



## Standard Test Method for Resistance of Nonporous Paper to Passage of Air<sup>1</sup>

This standard is issued under the fixed designation D 726; 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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the determination of the resistance of nonporous paper to the passage of air. This test method cannot be used in those cases where the paper cannot be clamped securely against surface and edge leakage, such as, crepe or corrugated papers.

1.2 This test method is applicable to papers that permit the passage of up to 25 mL of air/0.785 in.<sup>2</sup> in 15 s, and in general, to papers not sufficiently porous to be tested by TAPPI methods T460 and T536.

NOTE 1—For testing porous and semiporous paper, refer to TAPPI T460, and T536, respectively. Since the three methods (D 726, T460, and T536) do not give the same results, it is recommended that a specific method be agreed upon in specifications covering paper between the seller and the purchaser, and that the method be chosen to conform to the principle range.

1.3 *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:<sup>2</sup>

D 585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Products

D 685 Practice for Conditioning Paper and Paper Products for Testing

E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process

#### 2.2 TAPPI Standards:

T 460 Air Resistance of Paper<sup>3</sup>

T 536 Resistance of paper to passage of air (HP Method)<sup>3</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D06 on Paper and Paper Products and is the direct responsibility of Subcommittee D06.92 on Test Methods.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from the Technical Association of the Pulp and Paper Industry, Technology Park/Atlanta, P.O. Box 105113, Atlanta, GA 30348.

### 3. Significance and Use

3.1 The air resistance of paper can be used as an indirect indication of such variables as degree of beating, absorbency (penetration of oil, water, etc.), apparent specific gravity, filtering efficiency for liquids or gasses, etc. It is influenced by both the internal structure and the surface finish. Internal structure is controlled largely by type and length of fiber, degree of hydration, orientation, and compaction. Surface finish is governed by the degree of wet pressing, types of felts used in manufacture, and primarily, calendering, as well as by the presence or absence of coating. Air resistance is further greatly influenced by the type and amount of filler, sizing, etc. The air resistance of coated papers is generally so high as to be of doubtful significance. While the measurement of air resistance is a useful control test for machine production, due to the number and complexity of factors outlined above, careful judgment with a consideration for end-product use should govern the adoption of specification limits for air resistance.

3.2 In insulating papers, air resistance can be used as a criterion in predicting dielectric strength and absorbency, in uncoated printing papers it can be used as an indication of rotogravure ink absorption, and in filter papers it can foretell the performance in filtering liquids or gasses.

### 4. Apparatus

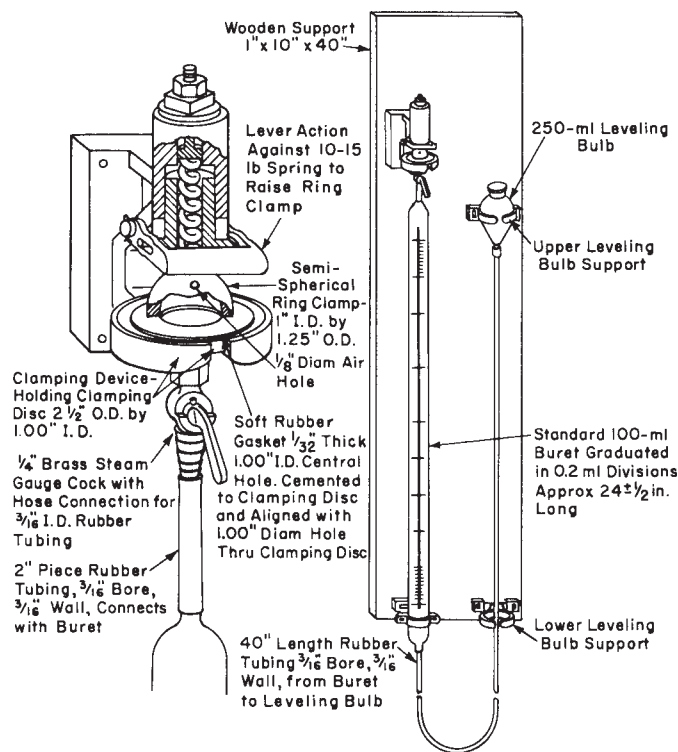
4.1 Fig. 1 shows the dimensions, design, and assembly of the apparatus, which consists essentially of a clamping device for the test specimen, a stopcock, a 100-mL buret, and a leveling bulb with tube mounted on a board for attachment to a wall or upright stand.

