



## Standard Test Method for 20° Specular Gloss of Waxed Paper<sup>1</sup>

This standard is issued under the fixed designation D 1834; 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 is primarily intended to measure the gloss of waxed papers.

NOTE 1—For determining the gloss of book paper reference should be made to Test Method D 1223. For very high gloss paper see Wink et al (1).<sup>2</sup>

1.2 *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 Product<sup>3</sup>

D 1223 Test Method for Specular Gloss of Paper and Paperboard at 75°<sup>4</sup>

### 3. Terminology

#### 3.1 Definition:

3.1.1 *specular gloss*—the degree to which a surface simulates a mirror in its capacity to reflect incident light.

### 4. Summary of Test Method

4.1 This test method involves the measurement of specular reflectance on a scale on which a polished black glass with a refractive index of 1.540 measures 100 units. The angles of incidence and reflection are each 20°, and the receptor or viewing window is round and its diameter subtends an angle of 5° with respect to an apex at the center of the illuminated area in the plane of the sample opening.

NOTE 2—These geometric conditions and measurement scale are rec-

ommended by Hunter and Lofland (2) for the gloss measurement of waxed papers.

### 5. Significance and Use

5.1 This test method gives good correlation with visual gloss or shininess provided the sample is flat. The degree of correlation decreases as the sample deviates from being flat.

### 6. Apparatus

6.1 The apparatus shall consist of a concentrated-filament lamp and lens projecting an incident beam of rays, means for locating the specimen surface to receive this beam, and a light-sensitive receptor located to receive certain rays reflected from this surface. These three parts shall be combined in a rugged instrument in which relative positions shall be as shown in Fig. 1. The actual dimensions of these parts shall be left to the designer of the apparatus, so long as the rays of light passed through the instrument satisfy the geometric and spectral conditions prescribed in 6.2-6.6.

NOTE 3—A suitable instrument has been built by using the following parts and dimensions (refer to Fig. 1):

Lamp<sup>5</sup>—6 V (requires adjustable voltage for standardization)

Lens in lamp beam<sup>6</sup>—Diameter 39 mm, focal length 63 mm

Lens at receptor window<sup>7</sup>—Double convex, diameter 19 mm, focal length 47 mm

Photocell<sup>8</sup>

Meter<sup>9</sup>—0 to 50 μA (90-mm (3½-in.) round flush phenolic plastic case)

Dimensions, mm:

|                                           |     |
|-------------------------------------------|-----|
| Lamp filament to center lens              | 92  |
| Center lens to center specimen            | 70  |
| Center specimen to center receptor window | 126 |
| Center window to center photocell         | 79  |

Window diameters, mm:

|                 |              |
|-----------------|--------------|
| Lamp beam lens  | 37           |
| Specimen        | more than 25 |
| Receptor window | 11           |

The cell-meter combination must be calibrated for linearity.

6.2 *Geometric Conditions*—The axis of the incident beam shall be  $20 \pm 1^\circ$  from a line perpendicular to the plane to the

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

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 15.09.

<sup>4</sup> Discontinued; see 1979 *Annual Book of ASTM Standards*.

<sup>5</sup> A General Electric instrument lamp No. 1630 has been found satisfactory for this purpose.

<sup>6</sup> Available from the Edmund Scientific Corp., 101 E. Gloucester Pike, Barrington, NJ 08007-1380, achromat stock No. 6246.

<sup>7</sup> Available from the Edmund Scientific Corp.

<sup>8</sup> A General Electric No. 8PV1AAB photovoltaic cell has been found satisfactory for this purpose.

<sup>9</sup> A Weston Model 301 has been found satisfactory for this purpose.

