

Standard Test Methods for Pore Size Characteristics of Membrane Filters by Bubble Point and Mean Flow Pore Test¹

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1. Scope

1.1 These test methods cover the determination of two of the pore size properties of membrane filters with maximum pore sizes from 0.1 to 15.0 μm .

1.2 Test Method A presents a test method for measuring the maximum limiting pore diameter of nonfibrous membranes. The limiting diameter is the diameter of a circle having the same area as the smallest section of a given pore (Fig. 1).

1.3 Test Method B measures the relative abundance of a specified pore size in a membrane, defined in terms of the limiting diameter.

1.4 The analyst should be aware that adequate collaborative data for bias statements as required by Practice D 2777 is not provided. See the precision and bias section for details.

1.5 *This standard may involve hazardous materials, operations, and equipment. 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:*

D 1129 Terminology Relating to Water²

D 1193 Specification for Reagent Water²

D 2777 Practice for Determination of Precision and Bias of Applicable Methods of Committee D19 on Water²

E 128 Test Method for Maximum Pore Diameter and Permeability of Rigid Porous Filters for Laboratory Use³

3. Terminology

3.1 *Definitions*—For definitions of other terms used in these test methods, refer to Terminology D 1129.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *pore size*—capillary equivalent pore diameter.

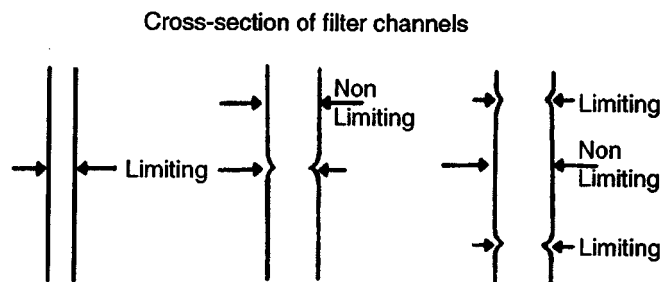


FIG. 1 Examples of Limiting Diameters

3.2.2 *limiting pore diameter*—diameter of a circle having the same area as the smallest section of a given pore.

TEST METHOD A—MAXIMUM PORE SIZE

4. Summary of Test Method

4.1 The bubble point test for maximum pore size is performed by prewetting the filter, increasing the pressure of gas upstream of the filter at a predetermined rate and watching for gas bubbles downstream to indicate the passage of gas through the maximum diameter filter pores.

4.2 The pressure required to blow the first continuous bubbles detectable by their rise through a layer of liquid covering the filter is called the "bubble point", and is used to calculate maximum pore size.

5. Significance and Use

5.1 This test method may be used to:

5.1.1 Determine the maximum pore size of a filter,

5.1.2 Compare the maximum pore sizes of several filters, and

5.1.3 Determine the effect of various processes such as filtration, coating, or autoclaving on the maximum pore size of a membrane.

5.2 Membrane filters have discrete pores from one side to the other of the membrane, similar to capillary, tubes. The bubble point test is based on the principle that a wetting liquid is held in these capillary pores by capillary attraction and surface tension, and the minimum pressure required to force liquid from these pores is a function of pore diameter. The

¹ These test methods are under the jurisdiction of ASTM Committee D19 on Water and are the direct responsibility of Subcommittee D19.08 on Membranes and Ion Exchange Materials.

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

³ *Annual Book of ASTM Standards*, Vol 14.04.