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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Gel Count of Plastic Film[1]

This standard is issued under the fixed designation D 3351; 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 number of gels present in plastic film when observing the images formed on a screen when light is projected through the film.

1.2 The thickness of the films covered by this specification is 100 µm (0.004 in.) or less.

1.3 *This standard does not purport to address all of the safety problems, 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.*

NOTE 1—There is no similar or equivalent ISO standard.

2. Terminology

2.1 *Definitions:*

2.1.1 *gel*—a nodule of plastic material which is present in the matrix of film and is of such a composition that it is not readily blended with the matrix. Gels are believed to be composed of oxidized or high molecular weight materials, or both. A gel is to be distinguished from contamination such as particles of dirt, carbon, or lint.

3. Summary of Test Method

3.1 This test method was developed because the counting of gels in plastic film with the unaided eye is difficult and fatiguing to the operator. The test method calls for magnifying the specimen by about 8 to 1, thus making the gels easier to see. At the same time, standard-size images are projected on the screen at the same magnification.

4. Significance and Use

4.1 The presence of gels in plastic film is often objectionable due to appearance and to the problems associated with printing the film. This test method is designed to allow gels to be counted that would normally be difficult to observe with the unaided eye.

5. Apparatus

5.1 *Overhead Projector*, with a viewing plate at least 200 by 200 mm (8 by 8 in.) in size.

5.1.1 A rectangle 190 by 200 mm (7½ by 8 in.) shall be drawn on the viewing plate of the projector.

5.2 *Projection Screen*, at least 2 by 2 m (6 by 6 ft) in size.

5.3 *Acrylic Plate*, approximately 230 by 230 mm (9 by 9 in.) by 3.2 mm (0.125 in.) thick containing two standard holes, one of which is 0.80 mm (1/32 in.) in diameter and the other is 0.40 mm (1/64 in.) in diameter. The holes shall be approximately 1 mm deep and shall have smooth edges. They shall be approximately 12 mm apart, and roughly centered on the acrylic plate.

6. Test Specimens

6.1 A test specimen consists of four layers of film which are at least 200 mm (8 in.) square. A convenient size is 254 mm (10 in.) square. It is also convenient to staple the four layers together at one corner.

6.2 Three test specimens shall be prepared for testing.

6.3 An area 190 by 200 mm (7½ by 8 in.) is viewed through four layers of film, which gives a total film test area of 1520 cm^2 (240 $in.^2$).

7. Preparation of Apparatus

7.1 Set up the projector and screen so that a magnification of between 8 to 1 and 10 to 1 is obtained. Care should be taken in projection not to distort the image on the screen. To prevent distortion, the line of projection from the mirror to the screen should be perpendicular to the screen.

8. Conditioning

8.1 No specific conditioning period is required.

9. Procedure

9.1 Place two blown tubing specimens or four flat film specimens, four layers of film in each case, on top of each other on the viewing plate of the projector, so that the lines on the viewing plate include the center portion of each specimen.

9.2 Place the transparent plastic plate with standard holes in contact with the film on the stack of specimens and press firmly to remove wrinkles as far as possible. Do not allow the staple holding film layers together to come between plates.

9.3 Focus the projector so that the gel images and the image of the gel size standards are clearly projected on the screen.

9.4 Count the gels within the rectangle that are as large or are larger than the 0.80 mm (larger) standard, and also the gels that are smaller than the 0.80-mm standard, but as large as or larger than the 0.40-mm (smaller) standard.

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[1] This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.19 on Film and Sheeting.

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