A/C Gravity Sewer Pipe

ASTM C-428 and C-644

CertainTeed

PLAINTIFF'S EXHIBIT

CT-643



CertainTeed A/C sewer pipe helps meet tough EPA requirements and tightened regulations for infiltration/exfiltration testing. It helps eliminate leaks, helps reduce costs and is available in sizes up to 24" diameter.

Bottle-Tight Joints Keep Sewage In, Ground Water Out

With CertainTeed A/C sewer pipe, you can substantially tighten your infiltration/exfiltration test requirements. That's because CertainTeed FLUID-TITE joints are machined to precise tolerances rather than cast or heat formed. So the FLUID-TITE joints are tighter, more uniform mile after mile.

To assure successful installations, CertainTeed qualification testing of FLUID-TITE joints exceeds ASTM C428 requirements. Joints are rejected if there is one drop of leakage. Straight alignment and axially deflected tests for infiltration/exfiltration are run at 25 psi, rather than the C428 requirement of 10 psi. CertainTeed also tests its joints with fully offset loading.

Autoclave Curing Helps A/C Pipe Resist Chemicals

A/C pipe is cured in autoclaves under high pressure steam at 180°C for 10 hours or more. The free lime content is reduced to less than 1% (it's many times that in concrete pipe). Since there is less lime to be attacked by sewer acids, A/C lasts longer and needs fewer repairs.

Fewer Lift Stations, Smaller Diameters

The superior flow of smoothbore A/C pipe could eliminate some lift stations, or even allow use of one size smaller pipe in the larger diameters. CertainTeed A/C sewer pipe has a Manning factor of n=0.010.

Economical to Install and Test

CertainTeed A/C sewer pipe is strong and durable, yet its relatively light weight reduces transportation costs and simplifies installation.

Easy joining speeds installation—and properly installed, CertainTeed A/C sewer pipe systems pass the most rigorous acceptance tests the first time.

Costs Less to Operate and Maintain

Because ground water infiltration is virtually eliminated, costly secondary and tertiary waste treatment loads are reduced. Because of its chemical resistance, the smooth bore of CertainTeed A/C sewer pipe remains smooth.

Complete Technical Service

Detailed technical assistance for engineering design or installation is available through your CertainTeed Territory Manager or the District Sales Office. CertainTeed offers A/C sewer pipe in 4" through 24" diameters, all ASTM crush strengths, and a complete line of fittings for main line and for house to main connections.

CTD030845

Specifications: A/C Gravity Sewer Pipe

1. General

1.1 SCOPE

These specifications cover CertainTeed FLUID-TITE asbestos-cement Non-Pressure Sewer Pipe intended for the conveyance of sanitary sewage in gravity-flow systems.

1.2 CONFORMANCE

CertainTeed Asbestos-Cement Non-Pressure Sewer Pipe, as manufactured to meet these specifications, meets the requirements of the latest issues of the following specifications.

ASTM Specification C428 (8" through 24")

ASTM Specification C644 (4", 5", and 6")

2. General Requirements

2.1 SIZES

Pipe shall be manuactured with nominal inside diameters of 4", 5", 6", 8", 10", 12", 14", 15", 16", 18", 20", 21", and 24".

2.2 CLASSES

Pipe shall be made in six strength classes as shown in the following table:



2.3 LENGTHS

2.3.1 STANDARD LENGTHS

The standard nominal length of the sewer pipe shall be 13 feet in all sizes and classes. At least 90% of the total number of pipes of any one class and size, excluding short lengths, shall be standard lengths. The remaining 10% or less may be in random lengths of not less than 7 feet.

2.3.2 SHORT LENGTHS

Short lengths shall not exceed 6'-6". Short lengths may be ordered as ¼ lengths (3'-3"), or half lengths (6'-6") in machined ends only (MEO).

2.4 COUPLINGS

Couplings shall be of the standard FLUID-TITE design. The coupling, when assembled on the pipe, shall be capable of meeting simultaneously the crushing strength and joint tightness requirements of ASTM C428 or C644. One coupling, suitable for the particular size of pipe with which it is used, shall be furnished with each standard, random, and short length of pipe. The coupling shall be of the sleeve type and shall be suitable for use with rubber sealing gaskets; and shall be of proper size for effective sealing. The necessary gaskets shall be furnished with each coupling unless ordered otherwise.

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2.4.1 CERTA-SPACER® BAND

Each Factory Pre-Belled Coupling shall be assembled using one CERTA-SPACER to provide positive end separation without employing the sealing gasket for this function.

