

**AWS B5.1:2013**  
**An American National Standard**



# **Specification for the Qualification of Welding Inspectors**



**American Welding Society®**



**AWS B5.1:2013**  
**An American National Standard**

**Approved by the**  
**American National Standards Institute**  
**November 14, 2012**

# **Specification for the Qualification of Welding Inspectors**

**2nd Edition**

**Supersedes AWS B5.1:2003**

Prepared by the  
American Welding Society (AWS) B5 Subcommittee on Welding Inspectors

Under the Direction of the  
AWS Personnel and Facility Qualification Committee

Approved by the  
AWS Board of Directors

## **Abstract**

This standard defines the qualification requirements to qualify welding inspectors. The qualification requirements for visual welding inspectors include experience and satisfactory completion of an examination, which includes demonstrated capabilities, and proof of visual acuity. The examination tests the inspector's knowledge of welding processes, welding procedures, nondestructive examinations, destructive tests, terms, definitions, symbols, reports, welding metallurgy, related mathematics, safety, quality assurance, and responsibilities.



**American Welding Society®**

---

International Standard Book Number: 978-0-87171-833-4  
American Welding Society  
8669 Doral Blvd., Suite 130, Doral, FL 33166  
© 2013 by American Welding Society  
All rights reserved  
Printed in the United States of America

**Photocopy Rights.** No portion of this standard may be reproduced, stored in a retrieval system, or transmitted in any form, including mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright owner.

Authorization to photocopy items for internal, personal, or educational classroom use only or the internal, personal, or educational classroom use only of specific clients is granted by the American Welding Society provided that the appropriate fee is paid to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, tel: (978) 750-8400; Internet: <[www.copyright.com](http://www.copyright.com)>.

## 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 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 is entrusted to appropriately qualified and competent personnel.

This standard may be superseded by new editions. This standard may also be corrected through publication of amendments or errata or supplemented by publication of addenda. Information on the latest editions of AWS standards including amendments, errata, and addenda is posted on the AWS web page ([www.aws.org](http://www.aws.org)). Users should ensure that they have the latest edition, amendments, errata, and addenda.

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.

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

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 Doral Blvd., Suite 130, Doral, FL 33166 (see Annex B). 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 Personnel and Facility Qualification Committee. 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 required and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS Personnel and Facility Qualification Committee 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 Personnel and Facility Qualification Committee 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 Doral Blvd., Suite 130, Doral, FL 33166.

This page is intentionally blank.

# Personnel

## Personnel & Facilities Qualification Committee

W. F. Behnke, Chair	<i>United Technical, LLC</i>
P. A. Michalski, 1st Vice Chair	<i>Dominion East Ohio</i>
P. A. Grimm, 2nd Vice Chair	<i>Modern Welding Company</i>
S. P. Hedrick, Secretary	<i>American Welding Society</i>
K. W. Coryell	<i>Consultant</i>
I. A. Cross	<i>Valiant Machine and Tool</i>
R. Dines	<i>United Technical, LLC</i>
K. M. Gilgenbach	<i>Airgas North Central</i>
M. D. Ison	<i>Tampa Tank Florida Structural Steel</i>
V. Kuruvilla	<i>Genesis Quality Systems</i>
B. W. Phillips	<i>Aker Solutions</i>
J. R. Reid	<i>Reid Consulting</i>
M. R. Stone	<i>Flint Field Services Ltd.</i>
D. L. Twitty	<i>Dona Ana Community College</i>

## AWS B5A Subcommittee on Welding Inspectors

P. A. Grimm, Chair	<i>Modern Welding Company</i>
S. P. Hedrick, Secretary	<i>American Welding Society</i>
W. F. Behnke	<i>United Technical, LLC</i>
K. W. Coryell	<i>Consultant</i>
R. E. Dines	<i>United Technical, LLC</i>
F. J. Fascenda	<i>Mitsubishi Power Systems Americas, Incorporated</i>
J. E. Greer	<i>Moraine Valley College</i>
M. D. Ison	<i>Tampa Tank Florida Structural Steel</i>
P. A. Michalski	<i>Dominion East Ohio</i>
C. K. Nicholson	<i>MACTEC Engineering &amp; Consulting, Incorporated</i>
J. R. Reid	<i>Reid Consulting</i>
D. L. Twitty	<i>Dona Ana Community College</i>
R. K. Wiswesser	<i>Welder Training &amp; Testing Institute</i>

## Advisors to the AWS B5A Subcommittee on Welding Inspectors

S. P. Fugate	<i>Fought &amp; Company, Incorporated</i>
A. S. Gallant	<i>Applus RTD</i>
V. Kuruvilla	<i>Genesis Quality Systems</i>
J. Olvera Sanchez	<i>Bombardier Transportation</i>
Z. Turner	<i>City &amp; County of San Francisco</i>

This page is intentionally blank.

## Foreword

This foreword is not part of AWS B5.1:2013, *Specification for the Qualification of Welding Inspectors*, but is included for informational purposes only.

This is the second edition of this specification. The first edition superseded, in part, AWS QC1, *Standard for Certification of AWS Welding Inspectors*. AWS QC1 sets the requirements for the AWS Certified Welding Inspector program. AWS B5.1 establishes a basic definition of a welding inspector, and is referenced by QC1. Companies or individuals wishing to establish in-house or internal qualification programs for inspection personnel may use AWS B5.1 as the basis for their program. Companies or individuals wishing to obtain AWS certification must follow the requirements in AWS QC1. Individuals who comply with AWS B5.1 but not with AWS QC1 should not be labeled as AWS Certified Welding Inspectors; only individuals who comply with AWS QC1, as determined by AWS, may obtain that title.

