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**Designation: ~~D1239 – 22~~ D1239 – 22a**

# Standard Test Method for Resistance of Plastic Films to Extraction by Chemicals[1]

This standard is issued under the fixed designation D1239; 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 for resistance of plastic films to chemicals covers the measurement of the weight loss of film after immersion in chemicals.

NOTE 1—There is no known ISO equivalent to this standard.

NOTE 2—Film is defined as sheeting having nominal thickness not greater than 0.25 mm (0.010 in.), in accordance with Terminology D883.

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1.2 The values stated in SI units are to be regarded as standard. The values stated in other units are nominal values given for information only.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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## 2. Referenced Documents

2.1 *ASTM Standards:*[2]

D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents
D882 Test Method for Tensile Properties of Thin Plastic Sheeting
D883 Terminology Relating to Plastics
D1600 Terminology for Abbreviated Terms Relating to Plastics

## 3. Terminology

3.1 *Definitions*—For definitions of technical terms pertaining to plastics used in this test method, refer to Terminology D883. For abbreviations used in this test method, refer to Terminology D1600.

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

***A Summary of Changes section appears at the end of this standard**

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## 4. Significance and Use

4.1 This test method is intended to be a rapid empirical test to determine the loss of the plasticizer or other extractable components from the plastic film when immersed in liquids commonly used in households.

## 5. Apparatus

5.1 *Balance*—An analytical balance, capable of weighing to 0.0001 g.

NOTE 3—An analytical balance capable of weighing to 0.001 g can be used when the specimen thickness is greater than 0.05 mm (0.002 in.) and the extracted weight loss of the specimen exceeds 0.005 g.

5.2 *Containers*—Container with a diameter of at least 65 mm (2.5 in.) and a minimum volume to hold one ~~specimen.~~specimen plus 400 mL of solvent in accordance with 9.2.

## 6. Materials

6.1 *Distilled Water*—Freshly prepared distilled or deionized water.

6.2 *Soap Solution* (1 %)—Dissolve 12 g of dehydrated pure white soap flakes (dried for 1 h at 105°C) in 1200 mL of distilled water. This is sufficient solution to test three specimens.

6.3 *Cottonseed Oil*—Household cooking grade.

6.4 *Mineral Oil, USP*—Heavy grade, sp gr 0.875 to 0.905.

6.5 *Kerosine.*

6.6 *Ethyl Alcohol* (50 %),as described in Test Method D543.

6.7 Any other standard or supplementary reagent listed in Test Method D543.

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## 7. Test Specimen

7.1 The test specimens for plastic films shall be in the form of squares 50 ± 0.25 mm (2 in.) on each side. At least three specimens of each sample shall be tested with each chemical reagent.

7.2 Nothing in this test method precludes the use of specimens of other dimensions or the making of other tests on the same specimens after they have been exposed to the chemicals. Another acceptable specimen is a disk 50 ± 0.25 mm (2 in.) in diameter (total area 41.5 $cm^2$), or a tension specimen at least 50 mm (2 in.) longer than the grip separation as prescribed in Test Methods D882.

7.3 A nominal tension specimen, uniform in width and thickness, shall not be less than 5.0 mm (0.20 in.) or greater than 25.4 mm (1.0 in.) in width.

7.4 For such specimens, use a proportionate amount of chemical and container of appropriate dimensions so that the specimen can be immersed in a completely vertical position during the test.

7.5 The amount of chemical used shall be approximately 8 mL/$cm^2$, ~~–~~of the specimen, counting the area of both sides of the specimen.

NOTE 4—Direct comparison of values should not be made between samples of different thicknesses, since percentage weight loss is a function of thickness.

## 8. Conditioning

8.1 *Conditioning*—Condition the test specimens at 23 ± 2°C (73.4 ± 3.6°F) and 50 ± 10 % relative humidity for not less than 40 h prior to test for those tests where conditioning is required. In cases of disagreement, the tolerances shall be ±1°C (±1.8°F) and ±5 % relative humidity.

8.1.1 Note that for some hygroscopic materials, such as nylons, the material specifications call for testing "dry as-molded specimens." Such requirements take precedence over the above routine preconditioning to 50 % relative humidity and require sealing the specimens in water vapor-impermeable containers as soon as molded and not removing them until ready for testing.

8.2 *Test Conditions*—Conduct tests in the standard laboratory atmosphere of 23 ± 2°C (73 ± 3.6°F) and 50 ± 10 % relative humidity, unless otherwise specified in the material specification or by customer requirements. In cases of disagreements, the tolerances shall be ±1°C (±1.8°F) and ±5 % relative humidity.

## 9. Procedure

9.1 Maintain the chemical reagent at the test temperature for at least 4 h before the specimens are immersed in it.

9.2 After weighing them, immerse the specimens in the liquids, one specimen per container. Each container shall contain 400 mL of the liquid. Suspend the specimen freely in a vertical position (Note 5), but fully covered by the liquid.

NOTE 5—To prevent each specimen from floating or curling, it may be necessary to attach small weights, such as paper clips.

9.3 Cover the containers containing the specimens and keep at the test temperature for the specified time. The standard conditions of test shall be 24 h at 23°C. Alternative conditions suggested are 4 h at 23°C, or either 4 or 24 h at 40°C.

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NOTE 6—The maximum weight loss by extraction is generally limited to approximately 50 % of the plasticizer content. If, in a comparison of materials, one or several samples have a weight loss greater than 15 %, tests should be made on all samples at a lower temperature or for less time.

9.4 Remove the specimens from the liquids and gently wipe with a solvent-soaked lint-free soft cloth or absorbent tissue. Specimens taken from water or volatile solvents like acetone or gasoline require no rinsing, but simply wipe dry as directed; rinse specimens tested in salt solutions, soaps, acids, or alkalis, with water before wiping to dryness.

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9.4.1 Specimens tested in nonvolatile oils require special consideration. These specimens are to be rinsed with a reagent-grade solvent, such as hexane, heptane, methanol, and petroleum ether, which is volatile and which is a poor solvent for the film, but a good solvent for the oil. If such a solvent is used, it is important to make sure that this solvent itself does not cause weight loss from the film. There can be problems in those cases where both the film and the nonvolatile oil are nonpolar.

9.5 It is realized that if the immersion chemical is not volatile, has good adhesion to the film, and does not attack the film, then, as a result, an increase in specimen weight at the end of the test is possible. Determine a weight correction by conditioning another sample of the same film, before immersion, in the same manner as for the standard test, but immerse the specimens in the particular chemical for only 5 min and then rinse and wipe dry. Add the average percentage weight gain of this blank sample to the average percentage weight loss; if the blank sample has a weight loss by this procedure, do not make any correction. If a sample gains more weight than its blank, report the difference as a percentage weight gain.

## 10. Calculations

10.1 The percentage loss in weight from extraction, expressed as percentage weight loss compared to the original specimen weight, shall be calculated as follows:

$$\text{Weight loss}, \% = [(W_1 - W_2)/W_1] \times 100 \quad (1)$$

*where:*

$W_1$ = weight of specimen after the conditioning period, and
$W_2$ = weight of specimen at the end of the test.