

# **SPECIFICATION FOR MANHOLE & LIFT STATION REHAB**

With

## **Polypropylene (PP) liner sections 03/09**

### **SCOPE:**

This method utilizes preformed Polypropylene (PP) liner segments, welded into sections and inserted into existing concrete or brick sanitary sewer structures, either for rehabilitation or retrofit applications.

**Option 1** requires excavation and removal of existing manhole cast iron frame with lid, chimney and corbel-cone (or flat slab top); insertion of the prefabricated Polypropylene (PP) liner sections and installation of a new precast F.R.P. or HDPE/PP lined corbel-cone (or flat slab top).

**Option 2** does not require the removal of the frame with lid. The Polypropylene (PP) liner segments can then be lowered into the existing structure where they shall be welded together into sections in situ.

### **POLYPROPYLENE (PP) LINER MATERIAL:**

The prefabricated Polypropylene (PP) liner sections shall be composed of 100% polypropylene with a minimum thickness of 1/4"(6 mm). The sections shall be non load bearing components which are resistant to the chemical environment normally found in the waste water collection system to which they will be exposed. The outer surface of the liner shall have ribs molded in opposing directions on the vertical axis and waterstop turnbacks on the horizontal axis to lock the liner into the grout upon hardening.

The prefabricated Polypropylene (PP) liner sections diameter shall fit into the existing structure such that a minimum of 2.5" (63 mm) annular space is available for "grouting" the liner to the existing concrete structure. The assembled prefabricated Polypropylene (PP) liner sections shall conform to the height of the corresponding manhole structure. Pipe connections shall accurately accommodate all existing inlets, outlets, drops and cleanouts and are to be "plumbed" through monolithically attached "Factory" installed pipe stubs. Watertight flexible rubber repair couplers and / or rubber boot seals are to be used as noted in the drawings or as directed by the engineer.

The contractor shall measure the existing manhole prior to installation to determine critical dimensions including (but not limited to) structure diameter, height, pipe connection elevation, type, size and pipe angle location. The contractor shall be responsible for liner installation and fit.

The contractor shall be responsible for the field welding of all PP manhole liner joints.

### **INSTALLATION:**

**GENERAL:** Excavate an area around top of existing manhole of sufficient width and depth to facilitate the removal of manhole frame, chimney, corbel-cone (or flat slab top).

**PREPARATION OF EXISTING STRUCTURE:** Clean all interior manhole surfaces by means of pressure washing/sandblasting to remove all scale, loose material, laitance, grease, sludge, organic material etc. Remove all loose or unsound concrete and mortar. Remove all protuberances – steps, hardware, brick (lift stations – pumps, plumbing and controls) that will interfere with liner installation. If necessary, use approved cleaners to remove grease, oil, and other matter that may prevent an acceptable bond between existing manhole wall and polypropylene liner. The interior surface should be tested for pH to insure all acid contamination has been removed. All other structural repairs deemed necessary shall be performed. Active leaks (infiltration) shall be stopped with hydraulic cement/mortar, injectable grout (or other approved materials).

**NOTE:** It may be necessary to plug sewer lines or cover invert to prevent extraneous materials from entering sewer lines. “By-pass” diversion pumping may be required to maintain sewage flow.

### **MORTAR BENCHING / CHANNEL INVERT AND LIFT STATION FILLET**

All required remedial work is to be performed per the governing utility specifications to insure watertight pipe connections and proper sewage flow. The benching or fillet shall be leveled or modified to insure proper bedding and vertical alignment of the Polypropylene (PP) liner sections within the vertical shaft of the existing manhole or lift station. The mortar benching shall be raised to a level just above the crown of main channel inlet to accommodate the proper installation of the Polypropylene (PP) liner sections.

**MORTAR BENCHING SEAL** A “bedding ring” of quick setting grout mixture shall be placed on the benching to achieve a good bottom seal in order to prevent loss of grout from annular space between riser sleeve liner and interior manhole wall. Polypropylene (PP) liner sections shall be lowered into “bedding ring” on prepared mortar benching. Allow sufficient cure of grout “bedding ring” before proceeding.

