



## SPECIFICATION DOCUMENT

### CIPMH FULL DEPTH-PA FOR STRUCTURAL REHABILITATION

#### INSTALLATION PRACTICE REHABILITATION OF FULL DEPTH MANHOLE USING A ONE-PIECE "ONE-SIZE FITS MOST" LINER

#### INSTALLED UNDER PRESSURE AND CURED UNDER AMBIENT CONDITIONS

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# Installation Practice for Rehabilitation of a Manhole Using A “One-Size Fits Most” Liner

## Installed Under Pressure and Cured Under Ambient Conditions

### 1. Significance and Use

This specification is for the use by designers, engineers who specify, regulatory agencies, owners and inspection organizations who are involved in the rehabilitation of manholes through the use of a resin-impregnated stretchable liner. As for any specification, modifications may be required for specific job conditions.

### 2. Intent

This specification covers requirements and test methods for the rehabilitation of manholes without excavation. The manhole is accessed through the existing manhole cover. The rehabilitation is accomplished by the installation of a one-piece resin impregnated stretchable liner tube that is cured under pressure. The liner is pressed against the existing manhole by a pressurized bladder until the thermo-set resins have cured ambiently. The liner shall start at the manhole cover seat and extend to a pre-determined length. The cured-in-place manhole liner shall be bonded to the contours of the existing structure, significantly increase structural integrity, reduce inflow and infiltration, and provide a surface resistant to sewer gases.

### 3. General

The rehabilitation is accomplished using a stretchable, uncoated, non-woven textile tube of particular length and with either polyester thermo-set resin with physical and chemical properties appropriate for the application. The liner is vacuum-impregnated (saturated) on-site with the thermo-set resin. The saturated liner tube is then lowered into the manhole and is temporarily held in position. The bladder is then lowered and properly positioned inside of the liner. The bladder is then pressurized so that the liner is pressed against the existing structure. Once the resin-saturated liner tube is cured, the bladder is then removed. The liner is then trimmed flush with the manhole cover seat.

### 4. Material

4.1 The liner shall be continuous in length and consist of one or more layers of a one-size fits most uncoated absorbent felt textile material. The liner is designed to withstand hydrostatic pressures, enhance the structural integrity, bridge missing mortar or brick segments, withstand freeze / thaw cycles, and conform to the contours of the existing structure. The saturated liner shall have excess resin distribution that when compressed at installation pressures will meet or exceed the desired thickness after cure per the manufacturer. Saturated (DISC) may be added to cover the bench area and invert of the pipe. Hydrophilic bands can also be placed at both the upper and lower portion of the manhole to seal out infiltration.

4.2 The liner shall be a one-piece assembly sewn in the shape of a tube at a predetermined length to seal the casting and manhole structure. The liner will be capable of conforming to offset bricks and grade rings, missing mortar gaps, and disfigured and deteriorated chimneys.

## 5. Resin System

The resin system shall be a corrosion resistant polyester resin and catalyst system that when properly cured within the liner forms an effective bond with well-prepared surfaces and withstands freeze/thaw cycles without cracking. The polyester resin system is cured ambiently.

## 6. Installation Recommendations

6.1 Safety – All precautions for safety will meet or exceed OSHA regulations. Areas of concern are traffic, PPE, confined space (if necessary), and small tool safety. MSDS sheets for the resin and first aid kit shall be kept on site.

6.2 Preparation – All surfaces to be lined must be stringently pressure washed with a minimum of 5000 psi @ 5 gal/min pressure washers. Other alternatives to clean the structure may be used along with pressure washing such as abrasive blasting. The existing casting shall be cleaned using a grinder or by sand blasting. Large voids and missing bricks shall be filled with hydraulic cement or expandable foam to provide an area that liner can press up against. Smaller voids and missing mortar may go un-patched, since these areas will be filled with excess resin. Steps that are located in the area to be lined must be removed prior to installation and not re-installed.

6.3 Vacuum Impregnation – The liner shall be vacuum-impregnated (saturated) on-site under controlled conditions. The resins shall be measured onsite to provide 5% to 7% excess resin for migration. The volume of resin used shall be sufficient to fill all voids in the liner material at nominal thickness and diameter. No dry or unsaturated areas in the liner shall be acceptable upon visual inspection.

6.4 Bladder – Once liner is placed in the manhole the bladder is inserted inside the liner. Once inserted, the bladder is pressurized. The bladder stays in place and is pressurized until the liner is cured.

6.5 Curing – The CIPMH Full Depth-PA (Polyester resin) liner is cured at ambient temperatures as it is pressed firmly against the structure. The curing time must take into consideration the resin system, ground conditions and weather conditions. Typically, two and one-half to three hours are needed to cure the liner. A curing log shall be used to document the cure time, pressure, resin usage, and other pertinent information.

6.6 Trimming – Once cured, the installation device is removed and the liner is trimmed at the manhole cover seat.

## 7. Completed Liner

7.1 The finished cured-in-place manhole liner shall be continuous from the manhole cover seat to a predetermined measurement. The liner shall provide a smooth surface that conforms to the existing structure. The liner shall be free of dry spots and delamination. The finished product must provide a structurally enhanced and corrosion resistant liner protecting

the manhole.

8. Recommended Inspection and Testing Practices

8.1 It is recommended that the liner be subjected to several freeze/thaw cycles either in the field or simulated in a freezer with no cracking or bond breakage.

9.2 The liner shall be visually inspected to insure resin saturation, complete cure, and a smooth surface free from cracks or significant hollow spots.

9. Payment

Price includes manhole preparation, permits, and water usage. Unit prices shall be submitted for the following items:

10.1 Mobilization Lump Sum

10.2 Traffic Control Lump Sum

10.3 Manhole Chimney Rehabilitation per each (12" minimum)

10.4 Manhole Chimney Rehabilitation additional footage (.5 foot increments)

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