AWS G2.4/G2.4M:2014
An American National Standard

Guide for the Fusion Welding of Titanium and Titanium Alloys

American Welding Society®

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Approved by the
American National Standards Institute
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Guide for the Fusion Welding of Titanium and Titanium Alloys

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Prepared by the
American Welding Society (AWS) G2 Committee on the Joining of Metals and Alloys

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

The standard *Guide for the Fusion Welding of Titanium and Titanium Alloys* provides instructional guidance for the welding of titanium and titanium alloys. This guide explains processes, equipment, materials, workshop practices, joint preparation, welding technique, tests, and the repair of defects.

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Foreword

This foreword is not part of AWS G2.4/G2.4M:2014, *Guide for the Fusion Welding of Titanium and Titanium Alloys*, but is included for informational purposes only.

This specification makes use of both U.S. Customary Units and the International System of Units (SI). The measurements are not exact equivalents; therefore each system must be used independently of the other, without combining values in any way when referring to filler metal properties. In selecting rational metric units, the AWS A1.1, *Metric Practice Guide for the Welding Industry*, and the International Standard ISO 544, *Welding consumables — Technical delivery conditions for welding filler metals — Type of product, dimensions, tolerances and markings*, are used where suitable. Tables and figures make use of both U.S. Customary and SI Units, which, with the application of the specified tolerances, provide for interchangeability of products in both the U.S. Customary and SI Units.

A vertical line in the margin or underlined text in clauses, tables, or figures indicates an editorial or technical change from the 2007 edition.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS G2 Committee on Joining Metals and Alloys, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

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Guide for the Fusion Welding of Titanium and Titanium Alloys

1. General Requirements

1.1 Scope. This guide provides information on welding processes and procedures that are recommended for use in titanium fabrication. The document presents detailed and up-to-date technical information on the best practices to allow first time fabricators of titanium as well as established fabricators to join titanium parts into high quality components.

1.2 Units of Measurements. This standard makes use of both the U.S. Customary Units and the International System of Units (SI). The latter are shown within brackets ([ ]) or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore, each system must be used independently.

1.3 Safety. Safety and health issues and concerns are beyond the scope of this standard and therefore are not fully addressed herein. Safety and health information is available from the following sources:

American Welding Society:

(1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

(2) AWS Safety and Health Fact Sheets

(3) Other safety and health information on the AWS website

Material or Equipment Manufacturers:

(1) Material Safety Data Sheets supplied by materials manufacturers

(2) Operating Manuals supplied by equipment manufacturers

Applicable Regulatory Agencies

Work performed in accordance with this standard may involve the use of materials that have been deemed hazardous, and may involve operations or equipment that may cause injury or death. This standard does not purport to address all safety and health risks that may be encountered. The user of this standard should establish an appropriate safety program to address such risks as well as to meet applicable regulatory requirements. ANSI Z49.1 should be considered when developing the safety program.

2. Normative References

The following standards contain provisions which, through reference in this text, constitute mandatory provisions of this AWS standard. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments to, or revision of, any of these publications do not apply. (Informative standards and specifications for titanium fabrication are available in Annexes C and D.)

AWS Documents:[1]

AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*;

[1] AWS standards are published by the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.