

ANSI/AWWA **C623-22**  
(First Edition)

AWWA Standard

# Cured-In-Place Pipe (CIPP) Rehabilitation of Pressurized Potable Water Pipelines, 4 In. (100 mm) and Larger

**Effective date: May 1, 2022.**

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American Water Works  
Association



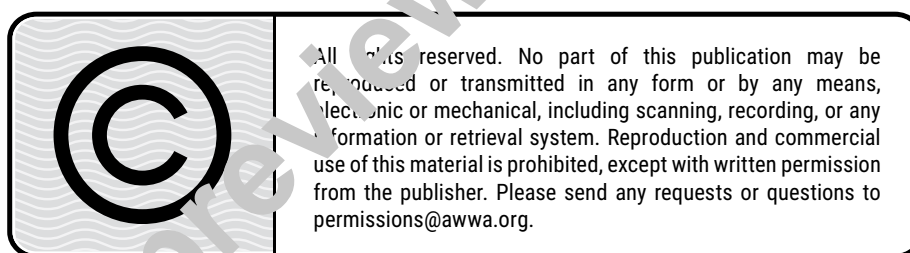
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# Contents

*All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.*

SEC.	PAGE	SEC.	PAGE
<b>Foreword</b>		<b>2</b>	<b>References</b> ..... 2
I	ix	<b>3</b>	<b>Definitions</b> ..... 3
I.A	ix	<b>4</b>	<b>Requirements</b>
I.B	ix	4.1	Workmanship ..... 4
I.C	ix	4.2	CIPP Construction ..... 5
II	x	4.3	Materials ..... 5
II.A	x	4.4	Design ..... 7
	x	4.5	Host Pipe Preparation ..... 7
II.B	xi	4.6	CIPP Installation ..... 10
II.C	xi	4.7	Final Inspection ..... 12
II.D	xi	4.8	CIPP Maintenance and Repair ..... 13
II.E	xi	4.9	Return to Service ..... 13
II.F	xi	<b>5</b>	<b>Verification</b>
III	xi	5.1	Quality Assurance Requirements ..... 14
III.A	xii	5.2	CIPP Sampling ..... 14
	xii	5.3	Visual and CCTV Inspection ..... 15
III.B	xiv	5.4	Testing of the Installed CIPP ..... 16
IV	xiv	5.5	Basis for Rejection ..... 20
V	xiv	5.6	Quality Assurance Documentation ..... 21
<b>Standard 1</b>		<b>6</b>	<b>Delivery</b>
1	1	6.1	Handling, Storage, and Delivery ..... 22
1.1	1	6.2	Affidavit of Compliance ..... 23
1.2	1		
1.3	2		

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# Foreword

*This foreword is for information only and is not part of ANSI\*/AWWA C623.*

## **I. Introduction.**

I.A. *Background.* The cured-in-place pipe (CIPP) system consists of curing a resin-impregnated textile tube within an existing host pipe to form a new tight-fitting pipe-within-a-pipe. This standard covers the rehabilitation of 4 in. (100 mm) and larger pressurized potable water mains using CIPP produced from a textile tube of specified materials that is impregnated with a specific resin system which is installed into the host pipe by inversion using water or air pressure or pulled in place then cured using hot water, steam, or photoinitiated reaction (light). All CIPP products must have NSF<sup>†</sup>/ANSI/CAN<sup>‡</sup> Standard 61 certification for use in potable water systems and meet jurisdictional requirements for potable water. The CIPP must be designed to support all design internal pressures, vacuum conditions, and external and other loads anticipated over the design life (typically 50 years) of the CIPP.

I.B. *History.* The AWWA Standards Committee for Pipe Rehabilitation was authorized in 2010 in response to the water industry's request for a standard on CIPP repair. This first edition was approved by the AWWA Board of Directors on Jan. 13, 2022.

