ANSI/AWWA C620-07 (R17)
(Reaffirmation of ANSI/AWWA C620 First Edition)
Reaffirmed without revisions 2017

American Water Works Association

Dedicated to the World's Most Important Resource®

AWWA Standard

Spray-Applied In-Place Epoxy Lining of Water Pipelines, 3 In. (75 mm) and Larger

Reaffirmed without revision June 11, 2017
Reaffirmation approved by American National Standards Institute Aug. 18, 2017

Effective date: Dec. 1, 2017.
First edition approved by AWWA Board of Directors June 24, 2007.
This edition approved June 24, 2007.
Approved by American National Standards Institute July 29, 2008.

American Water Works Association STANDARD Since 1881

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AWWA Standard

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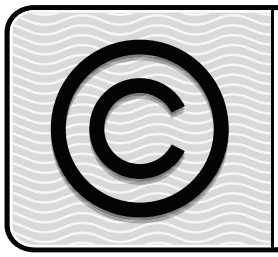

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ISBN-13, print: 978-1-62576-268-9 eISBN-13, electronic: 978-1-61300-452-4
DOI: http://dx.doi.org/10.12999/AWWA.C620.17

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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.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C620.

I. Introduction.

I.A. *Background.* Epoxy lining provides the interior of any pipe with a smooth finish that helps protect it from corrosion and tuberculation. The lining can effectively halt the recurrence of these problems in previously used pipe if the pipe has been properly cleaned and repaired before it is applied. Furthermore, the lining can increase carrying capacity because streamlining surface irregularities reduces friction.

In 1993, the first field trial of in-place epoxy lining (of pipe that had been in service) in the United States was conducted in Chester, Pa. The 80-year-old pipe that was lined was a short section, 6 in. (150 mm) in diameter. Flow test results revealed an increase in C_{hw}, the Hazen-Williams coefficient of roughness, from 22 to 114. The field demonstration confirmed the viability of the epoxy application for water main rehabilitation. The trial was a joint effort between the Awwa Research Foundation (AwwaRF), the Chester Water Authority, the Water Research Centre, and an experienced United Kingdom (UK) contractor. AWWA published a full report and produced a video titled *Demonstration of an Innovative Water Main Rehabilitation Technique: In Situ Epoxy Lining*.

I.B. *History.* During the 1970s and 1980s, water main lining contractors in the UK began research to find alternative material and methodology to improve on the lining procedures that were in common use, especially in aggressive waters. Various water boards and standards committees were involved in the process and an in-situ epoxy lining technique was developed and accepted for pipe rehabilitation projects throughout the UK. Thousands of kilometers of pipe have been subsequently treated with the epoxy lining technique over the past 20 years in the UK. Similar developments were being made in Japan, where the epoxy lining process has been successfully integrated into pipe rehabilitation projects.

In the early 1990s, the epoxy lining process was introduced to North America. Originally, projects were performed in the province of Quebec, Canada, with some pilot projects in Ontario and British Columbia and a few northern states in the United States. In the past few years, American contractors have started offering this technique to water utility owners as an alternative to present-day cement-mortar lining procedures.

This standard was produced to standardize this technique in North America.

The first edition of this standard was approved by the AWWA Board of Directors on June 24, 2007 and it was reaffirmed without revision on June 11, 2017.

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 (AWWA) 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*. Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references including

1. An advisory program formerly administered by USEPA, Office of Drinking Water, that was discontinued on April 7, 1990.
2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF†, NSF/ANSI‡ 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.
4. Other references, including AWWA standards, *Food Chemicals Codex*,§ *Water Chemicals Codex*, 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 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 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

* Persons outside the United States should contact the appropriate authority having jurisdiction.
† NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48105.
‡ American National Standards Institute, West 42nd Street, Fourth Floor, New York, NY 10036.
§ Both publications available from National Academy of Sciences, 500 Fifth Street, N.W., Washington, DC 20001.

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 C620 does not address additives requirements. Thus, users of this standard should consult the appropriate 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. *Handling Precautions.* Unmixed or uncured resin and hardener may represent a chemical hazard. Personnel are advised to use caution and to wear protective clothing (i.e., gloves, apron, goggles, and a suitable vapor mask) when handling the solutions. For safety aspects, refer to material safety data sheets (MSDS) available from the chemical supplier or manufacturer.