4.2 The gasket shall consist of a thin, elastic, oil-resistant, nonoxidizing material, having a smooth surface.<sup>4</sup> It shall be held in position with a water-insoluble synthetic rubber-base cold-setting adhesive. The calibrated portion of the scale shall be  $24 \pm \frac{1}{2}$  in. ( $610 \pm 13$  mm).

### 5. Calibration of Apparatus

5.1 With the stopcock open and no specimen over the orifice, place the leveling bulb in the lower support. Add sufficient distilled water to the level in the bulb so that it is

<sup>4</sup> Thiokol gasket, grade ST, polished plate molded,  $\frac{1}{16}$  in. (0.8 mm) in thickness, 50 to 60 Durometer hardness, is a satisfactory gasket material.



Metric Equivalents

in.	1/32	1/8	1/4	3/16	1/2	1	1.25	2 1/2	10	24	40
mm	0.8	3.2	6.4	4.8	13	25.4	32	64	254	610	1016

FIG. 1 Porosity Apparatus

about three-fourths full, and adjust the height of the lower support so that the amount of water in the buret stands at the 100-mL mark. With the stopcock and the specimen orifice still open, place the leveling bulb in the upper support, the height of which shall be first roughly adjusted so that the water level stands in the buret about 1/4 in. (6.4 mm) above the zero mark. With the stopcock open and the leveling bulb in the upper support, clamp a piece of impervious cellulose acetate sheet approximately 0.002 in. (0.05 mm) thick or impervious thin metal foil over the specimen orifice. Then place the leveling bulb in the lower support and observe the water level in the buret. This should be at the zero mark. If the water level is not at the zero mark, adjust the height of the upper support until this condition is satisfied. With the aspirator bottle in the lower support, the entire system shall be sufficiently tight so that the water level shall not fall more than 0.1 mL in 3 min.

**6. Sampling**

6.1 For acceptance sampling, obtain the sample in accordance with Practice D 585.

6.2 When sampling for other purposes, use Practice E 122 as an alternative.

**7. Test Specimens**

7.1 The test specimen or specimens should be cut to allow 25.8 cm<sup>2</sup> (4 in.<sup>2</sup>) for each one of ten tests. The size of the sample may be altered to conform to the available material, but the width of the test sheet should be not less than 51 mm (2 in.).

7.2 The test specimens shall be conditioned in accordance with Practice D 685.

**8. Procedure**

8.1 Test not less than 10 conditioned specimens in the standard atmosphere prescribed in Practice D 685, making an equal number of tests on each side of the sample.

8.2 With the stopcock and orifice open and the leveling bulb in the upper support, raise the ring clamp and centrally place a smooth, uncoated test specimen over the clamping plate orifice. Then lower the clamp. Be sure the semispherical ring clamp moves freely and that no liquid gets into the apparatus above the stopcock. Close the stopcock and place the leveling bulb in the lower support. Open the stopcock and start a stopwatch simultaneously. At the end of 15 s, close the stopcock and read the level of the water in the buret to 0.1 mL.

**9. Report**

9.1 The report shall include the average, maximum, and minimum values obtained for the ten test specimens used, with the values reported as millilitres for 15 s.

**10. Precision and Bias**

10.1 Precision:

10.1.1 Repeatability—Based on limited information from one laboratory, the repeatability standard deviation and the 95 % repeatability limits for the procedure in this test method are approximately 1.2 mL and 3.3 mL, respectively.



10.1.2 *Reproducibility*—The reproducibility of the procedure in this test method has not been measured.

10.1.3 It is not practicable to specify the precision of the procedure in this test method more extensively than that in 10.1. The test instrument required is no longer manufactured and few are known to be in active use. Because the procedure continues to be in limited use for specification of specialty grades of paper, and is not found in the published test methods of other standards writing organizations, it is provided here as a service to those using it. For specific situations where more

extensive precision estimates are required, they must be developed by those owning and using required equipment.

10.2 *Bias*—No statement is made about the bias of the procedure in this test method, as the value for resistance to passage of air as measured here is defined only in terms of the testing apparatus and conditions specified.

## 11. Keywords

11.1 filter paper; insulating paper; nonporous paper; paper; uncoated printing paper

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