

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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An American National Standard

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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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Table of Contents

	Page No.
<i>Personnel</i>	v
<i>Foreword</i>	vii
<i>List of Tables</i>	xi
<i>List of Figures</i>	xi
1. General Requirements	1
1.1 Scope	1
1.2 Units of Measurements	1
1.3 Safety	1
2. Normative References	1
3. Terms and Definitions	2
4. Introduction	4
4.1 Oxygen, Nitrogen, Carbon, Iron, and Titanium	5
4.2 Surface Oxide Film	5
5. Arc Welding Processes	6
5.1 Gas Tungsten Arc Welding (GTAW)	6
5.2 Gas Metal Arc Welding (GMAW)	6
5.3 Plasma Arc Welding (PAW)	6
6. Equipment	7
6.1 Power Source	7
6.2 Welding Torch	7
6.3 Tungsten Electrodes	8
7. Materials	10
7.1 Base Metals	10
7.2 Filler Metals	10
7.3 Procedure Qualification	12
8. Workshop Practice	12
8.1 Workshop Layout	12
8.2 Material Identification and Storage	12
8.3 Inert Gas Protection	12
8.4 Inert Gas Distribution	13
8.5 In-Chamber Welding	13
8.6 Open-Air Welding	14
8.7 Shielding Gases	17
8.8 Argon Safety	17
9. Joint Preparation	17
9.1 Joint Design	17
9.2 Cutting	18
9.3 Preliminary Preparation	19
9.4 Cleaning for Welding	20
9.5 Fitup and Tack Welding	20

	Page No.
10. Welding Technique	21
10.1 Welding Parameters.....	21
10.2 Preheating	21
10.3 Filler Metal Practice	21
10.4 Starting and Stopping the Arc.....	21
10.5 Electrode Practice.....	22
10.6 Wire Feeding.....	22
10.7 Interpass Cleaning.....	22
10.8 Interpass Temperatures	22
11. In-Process Weld Quality Tests	22
11.1 Visual Inspection.....	22
11.2 Dew Point Testing	24
11.3 Bend Testing	24
11.4 Hardness Testing.....	24
12. Nondestructive Test	25
12.1 Radiography	25
12.2 Liquid Penetrant Testing.....	25
12.3 Ultrasonic Inspection.....	26
13. Repair of Defects	26
13.1 Fabrication Defects.....	26
13.2 Repairs Following Service Failures.....	26
13.3 Porosity	26
13.4 Filler Metals for Welding Titanium Alloys Metal Joints	26
Annex A (Informative)—Requirements of Base Metals.....	27
Annex B (Informative)—Requirements of Filler Metals	31
Annex C (Informative)— Informative References	35
Annex D (Informative)—Classifications for Titanium and Titanium Alloys.....	37
Annex E (Informative)—Guidelines for the Preparation of Technical Inquiries	41
List of AWS Documents on Joining Metals and Alloys.....	43

List of Tables

Table	Page No.
1	Approximate Current Ranges Depending upon the Electrode Diameter.....9
2	ASTM Specifications for Product Forms10
3	Recommended Filler Metals11
4	Recommended Shielding Gas Purity and Dew Point13
5	Typical Joint Designs.....18
6	Typical Parameters for GTAW, GMAW, and PAW.....21
7	Surface Color in Titanium Welds.....23
8	Bend Test Requirements for Titanium Alloys.....25
A.1	Chemical Composition Requirements of Base Metals (from ASTM B265).....27
A.2	Tensile Strength Requirements of Base Metals.....29
B.1	Symbols for Chemical Composition and Composition Requirements32
D.1	Guidelines for Compatible Filler Materials37
D.2	Base Material Grouping S-5138
D.3	Base Material Grouping S-5238
D.4	Base Material Grouping S-5339
D.5	Base Material Grouping S-5440
D.6	Filler Material Grouping A-51B.....40
D.7	Filler Material Grouping A-52B.....40
D.8	Filler Material Grouping A-53B.....40

List of Figures

1	Body-Centered Cubic (BCC) Structure.....3
2	Hexagonal Close-Packed (HCP) Structure.....3
3	Interstitial Elements.....4
4	Substitutional Elements4
5	Titanium Surface Oxide Formed by Heating in Air.....5
6	Large-Diameter Gas Cup and Lens for Titanium Welding7
7	Tungsten Electrode Tip Shape.....8
8	Collapsible Plastic Chamber Purged with Argon14
9	Typical Trailing Shield Design.....15
10	Examples of Backup Shields for Manual GTAW16
11	Color Sequence in Titanium.....23
12	Contamination of Tungsten Electrode from Air Entrainment24

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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.