



GENERAL SPECIFICATION FOR THE REHABILITATION OF SEWER PIPELINES USING THE PIPEPATCH® CURED IN PLACE PIPE (CIPP) POINT REPAIR SYSTEM

1. Intent

1.1 It is the intent of this specification to provide for the reconstruction of existing service lateral and mainline gravity sewer lines, normally without excavation, by forming a new pipe within an existing deteriorated pipe, which has generally maintained its original shape. This will be accomplished by the installation of a resin impregnated flexible fiberglass mat, by means of pushing or pulling into the existing service lateral or sewer main utilizing a pressure apparatus positioned through a cleanout, basement drain, manhole or similar access point. Mainline Packers are “Flow-Thru” so the sewer can remain active without by-pass pumping/re-routing, or plugging. Curing shall be accomplished by means of ambient temperature, which will cure the resin-impregnated fiberglass mat into a hard, impermeable cured-in-place pipe (CIPP). When cured, PipePatch should extend over selected area of the service lateral or main as a continuous, tight-fitting, corrosion resistant and watertight CIPP pipe within a pipe.

2. Materials

2.1 Resin. The resin used shall be an ambient curing, two-part silicate based resin with a Waterglass hardener and catalyst system specifically designed for sewer lateral and mainline rehabilitation. The resin system must be specifically compatible with the knitted 100% fiberglass biaxial/chopped strand combo mat used to form the cured-in place pipe.

- A. The length of the lateral/main pipeline will be verified in the field prior to selecting the size of PipePatch repair kit. Each PipePatch repair kit includes premeasured and precut materials needed to repair the predetermined pipe size(s). The amount of resin used shall be in strict accordance with the manufacturer's instructions, based on the length, diameter, and the resin system selected.
- B. Selection of the appropriate PipePatch resin kit shall be made by taking into consideration the following conditions: the configuration of the existing service lateral/sewer mainline; e.g. bends, diameter transitions, host pipe conditions and temperature.

3. Physical Properties

3.1 After installation, the cured liner shall meet the minimum flexural properties listed in the table when tested in accordance with ASTM D 790 (technically equivalent to ISO 178).

Product	Flexural Modulus PSI	Flexural Strength PSI
PipePatch Resin	250,000	4,500
PipePatch Fiberglass & Resin	900,000	27,500

4. Referenced Specifications

- 4.1 **ASTM F 1216** *Standard Practice for Rehabilitation of Existing Pipelines by the Inversion and Curing of a Resin-Impregnated Tube*

ASTM D 790 *Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics*

- 4.2 National Association of Sewer Service Companies (NASSCO)

Wastewater Collection Systems Maintenance and Rehabilitation-10th Edition: Chapters titled, - "TV Inspection" and "Sewer Line Cleaning"

5. Specifications for Cured In Place Pipe (CIPP) Lining – Point Repairs

- 5.1 The _____ is specifying the PipePatch[®] sectional point repair kit system. This system is designed to structurally repair pipeline cracks, holes, infiltration/inflow and joint separations by inserting a silicate resin coated fiberglass mat. The resin saturated fiberglass mat is centered and held in place at the repair area by an inflatable bladder and push rod system. The resin and fiberglass must harden to repair and seal the damaged area, creating a structurally sound new pipe.

- 5.2 PipePatch[®] Repair Kit shall consist of the following items:

- a. Minimum of one (1) Fiberglass Mat
- b. Minimum of one (1) Plastic Work Surface Protection Sheet
- c. Minimum of four (4) pair of disposable gloves
- d. Minimum of (2) High Density Polyethylene Packer Protective Sleeves
- e. Minimum of (1) hard plastic spreading spatula/trowel
- f. Minimum of (3) Plastic/Nylon zip/cable ties
- g. Hermetically Sealed, Premeasured Silicate Resin & Waterglass Hardener provided in “Bag” form to mix
- h. Installation/application instruction sheet with working temperatures and cure chart
- i. MSDS / SDS – available online

- 5.3 Resin with Fiberglass must meet or exceed the following properties:

- a. Average Tensile Strength of 24,500 psi
- b. Average Flexural Strength of 27,500 psi
- c. Average Flexural Modulus of 900,000 psi
- d. Minimum Finished Repair Wall Thickness of 0.070”

- 5.4 Resin and Fiberglass must also meet or exceed the structural performance requirements of ASTM F-1216

- 5.5 Resin and Fiberglass system must be NSF-14 Certified. Third Party testing must be by NSF - NO EXCEPTIONS
- 5.6 Resin must be non-flammable, odorless, completely inert and non-toxic and contain no VOC's or Styrene
- 5.7 Liner material must mechanically bond with PVC, VCP, Concrete, Cast Iron, and C.I.P.P. type pipes
- 5.8 Resin must provide a minimal exothermic reaction at a temperature of 73°F and chemical reaction temperature must not exceed 110°F
- 5.9 Resin must be safe to touch and safe for contact with packing equipment (i.e. Packer/Bladder) without chemical lubricants
- 5.10 Resin must cure in the presence of water and stop active Infiltration & Inflow
- 5.11 Total Resin set time must not exceed 2 ½ hours at a temperature of 73°
- 5.12 Fiberglass mat must have a thickness of .056 inches and must be a knitted 100% fiberglass biaxial/chopped strand combo mat
- 5.13 Warranty terms and conditions must be submitted in writing with the bid. A Warranty is required and must insure against the structural failure of a properly prepared and installed PipePatch. The manufacturer will replace the PipePatch kit at no charge if the PipePatch fails before the agreed upon term of the warranty.

