



Standard Test Method for Thickness of Thin Foil and Film by Weighing¹

This standard is issued under the fixed designation E 252; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the determination of the thickness of metallic foils 0.002 in. (0.05 mm) and less in thickness by weighing a specimen of known area and density. The test method is applicable to other foils and films as indicated in Annex A3.

1.2 The values stated in inch-pound units are to be regarded as the standard.

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

2. Referenced Documents

2.1 The following documents of the issue in effect on the date of material purchase, unless otherwise noted, form a part of this specification to the extent referenced herein:

2.2 ASTM Standards:

D 1505 Test Method for Density of Plastics by the Density-Gradient Technique²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications³

3. Apparatus

3.1 *Precision Blanking Press*—to cut foil circles that are 8.000 ± 0.008 in.² (51.613 ± 0.051 cm²) in area or 3.1915 ± 0.0015 in. (81.06 ± 0.04 mm) in diameter. Other size specimens may be used with the recognition that the accuracy stated in 6.1 is no longer applicable. See Annex A1 for the selection of other specimen sizes and the resulting change in accuracy of the test method.

3.2 *Balance*—capable of measuring to the nearest 0.1 mg of thickness for the 8.000-in.² (51.613 -cm²) circle.

4. Procedure

4.1 Blank an 8.000 ± 0.008 -in.² (51.613 ± 0.051 -cm²) circle representative of the foil swab with acetone or other suitable solvent to ensure a surface free of soil, and weigh the clean, dry specimen to the nearest 0.1 mg. Use a suitable solvent to remove any coating known to exceed 0.005 mg/ft² (4.645 mg/cm²) of surface area.

5. Calculation

5.1 Determine the thickness from the relationship:

$$T = W/AD$$

where:

T = thickness of the foil or film, in. (or cm),

W = weight of the circle, g,

A = area of the circle, in.² (or cm²), and

D = density of the foil, g/in.³ (or Mg/m³).

5.2 Densities of Aluminum Alloys:

5.2.1 Calculate the density of aluminum foil from chemical composition limits of the alloy by the method described in Annex A2. The densities of foil alloys determined in this manner are accurate to within ± 0.3 %.

5.2.2 Table 1 lists densities computed for some of the common foil alloys. A column headed "Mils/g for 8.000-in.² Area" is added for convenience in determining thickness of the 8.000-in.² (51.613 -cm²) specimens. The weight of the specimen in grams multiplied by this factor is equal to the thickness of the foil in mils.

6. Precision and Bias

6.1 Following the procedure outlined in this test method, repeated weighings of the same specimen on different balances should result in agreement within 1 mg. It is outside of the scope of this test method to describe maintenance and calibration procedures for balances, but disagreement larger than 1 mg warrants attention to maintenance or recalibration of the balance.

¹ This test method is under the jurisdiction of ASTM Committee B-7 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.05 on Testing.

Current edition approved Aug. 31, 1984. Published November 1984. Originally published as E 252-64T. Last previous edition E 252-78.

² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 14.02.