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Standard Methods for Gas Flow Resistance Testing of Filtration Media[1]

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1. Scope

1.1 The flow resistance of any fabricated filter device will depend on the flow resistance of the media used.

1.2 This standard offers procedures sufficient to determine the gas flow characteristics of flat specimens of media used in the filtration process. The methods are extended to include pleated specimens and bulk media as well.

1.3 In all cases, flow rates through the specimen are determined in accordance with procedures outlined in ASME "Fluid Meters." The test fluid is air.

1.4 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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 461 Test Methods for Testing Felt[2]

D 585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Product[3]

D 645 Test for Thickness of Paper and Paperboard[4]

D 685 Method for Conditioning Paper and Paper Products for Testing[3]

D 737 Test Method for Air Permeability of Textile Fabrics[2]

D 1776 Practice for Conditioning Textiles For Testing[2]

D 1777 Method for Measuring Thickness of Textile Materials[2]

D 2905 Practice for Statements on Number of Specimens for Textiles[2]

D 3574 Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams[5]

E 105 Practice for Probability Sampling of Materials[6]

E 122 Practice for Calculating Sample Size to Estimate, with a Specified Tolerable Error, the Average for a Characteristic of a Lot or Process[6]

2.2 *ASME Document:*

"Fluid Meters," Sixth Edition, 1971[7]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *air density,* ρ—mass per unit volume.

3.1.2 *air flow resistance,* ΔP—pressure drop or pressure differential across a test specimen of filter medium at a specified air face velocity or mass flow rate.

3.1.3 *constituted bulk media*—those types of filter media formed from bonded aggregates or discrete solid materials.

3.1.4 *edge leakage*—air flow that passes into or bypasses the test specimen in geometric planes other than those intended for resistance measurement.

3.1.5 *face area, A*— cross-sectional area perpendicular to air flow at the specimen test boundary.

NOTE 1—If specimen inlet and exit face areas are different, "Inlet" or "Exit" shall be used to describe the face area in question.

3.1.6 *face velocity, V*— volumetric flow rate per unit face area.

NOTE 2—If specimen inlet and exit face areas are different, "Inlet" or "Exit" shall be used to describe the face velocity in question.

3.1.7 *mass rate of flow,* $\dot{m}$—mass transport of air per unit time through the test specimen.

3.1.8 *medium area,* A_m—total area of filtration media exposed to air flow.

NOTE 3—Medium area may be greater than face area due to pleating, folding, etc.

3.1.9 *medium velocity,* V_m—volumetric flow rate per unit medium area.

3.1.10 *normalized resistance,* $\sigma\Delta P$—product of sigma and measured air flow resistance.

[1] These methods are under the jurisdiction of ASTM Committee D22 on Sampling and Analysis of Atmospheres and are the direct responsibility of Subcommittee D22.90 on Executive.

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[2] *Annual Book of ASTM Standards,* Vol 07.01.

[3] *Annual Book of ASTM Standards,* Vol 15.09.

[4] Discontinued, see *1981 Annual Book of ASTM Standards,* Part 20.

[5] *Annual Book of ASTM Standards,* Vol 09.02.

[6] *Annual Book of ASTM Standards,* Vol 14.02.

[7] Available from American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

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