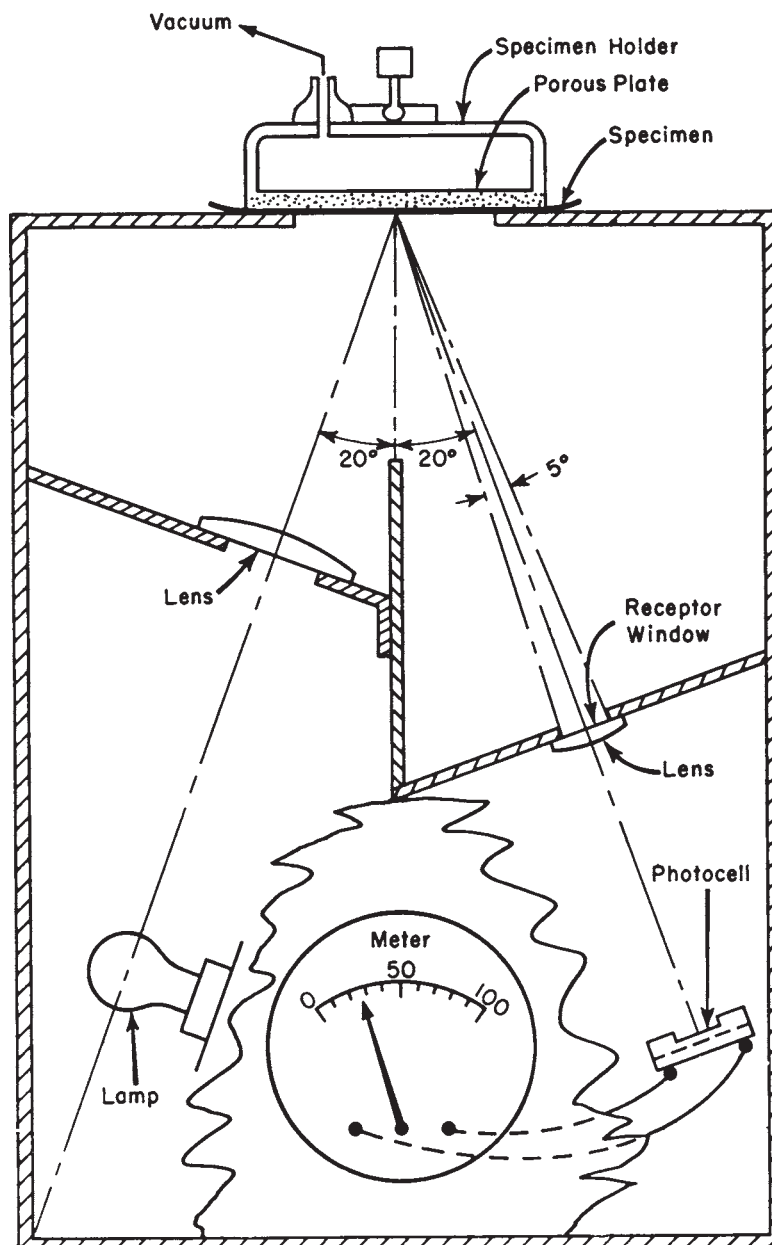


FIG. 1 Diagram of Relative Positions of Essential Elements of Glossmeter

test surface. The receptor window, the lens adjacent to this window, and the photoreceptor shall be centered about an axis which is the mirror image of the axis of the incident beam. With a piece of polished black glass or other front-surface mirror in sample position, an image of the source shall be formed at the center at the receptor window. No diameter of the illuminated area of the specimen shall be more than one quarter the distance from the center of this area to the center of the receptor window. The receptor window shall be round in shape and measure  $5 \pm 0.05^\circ$  in diameter from the center of the illuminated area in the plane of the sample opening. An image of the source shall be formed in the center of the receptor window when a front-surface mirror is placed in the specimen position. Diameters of the image shall subtend angles at the center of the illuminated area in the specimen plane of no more than  $2.5^\circ$  nor less than  $1.0^\circ$ .

NOTE 4—It is advantageous, though not essential that there be means by which the operator may observe the specimen area under test.

NOTE 5—The geometric dimensions of glossmeters and the relations of these dimensions to instrument accuracy have been analyzed by Hammond and Nimeroff (3).

**6.3 Stray Light and Vignetting**—There shall be diaphragms and light shields to keep all light from reaching the receptor except that in the beams described in 6.2, but there shall be no vignetting nor interception by stops or diaphragms of rays projected in the directions specified in 6.2. The interior of the instrument shall be finished in matt black. Lamp, lenses, photoreceptor, and interior surfaces shall be kept clean and free of dust.

**6.4 Spectral Conditions**—The instrument shall have as its source Standard Illuminant C defined by the International Commission on Illumination (CIE), and its receptor shall have