



Designation: **F2994 – 13 F2994 – 18**

Standard Practice for Utilization of Mobile, Automated Cured-In-Place Pipe (CIPP) Impregnation Systems¹

This standard is issued under the fixed designation F2994; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope—Scope*

1.1 This practice describes the procedures for the impregnation of 42 to 48 in (1067(50) to 1200 mm) diameter cured-in-place pipe utilizing mobile, automated systems. Temporary impregnation facilities set up at the jobsite (“over-the-hole” wet outs) are not covered under this standard. Once resin saturation is complete, the wet out liner is then used to rehabilitate existing gravity flow or pressure pipelines, process piping, electrical conduits or ventilation systems.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D1600 Terminology for Abbreviated Terms Relating to Plastics

D5813 Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems

F412 Terminology Relating to Plastic Piping Systems

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

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F412 and abbreviations are in accordance with Terminology D1600, unless otherwise specified.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *certificate of analysis (COA), n*—Documented evidence of the quality control testing performed on the resin and catalyst formulations. As a minimum, the COA shall include the product name; batch number; date of manufacture; name, address and phone number of manufacturer; test methods; test limits and actual results.

3.2.2 *CIPP automation, n*—The use of PLCs and HMIs to control the operation of a mobile impregnation unit. As a minimum, the following functions shall be controlled and monitored by the CIPP automation process: Operating speed and pressure of resin and catalyst pumps; resin and catalyst temperature, mixing ratio, tank container levels, utilization, recirculation and dispense; vacuum pump operation; calibration roller speed, direction and gap setting. Data from all installations shall be electronically stored on an internal memory device integrated into the HMI and shall be downloadable to an external storage device for project quality assurance record keeping—record keeping. The data stored shall at a minimum include: project name, identification number and location; date and time of processing wet out; CIPP liner diameter, thickness and length; and resin and catalyst temperatures

¹ This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.67 on Trenchless Plastic Pipeline Technology.

Current edition approved Aug. 1, 2013/April 1, 2018. Published September 2013/July 2018. Originally approved in 2013. Last previous edition approved in 2013 as D2994–13. DOI: 10.1520/F2994-13/10.1520/F2994-18

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard’s Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

temperatures, pressures, flow rates, and volumes utilized. Additional data recorded may include the calibration roller distance, gap setting and roller speed: setting, roller speed, and vacuum level.

3.2.3 *cured-in-place pipe (CIPP), n*—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.

3.2.4 *electric-calibration roller, n*—Electrically driven or variable speed hydraulic drive device used to assist with the impregnation process. Resin saturated liners shall pass through the rollers at a set speed and gap setting. The gap setting shall be adjustable and measurable via a mechanical scale or the electronic display of the HMI. The linear rate of the CIPP liner processed through the roller shall be adjustable ~~via~~ by a variable speed drive ~~or~~ via the electronic display of the HMI.

3.2.5 *impregnation module, n*—fully contained, insulated system used in the production of CIPP on a mobile impregnation unit. (See Fig. 1.)

3.2.5.1 *Discussion*—

The module shall operate through CIPP automation and as a minimum shall include the following components: precision pumps and metering devices, bulk resin and catalyst storage tanks/containers with temperature control system, roller bed, work table, external connections for resin and catalyst filling, compatible piping, hoses, directional flow control valves, vacuum system, hoses and connections and resin mixing chamber including static mixer. The vacuum pump may be installed inside or outside the insulated module.

3.2.6 *mobile impregnation unit, n*—a mobile system, usually permanently mounted on a trailer or truck, used to manufacture CIPP at or nearby the point of installation using CIPP automation.

3.3 *Acronyms:*

3.3.1 *PLC, n*—programmable logic controller

3.3.2 *HMI, n*—human machine interface (touch screen)

4. Significance and Use

4.1 This practice is for use by installers who are involved in the rehabilitation of conduits through the use of a mobile, automated CIPP impregnation system to manufacture resin impregnated tube installed through an existing conduit. As for any practice, modifications may be required for specific job conditions.

5. Materials

5.1 All materials shall be handled, packaged, marked and transported in accordance with local, state and federal regulations and requirements.

5.2 *Liner tube*—The liner tube shall consist of one or more layers of flexible needled felt or fiberglass, or both, an equivalent nonwoven or woven material, or a combination of nonwoven and woven materials or fiberglass, or a combination thereof, capable

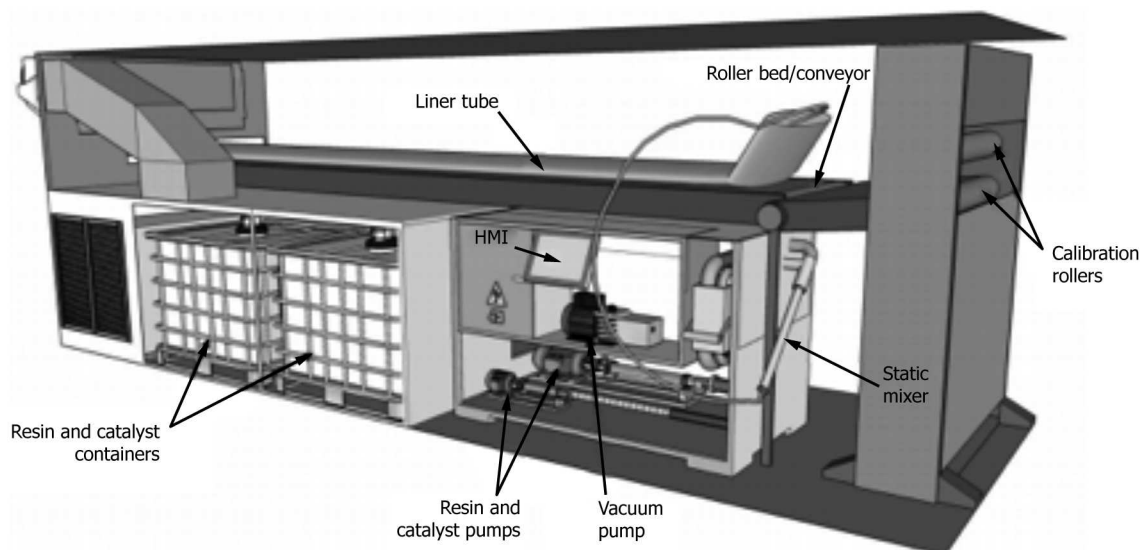


FIG. 1 Typical Impregnation Module