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Standard Specification for PERFORATED, HOMOGENEOUS BITUMINIZED FIBER PIPE FOR AIRPORT AND HIGHWAY DRAINAGE¹

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1. Scope

1.1 This specification covers homogeneous perforated bituminized fiber pipe, couplings, joints, and fittings used in subsurface airport, highway, and similar drainage.

1.2 The values stated in SI units are to be regarded as the standard.

2. Applicable Document

2.1 ASTM Standard:

D 2314 Methods of Testing Homogeneous Bituminized Fiber Pipe²

3. Materials and Manufacture

3.1 Pipe shall be composed of a reinforcing interwoven fibrous structure thoroughly impregnated with a durable bituminous compound. The wall of the pipe shall be without seams or laminations and the bore shall have a smooth surface free from obstructions and rough, flaky areas. Couplings and fittings shall be of the same material as the pipe or of a material having equal or better physical and chemical characteristics.

3.2 *Joint Systems*—The pipe is furnished in two joint systems as follows:

3.2.1 *Type TJ* has tapered male ends on the pipe and tapered female couplings to match. The tapers shall be accurately machined or molded. A coupling shall be provided for each length of pipe and for each fitting. The slope of all tapers shall be 2 deg (4 deg included angle) (see Fig. 1).

3.2.2 *Type BJ* has squarely cut ends on both pipe and fittings. An internal-insertion coupling shall be provided for each length of pipe and for each fitting (see Fig. 2).

4. Chemical and Physical Requirements

4.1 *Chemical Resistance*—The specimen shall show no evidence of chemical reaction or deterioration of impregnant.

4.2 *Water Absorption*—The maximum water absorption shall be 2 % of the original weight, calculated to the nearest 0.1 %.

4.3 *Kerosine Resistance*—Specimens shall meet the dry crushing strength requirements specified in Table 1.

4.4 *Heat Resistance*—The heat shall not cause a weight loss over 1 % in the specimen due to exudation of the impregnant.

4.5 *Resistance to Flattening*—The decrease in diameter shall be not more than 3 %.

4.6 *Crushing Strengths*—The requirements for dry and wet crushing strengths are given in Table 1.

5. Dimensions

5.1 Dimensions of pipes, couplings, and joints of the specified nominal sizes are shown in Tables 3 and 4 and in Figs. 1 and 2. For a given pipe size, the inside diameter and wall-thickness dimensions of Types TJ and BJ are the same.

5.2 *Bore*—The bore of a pipe shall be straight and circular in cross section, as determined by the unobstructed passage of a 1-m (40-in.) long mandrel 6.4 mm ($\frac{1}{4}$ in.) smaller

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²Annual Book of ASTM Standards, Vol 04.04.



than nominal diameter of the pipe.

5.3 *Length*—Overall length of the pipe shall be 1.5, 2.4, or 3.0 m (5, 8, or 10 ft), depending on manufacturer's standard practice. A tolerance of ± 25 mm (± 1 in.) shall be permitted. Up to 20 % shorter lengths than the manufacturer's standard may be supplied, but no length shorter than 1.2 m (4 ft) shall be furnished.

5.4 *Perforations*—The perforations shall be circular in shape and arranged in parallel rows along the axis of the pipe. They shall be 7.9 ± 1.6 mm ($\frac{5}{16} \pm \frac{1}{16}$ in.) in diameter and spaced approximately 76 mm (3 in.) center to center along the rows. The rows of perforations shall be arranged in two equal groups placed symmetrically on each side of a lower segment corresponding to the flow line of the pipe. Pipe sizes of 125 to 200-mm (5 to 8-in.) diameters shall be supplied with four rows of holes, the inner rows 90 ± 10 deg apart, and the outer rows 160 ± 10 deg apart. Pipe sizes of 100 mm (4 in.) and smaller diameters shall be drilled with two rows of holes. These rows may be 90 to 125 deg apart.

6. Sampling

6.1 From each lot to be tested or fraction thereof, representing one size of product, select at random a number of lengths equivalent to one half the cube root of the total number of lengths included in the lot, except that in lots of 1000 lengths or less, 5 lengths shall be taken. If one half the cube root, as calculated, proves to be a fractional number, express it as the next higher whole number. Test specimens shall not include damaged pipe. Tapered joints shall not be included.

7. Test Methods

7.1 Determine compliance with the requirements of this specification in accordance with Methods D 2314.

7.1.1 *Resistance to Flattening*—The flattening loads are given in Table 2.

7.1.2 *Crushing Strengths*—Use the three-edge-bearing loading surfaces.

8. Inspection

8.1 Inspection of the material shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

9. Rejection and Rehearing

9.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

9.2 If 20 % or less of the test specimens fail to meet any of the test requirements, then the supplier will be allowed to retest on two additional specimens for each specimen that failed, and the lot shall be acceptable if all these retest specimens meet the respective tests.

9.3 If any, but not more than 20 %, of the specimens fail to meet the requirements of the specification other than those of physical and chemical test, the supplier may cull the lot and eliminate whatever quantity of pipe he desires, and must so mark those pipe that they will not be considered part of the lot. The required tests and inspection will be made on the balance of the order and they shall be accepted if they conform to the specified requirements.

10. Certification

10.1 When specified in the purchase order or contract, a producer's or supplier's certification shall be furnished to the purchaser that the material was manufactured, sampled, tested, and inspected in accordance with this specification and has been found to meet the requirements. When specified in the purchase order or contract, a report of the test results shall be furnished.

11. Marking

11.1 Each length of pipe shall bear the manufacturer's identification. The markings shall be on the exterior of the barrel of the pipe and shall be legible until installed.

TABLE 1 Minimum Dry and Wet Three-Edge-Bearing Crushing Strengths, kN/m (lbf/ft)

	Nominal size, mm (in.)					
	50 (2)	75 (3)	100 (4)	125 (5)	150 (6)	200 (8)
Crushing strength	17.6 (1200)	17.6 (1200)	17.6 (1200)	20.6 (1400)	20.6 (1400)	25.5 (1700)