

SPECIFICATION FOR

POLYPROPYLENE(P.P) AND/OR FIBERGLASS REINFORCED PLASTIC MANHOLE BASE LINER 03/09

(A) SCOPE

Furnish a prefabricated Manhole Base Liner of Polypropylene (PP) and/or Fiberglass Reinforced Plastic which is resistant to the chemical environment normally found in wastewater transmission systems. The PP/FRP manhole base liner shall be a non load-bearing component integrally cast and anchored in new precast concrete manhole section(s) during the casting process at a precast concrete manufacturing facility.

(B) Polypropylene (PP) AND/OR FIBERGLASS REINFORCED MANHOLE BASE LINER

(1) The prefabricated manhole base liner shall be a one piece construction of unlayered, homogenous composite. Minimum thickness shall be 0.12"-0.2" (3mm-5mm) and shall be in lengths and nominal inside diameters corresponding to the precast concrete manhole base section

(2) The manhole base liner shall include: full flow channels with side walls to the crown of the pipe(s); inner bench surfaces to have a non-skid pattern; gasketed, flexible and watertight bell type pipe connectors and/or sleeves for flexible boot connectors of either PP, FRP or PVC to suit specific pipe types, alignments and grades shall be monolithically attached to the manhole base liner channeling and shall extend to the outside profile of the precast concrete structure. The vertical side wall (skirt) of the manhole base liner representing the inside diameter of the manhole structure shall be in nominal and varied heights from a minimum of 2" (50 mm) extending vertically and returning horizontally to create a flush surface with the top of the first manhole riser joint as per drawing details.

(3) The outer surface of the FRP manhole base liner shall have PP bridges or steel spirals bonded and a coating of multi-faceted aggregate. PP liners shall have perforated PP "I" beams and multi-faceted PP pellets bonded and/or ribs molded in opposing directions on the vertical axis and waterstop turnbacks on the horizontal axis. All bonding mediums to ensure adequate anchoring with the precast concrete section and meeting a pressure test of 1 bar (14.7 PSI) or the prescribed ASTM criteria for vacuum testing of concrete sewer manholes.

(C) INSTALLATION IN PRECAST CONCRETE

(1) The P.P./F.R.P. base liner shall be cast integral with the precast concrete manhole base section in accordance with the liner manufacturer's recommendations and specifications. The liner must be fully supported during the casting process; lifting devices shall not penetrate inside walls P.P./F.R.P. base liner.

(2) The Wet Cast method is the recommended precasting process for base liners.

(3) Inside P.P./F.R.P. liner surfaces shall be free of bulges, dents and other defects that result in a variation of inside diameter of more than 1/4" (7 mm) for base liner flow channel and pipe connections. The precast concrete pipe penetration joint surfaces shall be free of excess concrete at external and internal surfaces to insure proper seal of pipe connection and P.P./F.R.P. liner.

(D) FIELD ASSEMBLY AND INSPECTION PRECAST CONCRETE MANHOLE WITH P.P./F.R.P. LINER

(1) During the field installation of P.P./F.R.P. lined precast manhole base sections; all pipe connections are to be sealed per the liner manufacturer's standard method and details. Precast concrete sections shall be sealed as prescribed by precast manufacturer and utility specifications.

(2) The interior surfaces of the liner shall be completely free from pinholes, cracks, pits or defects that are detrimental to the intended use of the P.P./F.R.P. base liner. No P.P./F.R.P. base liner shall have holes, or openings, which will permit the passage of liquid or gases through the liner wall to precast concrete. There shall be no exposed concrete mortar through inside liner surface to include (but not limited to) pipe penetrations. All mechanical anchor attachments through liner surfaces must be sealed with an approved elastomeric sealant. Consult liner manufacturer for specific information regarding approved sealant supplier list and availability.

PROTECTIVE LINER

GU POLYPROPYLENE (P.P.) OR FIBERGLASS REINFORCED PLASTIC (F.R.P.)

CONCRETE PROTECTIVE LINER

Scope:

Furnish Polypropylene (P.P.) or Fiberglass Reinforced Plastic (F.R.P.) of polyurethane hybrid polymer resin to be installed in sanitary sewer manholes and lift station/ wetwells as a protective surface barrier. The P.P. or F.R.P. polyurethane hybrid polymer liner shall be a non load-bearing component, which is resistant to the chemical environment normally found in wastewater collection systems. The liner shall be prefabricated rigid P.P or F.R.P. sections of unlayered homogeneous composite with an aggregate coated outer surface to insure adequate mechanical anchoring of P.P/F.R.P. liner to concrete/ grout in sanitary sewer structures.

2.0 Materials: Polypropylene (P.P.) or F.R.P. Polyurethane Hybrid Polymer Composite 2.1 Minimum Thickness:

- (A) Integrally cast in new precast concrete structures Minimum thickness .12" - .20" (3 mm- 5 mm)
- (B) Field installed rehab/ retrofit into existing sanitary manholes Minimum thickness 1/4" (7 mm)

2.2 Material Properties

- (A) Fiberglass (Type E Glass) Minimum length of fibers = 0.625 inches Content by weight 12% - 15%
- (B) Inert Filler Content by weight 10% - 13%
- (C) Bonding aggregate - prewashed, kiln dried, fractured 3/8" gravel Graded particle size minimum 3/16" and maximum 3/8" Rate of application - 3.5 lb/ sq ft

2.3 Physical Properties

- (A) Abrasion resistance - Falling Sand (ASTM D968) Thickness of material removed passes

Passes	0-5	5-10	10-15	15-20	20-25	Total for 25 passes
Thickness removed	.04 mil	0.04 mil	0.6 mil	0.04 mil	0.12 mil	1.2 mil

- (B) Density of F.R.P. Polyurethane Hybrid Composite (ASTM D1622) - 1.17g/cm³
- (C) Shore "A" Hardness Durometer (ASTM D2240) - Exceeds 90 on scale
- (D) Percolation Test - Water absorption of top surface - 0.032%
- (E) Thermal shock (CSA-B45-M93) 100 thermal cycles- no sign of surface defects

2.4 Chemical Resistance

- (A) Chemical Resistance (Selected Reagents) (ASTM D1308)

Nitric Acid 69%	No surface Degradation - Surface Staining
Hydrochloric Acid 60%	No surface Degradation
Ammonia 28%	No surface Degradation
Sodium Hydroxide 5.25%	No surface Degradation

Sulfuric Acid 50%	No surface Degradation
Sulphuric Acid 70%	No surface Degradation
Sulphuric Acid 80%	No surface Degradation
Acetone	No surface Degradation
Unleaded Gasoline	No surface Degradation
Turpentine	No surface Degradation

(B) Acetone Immersion (ASTM. D2152) - No attack

NOTE: For comprehensive Precast or Rehab/ Retrofit liner specifications refer to GU Liner Specifications for GU P.P or F.R.P. Manhole Base Liner, GU P.P or F.R.P. Manhole Liner, GU P.P or F.R.P. Wetwell Liner and GU P.P or F.R.P. Rehab Liner.