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An American National Standard

Standard Test Method for Thickness of Paper and Paperboard[1]

This standard is issued under the fixed designation D645/D645M; 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 covers the determination of the thickness of paper and paperboard except electrical insulating papers (see Test Methods D202).

1.1.1 Because of the relatively high pressure 50 kPa [7.3 psi] used in this test method, it may not be suitable for measurement of tissue or other soft or low density materials, because the structure may collapse (decrease in thickness) at the prescribed pressure of 50 kPa.

1.2 The values stated in either SI units or in other units shall be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system must be used independently of the other, without combining values in any way.

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:*[2]

D202 Test Methods for Sampling and Testing Untreated Paper Used for Electrical Insulation

D585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Product

D685 Practice for Conditioning Paper and Paper Products for Testing

D1968 Terminology Relating to Paper and Paper Products

2.2 *TAPPI Standards:*[3]

T 411 Thickness (caliper) of paper, paperboard, and combination board

T 1206 Precision statements for test methods

3. Terminology

3.1 Definitions shall be in accordance with Terminology D1968 and the *Dictionary of Paper*.[3]

4. Significance and Use

4.1 Thickness is an important property of paper or paperboard, critical for certain end uses of paper and paperboard. This test method is useful for research work, routine control, design of end-use products, and for acceptance testing for conformance to a specification. Apparent density and other paper properties are related to thickness.

5. Apparatus

5.1 *Micrometer*, conforming to the following specifications:

5.1.1 Motor operated, dead-weight (not spring) actuated.

5.1.2 The micrometer shall have a flat ground circular movable face (the presser foot), having an area of 200 ± 5 mm^2 [equivalent to about 0.31 ± 0.01 $in.^2$] and corresponding to a diameter of 16 ± 0.2 mm [0.63 ± 0.01 in.].

5.1.3 The micrometer shall have a flat ground circular fixed face (the anvil) of such size that it is in contact with the whole area of the pressure foot in the zero position.

5.1.4 The surface of the presser foot shall be parallel to the surface of the anvil to within 0.001 mm [0.00005 in.]. The presser foot movement shall be on an axis that is perpendicular to the anvil surface. The minimum distance between the anvil and the presser foot in the "up" or raised position shall be 0.75 mm [0.030 in.].

5.1.5 The presser foot, when lowered, shall exert steady pressure on the specimen of 50 ± 2 kPa [approximately 7.3 ± 0.3 psi or 0.51 kgf/cm^2] for 3 ± 1 s. The period of steady pressure on the specimen is referred to as dwell time.

5.1.6 The presser foot shall have a lowering speed of 0.8 ± 0.1 mm [0.03 ± 0.004 in.]/s.

5.1.7 The frame of the micrometer shall be of such rigidity that a load of 1.5 kg (3 lb) applied to the dial housing, out of contact with either the weight or the presser foot spindle, will produce a deflection of the frame not greater than 0.0025 mm [0.0001 in.] as indicated by the micrometer readout system.

5.2 *Readout System*—Two types of readout systems are available for use in this test method as follows:

[1] 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 Standard Documents Relating to Paper and Paper Products.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Technical Association of the Pulp and Paper Industry (TAPPI), 15 Technology Parkway South, Norcross, GA 30092, http://www.tappi.org.