Designation: C 444 – 03

Standard Specification for Perforated Concrete Pipe[1]

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers perforated concrete pipe intended to be used for underdrainage.

1.2 A complete metric companion to Specification C 444 has been developed—C 444M; therefore, no metric equivalents are presented in this specification.

2. Referenced Documents

2.1 *ASTM Standards:*

C 822 Terminology Relating to Concrete Pipe and Related Products[2]

3. Terminology

3.1 *Definitions*—For definitions of terms relating to concrete pipe, see Terminology C 822.

4. Classification

4.1 Pipe manufactured according to this specification shall be of two classes known as Type 1 and Type 2, which cover two arrangements of perforations to be used with pipe manufactured according to any of the standard specifications for plain or reinforced concrete pipe, and any of the classifications within those standard specifications.

4.1.1 Type 1 perforated pipe shall have circular perforations conforming to 6.1 and Table 1.

4.1.2 Type 2 perforated pipe shall have slotted perforations conforming to 6.2 and Table 2.

4.1.3 It is intended that perforated pipe shall be specified by reference to this specification and the specification for the type and class of pipe desired.

NOTE 1—*Example* "Perforated concrete pipe shall conform to the requirements of Specification C 444 Type 2, and all applicable requirements of Specification C 14, Class 2."

5. Basis of Acceptance

5.1 The acceptability of the pipe shall be determined by the results of all applicable tests (Note 2) prescribed for the type and class of pipe specified, and by inspection to determine whether the pipe conforms to this specification as to design and freedom from defects.

NOTE 2—It is intended that all tests will be applicable except those having to do with permeability and the hydrostatic test.

TABLE 1 Number of Rows of Perforations Required

Internal Designated Diameter, in.	Rows of Perforations
4	4
6	4
8	4
10	6
12	6
14	6
15	6
16	8
18	8
20	8
21	8
24	8
27 and larger	space rows approximately 6 in.

6. Perforations

6.1 *Type 1*—Perforations shall be circular, not more than 5/16 in. or less than 3/16 in. in diameter, and arranged in rows parallel to the axis of the pipe. Perforations shall be 3 in. center-to-center, along rows. The spigot or tongue end shall not be perforated for a length equal to the depth of the socket, or depth

TABLE 2 Requirements for Length and Spacing of Slots

Internal Designated Diameter, in.	Slot Length, in.	Slot Spacing[A], in.
4	1	3
6	1½	3
8	2	4
10	2	4
12	3	6
14	3	6
15	3	6
16	3	6
18	3	6
20	3	6
21	3	6
24	3	6
27 and larger	4	6

[A] See 6.2 for exceptions for plain-end pipe.

[1] This specification is under the jurisdiction of ASTM Committee C13 on Concrete Pipe and is the direct responsibility of Subcommittee C13.01 on Nonreinforced Concrete Sewer, Drain, and Irrigation Pipe.

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of the groove plus ¾ in. and perforations shall continue at uniform spacing along the entire length of the barrel. The total number of rows shall be as shown in Table 1. The rows shall be spaced over not more than 165° of circumference. Rows shall be symmetrically arranged with respect to the intended top or bottom of the pipe.

6.2 *Type 2*—Slots shall be circumferential in direction, not more than 3/16 in. or less than ⅛ in. in width, and of the lengths shown in Table 2. There shall be two rows of slots, spaced 165° apart, and centered, in the case of elliptically reinforced pipe, about the minor axis of the reinforcing. Slots shall be spaced as shown in Table 2, except as modified herein for plain-end pipe. The distance from the spigot end, or from the shoulder of the tongue end, to the first pair of slots shall be not more than 1 in. greater than the specified slot spacing, nor less than 1 in. less than the specified slot spacing. Slots shall continue at uniform spacing along the length of the barrel.

6.2.1 Slots in plain-end pipe shall be spaced as shown in Table 2 except that smaller spacing shall be used where necessary to provide not less than three equally spaced slots in each row. Slots shall be centered with respect to the ends of the pipe and there shall be not more than the specified slot spacing from the pipe end to the first pair of slots, or less than one half of the slot spacing employed.

6.3 The manufacturer shall submit to the owner for approval, prior to manufacture, sizes and arrangements of perforations other than specified herein.

7. Joints

7.1 The joints shall be of such design and the ends of the concrete pipe sections so formed that the pipe can be laid together to make a continuous line of pipe compatible with the permissible variations given in Section 8.

8. Permissible Variation in Dimensions

8.1 The permissible variation in circular perforation size or slot width shall be as specified in Section 6. Slot length tolerance is + ¼ in. or − ⅛ in. Variation in row spacing, or in the spacing of holes or slots in any row, shall be ± ½ in. except as required to provide specified cover for reinforcing steel.

9. Repairs

9.1 Pipe repaired because of imperfections in manufacture or damage during handling, will be acceptable, if in the opinion of the owner, the repairs are sound and properly finished and cured and the repaired pipe conforms to the requirements of this specification.

10. Marking of Rejected Specimens

10.1 All rejected pipe shall be marked clearly by the owner and shall be replaced by the manufacturer with pipe that will meet the requirements of this specification, without additional cost to the owner.

11. Inspection

11.1 The quality of all materials and the finished pipe shall be subject to inspection and approval by the owner. Such inspection shall be performed at the point of manufacture or delivery. The method of marking as to acceptance or rejection of the pipe shall be agreed upon, prior to inspection, between the owner and manufacturer. Rejected pipe shall be replaced by the manufacturer with pipe that meets the requirements of this specification.

12. Rejection

12.1 Pipe shall be subject to rejection on account of any of the applicable causes for rejection listed for the type and class of pipe specified, or on account of any of the following:

12.1.1 Variations in dimensions exceeding those specified in Sections 6 and 8, or

12.1.2 Any spall more than ¾ in. in diameter or 3/16 in. in depth caused by making perforations or slots.

13. Keywords

13.1 concrete pipe; perforated; subsurface drainage; underdrainage

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