

A/C Pressure Pipe

AWWA C-400

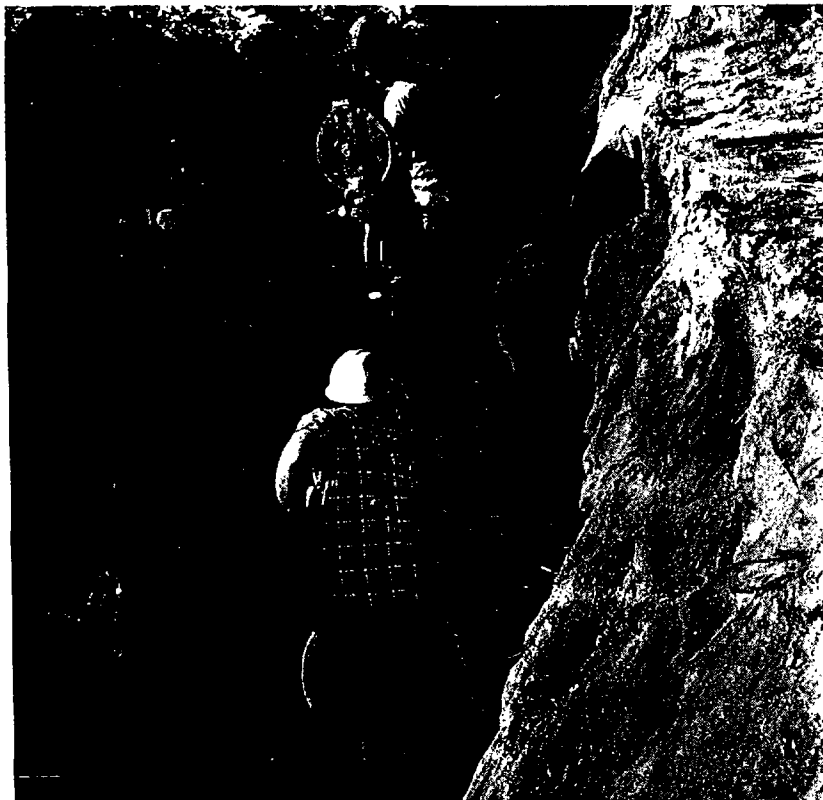
ASTM C-296

Specifications

CertainTeed

PLAINTIFF'S EXHIBIT

CT-1002



A/C Water Pipe is Used Throughout the World

In virtually every country and in all 50 of the United States, A/C water pipe is recommended and installed. Over 1,600,000 miles are in service worldwide, with 300,000 miles in the U.S.

A/C pipe is a highly cost-effective vehicle for the delivery of pure water. It has a lower initial cost than most other piping material; it costs less to install; and, since it is noncorrodible, it lasts longer with fewer repairs than most competitive materials. Because of its low initial and installation costs, communities using A/C pipe save significantly on long-term financing.

A/C water pipe has many beneficial characteristics. It delivers quality water without discoloration from rust. It is designed to be leakproof and practically trouble-free once in the ground because of its superior structural integrity, joint reliability and system dependability. And it's made from plentiful, natural ingredients: cement, the primary binder; silica, the reactive filler; asbestos, the reinforcement. All are noncorrodible, inorganic and compatible with each other.

In the manufacturing process, controlled amounts of these materials are blended with water. The slurry that's formed is transferred under precise pressure onto a mandrel which produces a smooth inside diameter. The mandrel is removed when the pipe is partially set. An intermediate curing

step is followed by autoclaving—full curing for 10 hours or more under high-pressure steam at 180°C. The result is a completely unified composite material that is chemically more stable than conventionally cured A/C or any metallic piping material. Because of its chemical resistance, special linings generally are not needed; but they are available where required.

Every piece of CertainTeed A/C pressure distribution pipe and every coupling and accessory is hydrostatically proof tested to 3.5 times its working pressure rating. Stringent crush and flexural tests must also be passed.

