prepared using controlled material proportions and specific gravity measurements.
- Application performed within established time limits following abrasive blasting to prevent substrate contamination.
- Lined components are dried in oven prior to firing to remove moisture.
- Each coat is individually fired to fuse the glass to the metal surface.
- A minimum of two separately fired coats are applied.
- Final cured lining thickness shall be no less than 10 mils.

7. LINING CHARACTERISTICS (THIRD-PARTY TESTING)

- **Thickness** – Minimum cured lining thickness of 10 mils to provide continuous corrosion protection.
- **Hardness** – Minimum hardness of 5 Mohs, providing resistance to abrasion and wear.
- **Strain Tolerance** – Capable of withstanding substrate strain up to 0.001 in./in. without lining failure.
- **Thermal Shock Resistance** – Designed to tolerate rapid temperature differentials up to 350°F.
- **Surface Quality** – Smooth, continuous, and free of significant defects that could impair service performance.

8. INSPECTION AND TESTING

- **Thickness Testing** – Dry film thickness measurements shall be conducted in accordance with ASTM D7091 and SSPC-PA2 requirements to verify compliance with specified minimum thickness values.
- **Visual Inspection** – All lined surfaces shall undergo visual examination to verify continuity, coverage, appearance, and freedom from defects. The light-colored lining assists in identifying imperfections and discontinuities.

- **Holiday Testing (Continuity Testing)** – Holiday testing shall be performed using the low-voltage wet sponge method in accordance with ASTM D5162 to verify lining continuity.
- **Testing Procedure**
 - Full circumferential contact maintained during testing.
 - Maximum travel speed approximately 1 ft/sec.
 - Two-pass coverage of the entire lined surface.
- **Acceptance Criteria**
 - Holiday indications shall not exceed the allowable limits identified in Table 2.
 - Components exceeding acceptance limits shall be repaired in accordance with approved procedures or rejected.

Table 2 – Allowable Non-Visible Holiday Indications Permitted

Fittings	Max. # of Holidays	Pipe	Max. # of Holidays
4" - 8" diameter	5	4" - 8" diameter	11
10" - 18" diameter	7	10" - 18" diameter	18
20" and larger	9	20" and larger	25

Note (A): Values apply to 18 ft lengths. Shorter lengths shall be pro-rated proportionally.

9. LABORATORY TESTING

- **Mechanical Performance** – Glass-lined samples shall demonstrate adequate flexibility and strain resistance without cracking, spalling, or loss of adhesion under prescribed test conditions.
- **Chemical Resistance** – Testing shall verify resistance to commonly encountered corrosive media, including sulfuric acid, hydrochloric acid, sodium hydroxide, and similar service chemicals.
- **Thermal Shock Resistance** – The lining shall withstand temperature differentials of at least 350°F without detrimental effects to adhesion or integrity.
- **Hardness** – Testing shall confirm a typical Mohs hardness value of approximately 5.
- **Density** – Glass lining density shall typically range from 2.5 to 3.0 g/cm³.

10. DOCUMENTATION

The manufacturer shall provide documentation demonstrating compliance with project requirements, including:

- Certificate of Compliance.
- Quality control inspection records.
- Product traceability documentation.
- Manufacturing and inspection records as applicable.
- Interior identification markings indicate inspection and production information.

11. HANDLING AND FIELD CONSIDERATIONS

- Pipe and fittings shall be handled using methods that prevent damage to the glass-lined interior.
- Lined surfaces shall be protected from impact, abrasion, and contamination during shipment and installation.
- Field cutting may be permitted when performed in accordance with manufacturer recommendations.
- Any approved field repairs shall be completed using manufacturer-approved repair materials and procedures.
- Welding operations shall be evaluated and performed in accordance with manufacturer guidance to prevent damage to surrounding lined surfaces.

12. MANUFACTURER QUALIFICATIONS

- Manufactured in a dedicated, state-of-the-art glass-lining facility utilizing controlled application, firing, inspection, and quality assurance processes.
- MPI has been supplying glass-lined products for municipal wastewater, industrial, and process piping applications for over 5 years.
- Ability to provide independent third-party testing data and quality documentation upon request.
- Proven manufacturing expertise and technical support capabilities for glass-lined piping systems.

13. SUMMARY

MPI glass-lined ductile iron pipe and fittings provide a durable, corrosion-resistant, abrasion-resistant, and anti-fouling solution for demanding wastewater and industrial process applications. Through controlled surface preparation, multi-coat glass application, high-temperature firing, and rigorous quality testing, the resulting lining system delivers reliable long-term performance while minimizing maintenance and preserving hydraulic efficiency.