Issue: DS 2024-044: The petitioner Michael Wilson of Pipelining Technologies, Inc. is seeking a declaratory statement regarding whether rehabilitation of building sewers using a CIPP "Gapping," "Start and Stop," or "Hybrid Lining." can be utilized in reference with Section 718.1 of the 8th Edition (2023) Florida Building Code, Plumbing and Section P3012.1 of the 8th Edition (2023) Florida Building Code, Residential.

Petitioner seeks clarification of the following questions:

Questions:

1. Can an installation using a CIPP "Gapping", "Start and Stop", or a "Hybrid Lining" process to "cut out all lateral connection points from the sleeve prior to the installation of the liners" or a similar CIPP drainage pipe rehabilitation material installation method be utilized in reference with the Florida Building Codes 718.1 and P3012.1 (Exhibit A) requirement of adherence to ASTM F1216 (Exhibit B) and ASTM F1743? (Exhibit C)?

2. Can a CIPP "Gapping", "Start and Stop", or a "Hybrid Lining" process to "cut out all lateral connection points from the sleeve prior to the installation of the liners" or similar drainage pipe rehabilitation material installation methods or processes along with an epoxy, polyurea, or polyurethane "brush coating, spin casting, or spray coating" process be utilized with the Florida Building Codes 718.1 and P3012.1(Exhibit A) requirement of adherence to ASTMF1216(Exhibit) and ASTM F1743 (Exhibit C), and IPC/ICC Code 303.4 (Exhibit E) regarding third party certifications?

3. Can a CIPP installation of epoxy, polyurea, or polyurethane "brush coating, spin casting, or spray coating" as part of a drainage pipe rehabilitation process be utilized with the Florida Building Codes 718.1 and P3012.1(Exhibit A) requirement of adherence to ASTM F1216 (Exhibit B) and ASTM F1743 (Exhibit C), and IPC/ICC Code 303.4 (Exhibit E) regarding third party certifications?

Background:

The Petitioner provides for the following:

Pipelining Technologies, Inc. (PTI), Petitioner, is a fully insured Licensed Plumbing Contractor, solely in the business of structurally rehabilitating aged and defective horizontal drainage pipes below ground and under building slabs, and vertical drainage pipes behind walls, using Cured-In-Place Pipe (CIPP) lining tools, materials, and technology.

PTI is seeking to rehabilitate an 8,280-foot vertical drainage system in a multi-story building, which includes 4", 5", and 6" cast iron stacks with 1,048 lateral branch connections. The PTI is planning to use a CIPP (Cured-In-Place Pipe) method called "Gapping," "Start and Stop," or "Hybrid" Pipe Lining.

This approach avoids covering branch fittings with CIPP lining material, eliminating the need for costly remote-controlled cutting devices to reopen these connections. During the initial camera inspection, PTI measures the distances between branch connections to determine the locations of

the “gapped” sections where the original cast iron lateral branch fittings will remain unlined. The lining material is now cut as one continuous piece to match the total length of the pipe, and then specific sections are removed to correspond with the pre-determined branch connection locations. This creates an “assembly” of multiple sections of multiple sections of CIPP lining material attached to a total length inflatable bladder.

The prepared liner is installed as an assembly with “start and stop gaps” at each branch connection. In the “hybrid “process, any bare “gapped” cast iron branch fittings are coated with epoxy after the sectional liner segments are cured and the inflatable bladder is removed. Currently, there are no ASTM standards, Florida Building Codes, or third-party certifications (e.g., IPC/ICC 303.4) for using epoxy, polyurea, polyurethane brush coatings, spin casting, or spray coating methods for deteriorated drainage pipe rehabilitation.

8th Edition (2023) Florida Building Code, Building

CHAPTER 1 SCOPE AND ADMINISTRATION

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed alternative meets all of the following:

1. The alternative material, design or method of construction is satisfactory and complies with the intent of the provisions of this code.
2. The material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code as it pertains to the following:
2.1. Quality.
2.2. Strength.
2.3. Effectiveness.
2.4. *Fire resistance*.
2.5. Durability.
2.6. Safety.

Where the alternative material, design or method of construction is not approved, the *building official* shall respond in writing, stating the reasons why the alternative was not approved.

8th (2023) Florida Building Code, Plumbing

SECTION 303 MATERIALS

303.1 Identification. Each length of pipe and each pipe fitting, trap, fixture, material and device utilized in a plumbing system shall bear the identification of the manufacturer and any markings required by the applicable referenced standards.

