



## Standard Test Method for Specular Gloss of Paper and Paperboard at 75°<sup>1</sup>

This standard is issued under the fixed designation D1223; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method is for measuring the specular gloss of paper at 75° (15° from the plane of paper).

1.2 Although its chief application is to coated papers (1),<sup>2</sup> this test method may also be used for uncoated papers.

1.3 This test method is not a measure of image-reflecting quality and should not be used for cast-coated, lacquered, highly varnished (2, 3, 4) or waxed papers (5), and high-gloss ink films (6). For these purposes, TAPPI T 653 “Specular Gloss of Paper and Paperboard at 20 Degrees” is preferred, although the present method has been shown to be suitable for gloss measurements of most other ink films on paper or paperboard. Here, differences in the color and the diffuse reflectances of these ink films have a negligible effect on measured gloss. For example, on comparing white and black surfaces which are otherwise identical, the white surface will measure less than one gloss unit higher than the black.

1.4 *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>3</sup>

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

#### 2.2 TAPPI Standard:

T 1200 Interlaboratory evaluation of test methods to deter-

mine TAPPI repeatability and reproducibility<sup>4</sup>

### 3. Significance and Use

3.1 This test method is widely used as a partial measure of the surface quality and shiny appearance of coated paper.

### 4. Apparatus

4.1 *Gloss Meter*—(see Fig. 1). It consists of a source of light, a lens giving a converging beam of rays incident on the test specimen, a suction plate to hold the specimen flat, and a light detector to receive and measure certain of the rays reflected by the test specimen. These components are combined in a light tight housing that is matte black inside and is structurally and optically stable during warming and at the operating temperature. Details of the geometric, spectral, and photometric characteristics of the instrument and of the specimen holder are given in Annex A1.

4.1.1 *Area of Specimen Illuminated*—The area illuminated is controlled by the dimensions of the aperture stop A-A specified in Fig. 1. If the outline of this spot is projected sharply onto the specimen, the illuminated area will be rectangular,  $0.10d \pm 0.01d$  wide and  $0.05 \pm 0.005d$  times  $1/\cos 75^\circ$  long. When the value for  $d$  is 100 mm, the illuminated spot will have a width between 9.0 and 11.0 mm, and length between 17.4 and 21.3 mm, resulting in an illuminated area between 156 and 234 mm<sup>2</sup>. On the assumption that approximately 2000 mm<sup>2</sup> of paper or board should be evaluated to obtain a representative gloss value for the sample, 10 separate sheets or 10 different areas on one sheet should be measured and averaged.

NOTE 1—No minimum value for  $d$  is specified since none is required when a sufficient number of measurements is made so that the average provides a gloss value representative of 2000 mm<sup>2</sup> of sample.

4.2 *Gloss Standards*—The theoretical specular-gloss standard is an ideal, completely reflecting, plane mirror having an assigned value of 384.4 gloss units. A flat, clean, and polished surface of black glass having a refractive index of 1.540 for the Sodium D line may be shown by the Fresnel equation (7) to measure 100 gloss units on this scale.

<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 Standard Documents Relating to Paper and Paper Products.

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<sup>2</sup> The boldface numbers in parentheses refer to the list of references at the end of this test method.

<sup>3</sup> 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.

<sup>4</sup> Available from Technical Association of the Pulp and Paper Industry (TAPPI), 15 Technology Parkway South, Norcross, GA 30092, http://www.tappi.org.