\* **IMPORTANT NOTE:** Care must be given to insure proper vertical alignment of Polypropylene (PP) liner sections to maintain proper annular space orientation for full height of new liner assembly with existing structure. If existing structure is “out-of-plumb” a miter cut adjustment must be made at the bottom end of the first riser liner section.

A six to twelve inch height pour of high strength, non-shrink flowable/pumpable cementitious grout shall be placed above the initial bottom seal in the annular space between the liner and interior structure wall to facilitate bonding of the PP liner section(s) to the existing concrete structure.

\*\* **IMPORTANT NOTE:** Polypropylene (PP) liner section interior must be fully supported during grout placement with expandable support ring fixture, inflatable rubber bladder or bracing / shoring forms to maintain proper riser liner geometry. Allow sufficient cure of grout before disturbing support fixture to avoid bulging or deflection of Polypropylene (PP) liner sections.

If existing structure has had extensive corrosion and structural deterioration / reduction of wall thickness, the governing utility may require inserting wire mesh or rebar reinforcement in annular space.

Deep manholes/lift stations may require multiple Polypropylene (PP) liner sections which shall be assembled, sealed/welded, supported and grouted in stages as described previously in this specification. The Polypropylene (PP) liner sections shall be constructed to the prescribed height with the top of the “final” riser section having a level mortar “butt type” joint to allow for installation of either a new lined precast corbel-cone (PP or F.R.P.) or F.R.P. lined precast flat slab top.

The new lined precast corbel-cone / flat slab top shall have an I.D. corresponding to the I.D. of the Polypropylene (PP) liner sections. The internal flange joint between “final” Polypropylene (PP) liner and lined precast corbel-cone (or lined precast top slab) shall be sealed by hot air extrusion field welding.

An HDPE convertible collar shall be installed on top of the lined corbel-cone /flat slab top with masonry grade adjustment (brick courses, field poured concrete or precast grade rings) for setting cast iron frame. The Convertible Collar shall be inserted through compression seal gasket mounted in the lined corbel-cone / flat slab top with appropriate GU Convertible Collar gasket flange design.

The lined corbel / flat slab top having appropriate access way ID design and cast iron frame shall be sealed with approved preformed butyl strips. The manhole/lift station frame and lid shall be set to

accurately conform to the finished ground or pavement grade as shown on the drawings or as directed by the engineer. Non-shrink mortar shall be used for installation of corbel-cone (flat slab top), masonry grade adjustment and cast iron frame in customary manner for proper structural assembly and to prevent ground water infiltration.

Interior surfaces of liner shall be completely free from pinholes, cracks, pits or defects, which are detrimental to the intended use of the liner. No Polypropylene (PP) liner sections shall have holes or openings, which will permit the passage of liquid or gases through the liner wall to the mortar/ concrete. There shall be no exposed mortar / concrete through inside liner surface to include (but not limited to) riser section joints, adjustment liner section joints, pipe penetrations and cast iron frame. All mechanical anchor attachments through liner surfaces must be sealed with an elastomeric sealant approved by the Polypropylene (PP) liner manufacturer.

There is no correlation between vacuum (air) and hydrostatic tests (see ASTM C1244-93).

Vacuum testing coupled with hydrostatic pressure (elevated ground water conditions) provides unreliable test results. Due to this inaccuracy Predl GU or GU companies shall bear no responsibility in the event of concrete manhole joint failure or failure due to poor integrity of the precast concrete.

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**SUPPLY SOURCES OF RECOMMENDED GROUTS, ELASTOMERIC BUTYL SEALANTS AND ADHESIVES FOR INSTALLATION OF THE POLYPROPYLENE (PP) REHAB LINER (03/09)**

**FLOWABLE/PUMPABLE GROUTS**

**SULPHATE RESISTANT GROUTS**

**PRODUCT: MASTERFLOW 928**  
**BASF BUILDING SYSTEMS**  
889 Valley Park Dr  
Shakopee, MN 55379  
TEL: 800 / 433-9517  
FAX: 800 / 496-6067  
[www.buildingsystems.basf.com](http://www.buildingsystems.basf.com)

