



Standard Test Method for Measurement of Coating Mass Per Unit Area on Anodically Coated Aluminum¹

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

1. Scope

1.1 This test method covers determination of the mass per unit area of coating on anodically coated aluminum and its alloys.

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:*²
[D1193 Specification for Reagent Water](#)

3. Significance and Use

3.1 This test method is a destructive test procedure suitable for quality control within manufacturing operations for coating mass on anodically coated aluminum and aluminum alloys. The mass of the coating is an approximation of its thickness provided the conditions under which the coating was applied, or the density of the coating, are known. An anodic coating's protective value and amenability to coloring by dyeing or electrolytic methods are related to mass of coating per unit area.

¹ This test method is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.07 on Conversion Coatings.

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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.

4. Reagents

4.1 The test solution shall have the following makeup:

| | |
|--|-------------|
| Chromic acid anhydride (CrO ₃) | 20 ± 0.5 g |
| Orthophosphoric acid of 85 mass %, density 1.69 | 35 ± 0.5 mL |
| Distilled or deionized water conforming with Type III Reagent Water of Specification D1193 , to make up to | 1000 mL |

NOTE 1—This solution is commonly referred to as a nondestructive “stripping solution” for anodic coatings. This solution dissolves the anodic coating with no significant attack of the substrate metal.

5. Test Specimen

5.1 Prepare a test specimen of known surface area, preferably a piece about 75 mm square. If the anodic coating is contaminated or impregnated with oil, grease, lacquer, etc., remove as much as possible of this material before determining the mass of the coating. It is not usually practicable to remove these materials from the pores of the coating, but surface films can frequently be removed by wiping the sample with a cloth wet with a suitable solvent.

5.2 In cases where it is required to measure the mass of coating on only one side of a specimen where both sides have anodic coatings, the following procedure may be used:

5.2.1 Prepare a specimen somewhat larger than required for 5.1.

5.2.2 Apply a suitable stop off around the edges of the specimen so that the area on the side of the specimen that is not to be tested is about 75 mm square. Paraffin wax has been used for this purpose, but any stop off that resists warm sodium hydroxide is suitable.

5.2.3 Swab the area with a warm solution of sodium hydroxide (10 mass %, 100 g/L) until bare metal is exposed, which is indicated by uniform bubbling over the entire exposed surface.

5.2.4 Swab with warm distilled water.

5.2.5 Dry with a clean cloth.

5.2.6 Swab with diluted nitric acid (1 part HNO₃, density 1.41, plus 1 part water).

5.2.7 Rinse with warm deionized or distilled water.

5.2.8 Dry at approximately 100°C until dry.

5.2.9 Cool and shear off the area covered with stop off, so that the coated area is the desired size, preferably at least 75 mm square.

NOTE 2—The stop off is intended to prevent the coating removal process from affecting the test area. Check visually to verify that the solutions have not run over the edges and removed or damaged the coated area to be tested.

6. Procedure

6.1 Measure the area of the coating. Do not include the area of cut edges or other uncoated surfaces.

6.2 Weigh the test specimen before and after stripping the coating from it to the nearest 1 mg.

6.3 Immerse the test specimen for 5 min in the phosphoric-chromic acid solution maintained at a temperature of about

100°C. Remove the specimen, wash in distilled or deionized water, dry, and weigh. Repeat this cycle of operations until the coating is completely removed, which is indicated by the weight of the specimen remaining constant.

7. Report

7.1 Report the mass of coating in milligrams per square decimetre.

8. Precision and Bias

8.1 *Precision*—The precision for this test method is most affected by the precision of the measurement of the test area. When performed by properly instructed personnel, the method is capable of yielding results with an uncertainty of less than 10 % over a significant range of coating weights.

8.2 *Bias*—The procedure in this test method for measurement of the mass of coating on anodically coated aluminum has no bias because the value of the mass of coating is defined only in terms of this test method.

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