6. Installation Responsibilities & Procedures – Must be installed by Factory Trained Installer

- 6.1 It shall be the responsibility of the Owner to locate and designate all access points open and accessible for the work, and provide rights of access to these points. The Owner shall also provide free access to water hydrants for cleaning and other work items requiring water.
- 6.2 **Cleaning.** Sewers shall be cleaned of all debris, roots and other materials that would block proper inversion of the cured-in-place-pipe. Utilizing high pressure jet cleaning equipment, several passes must be completed to assure all debris is removed from the pipe. If roots are present, root cutters or mechanical brushes should be used to remove all root intrusions.
- 6.3 **TV Inspection of Pipelines.** Experienced personnel trained in locating breaks and obstacles shall perform inspection of pipelines by closed circuit television (CCTV). The interior of the pipeline shall be carefully inspected to determine the location of any conditions that may prevent proper installation of the PipePatch into the pipeline, and it shall be noted so that the condition(s) can be corrected. A videotape or DVD and suitable

log shall be kept for later reference by the Owner. Position the camera head at the center of the damaged area. Attach a piece of tape to the camera cable at the entry point into the sewer line. This will serve as the distance to the center of the patch on the packer.

- 6.4 Preparing the Push Rods.** Connect the flex adapter to the packer. Assemble the appropriate number of push rods to the flex adapter making sure that each connection is locked in place. Place the camera head at the center of the packer and transfer the measurement from the camera cable to the assembled push rods.

IMPORTANT: Tape all connections that do not have a locking mechanism to prevent accidental disconnection in the pipe.

- 6.5 Test Equipment.** Bow off Safety Regulator Relief Valve to check air gauge. Pre-inflate your packer inside appropriate size pipe – using PSI embossed on Packer . Allow packer to sit for 5 minutes at appropriate PSI. Re-inflate Packer until it inflates tightly to the inside of the test pipe. Note the PSI needed for full inflation and add 2 – 3 PSI when installing Repair (PSI indicated on Packer MAY NOT BE NEEDED). Check PushRods/AirHose to verify that there are no obstructions to restrict air flow or air loss.

- 6.6 Prepare the Packer.** Slide the protective sleeve over the packer. Using the vinyl tape provide, secure the protective sleeve to both ends of the packer in such a way that it does not restrict inflation or water flow on Flow-Thru Packer.

- 6.7 Perform “Dry Run”.** Push the packer without a Patch to the point to be repaired. This verifies that the packer can reach the damaged area. **DO NOT INFLATE!** Pull the packer out of the sewer using the pull cable. Inspect the packer to verify that the protective sleeve has not been damaged. If the sleeve has been damaged, repeat step 6.6 before continuing to step 6.8 (Replacing the Protective Sleeve is recommended).

- 6.8 Resin Impregnation of the Fiberglass.** The Installer shall designate a location where the fiberglass shall be impregnated or "wet out" with resin. The impregnation shall be done using a plastic work surface and spatulas found within the PIPEPATCH repair kit. Put on both pair of gloves. Layout work surface, unfold the fiberglass mat and position it woven side down (bright shiny surface). Remove the clip from the resin bag and mix thoroughly until resin has consistent color - approximately 1 minute.

IMPORTANT: ONCE THE CONTENTS OF THE BAG ARE MIXED THEY MUST BE APPLIED TO THE PATCH AND THE PACKER MUST BE INSERTED INTO THE PIPE. PLEASE REFER TO THE WORKING TIME ON THE RESIN CURE CHART.

Cut off one corner of the bag and pour part of the contents (80%) onto the fiberglass mat. Use the spatula provided to spread the resin evenly and liberally to coat the surface of the mat. Flip the entire mat over. Pour the remaining resin and spread out evenly. Scrape off excess resin. Fold the right side over 12". Fold the left side over 13" to provide a 1" overlap.

6.9 Loading the Packer. Center the wetted mat on the protected packer. Tightly roll the wetted mat around the protected packer over lapping as you go. Secure the wetted mat to the protected packer using the 3 (or more) provided cable ties. Position one tie in the middle of the fiberglass mat and position the other two 1” from the end of the fiberglass mat. Pull the cable ties snug. Over tightening of the cable ties can cause them to break. Cut off any tails. Reattach the packer to the push rods and pull cable. Make sure that each connection is taped to lock the push rods in place. Introduce the packer into the pipe and position it at the point to be repaired as marked on the push rods.

6.10 Inflating the Packer. Using the air regulator, slowly inflate the packer to the noted PSI. The nylon ties will release at allowing the wetted mat to be pressed against the inner wall of the pipe at the point of the repair.

NOTE: If the pipe is badly damaged then care must be taken when inflating the packer to avoid further damage to the pipe and possible packer failure. Full pressure may not be needed.

6.11 Removing the Packer. Leave the packer in place under maintained pressure allowing the patch to cure (refer to cure chart). Deflate the packer and remove using the pull cable. Inspect and record the point of the repair with CCTV. Include Resin Lot Number and kit type in the post inspection report.

7. Clean Up

7.1 Upon acceptance of the installation work, the installer shall return the project area affected by the operations to as close to the original condition as possible. All PipePatch materials are safe for normal disposal.