2.4.2 INFILTRATION

The FLUID-TITE Couplings furnished under these specifications when assembled in accordance with the manufacturer's instructions shall be capable of meeting specifications of 50 Gal. per inch of diameter per mile per 24 hrs.

2.5 FITTINGS

2.5.1 FITTINGS

CertainTeed FLUID-TITE Asbestos-Cement Wyes, Tees, Elbows and other fittings shall be manufactured in classes suitable for the class of pipe with which they will be used.

2.6 MATERIALS

2.6.1 PIPE

Asbestos-Cement Non-Pressure Sewer Pipe shall be composed of an intimate mixture of portland cement, asbestos fiber and silica, and shall be free from organic additives.

2.6.2 RUBBER GASKETS

Rubber sealing gaskets shall conform to the requirements of ASTM D-1869 latest issue and consist of a vulcanized rubber compound as specified by the manufacturer.

2.6.3 CERTA-SPACER BAND

CERTA-SPACER Band shall consist of a special yielding synthetic compound as specified by the manufacturer.

3. Detail Requirements

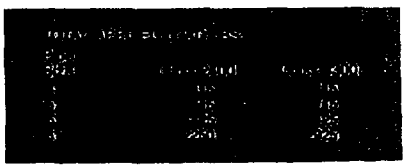
3.1 PIPE

3.1.1 DESCRIPTION

CertainTeed FLUID-TITE Asbestos-Cement Sewer 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. All pipe made under this specification shall be Type II as specified in ASTM C428—latest issue.

3.1.2 FLEXURAL STRENGTH

Each length of pipe in 4", 5", 6", and 8" sizes shall have sufficient flexural strength to withstand without failure the total load prescribed below when tested in accordance with Section 4, Paragraph 4.2.1.



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3.1.3 CRUSHING STRENGTH
Each pipe shall have sufficient strength, when subjected to the ASTM V block bearing test as specified in Section 4.2.2, to support a load not less than its specified crushing strength class.

3.1.4 WORKMANSHIP
3.1.4.1. INSIDE SURFACE
Each pipe shall be free from bulges, dents, and tears on the inside surface which result in variation in diameter greater than 3/16 inch from that obtained on adjacent unaffected portions of the surface.

3.1.4.2 ENDS
The machined ends of the pipe shall be free from dents and gouges that will affect the tightness of the joint.

3.1.4.3 STRAIGHTNESS
Each length of pipe shall not vary in straightness by more than 0.05" per foot of length when the variation is measured in accordance with Section 13 of ASTM C500.

3.1.4.4 DIMENSIONS
Nominal Dimensions not specifically covered under other sections of this specification, shall be in accordance with the manufacturer's specifications for all sizes and classes of pipe. The average inside diameter may be less than the nominal by not more than ¼ inch, or 1½ per cent, whichever is the greater.

3.2 COUPLINGS
The FLUID-TITE 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 FLUID-TITE gaskets shall conform to the manufacturer's standards.

3.4 CERTA-SPACER BAND
Shall conform to the manufacturer's standards.

3.5 CHEMICAL REQUIREMENTS
The Uncombined Calcium Hydroxide in CertainTeed FLUID-TITE Asbestos-Cement Sewer Pipe shall not be greater than one per cent when tested by the method described in ASTM C500.

4. Inspection Tests and Rejections

4.1 GENERAL
All material furnished under this specification shall be inspected and tested in accordance with this specification. 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 this specification.

4.2 TESTS
4.2.1 FLEXURE TEST
Each standard length of 4", 5", 6", and 8" pipe shall be tested in flexure. The test shall be performed by supporting the pipe over a clear span of 12 ft. in a rigidly supported flexure testing machine. Apply the load at a uniform rate as specified in ASTM C500 latest revision. Distribute the load equally and apply at the third points of the clear span.

4.2.2 CRUSHING
For crushing tests, one full length of pipe shall be selected from each lot, as defined in ASTM C428 or C644, from which shall be cut an unmachined portion one foot long for testing in crushing by the ASTM V block bearing method. The one-foot section shall not fail, when tested as below, until the total load exceeds the applicable value shown in Section 2.2 with a rate of loading of 2,000 lbs. ± 500 lbs. per minute per lineal foot.

