



Designation: C1208/C1208M – 18 (Reapproved 2022)

Standard Specification for Vitrified Clay Pipe and Joints for Use in Microtunneling, Sliplining, Pipe Bursting, and Tunnels¹

This standard is issued under the fixed designation C1208/C1208M; 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

1.1 This specification establishes the criteria for the manufacture, quality assurance testing, inspection, installation, field acceptance testing, and product marking of vitrified clay jacking pipe to be used in microtunneling, the pilot tube method, sliplining, pipe bursting, and in casings and tunnels for the conveyance of sewage, industrial wastes, and storm water.

1.1.1 Sections 3 through 7 and 9 of this specification contain manufacturing, quality assurance testing, inspection, and product marking criteria which are applicable to vitrified clay pipe prior to installation.

1.1.2 Section 8 of this specification contains criteria for the installation and field acceptance testing of vitrified clay pipe.

1.2 This specification also covers materials and test requirements for jointing of the pipe.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4 *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.*

1.5 *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.*

¹ This specification is under the jurisdiction of ASTM Committee C04 on Vitrified Clay Pipe and is the direct responsibility of Subcommittee C04.20 on Methods of Test and Specifications.

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2. Referenced Documents

2.1 ASTM Standards:²

- C67/C67M** Test Methods for Sampling and Testing Brick and Structural Clay Tile
- C301** Test Methods for Vitrified Clay Pipe
- C828** Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines
- C896** Terminology Relating to Clay Products
- C1091** Test Method for Hydrostatic Infiltration Testing of Vitrified Clay Pipe Lines
- D395** Test Methods for Rubber Property—Compression Set
- D412** Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- D471** Test Method for Rubber Property—Effect of Liquids
- D518** Test Method for Rubber Deterioration—Surface Cracking (Withdrawn 2007)³
- D543** Practices for Evaluating the Resistance of Plastics to Chemical Reagents
- D573** Test Method for Rubber—Deterioration in an Air Oven
- D1149** Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
- D2240** Test Method for Rubber Property—Durometer Hardness

3. Terminology

3.1 **Definitions**—Terminology C896 can be used for clarification of terminology in this specification.

PIPE

4. Materials and Manufacture

4.1 Vitrified clay pipe shall be manufactured from fire clay, shale, surface clay, or a combination of these materials that, when formed into pipe and fired to suitable temperatures, yields a product that conforms to this specification.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

4.2 Test Requirements for Pipe:

4.2.1 Test Samples:

4.2.1.1 When requested, test samples representative of the pipe to be used shall be selected by the purchaser or his representative from the supplier's stock.

4.2.1.2 The number of samples to be tested shall not exceed 0.5 % of the number of pipe of each size furnished, except that no less than three samples shall be tested.

4.2.1.3 If any of the test samples fail to meet the requirements of 4.2.2 through 4.2.6, the manufacturer will be allowed to retest two additional samples representative of the original material for each one that failed. The pipe will be acceptable if all retest samples meet the test requirements. If any of the re-test pipe fail, the lot shall be rejected.

4.2.1.4 If, subsequent to an initial test failure, the accuracy of the testing equipment is questioned, at the request of the manufacturer, the equipment shall be recalibrated and a retest made or a retest made using other equipment of known accuracy.

4.2.2 Bearing Strength:

4.2.2.1 Pipe shall meet the bearing strength requirements of Table 1 or Table 2.

4.2.2.2 The manufacturer may test and certify pipe to higher bearing strengths than listed in Table 1 and Table 2.

4.2.3 Compressive Strength Test:

4.2.3.1 This test is used to determine the compressive strength of pipe material. This test shall be performed only when specified.

4.2.3.2 Pipe material shall have a minimum compressive strength of 7000 psi [48 MPa].

4.2.3.3 The testing machine shall be of a type having sufficient capacity and capable of providing the rates of loading prescribed. The bearing area from which the force will be applied shall be spherically seated.

4.2.3.4 The specimen shall be a cylinder cut from the pipe so that the length of the specimen is parallel with the longitudinal axis of the pipe. The cylinder shall have a minimum diameter of 0.75 in. [19 mm] for pipe wall thicknesses through 2½ in. [64 mm] and 2 in. [51 mm] for greater wall thicknesses and a diameter to length ratio of 1:1. The tolerance of the diameter and length shall be +10 % –0 %. Measurements shall be made to the nearest 0.01 in. [0.25 mm].

4.2.3.5 The test load on the specimen shall be centered axially on the ends of the cylinder.

TABLE 1 Three Edge Bearing Strength

Nominal Diameter, in.	Bearing Strength, lb/linear ft
4	2000
6	2000
8	2200
10	2400
12	2600
15	2900
18	3300
21	3850
24	4400
27	4700
30	5000
36	6000
42	7000
48	8000

TABLE 2 Three Edge Bearing Strength [SI]

Nominal Diameter, mm	Bearing Strength, kN/m
100	29
150	29
200	32
250	35
300	38
400	42
500	52
600	64
700	69
800	77
900	88
1000	96
1100	105
1200	120

4.2.3.6 The bearing surfaces of the specimen shall be parallel planes and perpendicular to the vertical axis.

4.2.3.7 The bearing surface of the test samples shall be ground to planes, parallel within 0.002 in. [0.05 mm]. To ensure a uniform bearing of the sample, place between two plywood sheets. The plywood shall be three-ply, ranging from 0.19 in. [4 mm] to 0.25 in. [6 mm] thick, made of soft wood and free from knots. The plywood shall exceed the specimen diameter by 0.50 in. [13 mm] to 1.50 in. [38 mm]. Use a fresh pair of plywood sheets for each test.

4.2.3.8 Apply the load up to 3500 psi [24 MPa]. The remaining required load is applied at the uniform rate in not less than 1 min nor more than 2 min.

4.2.3.9 Calculate and report the compressive strength as follows:

$$\text{Compressive Strength, } C = W/A \quad (1)$$

where:

C = compressive strength of the specimen, psi [kPa] to the nearest 100 psi [690 kPa],

W = recorded load, lbf [kgf/mm²], indicated by the testing machine, and

A = average of the gross areas of the upper and lower bearing surfaces of the specimen, in.² [mm²] to the nearest 0.04 in.² [26 mm²].

4.2.4 Jacking Load:

4.2.4.1 The pipes jacking strength is calculated from the minimum cross sectional area multiplied by the compressive strength requirement of 4.2.3.2. The maximum allowable jacking load shall be calculated by dividing the pipes jacking strength by the specified factor of safety as determined by the engineer.

4.2.5 Hydrostatic Pressure Test or Absorption Test:

TABLE 3 Hydrostatic Pressure Test Time

Barrel Thickness, in.	Test Time, min
Up to and including 1	7
Over 1 including 1.5	9
Over 1.5 including 2	12
Over 2 including 2.5	15
Over 2.5 including 3	18
Over 3	21