



## **Standard Test Method for Surface Wettability of Paper (Angle-of-Contact Method)<sup>1</sup>**

This standard is issued under the fixed designation D 724; 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 measures the angle of contact when a drop of liquid is applied to the surface of a specimen of paper.

1.2 The measurement of both the initial angle of contact and the angle of contact after a defined elapsed period of time may be measured.

1.3 A standard liquid (ink) for making measurements is described.

1.4 Other liquids including printing inks, writing inks, adhesives, oils, and coating materials may be used upon agreement of those involved in the testing being done.

1.5 Two types of apparatus for measuring the contact angle using the procedure in this test method are described. Additional instruments that can perform the procedure in this test method may also provide equivalent results. A different procedure using an automated instrument for measuring angle of contact will be found in Test Method D 5725

1.6 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.7 *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 585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, or Related Products<sup>2</sup>

D 685 Practice for Conditioning Paper and Paper Products for Testing<sup>2</sup>

D 5725 Test Method for Surface Wettability and Absorbency of Sheeted Materials Using an Automated Contact Angle Tester<sup>2</sup>

E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process<sup>3</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-6 on Paper and Paper Products and is the direct responsibility of Subcommittee D06.92 on Test Methods.

Current edition approved Feb. 10, 1999. Published May 1999. Originally published as D 724 – 43. Last previous edition D 724 – 94.

<sup>2</sup> Annual Book of ASTM Standards, Vol 15.09.

<sup>3</sup> Annual Book of ASTM Standards, Vol 14.02.

#### **2.2 TAPPI Standard:**

TAPPI Test Method T 458 Surface wettability of paper (angle of contact method)<sup>4</sup>

### **3. Significance and Use**

3.1 This test method is useful in measuring the interaction of paper with liquids in a variety of applications.

3.2 When using the standard ink described in this test method, the contact angle measured initially is often considered a measure of the ruling quality of the paper.

3.3 When using the same standard ink, the change in contact angle between the times specified in this test method, 5 and 60 s, is often considered a measure of writing quality of the paper when an aqueous ink is used.

3.4 In many applications, a contact angle between 90 and 100 degrees, when a paper is tested with the standard ink, indicates that the paper will be suitable for general activities where water-based inks are used.

3.5 When this test method is used with specific non-standard inks of interest, or non-aqueous liquids, the users must agree in advance the data to be collected and how the data will be used.

3.6 Additional suggestions for more specific use of this test method will be found in Section 10.

### **4. Apparatus**

4.1 *Drop Projection Instrument*—An instrument capable of projecting the image of a drop of liquid on the surface of paper onto a screen so that the angle of a line tangent with the drop at the paper surface can be measured. The general concept is shown in Fig. 1 and shall consist of the following:

NOTE 1—While the projection instrument illustrated and described is antiquated, it describes the concept of the measuring procedure. Instruments are available in a more convenient form that serve the same purpose, that is projecting the image of the drop on a screen.

4.1.1 *Angle Measuring Device*—A protractor or similar device for measurement of contact angle.

4.1.2 *Filter*, used to reduce the heat on the specimen and drop.

4.1.3 *Lamp*—A ventilated lamp house containing a light source.

<sup>4</sup> Available from the Technical Association of the Pulp and Paper Industry, Technology Park/Atlanta, P.O. Box 105113, Atlanta, GA 30348.