CertainTeed manufactures A/C water pipe and accessories in a full range of sizes, pressure ratings, and strength classifications.

Fluid Transmission pipe is also offered in 18" through 24" sizes conforming to AWWA C-402 in nine strength classifications and in diameters 6" through 24" conforming to ASTM C-668.

A/C water pipe is completely safe. Government, industry and scientific studies in the U.S. and abroad confirm that there is no evidence that anyone in the general public has ever contracted any disease from naturally-occurring asbestos found in most water systems. These studies reveal that the release of asbestos fibers, if any, from A/C pipe is far less than the amount of fiber found in many natural-source drinking waters.

A/C pipe connects with ease to hydrants, valves, bends and tees. Interchangeable pipe design and standard accessories expedite additions, tie-ins and closures.

CTD032839

The FLUID-TITE CG Coupling

WIDER, HEAVIER GASKET.

The increased width of the gasket tends to stabilize it in the coupling groove while it is being deformed by the incoming pipe. Heavier construction prevents displacement from the groove.

PIPE END SEPARATION

is achieved by the gasket and stop shoulder design. Separation allows for pipe expansion, contraction, and deflection. Design eliminates a separate spacer ring.

COMPLETE INTERCHANGEABILITY with other makes of A/C pipe has been made possible by the design of the machined end of the pipe. This design reduces chances of a ring blowout and allows for field gauging of the ring, if this is desired.

SELF-CENTERING ACTION.

Tapered edges guide the pipe quickly into alignment, help assure proper assembly every time.

CLOSE TOLERANCES

are maintained during manufacture to ensure maximum protection from high pressures and surges.

NEW GASKET

has holes which furnish the hydraulic "self-energizing" feature that provides the tight joints characteristic of FLUID-TITE CG pipe.

Threaded Brass Insert Coupling

CertainTeed's threaded brass insert coupling eliminates costly field labor for service connections in A/C water systems. During installation of a new water line, the threaded brass insert coupling is installed, the location is marked, and a corporation stop is inserted, while main line installation proceeds. Later, service lines are simply connected to the stop without the need for tapping the pipe in the trench.

Threaded brass insert couplings are available with $\frac{3}{4}$ " and 1" AWWA thread in sizes 4" through 12". $\frac{3}{4}$ ", 1" and $1\frac{1}{2}$ " NPT threads are also available in the same size range.

Pipe sections 3'-3" long, with the same threaded brass insert design, are available in sizes 14" through 24".



**Specifications:
A/C
Pressure
Pipe**

1. General

1.1 SCOPE

These specifications cover A/C Pressure Distribution Pipe, as manufactured by CertainTeed Corporation and intended for use in water systems for the conveyance of water under pressure. CertainTeed A/C Pressure Distribution Pipe is manufactured in sizes from 4 inches to 16 inches inclusive for working pressures of 100, 150 and 200 pounds per square inch; and 18-, 20-, and 24-inch sizes for working pressures of 100 and 150 pounds per square inch. Fluid Transmission Pipe is also offered in sizes 6" through 24" in nine strength classifications.

1.2 CONFORMANCE

CertainTeed A/C Pressure Distribution Pipe, as manufactured to meet these specifications, meets the requirements of the latest issues of the following:

AWWA Specification C-400
Fed. Specification SS-P-351
ASTM Specification C-296
ASTM Specification D-1869

Fluid Transmission Pipe meets the requirements of AWWA Specification C-402 and ASTM Specification C-668.

2. General Requirements

2.1 SIZES

Pipe shall be manufactured with nominal inside diameters of 4", 6", 8", 10", 12", 14", and 16" in classes 100, 150 and 200 psi; 18", 20" and 24" in classes 100 and 150 psi.

2.2 TYPES

Pipe shall be manufactured in three classes, for working pressures of 100, 150 and 200 psi designated as Class 100, Class 150 and Class 200 respectively.

