

**Standard Welding
Procedure
Specification for
Naval Applications
(SWPS-N) for Gas
Tungsten Arc Welding
of Austenitic Stainless
Steel (S-8), 1/8 inch
[3 mm] through 1-1/2
inch [38 mm] Thick,
MIL-3XX, in the
As-Welded Condition,
Primarily Pipe for
Naval Applications**



AWS-NAVSEA B2.1-8-318:2016
An American National Standard

Approved by the
American National Standards Institute
January 26, 2016

Standard Welding Procedure Specification for Naval Applications (SWPS-N) for Gas Tungsten Arc Welding of Austenitic Stainless Steel (S-8), 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, MIL-3XX, in the As-Welded Condition, Primarily Pipe for Naval Applications

1st Edition

Prepared by the
American Welding Society (AWS) B2 Committee on Procedure and Performance Qualification

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This standard contains the essential welding variables for austenitic stainless steel in the thickness range of 1/8 inch [3 mm] through 1-1/2 inch [38 mm], using manual gas tungsten arc welding. It cites the base metals and operating conditions necessary to make the weldment, the filler metal specifications, and joint designs for groove and fillet welds. This SWPS-N was developed primarily for naval applications that require performance to NAVSEA Technical Publication S9074-AQ-GIB-010/248, *Requirements for Welding and Brazing Procedure and Performance Qualification*.



ISBN: 978-0-87171-881-5
© 2016 by American Welding Society
All rights reserved
Printed in the United States of America

Statement on the Use of American Welding Society Standards

All standards (codes, specifications, recommended practices, methods, classifications, and guides) of the American Welding Society (AWS) are voluntary consensus standards that have been developed in accordance with the rules of the American National Standards Institute (ANSI). When AWS American National Standards are either incorporated in, or made part of, documents that are included in federal or state laws and regulations, or the regulations of other governmental bodies, their provisions carry the full legal authority of the statute. In such cases, any changes in those AWS standards must be approved by the governmental body having statutory jurisdiction before they can become a part of those laws and regulations. In all cases, these standards carry the full legal authority of the contract or other document that invokes the AWS standards. Where this contractual relationship exists, changes in or deviations from requirements of an AWS standard must be by agreement between the contracting parties.

AWS American National Standards are developed through a consensus standards development process that brings together volunteers representing varied viewpoints and interests to achieve consensus. While the AWS administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in its standards.

AWS disclaims liability for any injury to persons or to property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this standard. AWS also makes no guarantee or warranty as to the accuracy or completeness of any information published herein.

In issuing and making this standard available, AWS is neither undertaking to render professional or other services for or on behalf of any person or entity, nor is AWS undertaking to perform any duty owed by any person or entity to someone else. Anyone using these documents should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. It is assumed that the use of this standard and its provisions are entrusted to appropriately qualified and competent personnel.

This standard may be superseded by the issuance of new editions. Users should ensure that they have the latest edition.

Publication of this standard does not authorize infringement of any patent or trade name. Users of this standard accept any and all liabilities for infringement of any patent or trade name items. AWS disclaims liability for the infringement of any patent or product trade name resulting from the use of this standard.

Finally, the AWS does not monitor, police, or enforce compliance with this standard, nor does it have the power to do so.

On occasion, text, tables, or figures are printed incorrectly, constituting errata. Such errata, when discovered, are posted on the AWS web page (www.aws.org).

Official interpretations of any of the technical requirements of this standard may only be obtained by sending a request, in writing, to the appropriate technical committee. Such requests should be addressed to the American Welding Society, Attention: Managing Director, Technical Services Division, 8669 NW 36 St, # 130, Miami, FL 33166 (see Annex A). With regard to technical inquiries made concerning AWS standards, oral opinions on AWS standards may be rendered. These opinions are offered solely as a convenience to users of this standard, and they do not constitute professional advice. Such opinions represent only the personal opinions of the particular individuals giving them. These individuals do not speak on behalf of AWS, nor do these oral opinions constitute official or unofficial opinions or interpretations of AWS. In addition, oral opinions are informal and should not be used as a substitute for an official interpretation.

This standard is subject to revision at any time by the AWS B2 Committee on Procedure and Performance Qualification. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn. Comments (recommendations, additions, or deletions) that may be of use in improving this standard should be sent to AWS Headquarters. Any pertinent data supporting the comments are required. Such comments will receive careful consideration by the AWS B2 Committee on Procedure and Performance Qualification 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 B2 Committee on Procedure and Performance Qualification 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.