303.2 Installation of materials. All materials used shall be installed in strict accordance with the standards under which the materials are accepted and approved. In the absence of such installation procedures, the manufacturer’s instructions shall be followed. Where the requirements of referenced

standards or manufacturer's installation instructions do not conform to minimum provisions of this code, the provisions of this code shall apply.

303.4 Third-party certification. All plumbing products and materials required by the code to be in compliance with a referenced standard shall be listed by a third-party certification agency as complying with the referenced standards. Products and materials shall be identified in accordance with Section 303.1.

CHAPTER 7 SANITARY DRAINAGE (Supplement 1)

718.1 Cured-in-place. Cured-in-place rehabilitation of building sewers and building drainage piping shall be in accordance with ASTM F1216 – 2022 or ASTM F1743 - 2022.

8th (2023) Florida Building Code, Residential

P2609.2 Installation of materials. Materials used shall be installed in strict accordance with the standards under which the materials are accepted and approved. In the absence of such installation procedures, the manufacturer's instructions shall be followed. Where the requirements of referenced standards or manufacturer's instructions do not conform to the minimum provisions of this code, the provisions of this code shall apply

P2609.4 Third-party certification. Plumbing products and materials required by the code to be in compliance with a referenced standard shall be listed by a third-party certification agency as complying with the referenced standards. Products and materials shall be identified in accordance with Section P2609.1

SECTION P3012

REHABILITATION OF BUILDING SEWERS AND BUILDING DRAINS

P3012.1 Cured-in-place. Cured-in-place rehabilitation of building sewers and building drainage piping shall be in accordance with ASTM F1216 - 2022 or ASTM F1743 - 2022. **(Supplement 1)**

F1216 − 22 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

Scope 1.1

This practice describes the procedures for the reconstruction of pipelines and conduits (2 in. to 108 in. diameter) by the installation of a resin-impregnated, flexible tube which is inverted into the existing conduit by use of a hydrostatic head or air pressure. The resin is cured by circulating hot water, introducing controlled steam within the tube, or by photoinitiated reaction. When cured, the finished pipe will be continuous and tight-fitting. This reconstruction process is used in a variety of gravity and pressure applications such as sanitary sewers, storm sewers, process piping, electrical conduits, and ventilation systems.

3. Terminology

3.2.1 cured-in-place pipe (CIPP)—a hollow cylinder containing a nonwoven or a woven material, or a combination of nonwoven and woven material surrounded by a cured thermosetting resin. Plastic coatings may be included. This pipe is formed within an existing pipe. Therefore, it takes the shape of
and fits tightly to the existing pipe.

3.2.2 inversion—the process of turning the resin-impregnated tube inside out by the use of water pressure or air pressure.

7. Installation

7.8 Workmanship—The finished pipe shall be continuous over the entire length of an inversion run and be free of dry spots, lifts, and delaminations. If these conditions are present, remove and replace the CIPP in these areas.

7.8.1 If the CIPP does not fit tightly against the original pipe at its termination point(s), the space between the pipes shall be sealed by an approved method using compatible materials, if required by the owner in contract documents.

F1743 − 22 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

Scope 1.1 This practice describes the procedures for the reconstruction of pipelines and conduits (2 in. to 96 in. (5 cm to 244 cm) diameter) by the pulled-in-place installation of a resin-impregnated, flexible fabric tube into an existing conduit and secondarily inflated through the inversion of a calibration hose by the use of a hydrostatic head or air pressure (see Fig. 1). The resin is cured by circulating hot water, by the introduction of controlled steam into the tube, or by photoinitiated reaction. When cured, the finished cured-in-place pipe will be continuous and tight fitting. This reconstruction process may be used in a variety of gravity and pressure applications such as sanitary sewers, storm sewers, process piping, electrical conduits, and ventilation systems.

3.2.2 cured-in-place pipe (CIPP)—a hollow cylinder consisting of a fabric tube with cured (cross-linked) thermosetting resin. Interior or exterior plastic coatings, or both, may be included. The CIPP is formed within an existing pipe and takes the shape of and fits tightly to the pipe.

Significance and Use 4.1

This practice is for use by designers and specifiers, regulatory agencies, owners, and inspection organizations who are involved in the rehabilitation of conduits through the use of a resin-impregnated fabric tube pulled-in-place through an existing conduit and secondarily inflated through the inversion of a calibration hose. Modifications may be required for specific job conditions.

