



Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum¹

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

1. Scope

1.1 This method is intended to determine whether anodic oxide coatings on aluminum and its alloys, that have undergone a sealing treatment and contact with an acid solution, are stainproof or nonadsorptive with respect to dyes.

1.2 Coatings that have been properly sealed should be proof against adsorption of coloring materials and, hence, “nonstaining” in many types of service.

1.3 This method is applicable to anodic coatings intended for applications where they are exposed to the weather, or for protective purposes in corrosive media, and where resistance to staining is important.

NOTE 1—Performance in this test is predictive only of susceptibility to stain by dyes. It is not intended to be predictive of other factors in service performance such as pitting or general corrosion.

NOTE 2—For Aluminum Association Class I and II architectural anodic coatings that are sealed in solutions containing less than 15 ppm silicates or 3 ppm phosphates, the acid pretreatment may be omitted.

1.4 In the case of coatings colored in deep shades, where estimation of the intensity of any residual dye stain is difficult, interpretation of the test is based on whether or not the original color has been affected by the action of the test.

1.5 This method is not applicable to:

1.5.1 Chromic acid type anodic coatings.

1.5.2 Anodic coatings on aluminum alloys containing more than 2 mass % Cu or 4.5 mass % Si.

1.5.3 Anodic coatings that have been sealed only in dichromate solutions.

1.5.4 Anodic coatings that have undergone a treatment to render them hydrophobic.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

¹ This method is under the jurisdiction of ASTM Committee B-8 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.07 on Chemical Conversion Coatings.

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2. Summary of Test Method

2.1 The method depends upon the observation that a nonsealed or poorly sealed anodic coating is attacked by acid and easily colored by dye, while an adequately sealed coating is not appreciably attacked and does not retain any dye stain.

2.2 The method comprises contacting the test area of the anodized specimen with nitric acid solution and, after rinsing and drying, applying a special dye solution followed by rinsing and rubbing the test area with pumice powder, drying, and visual examination of the test area for retention of dye stain. Coatings that exhibit no dye stain or change in color are considered to have passed the test.

3. Reagents

3.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society,² where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

3.2 *Nitric Acid Solution*—Prepare a 40 ± 5 mass % solution of nitric acid (HNO_3) in distilled or deionized water.

NOTE 3—A convenient way is to carefully add one volume of 70 % HNO_3 (sp gr 1.41 at 20°C) to an equal volume of water, while stirring, observing the normal precautions for handling strong acids.

3.3 *Special Dye Solution*—Dissolve 1 g of aluminum blue 2LW dye³ in 50 mL of distilled or deionized water. The pH of the dye test solution shall be adjusted to 5.0 ± 0.5 and maintained at this value with additions of acetic acid or sodium hydroxide, as required.

NOTE 4—Dye solutions contaminated with soluble phosphates have reduced capability for staining nonsealed or poorly sealed anodic coatings.

² “Reagent Chemicals, American Chemical Society Specifications,” Am. Chemical Soc., Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see “Reagent Chemicals and Standards,” by Joseph Rosin, D. Van Nostrand Co., Inc., New York, NY, and the “United States Pharmacopeia.”

³ A suitable dye for this test is Aluminum Blue 2LW, available from Sandoz Colors and Chemicals, East Hanover, NJ, 07936.