This page is intentionally blank

Personnel

AWS B2 Committee on Procedure and Performance Qualification

J. L. Cooley, Chair	<i>J. C. & Associates, Incorporated</i>
H. R. Castner, 1st Vice Chair	<i>Edison Welding Institute</i>
E. W. Beckman, 2nd Vice Chair	<i>Consultant</i>
J. M. Rosario, Secretary	<i>American Welding Society</i>
D. M. Allbritten	<i>Consultant</i>
J. Alston	<i>Jefferson Lab</i>
M. Bernasek	<i>C-SPEC</i>
K. L. Bingham	<i>Los Alamos National Laboratory</i>
M. W. Bumgarner	<i>Bumgarner Welding & Inspection, Incorporated</i>
M. C. Cook	<i>St. Louis Carpenters Apprenticeship Program</i>
T. A. Davenport	<i>PRL Industries, Incorporated</i>
J. J. Fluckiger	<i>Idaho National Laboratory</i>
E. H. Gray	<i>U.S. Nuclear Regulatory Commission</i>
M. F. Herrle	<i>Arise</i>
K. G. Kofford	<i>Idaho National Laboratory</i>
G. S. Michels	<i>Summit Design and Engineering Services</i>
S. D. Mobley	<i>Oak Ridge National Laboratory</i>
C. D. Morell	<i>U.S. Nuclear Regulatory Commission</i>
T. C. Mueller	<i>TransCanada Pipelines</i>
W. M. Ruof	<i>Bechtel Plant Machinery, Incorporated</i>
J. J. Sekely	<i>Welding Services, Incorporated</i>
M. L. Thomas	<i>Rocky Mountain Testing, LLC</i>
G. M. Wisbrock, Jr.	<i>Consultant</i>
R. K. Wiswesser	<i>Welder Training & Testing Institute</i>

Advisors to the AWS B2 Committee on Procedure and Performance Qualification

L. P. Connor	<i>Consultant</i>
B. J. Hable	<i>Ford Motor Company</i>
K. Y. Lee	<i>U.S. Department of Transportation</i>
B. B. MacDonald	<i>Consultant</i>
J. F. Pike	<i>NASA Langley Research Center</i>
F. A. Schweighardt	<i>Air Liquide Industrial U.S. LP</i>
A. W. Sindel	<i>GE Power, Steam Power Systems</i>
C. E. Spaeder, Jr.	<i>Consultant</i>
W. J. Sperko	<i>Sperko Engineering Services, Incorporated</i>
R. F. Waite	<i>Consultant</i>

AWS B2D Subcommittee on Standard Welding Procedure Specifications

H. R. Castner, Chair	<i>Edison Welding Institute</i>
J. M. Rosario, Secretary	<i>American Welding Society</i>
D. M. Allbritten	<i>Consultant</i>
J. Alston	<i>Jefferson Lab</i>
E. W. Beckman	<i>Consultant</i>

M. Bernasek	<i>C-SPEC</i>
K. L. Bingham	<i>Los Alamos National Laboratory</i>
J. L. Cooley	<i>J. C. & Associates, Incorporated</i>
T. A. Davenport	<i>PRL Industries, Incorporated</i>
J. D. Farren	<i>Naval Surface Warfare Center</i>
J. J. Fluckiger	<i>Idaho National Laboratory</i>
G. L. Franke	<i>Consultant</i>
K. G. Kofford	<i>Idaho National Laboratory</i>
C. D. Morrell	<i>U.S. Nuclear Regulatory Commission</i>
W. M. Ruof	<i>Bechtel Plant Machinery, Incorporated</i>
J. J. Sekely	<i>Welding Services, Incorporated</i>
T. J. White	<i>First Energy</i>

Advisors to the AWS B2D Subcommittee on Standard Welding Procedure Specifications

L. P. Connor	<i>Consultant</i>
K. Y. Lee	<i>U.S. Department of Transportation</i>
F. A. Schweighardt	<i>Air Liquide Industrial U.S. LP</i>
G. M. Wisbrock, Jr.	<i>Consultant</i>

Foreword

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

The American Welding Society and the Welding Research Council have joined in a cooperative effort to generate standard welding procedures for industry. The need for pretested welding procedures that are supported by adequate test data and that satisfy the technical requirements for the commonly used construction codes and specifications has been expressed by many individuals and organizations. The purpose of a welding procedure qualification is to provide test data for assessing the properties of a weld joint.

