Specification for

POLYPROPYLENE(PP) AND/OR FIBERGLASS REINFORCED PLASTIC (FRP) MANHOLE BASE LINER 03/09

(A) SCOPE:

Furnish a prefabricated Manhole Base Liner of Polypropylene (PP) and/or Fiberglass Reinforced Plastic (FRP) 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 with 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 (FRP) 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) MATERIALS:

1.0 POLYPROPYLENE (PP) – 100% Polypropylene copolymer

1.1 Minimum thickness – 0.12" – 0.20" (3mm-5mm)

1.2 Colour – dull mustard/goldenrod

1.3 Hardness – 80 Rockwell (R scale)

2.0 FIBERGLASS REINFORCED POLYURETHANE COMPOSITE (FRP)

2.1 Minimum thickness – 0.12" - 0.20" (3mm-5mm)

2.2 Glass fiber – Type E, Min fiber length – 0.625 inches. Content by weight – 10%-12%

2.3 Inert filler content by weight – 10%-13%

2.4 Aggregate bonding medium – processed sand containing crushed & uncrushed dry and cleaned semi-round particles in the 2-3mm size range.

2.5 Colour – dull mustard/goldenrod

(D) PHYSICAL PROPERTIES:

1.0 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

1.2 Density of FRP Polyurethane Hybrid Composite (ASTM D1622) - 1.17g/cm3
1.3 Shore "A" Hardness Durometer (ASTM D2240) - Exceeds 90 on scale
1.4 Percolation Test - Water absorption of top surface - 0.032%
1.5 Thermal shock (CSA-B45-M93) 100 thermal cycles- no sign of surface defects

2.0 Chemical Resistance
2.1 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
Acetone Immersion (ASTM. D2152)	No Attack

(E) INSTALLATION IN CONCRETE (PRECAST):
1.0 The PP and/or FRP liner shall be cast integrally within a monolithic precast concrete manhole base structure in accordance with the liner manufacturer's recommendations and specifications.
1.1 The "Wet Cast" method is the recommended precasting process for base liners.
1.2 Inside surfaces of PP and/or FRP liners shall be free of bulges, dents and other defects that could result in inside diameter variation(s) greater than ¼ inch (7mm) in the wastewater channels and pipe connections. No liner shall have holes or openings which will permit the intrusion of liquids or gases through the liner wall and into the concrete matrix. Manhole lifting devices shall not penetrate any surface of the base liner.
1.3 The base liner bench (shelf) must be fully supported during the concrete precasting process. Channels and pipe connecting bells greater than 12 inch diameter must be supported.
1.4 The finished manhole base shall not be moved until adequate hydration has occurred so as to not damage a semi-rigid casting.
(F) FIELD ASSEMBLY AND INSECTION OF PRECAST CONCRETE MANHOLE BASE WITH PP AND/OR FRP MANHOLE BASE LINER
1.0 During installation of the lined manhole base pipe connections shall be completed as per the manufacturer's standard method and details.
1.1 Mechanical anchoring attachments through liner surfaces must be sealed with an approved elastomeric sealant. (See approved source recommendations).
1.2 After assembly is complete, the interior surfaces of the liner shall be free of pinholes, cracks, pits or defects which are detrimental to the intended use of the liner. No liner shall have holes or openings which will permit the intrusion of liquids or gasses through the liner wall and into the

concrete matrix. There shall be no exposed concrete/mortar on any inside liner surface to include (but not limited to) pipe connectors and manhole riser section joints.
1.3 Testing of the lined manhole structure to meet pressure test of 1 bar (14.7 PSI) or the prescribed ASTM criteria for vacuum testing.
PLEASE NOTE: There is no correlation between vacuum (air) and hydrostatic tests (see ASTM C1244-93). Vacuum testing with the presence of hydrostatic pressure (high ground water conditions) provides unreliable test results.

SUPPLY SOURCES OF RECOMMENDED ELASTOMERIC BUTYL SEALANTS AND ADHESIVES FOR INSTALLATION OF THE PP AND/OR FRP MANHOLE BASE LINER

BUTYL RUBBER PREFORMED FLEXIBLE JOINT SEALANT

PRODUCT: RU106-RUB' R-NEK "LTM"
HENRY COMPANY, SEALANTS DIVISION
1277 Boyles St.
Houston, TX 77020
TEL: 713 /671-2494 - 800 / 231-4549
FAX: 713 / 673-7714
www.henry.com

PRODUCT: PRO-STIK
PRESS-SEAL GASKET CORPORATION
2424 W. State Blvd.
Fort Wayne, IN 46804
TEL: 219 / 436-0521 - 800 / 348-7325
FAX: 219 / 436-1908
www.press-seal.com

ELASTOMERIC SEALANTS - RESILIENT CURING NON SHRINK CAULK TYPE

(MECHANICAL ANCHOR PENETRATIONS AND REMEDIAL "CAULK" SEAL OF MISCELLANEOUS JOINTS OR SEAMS - 1" WIDTH OR LESS)

NOTE: The sealant manufacturer's application and surface preparation procedures (including primer) must be followed. This includes recommended maximum joint depth of 1/2" (1/4" minimum thickness) and the use of bond-breaker polyethylene closed cell foam backer rod or polyethylene bond breaker tape.

PRODUCT: SIKAFLEX 1a
Polyurethane sealant;
Use SIKAFLEX 449-203 PRIMER
SIKA CORPORATION
201 Polito Ave.
Lyndhurst, NJ 07071
TEL: 800 / 933-7452
www.sikaconstruction.com

PRODUCT: SCS 1003
PRODUCT: VULKEM 921
Polyurethane Sealant;
Tremco 171 PRIMER (porous substrates)
TREMprime NON-POROUS PRIMER (metal substrates)
TREMCO, INCORPORATED
3735 Green Road
Beachwood, OH 44122
TEL: 800 / 852-8173
www.tremcosealants.com

BONDING AGENT FOR DISSIMILAR MATERIALS I.E. POLYPROPYLENE, POLYETHYLENE, FIBERGLASS, URETHANE & VARIOUS METALS ETC.

PRODUCT: SCOTCH WELD DP-8010NS
3M

INDUSTRIAL BUSINESS
INDUSTRIAL ADHESIVES AND TAPES DIVISION
3M Center, Building 21-1W-10, 900 Bush Ave
St. Paul, MN 55144-1000
TEL: 800/362-3550
www.3M.com/industrial

CERTIFIED POLYPROPYLENE FIELD WELDING

Northwest Concrete Waterproofing
10410 40th Ave East
Tacoma, WA 98446
Tel 253-606 4964

Global Liner Systems
PO Box 326
Spanaway, WA 98387
Tel 253 686 1114

Plastic Composites Inc.
1222 Camp Ave
Mount Dora, Fl 32757
Tel 352-383-0194
www.yourpci.com