I.C. *Acceptance.* In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the Water Research Foundation (formerly AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.<sup>§</sup> Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health

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\* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

† NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

‡ Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

§ Persons outside the United States should contact the appropriate authority having jurisdiction.

effects of products and drinking water additives from such products, state and local agencies may use various references including:

1. Specific policies of the state or local agency.
2. Two standards developed under the direction of NSF, NSF/ANSI/CAN 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects.
3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,<sup>4</sup> and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI/CAN 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, “Toxicology Review and Evaluation Procedures,” to NSF/ANSI/CAN 61 does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of “unregulated” contaminants are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA C623 does not address additives requirements. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to:

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

## II. Special Issues.

II.A. *Chlorine and Chloramine Degradation of Elastomers.* The selection of materials is critical for water service and distribution piping in locations where there is a possibility that elastomers will be in contact with chlorine or chloramines. Documented research has shown that elastomers such as gaskets, seals, valve seats, and encapsulations may be degraded when exposed to chlorine or chloramines. The impact of degradation is a function of the type of elastomeric materials, chemical concentration, contact surface area, elastomer cross section, environmental conditions as well as temperature. Careful selection of and specifications for elastomeric materials and the specifics of their

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<sup>4</sup> Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

application for each water system component should be considered to provide long-term usefulness and minimum degradation (swelling, loss of elasticity, or softening) of the elastomer specified.

II.B. *Handling Precautions.* Unmixed or uncured resin components may represent a chemical exposure hazard. Workers are encouraged and expected to read and understand the product's Safety Data Sheets (SDS) and to follow the precautions identified including the use of personal protective equipment (PPE) when handling chemicals including resin components. For specific personal and jobsite safety aspects, refer to SDS available from the chemical supplier or manufacturer.

II.C. *Qualifications.* CIPP rehabilitation requires understanding of all the physical, chemical, and environmental factors which influence a successful and quality installation. Recognizing the importance of the experience and qualifications of the designer, manufacturer, and constructor involved in these applications and that the consequences of failure are high, the purchaser should take the necessary steps to assure itself that all personnel in all facets of the work are qualified.

II.D. *Structural Classification.* It is the purchaser's or purchaser's representative's responsibility to evaluate the condition of the host pipe to be rehabilitated with CIPP and to establish the structural requirements for the CIPP. AWWA M28 Rehabilitation of Water Mains and AWWA Committee Report "*Structural Classifications of Pressure Pipe Linings—Suggested Protocol for Product Classification*" provide guidance on structural classifications of linings.

II.E. *Distributing Information to Customers.* The purchaser should supply information to customers who will be affected by the pipe rehabilitation work before beginning the rehabilitation project. Customers may be informed using "door hanger" notices, newsletters, local media, social media, and/or other methods approved by the purchaser.

II.F. *Permeation.* The selection of materials is critical for potable water service and distribution piping systems in locations where there is a likelihood that the piping system will be exposed to significant concentrations of pollutants composed of low-molecular-weight petroleum products, organic solvents, or their vapors. Documented research has shown that piping system materials such as polyethylene and polyvinyl chloride, and elastomers used in gaskets and packing glands, can be subject to permeation by low-molecular-weight organic solvents or petroleum products. If a potable water piping system must pass through such a contaminated area or an area subject to contamination, consult the manufacturer regarding permeation of pipe

walls, valve components, jointing materials, and other piping system components *before* selecting materials for use in that area.

**III. Use of this Standard.** It is the responsibility of the user of an AWWA Standard to determine that the products described in that standard are suitable for use in the particular application being considered.

III.A. *Purchaser Options and Alternatives.* The following information should be provided by the purchaser, when available, and included in the scope of the Purchaser's Documents between the purchaser and constructor:

1. Standard used—that is, ANSI/AWWA C623, Cured-In-Place Pipe Rehabilitation of Pressurized Potable Water Pipelines, 4 In. (100 mm) and Larger, of latest revision.

2. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects is required for the selected CIPP product and any other material intended for contact with potable water installed with the CIPP technology.

3. Details of federal, state, and local requirements (Sec. 4.3.1).

4. Temporary water supply requirements.

5. Diameter, material, length, age, and location of pipeline, including plan and profile drawings when available; location of adjacent utilities; limits of pipeline shutdowns, if service requirements make limits necessary; location of access pits; location, type, and size of valves; location of interconnecting pipelines, hydrant branches, and service pipes; location of fittings and restrictions that could interfere with pipe cleaning and CIPP installation; location, diameter, and connections of temporary drinking water and fire protection bypass, if required; identification of chemicals and residual concentration used for water disinfection; and other details of the pipe within the scope of the Purchaser's Documents between the purchaser and the constructor.

