FiberSystems
521 Kiser Street
Dayton, OH 45404-1641
Tel: 937-222-9000
Fax: 937-222-9020

Guide Specification for Glass Flake Lining of Metal Tanks

These general procedures have been developed for our customers' use as guidelines in the development of their glass flake lining specifications.

1. **Scope**

1.1 These guidelines apply to the applications of glass flake linings over mild steel.

1.2 The surfaces to be covered with a premium vinyl ester resin glass flake are all surfaces exposed to corrosive fluids and vapors. This includes dip pipes, blind flanges, man hole covers, etc.

1.3 Materials, tank surface preparation, application and curing procedures are covered in this specification.

2. **Materials**

2.1 Resins:

2.1.1 An elastomeric toughened vinyl ester resin shall be used for priming. Acceptable resins are Interplastic's CoREZYN 8550 or Reichhold's 9084 or 9085.

2.1.2 A premium vinyl ester resin, such as Derakane 470, 510, 411 or 441-400; Ashland's 922, 970, 980 or FR992; or Reichhold's 9100, 9300, or 9480 shall be used for the bottom and top coat. Specifier should take into consideration the contents of the tank, the temperature, and the need for fire retardancy.

2.2 Reinforcing:

2.2.1 The bottom layer of glass flake mixture shall be applied at a thickness of 15- 20 mils.

2.2.2 The top layer of glass flake mixture shall be applied at a thickness of 15- 20 mils.

2.3 Fillers:

2.3.1 Fumed silica or mineral silica should only be used to make a resin putty for filling pits, filleting corners, and rounding welds.

3. Tank Preparation

3.1 All openings on the vessel should be standard flanged nozzles. A 12" (minimum) flanged nozzle should be placed at each end of the tank for ventilation. A manway positioned at the end of the vessel may be used as one of these ventilation nozzles.

3.2 All tank weld splatter shall be removed and sharp edges rounded, and all welds shall either be ground smooth or rounded with resin putty.

3.3 All metal surfaces shall be abrasive blasted with grit to a "white metal" condition (NACE #1).

NOTE: An adequate size abrasive must be used to obtain a 2-3 mil anchor pattern.

3.4 All abrasive dust must be removed from the surface by vacuuming or brushing.

3.5 All outside corners must be radiused 1/8" minimum. All inside corners must be filleted (1" radius).

3.6 All well-bonded FRP surfaces should be feathered by grinding.

3.7 FRP shall not be applied until surface preparatory work is deemed adequate by a qualified inspector.

4. Primer

NOTE: If the metal surface temperature is below 50 °F, the resin must not be applied. The metal surface must be dry and the dew point must be at least 5 °F below the air temperature. The surface may be warmed by introducing forced heated air.

4.1 As soon as possible after the dust has been removed, the surface shall be brush-coated with 2- to 3-mils of catalyzed and promoted elastomeric resin (see 2.1.1) to prevent flash rusting. The resin must be applied within 2 hours of grit blasting and have a maximum cup gel time of about 20-30 minutes.

4.2 The primer shall be allowed to cure until dry to the touch (usually 6 to 8 hours at 70 °F), and should be top-coated with the bottom coat or a fresh coat of primer within 10 days if the temperature has been greater than about 70 °F. As temperatures increase, the allowable period within which the primer coat should be top-coated is reduced.

4.3 Primed metal surfaces should be inspected and approved before bottom coat is applied.

5. Application Procedure

5.1 All inside corners shall be filled to a minimum 1" radius with catalyzed/accelerated resin putty. All pits and holes must be filled to obtain a level surface.

5.2 The glass flake shall be applied as follows:

5.2.1 Mechanically premix the glass flake mixture for 2 minutes prior to adding catalyst.

5.2.2 Add the required catalyst and mix 3 additional minutes

5.2.3 Apply the glass flake mixture at 20 to 32 mils WFT to yield 15 to 25 mils DFT. Average 60 sq-ft / gal. @ 15-25 mils.

5.2.4 Allow to harden. Repeat if required.

NOTE: If any layer is allowed to cure overnight, it should be wiped with clean rags to remove contaminants immediately before the next layer is applied. (Wiping a primary surface with a rag wetted with a solvent, such as styrene or acetone, is often the cause of poor secondary bond formation. A solvent wetted rag may contain contaminants that will act as mold release agents. If wiping with a clean rag does not remove the contaminants, they must be removed by grinding, sandblasting, etc.) Since the temperature of the resin and the type of resin in a glass flake mixture affects the rate of cure, it is a good practice to apply a test patch to check the ability of the surface to adhere to a secondary layer. The more complete the cure of a base, the less adhesion characteristic the glass flake mixture has without surface preparation.

5.3 Post curing the entire lining at a minimum of 160 °F is desirable where highly corrosive chemicals such as bleach or conc. mineral acid is to be contained.

6. Layer Quality

6.1 Appearance: The fabrication shall be free from visual defects such as foreign inclusions, dry spots, air bubbles, pinholes, and delaminations.

7. Inspection

7.1 The lining must be inspected and approved by a qualified inspector in order for the job to be accepted.

7.2 Poor workmanship is reason for rejection. Flaws which cannot be repaired, porosity, voids, cracks, crazing, delamination, blisters, excess resin, etc. are considered to be reason for rejection and rework.

7.3 Inspection and approval by the owner's representative shall not relieve the vendor from compliance with these specifications.

7.4 In isolated spots, the layer may be 20% above nominal thickness. Thickness of the lining at intersecting applications may be above nominal. The thickness of the lining shall not be less than nominal at any place.

7.5 Testing:

7.5.1 During application random wet film thickness readings shall be taken. Target thickness shall be 15-20 mils for both basecoat and topcoat yielding a total target thickness of 30-40 mils.
7.5.2 After Topcoat is hard, spark test at 5,000 volts to ensure pinhole free lining.
7.5.3 Dry Film Thickness Gauge may be utilized to measure thickness.

**SAFETY NOTE:
These suggested procedures do not include considerations necessary for safety. They should be put into practice only after a complete linings procedure has been developed and approved by both the lining company and the manufacturing company in whose plant the work will be

8. Acceptable Manufacturer

8.1 Fiber Systems
521 Kiser Street
Dayton, OH 45404-1641
Phone: 937-222-9000
Fax: 937-222-9020
8.2 Or approved equivalent

9. Properties

9.1 Technical and Physical Properties: the glass flake shall meet or exceed the minimum properties as stated in Table 1.

Table 1:

Property	Units	Test Method	Minimum
Tensile Strength	psi	ASTM D638	2500-3000
Density (wt. per gal)	lbs/gal	ASTM D1475	10.0± 0.2
Moisture Permeability	perm inch	ASTM E96	0.0016
Service Temperature Limits	degF	Immersion/Condensing fumes Occasional Splash and Spill Continuous Dry	140 200 350
Tabor Abrasion	mg	CS 17 wheel, 1000 gm, 1000 revolution	78
Volatile Organic Compounds	lbs/gal	EPA Method 24	2.14
Flash Point	degF	Pensky Martens Closed Cup	89