

AWS G2.5/G2.5M:2025
An American National Standard

Guide for the Fusion Welding of Zirconium and Zirconium Alloys



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Guide for the Fusion Welding of Zirconium and Zirconium Alloys

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Prepared by the
American Welding Society (AWS) G2 Committee on Joining 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 Zirconium and Zirconium Alloys provides instructional guidance for the welding of zirconium and zirconium alloys. This guide explains processes, equipment, materials, workshop practices, joint preparation, welding techniques, tests, and the repair of discontinuities.



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This standard is subject to revision at any time by the AWS G2 Committee on Joining of Metals and Alloys. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn. Comments (recommendations, additions, or deletions) and any pertinent data that may be of use in improving this standard are requested and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS G2 Committee on Joining of Metals and Alloys and the author of the comments will be informed of the Committee's response to the comments. Guests are invited to attend all meetings of the AWS G2 Committee on Joining of Metals and Alloys to express their comments verbally. Procedures for appeal of an adverse decision concerning all such comments are provided in the Rules of Operation of the Technical Activities Committee. A copy of these Rules can be obtained from the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

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Personnel

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D. J. Tillack	<i>The Nickel Institute</i>

AWS G2D Subcommittee on Reactive Alloys

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K. T. Tran	<i>Naval Surface Warfare Center</i>
G. E. Trepus	<i>Blue Origin, LLC</i>

Advisors to the G2D Subcommittee on Reactive Alloys

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H. Kotaki	<i>Consultant for the Japan Titanium Society</i>
S. L. Luckowski	<i>United States Department of the Navy</i>
J. Simpson	<i>International Titanium Association</i>
S. D. Sparkowich	<i>Boston Metal</i>

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Foreword

This foreword is not part of this standard but is included for informational purposes only.

The American Welding Society formed the G2 Committee on Joining Metals and Alloys in 1992 in response to an industry demand for information on welding the metals and alloys that have not been covered by other documents and committees. This document is written by the G2 Committee on Joining Metals and Alloys.

This guide 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. In selecting rational metric units, AWS A1.1, *Metric Practice Guide for the Welding Industry*, and 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 use 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.

The evolution of AWS G2.5/G2.5M, *Guide for the Fusion Welding of Zirconium and Zirconium Alloys*, is shown below:

AWS G2.5/G2.5M:2012	<i>Guide for the Fusion Welding of Zirconium and Zirconium Alloys</i>
AWS G2.5/G2.5M:2025	<i>Guide for the Fusion Welding of Zirconium and Zirconium Alloys</i>

A vertical line in the margin or underlined text in clauses, tables, or figures indicates an editorial or technical change from the 2012 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 Street, # 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 Measure	1
1.3 Safety	1
2. Normative References	1
3. Terms and Definitions	3
4. Introduction	4
4.1 Elements <u>Influencing</u> Zirconium Weld Integrity	5
4.2 Zirconium Metallurgy	5
4.3 Zirconium <u>Welding</u> Discontinuities	5
5. Arc Welding Processes	6
5.1 Gas Tungsten Arc Welding (GTAW)	6
5.2 Plasma Arc Welding (PAW)	6
6. Equipment	6
6.1 Power Source	6
6.2 <u>GTAW</u> Torches	6
6.3 Tungsten Electrodes	7
7. Materials	9
7.1 Base Metals	9
7.2 Filler Metals <u>for Specific Base Metals</u>	10
8. Zirconium Welding Procedure and Welder Performance Qualifications	10
8.1 <u>Procedure Documentation</u>	10
8.2 <u>Welding Documents</u>	10
8.3 <u>Material Groupings</u>	12
8.4 <u>Weld Position/Weld Orientation</u>	13
9. Workshop Practice	13
9.1 Workshop Layout	13
9.2 Material Identification and Storage	13
9.3 Inert Gas Protection	13
9.4 Inert Gas Distribution	14
9.5 In-Chamber Welding	15
9.6 Open Air Welding	15
9.7 Shielding Gases	18
9.8 Argon Safety	19
10. Joint Preparation	18
10.1 Joint Design	19