**PRODUCT: PORTLAND EXPANDING  
NON-SHRINK GROUT**  
**TARGET PRODUCTS LTD.**  
8535 East Lake Drive  
Burnaby, BC  
Canada V5A 2T7  
TEL: 604/444/3620 or 800/575/7700  
FAX: 604/420/3616  
[www.targetproducts.com](http://www.targetproducts.com)

**PRODUCT: FIVE STAR SPECIAL GROUT 150**  
**FIVE STAR PRODUCTS, INC**  
750 Commerce Drive  
Fairfield , CT 06825  
TEL: 203/336/7900  
FAX: 203/336/7930  
[www.fivestarproducts.com](http://www.fivestarproducts.com)

## **NON-SULPHATE RESISTANT GROUTS**

**PRODUCT: 1107 ADVANTAGE GROUT  
DAYTON SUPERIOR  
777 Washington Village Dr, Suite 130  
Dayton, OH 45459  
TEL: 877/632/9866  
FAX: 937/428/9560  
[www.daytonsuperior.com](http://www.daytonsuperior.com)**

**PRODUCT: NC GROUT  
THE EUCLID CHEMICAL COMPANY  
19218 Redwood Rd  
Cleveland, OH 44110  
TEL: 216/531/9222 or 800/321/7628  
FAX: 216/531/9596  
[www.euclidchemical.com](http://www.euclidchemical.com)**

**PRODUCT: NON-SHRINK PRECISION GROUT  
QUIKRETE CEMENT & CEMENT PRODUCTS  
One Securities Center  
3490 Piedmont Road, Suite 1300  
Atlanta, GA 30305  
TEL: 404/634/9100 or 800/282/5828  
FAX: 404/842/1424  
[www.quikrete.com](http://www.quikrete.com)**

## **BUTYL RUBBER PREFORMED FLEXIBLE JOINT SEALANT**

(PRECAST CONCRETE TOP SECTION JOINT ONLY - CONE / FLAT TOP / CAST IRON FRAME)  
(SPECIFICATION - ASTM C-990, Section 6.2 Butyl Rubber Sealant)

**Henry Company, Sealants Division  
1277 Boyles St.  
Houston, TX 77020  
TEL: 713 /671-2494 - 800 / 231-4549  
FAX: 713 / 673-7714  
[www.henry.com](http://www.henry.com)  
PRODUCT: RU106-RUB' R-NEK "LTM"**

**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](http://www.press-seal.com)  
PRODUCT: PRO-STIK**

## **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.

**SIKA Corporation  
201 Polito Ave.  
Lyndhurst, NJ 07071  
TEL: 800 / 933-7452  
[www.sikaconstruction.com](http://www.sikaconstruction.com)  
PRODUCT: SIKAFLEX 1a  
Polyurethane sealant;  
Use SIKAFLEX 449-203 Primer**

**General Electric Company  
260 Hudson River Road  
Waterford, NY 12188  
TEL: 800 / 255-8886  
[www.gesilicones.com](http://www.gesilicones.com)  
PRODUCT: SCS 1003  
Silicone sealant;  
Use GE SS4179 Primer**

**Tremco, Incorporated**  
3735 Green Road  
Beachwood, OH 44122  
TEL: 800 / 852-8173

[www.tremcosealants.com](http://www.tremcosealants.com)

**PRODUCT: VULKEM 921**

Polyurethane Sealant;

Tremco171 Primer (porous substrates)

TREMprime Non-porous primer (metal substrates)

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

**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](http://www.3M.com/industrial)

**PRODUCT: Scotch Weld DP-8010NS**

**CERTIFIED POLYPROPYLENE FIELD WELDING**

**Northwest Concrete Waterproofing**  
10410 40<sup>th</sup> 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](http://www.yourpci.com)

**CERTIFIED INSTALLATION & APPLICATION CONTRACTORS**

**Northwest Concrete Waterproofing**  
10410 40<sup>th</sup> Ave East  
Tacoma, WA 98446  
Tel 253-606 4964

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