5. Recommended Materials and Manufacture

5.1 General—The resins, fabric tube, tube coatings, or other materials, such as the permanent calibration hose when combined as a composite structure, shall produce CIPP that meets the requirements of this specification.
5.2 CIPP Wall Composition—The wall shall consist of a plastic coated fabric tube filled with a thermosetting (crosslinked) resin, and if used, a filler.

5.2.1 Fabric Tube—The fabric tube should consist of one or more layers of flexible needled felt, or equivalent, woven or nonwoven material(s), or both, capable of carrying resin, withstanding installation pressures, and curing temperatures. The material(s) of construction should be able to stretch to fit irregular pipe sections and negotiate bends. Longitudinal and circumferential joints between multiple layers of fabric should be staggered so as not to overlap. The outside layer of the fabric tube should have an impermeable flexible coating(s) whose function is to contain the resin during and after fabric tube impregnation. The outer coating(s) must facilitate monitoring of resin saturation of the material(s) of construction of the fabric tube. The fabric tube should be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the original conduit. Allowance should be made for circumferential and longitudinal stretching of the fabric tube during installation. As required, the fabric tube should meet minimum tensile strength requirements in the longitudinal and transverse directions as specified in 7.1. All the material(s) of construction for the fabric tube should be compatible with the resin system used.

6. Installation Recommendations

6.4 Installation Methods:

6.4.1 Perforation of Resin-Impregnated Tube—Prior to pulling the resin-impregnated fabric tube in place, the outer impermeable plastic coating may optionally be perforated. When the resin-impregnated fabric tube is perforated, this should allow resin to be forced through the perforations and out against the existing conduit by the force of the hydrostatic head or air pressure against the inner wall of the calibration hose. The perforation should be done after fabric tube impregnation with a perforating roller device at the point of manufacture or at the jobsite. Perforations should be made on both sides of the lay-flat fabric tube covering the full circumference with a spacing no less than 1.5 in. (38.1 mm) apart. Perforating slits should be a minimum of 0.25 in. (6.4 mm) long.

6.4.2 Pulling Resin-Impregnated Tube into Position—The wet-out fabric tube should be pulled into place using a power winch. The saturated fabric tube should be pulled through an existing manhole or other approved access to fully extend to the next designated manhole or termination point. Care should be exercised not to damage the tube as a result of friction during pull-in, especially where curvilinear alignments, multilinear alignments, multiple offsets, protruding services, and other friction-producing host pipe conditions are present. Once the fabric tube is in place, it should be attached to a vertical standpipe so that the calibration hose can invert into the center of the resin-impregnated fabric tube. The vertical standpipe should be of sufficient height of water head to hold the fabric tube tight to the existing pipe wall, producing dimples at side connections. A device such as a dynamometer or load cell should be provided on the winch or cable to monitor the pulling force. Measure the overall elongation of the fabric tube after pull-in completion. The acceptable longitudinal elongation shall not be more than 5 % of the overall length measured after the calibration hose has been installed, or exceed the recommended pulling force.

6.4.3 Hydrostatic Head Calibration Hose Inversion—The calibration hose should be inserted into the vertical inversion standpipe, with the impermeable plastic membrane side out. At the lower end of the inversion standpipe, the calibration hose should be turned inside out and attached to the standpipe so that a leakproof seal is created. The resin-impregnated fabric tube should also be attached to the standpipe so that the calibration hose can invert into the center of the resin-impregnated tube. The inversion head should be adjusted to be of sufficient height of water head to cause the calibration hose to invert from the initial point of inversion to the point of termination and hold the resin-impregnated fabric tube tight to the pipe wall, producing dimples at side connections. Care should be taken during the inversion so as not to overstress the felt fiber. At the request of the

purchaser, the fabric tube manufacturer should provide information on the maximum allowable axial and longitudinal tensile stress for the fabric tube.

6.4.3.1 An alternative method of installation is top inversion. In this case, the calibration hose and resin-impregnated fabric tube are attached to a top ring. In this case, the tube itself forms the standpipe for generation of the hydrostatic head. Other methods of installation are also available and should be submitted for acceptance by the purchaser.

