



Designation: D2651 – 01 (Reapproved 2024)

Standard Guide for Preparation of Metal Surfaces for Adhesive Bonding¹

This standard is issued under the fixed designation D2651; 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 U.S. Department of Defense.

INTRODUCTION

It is impossible and impractical to present a single surface-preparation method for a metal group, such as aluminum alloys, stainless steels, magnesium alloys, etc. The wide variety of individual alloys and heat treatments under each group, the fact that certain adhesives exhibit specific compatibilities with surface preparation and the complexity and nature of parts being bonded preclude the use of an all-inclusive procedure for a metal group. Procedures for aluminum alloys are well standardized, possibly because more bonding has been done with these alloys. Preliminary tests should be conducted with the specific adhesive and the exact lot of metals to determine performance. This is especially true for stainless steel. The adhesive manufacturers' recommendation should also be considered.

1. Scope

1.1 This guide covers procedures that have proved satisfactory for preparing various wrought metal surfaces for adhesive bonding. It does not address the preparation of cast metals.

1.2 Surface preparation methods are included for:

Metal	Section
Aluminum Alloys	7
Stainless Steel	8
Carbon Steel	9
Titanium Alloys	10
Magnesium Alloys	11
Copper and Copper Alloys	12

1.3 Procedures included herein are based on the commercial practice of numerous agencies and organizations. The methods may be revised or supplemented, as necessary, to include methods based on proven performance.

1.4 The surface preparation of metal systems used for qualification and quality control testing of the adhesive should be agreed upon by both manufacturer and user.

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

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 the user of this standard to establish appro-*

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

1.7 *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](#)

[D1125 Test Methods for Electrical Conductivity and Resistivity of Water](#)

[D2674 Methods of Analysis of Sulfochromate Etch Solution Used in Surface Preparation of Aluminum](#)

[D3933 Guide for Preparation of Aluminum Surfaces for Structural Adhesives Bonding \(Phosphoric Acid Anodizing\)](#)

2.2 *ASM International Document:*³

[Metals Handbook Volume V](#)

2.3 *Military Specifications:*⁴

[MIL-A-8625 Type II, Anodic Coatings for Aluminum and Aluminum Alloys](#)

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Society of Metals (ASM International), 9639 Kinsman Rd., Materials Park, OH 44073-0002, <http://www.asminternational.org>.

⁴ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

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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