

SECTION 02605a

SEALING OF SERVICE CONNECTIONS

PART 1 GENERAL

1.01 DESCRIPTION:

- A. The work of this section includes furnishing all labor, materials, tools and equipment required to seal the joint between the resin impregnated tube, the host pipe and the service connection against infiltration upon the completion of the cured in place pipe installation (and cutting of services), including cleaning and disposal of accumulated debris necessary to test service connections in sewer lines.

1.02 SUBMITTALS

- A. In accordance with Section 01300 – SUBMITTALS

- C. Submittals required under this section include, but are not limited to the following:

1. Contractor's description of all equipment to be used and proposed methodology, dosage, mixing, and safety precautions.
2. Manufacturer's list, description of all materials intended to be used, material safety data sheets, and written instructions regarding use.
3. Certifications including licenses for usage, where required, for each of the personnel handling chemicals that they are trained and experienced in handling the proposed chemicals.
4. Following completion of work, provide TV inspection video showing successful lateral connection sealing.

1.03 DESIGN CRITERIA AND PRODUCT HANDLING

- A. The work covered by this specification shall be in accordance with the best practice of the industry. The specifications call attention to certain features but do not purport to cover all details entering into the required work.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade the environment nor the quality, serviceability or appearance of any materials and equipment which may surround them.

- C. The manufacturer furnishing the service connection sealing and testing system and the Contractor performing the work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a fully satisfactory manner. Information confirming compliance with the following shall be submitted to the Engineer:
- i) The manufacturer of the service connection sealing and testing system shall have at least 4 years experience in the manufacture of cured-in-place liners of equal or greater size than the liners to be provided for this project, including liners for mainline sewers.
 - ii) The Contractor's personnel performing the sealing and testing of the service connections shall have been in a similar type of test and seal business for the past 4 years.
 - iii) The Contractor's personnel performing the sealing and testing of the service connections shall have successfully completed similar projects for a minimum of three municipalities in the Northeast. References including names, addresses, and telephone numbers of persons who can verify the previous satisfactory performance shall be provided.
 - iv) At the request of the Engineer, the Contractor shall provide documentation on infiltration reduction achieved as a result of the test and seal system in actual installations prior to approval of the system.
 - v) Failure to satisfactorily meet above qualifications may result in rejection of test and seal system.
- D. The following standards form a part of this specification as referenced:
1. The National Association of Sewer Service Companies (NASSCO) Specification Guidelines for Sewer Collection System Maintenance & Rehabilitation (Latest Edition), hereinafter referred to as the NASSCO Specifications.

PART 2 PRODUCTS

2.01 GENERAL

- A. Regardless of whether polymer or acrylamide gel grout is used, the grout shall have the following characteristics:
1. Resistance to chemicals; resistance to most organic solvents, mild acids and alkali.
 2. Shall return to original shape after repeated deformations.
 3. Toxicity; shall be essentially non-toxic in its cured form.

4. Sealing material shall not become rigid or brittle when subjected to dry or low moisture conditions or freeze thaw cycling and shall not be biodegradable.
 5. Sealing material shall be non-corrosive.
 6. Sealing material shall have a documented service of satisfactory performance in similar usage.
 7. Sealing material shall not contain neuro-toxic ingredients in either cured or uncured form.
 8. Sealing material shall not require on-site premixing.
 9. The chemical sealant must be able to react/perform in the presence of groundwater while being injected.
 10. The cured material must withstand submergence in water without degradation.
- B. A chemical root inhibitor shall be added to the polymer or gel. Root inhibitor must conform to requirements set forth in SECTION 02605.

2.02 SEALING MATERIALS

- A. Polymer Injection Method. The sealing compound shall be a hydrophilic polymer which is applied to a sewer pipe joint or defect by use of a sleeve packer. The materials shall be as designed for use with sleeve packers.
- B. Plastic Injection Method. The material shall be an Acrylamide Gel Grout.

PART 3 EXECUTION

3.01 SAFETY

- A. The Contractor shall perform all work in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements regarding confined space entry.
- B. The Contractor shall conform with all work safety requirements of pertinent regulatory agencies, and shall secure the site for the working condition in compliance with same. The Contractor shall erect such signs and other devices as are necessary for the safety of the work site.

3.02 GENERAL

- A. The purpose of the service connection sealing is for the joint between the resin impregnated tube, the host pipe and the lateral to be sealed against infiltration upon the completion of the cured in place pipe installation (and cutting of services).
- B. Service Connection sealing shall be performed using one of two separate methods; polymer injection or plastic injection method. These methods shall not be interchangeable between individual manhole reaches.
- C. Jetting or driving pipes from the surface shall not be allowed. Uncovering the service connections to be sealed shall not be allowed. Uncovering the pipe by excavation of pavement and soil to the existing pipe grades or use of any other repair technique which would disrupt traffic, undermine the adjacent utilities and structure and cause further damage to pipe lines being repaired will not be allowed. The packer rejoiner shall be positioned over the area of infiltration by means of a metering device at the surface and the closed circuit television camera in the line. Accurate measurement of the location of the service connection to be sealed shall be made, using a portion of the packer as a "Datum" or measurement point or target. Such measurements, target or point shall also be used to obtain necessary measurement for positioning injection area of packer over the area to be sealed.

