



Designation: D 3354 – 96

Standard Test Method for Blocking Load of Plastic Film by the Parallel Plate Method¹

This standard is issued under the fixed designation D 3354; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This test method yields quantitative information regarding the degree of blocking (unwanted adhesion) existing between layers of plastic film. It is not intended to measure susceptibility to blocking.

1.2 By this procedure, the film-to-film adhesion is expressed as a blocking load in grams which will cause two layers of polyethylene film to separate with an area of contact of 100 cm². The test method is limited to a maximum load of 200 g. See also Test Method D 1893.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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.*

NOTE 1—This test method resembles ISO 11502 in title only. The content is significantly different.

2. Referenced Documents

- 2.1 *ASTM Standards*:
D 883 Terminology Relating to Plastics²
D 1893 Test Method for Blocking of Plastic Film³
E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴
2.2 *ISO Standard*:
ISO 11502 Determination of Blocking Resistance⁵

3. Terminology

3.1 *Definitions*: For definitions related to plastics, see Terminology D 883.

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. Current edition approved Aug. 10, 1996. Published February 1997. Originally published as D 3354 – 74. Last previous edition D 3354 – 89.

This edition was revised to meet current ASTM format.

² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Discontinued*—See 1990 *Annual Book of ASTM Standards*, Vol 08.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

4. Summary of Test Method

4.1 The load in grams required to separate a specimen of blocked film is measured by a balance-beam system similar to an analytical balance. One sheet of a blocked specimen is secured to an aluminum block suspended from the end of the balance beam and the other sheet is secured to an aluminum block fastened to the balance base. Weight is added equivalent to 90 ± 10 g/m to the other side of the beam, until the two films just totally separate, or until they reach 1.905-cm separation.

5. Significance and Use

5.1 Blocking develops in film processing and storage. In most cases the adhesion occurs when touching layers of smooth film are in intimate contact with nearly complete exclusion of air. Adhesion of the touching surfaces is induced by temperature or pressure, or both.

5.2 The procedure of this test method closely simulates the operation of separating film in some end-use applications.

6. Apparatus

6.1 Balance Modification:

6.1.1 A system found satisfactory in a round robin was to modify a heavy-duty, two-pan analytical balance sensitive to 0.1 g by replacing one pan with an aluminum block suspended over another aluminum block attached to the balance base.⁶ The essential features of the modification are pictured in Fig. 1. The hook, rod, and universal joint suspension have a total length that will allow the aluminum blocks to mate when the balance is unlocked and balanced. The mating faces shall be square and 100 ± 0.1 mm on each edge with a flat and slightly knurled or sand-blasted finish of root mean square 125.

6.2 Electro Mechanical Devices⁷:

6.2.1 Versions of the same test method have been developed which conform to the same test procedure but with different mechanics. The unit adds weight by moving a weight out along a beam at a rate equivalent to the 90-g rate, and instead of weighing the accumulated water, the weight is electronically displayed (Fig. 2).⁷

⁶ The analytic balance apparatus is available from Custom Scientific Instruments, Inc., 13 Wing Drive, Cedar Knolls, NJ 07927.

⁷ The electro mechanical apparatus is available from Kayeness, Inc., East Main St., Honeybrook, PA 19344.



FIG. 1 Balance Modification with Buret Assembly

6.2.2 A typical stationary aluminum block is 100 ± 1 mm (4 by 4 in.) and 20 ± 0.1 mm thick. If holes are drilled through the blocks for mounting they must be countersunk so that the head of the fastener is below the surface of the block. Back-mounting tapped holes are preferred to leave a smooth surface.

6.2.3 A means must be provided to clamp the two blocks firmly together. However, the clamp must not close with enough force to cause the films to block.

6.3 *Water Supply*—Water is measured from a 100-mL buret into a container resting on the balance pan. The buret should be of the bottom-loading, three-way-stopcock type adjusted to deliver 90 ± 10 mL of water in 1 min (See Fig. 1). Other means such as constant-volume pumps for adding water to this container may be used if the rate of flow is 90 ± 10 mL/min.

6.3.1 An alternate method of adding weight is to move a weight axially along the beam with a precision-drive system.

This may be accomplished using a stepper motor with a digital stepping drive with 60 cycles as its reference control. The weight-addition rate must be equivalent to the 90 ± 10 mL/min.

6.4 *Constant Rate of Separation Testing Device*—A pair of aluminum blocks 100 by 100 ± 1 mm and 75 ± 0.1 mm thick with appropriate adapters for mounting in a universal testing machine (see Fig. 3).

6.5 *Accessory Equipment*—Necessary accessories may include a 100 by 180-mm template, double-faced pressure-sensitive tape, a stopwatch, and a balance sensitive to 0.1 g.

7. Test Specimens

7.1 Cut block test specimens with a 100 by 180-mm template with the longer length being in the machine direction. Due to variations in gage and blocking tendencies, it is desirable to select several sample locations across the width of