This Standard Welding Procedure Specification for Naval Applications is an outgrowth of the coordinated work of the Welding Procedures Committee of Welding Research Council, the AWS B2 Committee on Procedure and Performance Qualification, and a Task Group of this committee that included the Naval Sea Systems Command (NAVSEA) and representatives of the shipbuilding industry. The Welding Procedures Committee provided the test data documented by a Summary of Procedure Qualification Records. This SWPS-N was prepared by adapting AWS B2.1-8-212 to include requirements from NAVSEA Technical Publication S9074-AQ-GIB-010/248, *Requirements for Welding and Brazing Procedure and Performance Qualification*, and other relevant fabrication documents.

The welding terms used in this specification shall be interpreted in accordance with the definitions given in the latest edition of AWS A3.0M/A3.0, *Standard Welding Terms and Definitions Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*. Welding symbols shall be those shown in the latest edition of AWS A2.4, *Standard Symbols for Welding, Brazing, and Nondestructive Examination*. The AWS designation for welding gases should be those shown in the latest edition of AWS A5.32M/A5.32 (ISO 14175 MOD), *Welding Consumables—Gases and Gas Mixtures for Fusion Welding and Allied Processes*.

The AWS B2 Committee on Procedure and Performance Qualification was formed in 1979 to provide welding standards concerning the subject of qualification. The primary document developed by this committee is AWS B2.1/B2.1M, *Specification for Welding Procedure and Performance Qualification*. This document established the foundation and framework for Standard Welding Procedure Specifications (SWPSs). The Task Group on Standard Welding Procedure Specifications for Naval Applications was formed in 2009 to address the need for SWPS-N documents that support the requirements of NAVSEA Technical Publication S9074-AQ-GIB-010/248 and fabrication requirements for naval applications.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, B2 Committee on Procedure and Performance Qualification, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

This page is intentionally blank

Standard Welding Procedure Specification for Naval Applications (SWPS-N)

Gas Tungsten Arc Welding of Austenitic Stainless Steel (S-8), 1/8 inch [3 mm] through 1-1/2 inch [38 mm] Thick, MIL-3XX, in the As-Welded Condition, Primarily Pipe for Naval Applications

Welding Research Council—Supporting PQR Numbers:

001031, 001032, 003049, 007018 007019, 103023, 103024, 200005, 200175, 200201, 200204, 200623, 200720, 200721, 200749, 200751, 500223, 500224, 500225, 500226, 500227, 500228, 500229, 500230, 500231, 500253, 500254, 500255, 500256, 500257, 500258, 500263, 500264, 500265, 500266

Requirements for Application of SWPS-Ns

Scope. The data to support this Standard Welding Procedure Specification for Naval Applications (SWPS-N) have been derived from the above listed Procedure Qualification Records (PQRs) which were reviewed and validated under the auspices of the Welding Research Council. This SWPS-N is not valid using conditions and variables outside the ranges listed. The American Welding Society and Naval Sea Systems Command (NAVSEA) consider that this SWPS-N presents information for producing an acceptable weld using the conditions and variables listed. This procedure is intended to be used for groove and fillet welds. The user needs a significant knowledge of welding and accepts full responsibility for the performance of the weld and for providing the engineering capability, qualified personnel, and proper equipment to implement this SWPS-N.

Application. This SWPS-N is to be used only as permitted by AWS B2.1/B2.1M, *Specification for Welding Procedure and Performance Qualification*, and either NAVSEA Technical Publication S9074-AQ-GIB-010/248, *Requirements for Welding and Brazing Procedure and Performance Qualification*, or American Bureau of Shipping (ABS) Naval Vessel Rules (NVR), as applicable. Restrictions on the use of SWPS-Ns specified in the following documents, if any, shall also apply.

- NAVSEA Technical Publication S9074-AR-GIB-010/278, *Requirements for Fabrication Welding and Inspection, and Casting Inspection and Repair for Machinery, Piping, and Pressure Vessels*.
- MIL-STD-1689, *Fabrication, Welding, and Inspection of Ships Structure*.
- NAVSEA Technical Publication T9074-AD-GIB-010/1688, *Requirements for Fabrication, Welding, and Inspection of Submarine Structure*.

The fabrication document(s) should specify the engineering requirements such as design, need for postweld heat treatment, fabricating tolerances, quality control, and examination and tests applicable to the end product.

User's Responsibility. A SWPS-N does not replace or substitute for fabrication codes, specifications, contract requirements, or capability and judgment on the part of the user. A SWPS-N is to be used only as permitted by the applicable fabrication document, specification, or contract document. The ability to produce production welds having properties suitable for the application depends upon supplementing the SWPS-N with appropriate performance qualification tests