



Standard Test Method for Pore Size Characteristics of Membrane Filters Using Automated Liquid Porosimeter¹

This standard is issued under the fixed designation E 1294; 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 test method describes a procedure for measuring the pore size characteristics of membrane filters in the range of approximately 0.05 to 300 μm.

1.2 This test method uses the automated bubble point method described in ASTM Test Method F 316.

1.3 The liquid displacement technique used in this test method depends upon the capillary rise created by surface tension and uses the Washburn equation for calculating the pore diameter.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

F 316 Test Method for Pore Size Characteristics of Membrane Filters for Use with Aerospace Fluids²

3. Summary of Test Method

3.1 A filter wet with liquid exhibits properties similar to those of array of liquid filled capillaries (see Note). The sample under test is thoroughly wetted with liquid of low surface tension and low vapor pressure and placed in a sample holder assembly. An increasing air pressure is applied upstream of the sample and as successively smaller pores empty, the air flow across the sample is recorded as a function of applied pressure. The point of first flow is identified as the bubble point (maximum pore size). This continues until the smallest detectable pore is reached. This information is then compared with the flow rate against applied pressure response for the dry sample. The pore size distribution is then obtained from wet and dry curves.

NOTE 1—This test method will not change the priorities of the membrane if the test liquids are chosen to be compatible with the material from which it is made.

¹ This test method is under the jurisdiction of ASTM Committee E-48 on Biotechnology and is the direct responsibility of Subcommittee E48.03 on Unit Processes and Their Control.

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² *Annual Book of ASTM Standards*, Vol 11.01.

4. Significance and Use

4.1 This test method may be used to determine the maximum pore size, minimum pore size, and mean flow pore size.

4.2 The pore size distributions by flow, number, and volume can be deduced from pressure versus flow data.

5. Apparatus

5.1 *Source of Compressed Air* up to 150 psi.

5.2 *Automated Liquid Porosimeter*.³

5.3 *Sample Holders*.

5.4 *Metal Punch*, used to cut a suitable size membrane filter from the test sheet to fit the test filter holder.

6. Reagents and Materials

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available.⁴ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Porofil*.⁵

6.3 *Isopropyl Alcohol*.

6.4 *Water*.

6.5 *Mineral Oil*.

7. Procedure

7.1 Follow the manufacturer's operating instructions to prepare the sample to introduce to the instrument for analysis.

7.2 Establish standard sampling procedures to obtain repeatable results.

8. Operating Instructions

8.1 Operating instructions shall be supplied by the manufacturer with every instrument. The instructions shall contain:

³ Coulter Porometer available from Coulter Electronics, Inc., 601 W. 20th Street, Hialeah, Florida 33010 U.S.A., has been found suitable for this purpose.

⁴ "Reagent Chemicals, American Chemical Society Specifications," *American Chemical Society*, Washington DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see "Analytical Standards for Laboratory U.K. Chemicals," BDH Ltd., Poole, Dorset, and the "United States Pharmacopeia."

⁵ Porofil wetting liquid, available from Coulter Electronics, Inc., has been found suitable for this purpose.