6.4.4 Using Air Pressure—The resin-impregnated fabric tube should be perforated as described in 6.4.1. Once perforated, the wet-out fabric tube should be pulled into place using a power winch as described in **6.4.2.** The calibration hose should be inserted through the guide chute or tube of the pressure containment device in which the calibration hose has been loaded, with the impermeable plastic membrane side out. At the end of the guide chute, the calibration hose should be turned inside out and attached so that a leakproof seal is created. The resin-impregnated tube should also be attached to the guide chute so that the calibration hose can invert into the center of the resin-impregnated tube. The inversion air pressure should be adjusted to be of sufficient pressure to cause the calibration hose to invert from point of inversion to point of termination and hold the resin saturated fabric tube tight to the pipe wall, producing dimples at side connections. Care should be taken during the inversion so as not to overstress the woven and nonwoven materials. Take suitable precautions to eliminate hazards to personnel in the proximity of the construction when pressurized air is being used.

6.8 Workmanship—The finished CIPP should be continuous over the entire length of an installation and be free of dry spots, lifts, and delaminations. If these conditions are present, the CIPP will be evaluated for its ability to meet the applicable requirements of Section 8. Where the CIPP does not meet the requirements of Section 8 or specifically stated requirements of the purchase agreement, or both, the affected portions of CIPP will be removed and replaced with an equivalent repair.

6.8.1 If the CIPP does not fit tightly against the original pipe at its termination point(s), the full circumference of the CIPP exiting the existing host pipe or conduit should be sealed by filling with a resin mixture compatible with the CIPP.

6.9 Service Connections—After the new CIPP has been installed, the existing active (or inactive) service connections should be reinstated. This should generally be done without excavation, and in the case of non-man entry pipes, from the interior of the pipeline by means of a television camera and a remote-control cutting device. Service connections shall be reinstated to at least 90 % of the original area as it enters the host pipe or conduit

Staff Analysis

Question #1:
Can an installation using a CIPP “Gapping”, “Start and Stop”, or a “Hybrid Lining” process to “cut out all lateral connection points from the sleeve prior to the installation of the liners” or a similar CIPP drainage pipe rehabilitation material installation method be utilized in reference with the Florida Building Codes 718.1 and P3012.1 (Exhibit A) requirement of adherence to ASTM F1216 (Exhibit B) and ASTM F1743? (Exhibit C)?

Answer:

The drainage pipe rehabilitation process in question using a Cured-in-Place Pipe **(**CIPP) "Gapping", "Start and Stop", or a "Hybrid Lining" along with an epoxy, polyurea, or polyurethane "brush coating, spin casting, or spray coating" is not specifically addressed in section 718.1, Florida Building Code, Plumbing, 8th Edition (2023), in section P3012.1, Florida Building Code, Residential, 8th Edition (2023), in ASTM F1216, or in ASTM F1743. Accordingly, the drainage pipe rehabilitation process in question is a proposed alternative to the prescribed drainage pipe rehabilitation processes specified in ASTM F216 and ASTM F1743. Pursuant to section 104.11, Florida Building Code, Building, 8th Edition (2023), an alternative method of construction to that prescribed in the Code is subject to review and approval by the local building official, when such alternative is substantiated to be equivalent of that prescribed in the Code in quality, strength, effectiveness, durability and safety. In addition, pursuant to section 303.4, Florida Building Code, Plumbing, 8th Edition (2023), the drainage pipe rehabilitation process in question is required to demonstrate compliance with the applicable standards of the Code through examination by a third-party certification agency and listing by such agency.

Question #2:

Can a CIPP "Gapping", "Start and Stop", or a "Hybrid Lining" process to "cut out all lateral connection points from the sleeve prior to the installation of the liners" or similar drainage pipe rehabilitation material installation methods or processes along with an epoxy, polyurea, or polyurethane "brush coating, spin casting, or spray coating" process be utilized with the Florida Building Codes 718.1and P3012.1(Exhibit A) requirement of adherence to ASTMF1216(Exhibit) and ASTM F1743 (Exhibit C), and IPC/ICC Code 303.4 (Exhibit E) regarding third party certifications?

Answer: See answer to question 1.

Question #3:

Can a CIPP installation of epoxy, polyurea, or polyurethane "brush coating, spin casting, or spray coating" as part of a drainage pipe rehabilitation process be utilized with the Florida Building Codes 718.1 and P3012.1(Exhibit A) requirement of adherence to ASTM F1216 (Exhibit B) and ASTM F1743 (Exhibit C), and IPC/ICC Code 303.4 (Exhibit E) regarding third party certifications?

Answer: See answer to question 1.