2.3 LENGTHS

2.3.1 STANDARD LENGTHS

The standard length of Pressure Pipe shall be 13 feet in all classes and sizes. At least 90% of the total footage of any class and size, excluding short lengths, shall be of this length. The remaining 10% or less may be in random lengths of not less than 7 feet.

2.3.2 SHORT LENGTHS

Short lengths for use in making connections to valves, fittings, and structures, and for making closures shall not exceed 6 feet 6 inches. Standard lengths are ½ lengths (6'-6") machined ends only (MEO) and ¼ lengths (3'-3") fully machined (FM).

2.4 COUPLINGS

Couplings shall be of the FLUID-TITE design, unless otherwise specified. They shall provide tight joints when subjected to the same hydrostatic test as designated for the pipe. One FLUID-TITE Coupling of the same manufacture as the pipe shall be furnished with each standard, random and short length of pipe. It shall consist of an asbestos-cement sleeve and two rubber gaskets suitable for use with the particular size and class of pipe with which it is supplied.

2.5 MATERIALS

2.5.1 PIPE AND COUPLINGS

A/C Pressure Pipe and Couplings shall be composed of an intimate mixture of portland cement, asbestos fiber and silica, and shall be free from organic additives. The material shall be formed under pressure and cured by autoclave process to meet the physical and chemical requirements of the specification.

2.5.2 RUBBER GASKETS

Rubber Gaskets shall consist of a vulcanized rubber compound as specified by the manufacturer.

3. Detail Requirements

3.1 PIPE

3.1.1 DESCRIPTION

A/C Pressure Pipe shall be made to the manufacturer's standard dimensions and tolerances. The pipe shall be machined on each end to properly receive the Coupling and Gasket.

3.1.2 HYDROSTATIC TEST

Each standard, random, or short length of pipe and each Coupling for the corresponding pipe shall have sufficient strength to hold an internal hydrostatic test for each class of pipe equal to three and one half times the working pressure of the pipe as shown in the following table, when tested as described in Section 4.2.1.



3.1.3 FLEXURAL STRENGTH—

Each standard length of pipe in sizes 4", 6" and 8" shall have sufficient beam strength to withstand without failure the total applied load specified below when tested as described in Section 4.2.2.



3.1.4 CRUSHING STRENGTH

Each pipe when tested shall have sufficient strength, when submitted to the ASTM three-edge bearing test as specified in Section 4.2.3, to support not less than the loads indicated in the following tabulation:



3.1.5 WORKMANSHIP

3.1.5.1 INSIDE SURFACE

Each pipe shall be free from bulges, dents, and tears on the inside surface which result in a variation in diameter greater than $\frac{3}{16}$ from that obtained on adjacent unaffected portions of the surface.

3.1.5.2 ENDS

Machined ends of the pipe that receive the Coupling shall be free from dents and gouges that will affect the tightness of the joint.

3.1.5.3 STRAIGHTNESS

Each pipe shall not vary from straightness more than 0.05" per foot of length when measured in accordance with ASTM C500, Section 13.

3.1.5.4 DIMENSIONS

The average inside diameter of standard and random lengths shall not be less than the nominal by more than 5.0 per cent, when measured approximately 3" from the end.

3.2 COUPLINGS

Asbestos-Cement Couplings shall be machined on the inside surface so that the gaskets are retained in the proper position to make a tight seal.

3.3 RUBBER GASKETS

The Rubber gaskets shall conform to the manufacturer's standards, and ASTM D-1869.

3.4 CHEMICAL REQUIREMENTS

The Uncombined Calcium Hydroxide in Asbestos-Cement Pipe and Couplings shall not be greater than one per cent when tested in accordance with ASTM C-500.