4.2.3 CHEMICAL REQUIREMENTS
The Uncombined Calcium Hydroxide in an Asbestos-Cement Sewer Pipe shall not be greater than one per cent. The manufacturer will, upon request and proper notification by the purchaser, furnish certifications that the material meets this requirement and conforms to ASTM Specification C428 Type II.

4.3 REJECTION
Failure of the specimen tested for crushing strength to withstand 75 per cent of the load specified shall be cause for rejection of the entire lot represented by the test specimen. When the specimen tested for crush strength withstands over 75 per cent, but under 100 per cent of the load specified, one specimen shall be cut from each of two additional pipes of the same lot as the original specimen. Failure of one of these additional specimens to meet the strength requirements of Sec. 3.1.3 shall be cause for rejection of the entire lot represented by the test specimen.

Specifications:
A/C
Sewer
Pipe
(continued)

5. Marking

5.1 PIPE

Each standard, random and half length of pipe shall be clearly marked on the outside surface with the trade name, pipe size, class, type and date of manufacture.

5.2 COUPLING

Each CertainTeed FLUID-TITE Coupling shall be clearly marked with the class and size of pipe for which it is intended.

5.3 GASKETS

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

5.4 FITTINGS

Each fitting shall be marked with the manufacturer's identification, the size and class.

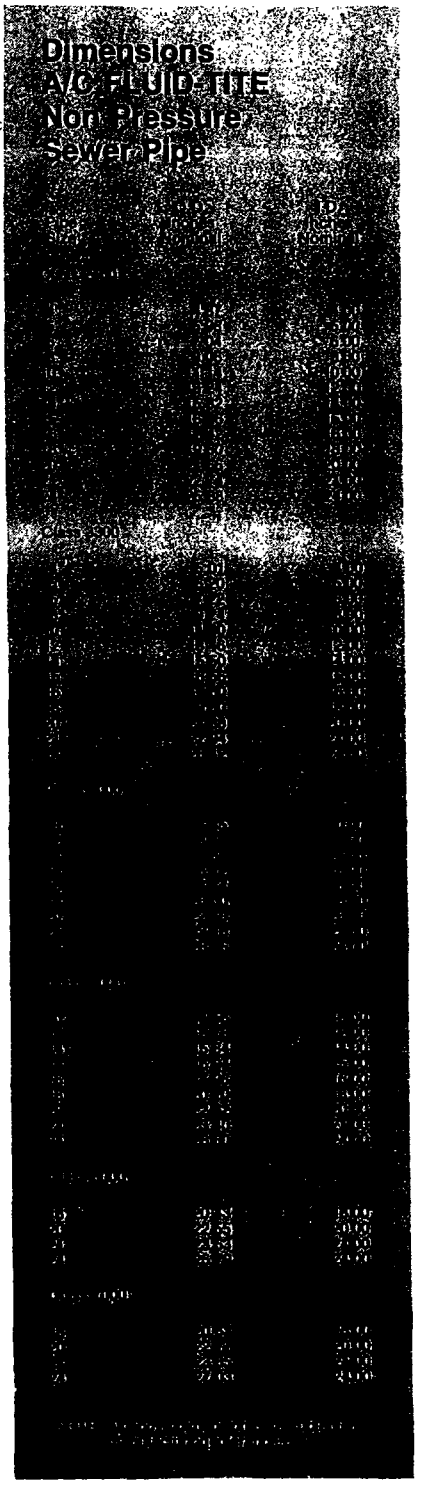
5.5 ADDITIONAL MARKING

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 ensure acceptance by common or other carriers. Special packaging will require additional lead time and details must be clarified on original order.



Fittings:

Increaser
Size 4" x 5" through 21" x 24"

Cap
Size 4" through 24"

Adapters
A wide range of adapters is available to connect A/C Sewer to practically any other sewer pipe material.

Elbow
45° Size 4" through 24"
90° Size 4" through 24"

Tee
(SxSxS)
Size 4" x 4" through 24" x 24" with reducing branches available on all sizes.

Wye 45°
(SxSxS)
Size 4" x 4" through 24" x 24" with reducing branches available on all sizes.

Additional Information

Detailed product specifications and recommended short form engineering specifications are available in CertainTeed publication 40-31-02.

Detailed recommendations for installation are available in CertainTeed publication 40-31-06 "A/C Gravity Sewer Pipe Installation Guide."

Engineering design information relative to flow, earthloads, adaptors, etc. is in CertainTeed publication 40-12-00.

Fittings are detailed in CertainTeed publication 40-31-04.

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