II.B. *Constructor Experience.* The constructor shall have certification from both the product supplier and the application equipment provider that he is experienced in the successful application of in-place spray-applied epoxy lining. Supervisory personnel must be competent to ensure that the pipe is suitably prepared and that the epoxy components are applied within the manufacturer's requirements.

II.C. *Distributing Information to Customers.* The purchaser shall distribute appropriate information to those customers who will be affected by the rehabilitation work before beginning any fieldwork. Customers may be informed using "door-hanger" notices.

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 shall be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C620, Spray-Applied In-Place Epoxy Lining of Water Pipelines, 3 In. (75 mm) and Larger, of latest revision.
2. Project. Diameter, material, length, and location of pipeline, including plan and profile drawings when available; limits of pipeline shutdowns, if service requirements make limits necessary; location of access manholes, location, type, and size of valves; location of interconnecting pipelines, hydrant branches, and service pipes; location of fittings and restrictions that could interfere with cleaning and lining

operations; location, diameter, and connections of temporary bypass, if required; and other details of the pipe within the scope of the contract between the purchaser and the contractor.

3. Characteristics of epoxy lining. Nominal dry film thickness (DFT) of epoxy lining required—generally 40 mil (1 mm) and minimum cure time of epoxy between epoxy application and reintroduction of water into the pipe.

4. Services furnished by purchaser. Description of services or field operations to be performed by the purchaser, such as locating the main to be cleaned and lined, removal and replacement of line valves, operation of valves, tagging valves that separate the main to be cleaned and lined from the water system to prevent accidental opening, shutting off inflow of water from connecting pipelines, locating and operating blowoffs, connecting and disconnecting temporary bypasses to customer services, obtaining permits required for the work, handling customer contacts, disinfection, and conducting flow tests.

5. Additional work to be performed by constructor. Description of work, including repairs to deteriorated pipe, excavation, backfill, and resurfacing 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.

NOTE: When it is necessary to repair deteriorated pipe before lining, the pipe will be repaired by the purchaser or under provisions of the contract between the purchaser and the constructor.

6. Water for cleaning and lining operations. Location of water sources, method of providing, quantity available, and pressure information.

7. Disposal of cleaning water and debris. Requirements for the disposal of cleaning water, old lining, and other debris; instructions regarding permits from the responsible authorities.

8. Purchaser options. Options that may be specified by the purchaser:

   a. Affidavit of compliance.
   b. Access openings and pavement repairs.
   c. Traffic control.
   d. Cleaning of valves, installing new bolts and gaskets.
   e. Temporary bypass.
   f. Disinfection of temporary bypass.
   g. Replacing/repairing faulty/leaking valves.
   h. Cathodic protection.

i. Service box repairs.

j. Meter upgrades.

k. Hydrant replacement.

9. Rejection of work. 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 nonstandard work.

10. Warranty period. 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. Major revisions made to the standard in this edition include the following:

1. C620-07 was reaffirmed without revision on June 11, 2017.

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711, FAX at 303.795.7603, write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail at standards@awwa.org.

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Spray-Applied In-Place Epoxy Lining of Water Pipelines, 3 In. (75 mm) and Larger

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the requirements for the materials and application of an epoxy lining to the inside surface of previously installed water pipelines 3 in. (75 mm) in diameter and larger. The water pipelines to be rehabilitated may be constructed of any of the following materials: steel, ductile iron, cast iron, asbestos cement, and concrete. Related work required for performing a complete contract is also generally described.

The application is appropriate for the following pipe:

1. Straight pipe sections can be lined with a machine that progresses uniformly through the pipe and applies an epoxy to the pipe surfaces centrifugally to obtain a smooth lining of uniform thickness with smooth transitions over joints.

2. Long radius bends may be lined similarly, however most bends are the short radius type. The lining of short radius bends and fittings that cannot be readily negotiated shall be hand coated. This may require additional access points.

3. Pipe must be structurally suitable. Epoxy lining is not designed to replace the host pipe. Structurally weakened pipes whether by pitting, graphitization, or