4. Inspection Tests and Rejections

4.1 GENERAL

All material furnished shall be inspected and tested in accordance with these specifications. All material shall be in a normal processed condition prior to test for conformance to the requirements stated in previous sections. When requested on his order, the purchaser may witness inspection and test procedures at his own expense. In lieu of this witnessing, he may request the manufacturer to submit a certificate certifying the product meets the requirements of these specifications. To insure the purchaser that all pipe purchased under these specifications conforms to the standards herein required and for the convenience of the purchaser or his representative, all tests must be conducted in the Continental U.S.

4.2 METHODS OF TESTING

4.2.1 HYDROSTATIC PROOF TEST

4.2.1.1 a DESCRIPTION OF TERM

Hydrostatic Strength, as used in these specifications, refers to the ability of each Pipe and Coupling to withstand the bursting forces resulting from internal pressures.

4.2.1.1 b SIGNIFICANCE OF TEST

The Hydrostatic Proof Test is mandatory for each piece of Pipe and Coupling Sleeve prior to shipment. It is performed to establish the fact that finished, shippable material has strength to withstand the internal

bursting pressures stated in these specifications. The strength level required by these specifications assures minimum strengths that are three and one half times maximum recommended operating pressures in field service and that accommodate the stresses simultaneously induced by internal pressure, earth loads, and surge pressures.

4.2.1.1 c PROCEDURE

Each Pipe regardless of length, each A/C Coupling shall be tested under a hydrostatic pressure of three and one half times the working pressure for the type of pipe. The water pressure shall be applied gradually and maintained at the specified test level for 5 seconds. Any Pipe or Coupling showing any defect shall be rejected. The machine used for the hydrostatic tests shall have gaskets which seal the ends of the pipe without materially counteracting the hydrostatic test pressure.

4.2.1.1 d SAMPLING METHOD

From each lot of pipe, as defined in ASTM C296, which has passed the routine hydrostatic and flexural tests, one length shall be selected by the inspector. Each selected length shall be hydrostatically tested to a pressure of four times the rated working pressure for the class of pipe, such pressure to be maintained for at least 5 seconds. The pipe shall not fail under this pressure. Each pipe so tested shall be retested in the manner specified in Paragraph 4.2.1.1 c.

4.2.2 FLEXURE PROOF TEST

4.2.2.1 a DESCRIPTION OF TERM

Flexural Strength, as used in these specifications, refers to the ability of a standard pipe section to withstand external loads bearing on the pipe transversely to its long axis that induce bending in the section.

**Specifications:
A/C
Pressure
Pipe
(continued)**

4.2.2.1 b SIGNIFICANCE OF TEST

Each standard 13-foot length of 4", 6" and 8" pipe, of all classes, shall be tested in flexure. It is performed to establish the fact that finished, shippable material has inherent strength to withstand the external loads specified in Section 3.1.3. The strength level required by these specifications assures resistance with a reasonable margin of safety to transverse bending loads normally encountered in field service.

4.2.2.1 c PROCEDURE

The test shall be conducted by supporting the pipe in a flexural testing machine with supports 12 feet apart. The load shall be applied at a uniform rate until it equals the test loads specified in Section 3.1.3. The total load shall be divided equally and applied at the third points of the clear span at a uniform loading of at least 500 pounds per second.

4.2.3 CRUSHING TEST

4.2.3.1 a DESCRIPTION OF TERM

Crushing Strength, as used in these specifications, refers to the ability of the pipe to withstand external loads that tend to collapse the pipe.

4.2.3.1 b SIGNIFICANCE OF TEST

From each lot of pipe, as defined in ASTM C296, when specifically requested by the purchaser on his order, one length shall be selected by the inspector for a three-edge bearing test before shipment. From each selected length, there shall be cut one unmachined section of pipe one foot long. This section shall be tested by the ASTM three-edge bearing method and shall not fail until the total applied load exceeds the applicable value shown in Section 3.1.4.

