



Designation: D3933 – 98 (Reapproved 2017)

Standard Guide for Preparation of Aluminum Surfaces for Structural Adhesives Bonding (Phosphoric Acid Anodizing)¹

This standard is issued under the fixed designation D3933; 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 guide describes the requirements for phosphoric acid anodizing of aluminum and its alloys for structural adhesive bonding.

1.2 The procedure included herein is based on the commercial practice of numerous agencies and organizations. The method may be revised or supplemented, as necessary, to include methods based on proven performance.

1.3 The surface preparation of metal systems used for qualification and quality-control testing of the adhesive should be agreed upon between the manufacturer and the user.

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

1.5 *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. A specific precaution is given in 5.5.*

1.6 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D907 Terminology of Adhesives

D2651 Guide for Preparation of Metal Surfaces for Adhesive Bonding

2.2 *Federal Specifications:*

0-0-670 Orthophosphoric Acid, Technical³

3. Terminology

3.1 *Definitions*—Many terms in this guide are defined in Terminology D907.

4. Significance and Use

4.1 Durable adhesive bonds between metal to metal, metal to composites can be obtained reliably only through proper selection and careful control of the materials used and the steps in the bonding process. The preparation of the metallic substrates to obtain surfaces with appropriate characteristics is a critical step. Improper surface preparation can produce seemingly acceptable bonds that can degrade rapidly with time. This guide describes one method on how to properly prepare aluminum surfaces can be obtained.

4.2 The formation of reproducible, durable, adhesive bonds in structural assemblies requires great care in the selection of materials, the preparation of the surfaces of the components to be bonded, the fit of the components, and the performance of the steps in the bonding process. Experience has shown that when adhesively bonded aluminum surfaces which have been prepared in accordance with this guide produce relatively reproducible, durable bonds.

5. Apparatus

5.1 Locate surface preparation and drying facilities separate from other activities or equipment, or both, to preclude contamination by substances detrimental to adhesion.

5.2 Facilities should be arranged such that parts can flow from the beginning of surface preparation to the priming operation without being touched.

5.3 Filters or traps, or both, should be installed for removing airborne dust, moisture, and oil from all air lines or ducts used for solution agitation and parts drying. Periodically check, clean, or replace filters to ensure proper operation.

¹ This guide is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.80 on Metal Bonding Adhesives.

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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.

³ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.