6. Method or standard for the design of CIPP. AWWA M28 Rehabilitation of Water Mains and AWWA Committee Report "*Structural Classifications of Pressure Pipe Linings—Suggested Protocol for Product Classification*" provide guidance on CIPP design.

7. All performance requirements necessary for the design of the CIPP to support all internal pressures, vacuum conditions, and external and other loads anticipated over the CIPP design life (typically 50 years).

8. Services to be furnished by purchaser specifically designated and described. Services may include: locating the main to be rehabilitated, removing and replacing line valves, operating of valves and fire hydrants, tagging valves that separate the main to be rehabilitated from the water system to prevent accidental opening, shutting off

inflow of water from connecting pipelines, locating and operating blowoffs, connecting and disconnecting temporary consumption bypasses to customer services, connecting and disconnecting temporary fire protection mains and hydrants, obtaining permits required for the work, handling customer contacts, disinfecting, and conducting flow tests.

9. Description of additional work to be performed by constructor. Work may include: pipe cleaning requirements, installation of preliners, end seals, service connection reinstatement, repairs to or replacement of deteriorated pipe, excavation, backfill, and pavement or surface restoration work at access excavations; method of opening and closing access openings in the pipeline; flushing, laying, and removing temporary bypass pipe; and operation of main line or blowoff valves and fire hydrants, shut-off valves and hydrants installation or replacement.

10. Location of water sources for cleaning, CIPP installation, and cure. Method of providing water, quantity available, pressure information, temporary metering (as required), and backflow prevention.

11. Requirements for the dechlorination and disposal of cleaning water, curing water, and debris; instructions regarding permits from the responsible authorities.

12. Options that may be specified by the purchaser, include but are not limited to:

- a. Affidavit of compliance
- b. Access openings, pavement repairs, and site restoration
- c. Traffic control and work area safety
- d. Cleaning of the host pipe and valves, installing new bolts and gaskets
- e. Temporary domestic consumption and fire protection bypass plan
- f. Disinfection and pressure testing of temporary bypass plan
- g. Replacing/repairing faulty/leaking valves
- h. Cathodic protection
- i. Service box repairs
- j. Meter upgrades
- k. Hydrant replacement

13. The purchaser should specify a procedure for reporting the rejection of work not performed in accordance with this standard. The purchaser should also outline the responsibility of the purchaser and the constructor in cases of nonconforming work.

14. The purchaser should specify the duration of the warranty period and warranty inspection protocols, and outline the responsibility of the purchaser and the constructor in cases of nonconforming work discovered during the warranty period.

III.B. *Modification to Standard.* Any modification to the provisions, definitions, or terminology in this standard must be provided by the purchaser.

**IV. Major Revisions.** This is the first edition of this standard.

**V. Comments.** If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711; write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email at [standards@awwa.org](mailto:standards@awwa.org).



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# Cured-In-Place Pipe (CIPP) Rehabilitation of Pressurized Potable Water Pipelines, 4 In. (100 mm) and Larger

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## SECTION 1: GENERAL

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### **Sec. 1.1 Scope**

This standard covers materials and procedures for the rehabilitation of existing water mains 4 in. (100 mm) in diameter and larger by the installation and curing of a resin-impregnated textile tube that is either inverted into the main using a hydrostatic head of potable water or air pressure or pulled into the main and subsequently inflated by potable water or air. The cured-in-place pipe (CIPP) is cured by circulating hot water, introducing controlled steam, or photoinitiated reaction (light) within the resin-impregnated textile tube once installed into the existing pipe. When cured, the finished product will be a continuous, tight-fitting CIPP.

### **Sec. 1.2 Purpose**

The purpose of this standard is to provide the minimum requirements for the materials and installation of CIPP systems for the rehabilitation of existing potable water mains 4 in. (100 mm) in diameter and larger. The standard includes