4.2.3.1 c PROCEDURE

For this test, the two lower bearings shall consist of two straight wooden strips with vertical sides, each strip having its interior top edge rounded to a radius of approximately $\frac{1}{2}$ inch. The strips shall be securely fastened to a rigid block, with the interior vertical faces parallel and spaced a distance apart of approximately 1 in/ft of internal pipe diameter but in no case less than 1 in. The upper bearing shall be a rigid wooden block, straight and true from end to end. The upper and lower bearings shall extend the full length of the test section. The rate of loading shall be 2,000 pounds per minute per lineal foot, with a tolerance of plus or minus 500 pounds per minute per lineal foot.

4.2.4 UNCOMBINED CALCIUM HYDROXIDE TEST

4.2.4.1 a DESCRIPTION OF TERM

The Uncombined Calcium Hydroxide characteristics covered by these specifications refer to the chemical stability of the pipe.

4.2.4.1 b SIGNIFICANCE OF TEST

The Uncombined Calcium Hydroxide Test establishes the fact that A/C Pipe has chemical stability. The stability level required by these specifications assures that the material has maximum chemical stability and will satisfactorily resist, with a reasonable factor of safety, the chemical action normally encountered in field service.

4.2.4.1 c CERTIFICATION OF TEST

The manufacturer shall conduct periodic controlled Uncombined Calcium Hydroxide tests in accordance with ASTM C-500 (latest issue). Upon request, certifications shall be issued to the customer that the Pipe and Couplings will conform to the requirements of maximum Uncombined Calcium Hydroxide permitted in Section 3.4.

4.3 REJECTION

4.3.1 HYDROSTATIC

If any pipe subjected to the higher hydrostatic test fails to withstand the specified pressure required in Section 3.1.2 two additional lengths of the same size and class of pipe shall be subjected to the higher hydrostatic test. The failure of one of these additional lengths to withstand the specified pressure shall be cause for rejection of the entire lot of that size and class manufactured during the same shift as the test lengths.

4.3.2 CRUSHING

Failure of the specimen tested for crushing strength to attain 75 per cent of the crushing load required in Section 3.1.4 shall be cause for rejection of the entire lot of that size and class manufactured during the same shift as the test specimen. If any specimen tested for crushing strength supports more than 75 per cent but less than 100 per cent of the crushing load required in Section 3.1.4, one specimen shall be cut from each of two additional pipes of the same size and class manufactured during the same shift and shall be subjected to the crushing test. Failure of one of these additional specimens to meet the crushing strength requirements shall be cause for rejection of the entire lot of that size and class manufactured during the same shift as the test specimen.

5. Marking

5.1 PIPE

Each standard, random and short length of pipe shall be clearly marked on the outside surface with the trade name, pipe size, class-designation, hydrostatic proof pressure and date of manufacture.

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5.2 COUPLING

The component parts of each coupling shall be clearly marked with the trade name pipe size, class designation and the letter "T" to indicate that it has been hydrostatically tested.

5.3 GASKETS

Each rubber gasket shall be marked with the manufacturer's identification, the size, pressure rating, and year of manufacture.

5.4 ADDITIONAL MARKING

When factory inspection is made by the purchaser, each Pipe and each coupling may receive an additional special marking of no more than three letters, as required by the purchaser.

6. Preparation for Shipment

6.1 GENERAL

All pipe, couplings, and gaskets shall, unless otherwise specified, be prepared for standard commercial shipment, so as to insure acceptance by common or other carriers.

Additional Information

Detailed product specifications are available in CertainTeed publication 40-21-02.

Detailed recommendations for installation are available in CertainTeed publication 40-21-07 "FLUID-TITE Pressure Pipe Installation Guide."

Engineering design information relative to flow, earthloads, etc. are in CertainTeed publication 40-20-00.

Detailed design information on Fluid Transmission Pipe is available in the, "Fluid Transmission Design and Specification Manual," publication no. 40-80-01.

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