<u>10.2</u> Cutting	20
<u>10.3</u> Preliminary Preparation	20
<u>10.4</u> Final Cleaning for Welding	21
<u>10.5</u> Fitup and Tack Welding	22
<u>11. Welding Technique</u>	22
<u>11.1</u> Welding Parameters	22
<u>11.2</u> Preheating	22
<u>11.3</u> Filler Metal Practice	23
<u>11.4</u> Starting and Stopping the Arc.....	23
<u>11.5</u> Electrode Practice	23
<u>11.6</u> Wire Feeding.....	23
<u>11.7</u> Interpass Cleaning	23
<u>11.8</u> Interpass Temperatures	24
<u>12. In-Process Weld Quality Tests</u>	24
<u>12.1</u> Visual Inspection	24
<u>12.2</u> <u>Shielding Gas Purity Testing</u>	24
<u>12.3</u> Bend Testing	26
<u>12.4</u> Hardness Testing.....	27
<u>13. Nondestructive Testing</u>	27
<u>13.1</u> Radiography.....	27
<u>13.2</u> Liquid Penetrant Testing.....	27
<u>13.3</u> Ultrasonic Inspection	28
<u>14. Heat Testing</u>	28
<u>14.1</u> <u>Stress Relief Annealing</u>	28
<u>14.2</u> <u>Oxide Thickening</u>	29
<u>14.3</u> <u>Full Annealing</u>	29
<u>15. Repair of Discontinuities</u>	29
<u>15.1</u> <u>Fabrication Discontinuities</u>	20
<u>15.2</u> Repairs Following Service Failures.....	31
<u>15.3</u> Porosity.....	31
Annex A (Informative)—Requirements of Base Metals	33
Annex B (Informative)—Requirements of Filler Metals	35
Annex C (Informative)—Informative References	37
Annex D (Informative)—Requesting an Official Interpretation on an AWS Standard	39
List of AWS Documents on Joining Metals and Alloys.....	

List of Tables

Table	Page No.
<u>6.1</u> Common Tungsten Electrodes Used During GTAW.....	8
<u>6.2</u> Approximate Current Ranges Depending upon the Electrode Diameter.....	8
<u>7.1</u> ASTM/ASME Specifications for Product Forms	9
<u>9.1</u> Recommended Shielding Gas Purity and Dew Point	14
<u>10.1</u> Typical Joint Designs	21
<u>11.1</u> Typical Parameters for GTAW of Zirconium.....	22
<u>12.1</u> Surface Color in Zirconium Welds	26
<u>12.2</u> Bend Test Requirements for Zirconium Alloys.....	27
A.1 Chemical Composition Requirements of Base Metals	33
A.2 Tensile Strength Requirements of Base Metals	33
B.1 Chemical Composition Requirements of Filler Metals—Weight Percent.....	35

List of Figures

Figure	Page No.
<u>3.1</u> Body-Centered Cubic (BCC) Structure.....	3
<u>3.2</u> Hexagonal Close-Packed (HCP) Structure.....	3
<u>3.3</u> Interstitial Elements.....	3
<u>3.4</u> Substitutional Elements	4
<u>3.5</u> Widmanstätten Grain Structure	4
<u>6.1</u> Large-Diameter Gas Cup and Lens for Zirconium Welding.....	7
<u>6.2</u> Tungsten Electrode Tip Shape	9
<u>9.1</u> Collapsible Plastic Chamber Purged with Argon	15
<u>9.2</u> Typical Trailing Shield Design	16
<u>9.3</u> Examples of Backing Shields for Manual GTAW	17
<u>12.1</u> Color Sequence in Zirconium Welding.....	25
<u>12.2</u> Contamination of Tungsten Electrode from Air Entrainment.....	26
<u>14.1</u> Iso-corrosion Curve of Zr Grade 702 (UNS R60702) in Sulfuric Acid.....	30

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Guide for the Fusion Welding of Zirconium and Zirconium Alloys

1. General Requirements

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

Although this guide is not written with mandatory requirements, mandatory language, such as the use of “shall,” will be found in those portions of the document where failure to follow the instructions or procedures could produce inferior, misleading, or unsafe results.

1.2 Units of Measure. This standard makes use of both 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) 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 documents listed below are referenced within this publication and are mandatory to the extent specified herein. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments or revisions of the publications may not apply since the relevant requirements may have changed. (Informative standards and specifications for zirconium fabrication are available in Annex C.)

American Welding Society (AWS) standards:

- AWS A3.0M/A3.0, *Standard Welding Terms and Definitions*