1. Polymer Injection Method

- a. Sealing equipment shall consist of two separate pumping systems capable of supplying a flow of sealing materials to form a new gasket or a seal on the infiltration point. Sealing material shall pass from the pumping system through hoses into the sealing device. The sleeve packer shall be a cylindrical case of less size than the pipe size with cables at either end, used to pull it through the line. The sleeve packer shall be so constructed as to allow a nominal flow of sewage at all times. The packer shall consist of a bypass tube, protective end shoes, with an inflatable packing sleeve. The sleeve shall be so constructed that it can be totally pneumatically expanded. When the packer is totally inflated, the packing sleeve shall be pressed tight against the pipe. No sealing device which is expanded hydraulically or mechanically or where the expansion sleeve is not continuous, will be allowed. Special air regulators shall be used to prevent damage to the pipe from excessive amounts of sealing pressures. Packing devices using multiple bladders that produce an annular void around the confined portion of the packer will not be allowed.
- b. Sealing shall be accomplished by extruding premeasured amounts of sealing chemical outside of the packing sleeve, allowing the chemical to begin expansion and then forcing the expanding materials into the point of infiltration. Proper cure time shall be observed after injection according to the material manufacturer's specifications. The packer shall be positioned over the area of infiltration by means of a metering device at the surface and the closed-circuit television camera in the line. A visual presentation of the metering device shall be located in the television monitoring unit. Accurate measurements of the location of the defect to

be sealed shall be made. The inflatable element shall then be expanded using precisely controlled pressures. The pneumatically expanded element shall seal against the inside periphery of the pipe to form a void area at the point of infiltration, now completely isolated from the remainder of the pipe lines. Into this isolated area, sealant material shall be pumped through the hose system. The packing sleeve shall inflate against the entire inside joint area being sealed.

2. Plastic Injection Method

- a. Generally, this shall be accomplished by forcing chemical sealing materials into the infiltration point through a system of pumps, hoses and rejoiner. The packer sleeves shall be expanded using precisely controlled pressures. The pneumatically expanded sleeve shall seal against the inside periphery of the pipe to form a void area at the point of infiltration, which is completely isolated from the remainder of the pipe line.
- b. Sealant materials shall be pumped through the hose system at controlled pressures which are in excess of groundwater pressures. The pumping, metering, and packer rejoiner device shall be integrated so that proportions and quantities of materials, and pressures for materials and sealing can be instantly regulated in accordance with the type of size of the leak, percentage of voids being filled, type of soil surrounding the pipe, and the rate of flow of the sealing solution in relation to the back pressures.
- c. Upon completion of the injection, the television camera shall be moved to a position to observe and inspect the results of the injection. If inspection shows the seal was not completely effective, the process shall be repeated until all infiltration has been cut off. After the leak has been satisfactorily sealed, excessive gels shall be removed from inside the pipe by partially inflating the packer, and pulling it past the area as a wiper to restore the pipe to its original inside diameter.

3.03 TESTING

- A. After completion of the sealing operations, the service connection joints shall be re-tested in accordance with the requirements of SECTION 02703, TESTING OF SERVICE CONNECTIONS. If a joint fails the test it shall be resealed and retested until it passes.

3.04 FLOW CONTROL

- A. Joint sealing and re-testing shall be performed only when the depth of flow in the sewer line is at or below 1/4 of the pipe diameter. When the depth of flow in the sewer line is above 1/4 of the pipe diameter, flow control methods shall be utilized.

3.05 REPORT

- A. Three bound sets of sealing and re-testing logs shall be furnished to the Engineer.

3.06 CLEAN-UP

- A. The Contractor shall be responsible for the legal disposal of excess material and general clean-up of the work area which will be subject to the approval of the Engineer.
- B. A notification form shall be attached to the door of each home or building for which laterals have been grouted. This notification to the occupant states that the lateral servicing this listed address was grouted on this particular date and if any blockage of sanitary flow occurs, the occupant should call the number given on the form. The Owner or their representative shall provide these notification forms to the Contractor.

3.07 SERVICE CONNECTION GUARANTEE

- A. All sewer pipe joint or defect sealing work performed shall be guaranteed against faulty workmanship and/or materials for a period of one year after the completion of the work.
- B. Prior to the expiration of the guarantee period, the Contractor shall television inspect and test all previously grouted/ sealed service connections. Any service connection failing the warranty re-test shall be regouted as specified in this specification section.
- C. Television inspection, testing, and regrouting of service connections shall be performed prior to the expiration of the warranty period, during periods of high groundwater and at a time to be approved by the Engineer.
- D. All inspecting, retesting, and regrouting within the warranty period shall be provided at no additional cost to the owner.
- E. The Contractor will be required to provide the same number of crews as utilized in the original project so that the retesting will proceed at a more rapid rate.

END OF SECTION