This second edition includes revisions to nearly every area of the specification: duties, capabilities, education, experience, and testing. An alternative to taking the Senior Welding Inspector exam has been added, see 7.3.

The Qualification and Certification Committee of the American Welding Society was formed in 1973. AWS QC1, *Standard for Certification of AWS Welding Inspectors*, was first published in 1975. The first examinations for the certification of AWS Certified Welding Inspector were conducted in the spring and fall of 1976. Over 30,000 individuals have met the requirements of AWS QC1, worldwide, since the start of the program. The last revision to AWS QC1 was published in 2007 and was approved by the American National Standards Institute. In 1996, the AWS Qualification & Certification Committee was divided into two freestanding committees. The Personnel & Facility Qualification Committee is now responsible for creating ANSI American national standards for welding personnel and welding facility qualification requirements. The AWS Certification Committee is now responsible for creating certification programs from these and other recognized standards.

The purpose of welding inspection is to determine if a weldment meets the acceptance criteria of a specific code, standard, or other document. The welding inspector must be thoroughly familiar with welding processes, welding procedures, welder qualifications, materials, the limitation of weld testing, be able to read drawings, prepare and keep records, prepare and make reports, and make responsible judgments. For welding inspectors to be effective, the activities performed should be consistent with the requirements and technical and ethical principles.

Comments and suggestions for the improvement of this standard are welcomed. They should be sent to the Secretary, AWS Personnel and Facility Qualification Committee, American Welding Society, 8669 Doral Blvd., Suite 130, Doral, FL 33166.



This page is intentionally blank.

# Table of Contents

	Page No.
<i>Personnel</i> .....	v
<i>Foreword</i> .....	vii
<i>List of Tables</i> .....	x
<b>1. Scope</b> .....	1
1.1 Requirements .....	1
1.2 Levels .....	1
1.3 Responsibility .....	1
1.4 Employer .....	1
1.5 Terminology Guideline .....	1
1.6 Units .....	1
1.7 Safety .....	1
1.8 Referenced Documents .....	2
<b>2. Terms and Definitions</b> .....	2
<b>3. Levels of Qualification</b> .....	2
3.1 Associate Welding Inspector (AWI) .....	2
3.2 Welding Inspector (WI) .....	2
3.3 Senior Welding Inspector (SWI) .....	2
<b>4. Functions</b> .....	2
4.1 Duties .....	2
4.2 Capabilities .....	2
<b>5. Education and Experience Requirements</b> .....	5
5.1 Associate Welding Inspector .....	5
5.2 Welding Inspector .....	5
5.3 Senior Welding Inspector .....	6
5.4 Documentation .....	6
5.5 Qualifying Experience .....	6
<b>6. Examination Requirements</b> .....	7
6.1 Visual Requirements .....	7
6.2 Written Test Requirements .....	7
<b>7. Examination Structure</b> .....	7
7.1 WI/AWI Examination .....	7
7.2 SWI Examination .....	8
7.3 SWI Alternate Qualification .....	8
<b>8. Maintenance of Qualification</b> .....	8
Annex A (Informative)—Reference Documents .....	9
Annex B (Informative)—Guidelines for the Preparation of Technical Inquiries .....	11

# List of Tables

<b>Table</b>	<b>Page No.</b>
1 Welding Inspection Capabilities Based on Qualification Level .....	3

# Specification for the Qualification of Welding Inspectors

## 1. Scope

**1.1 Requirements.** This standard establishes the requirements for qualification and defines the body of knowledge applicable to welding inspection personnel.

**1.2 Levels.** There are three levels of qualification: Associate Welding Inspector (AWI), Welding Inspector (WI), and Senior Welding Inspector (SWI).

**1.3 Responsibility.** Qualification of AWI/WI/SWI personnel to the requirements of this standard does not eliminate the need of an employer to determine the ability of the individual to perform the duties involved in a particular welding inspection assignment.

**1.4 Employer.** This standard is intended to supplement the requirements of an employer, code, or other documents, and shall not be construed as a preemption of the employer's responsibility for the work or for the performance of the work.

**1.5 Terminology Definitions.** As used in this standard, the word *shall* denotes a requirement, the word *should* denotes a guideline, and the word *may* means it is permissible. As used in this specification the word *welders* includes welding operators, brazers, and brazing operators.

**1.6 Units.** This standard does not require units of measure. Therefore, no equivalents or conversions are contained except when they are cited in examples.

### 1.7 Safety

**1.7.1** Safety and health issues and concerns are beyond the scope of this standard; some safety and health information is provided, but such issues are not fully addressed herein.

**1.7.2** 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

**1.7.3** 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.

## 1.8 Referenced Documents

- (1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*<sup>1</sup>
- (2) AWS A3.0, *Standard Welding Terms and Definitions*<sup>1</sup>

## 2. Terms and Definitions

Terms used in this standard are defined below. All other terms, are defined by AWS A3.0, *Standard Welding Terms and Definitions*.

**active supervision.** Direct on-site or readily available supervision by the WI/SWI in the form of necessary instructions to assure that the AWI can perform specific evaluations as specified by the employer.

**candidate.** The person attempting to qualify to this standard.

**certification.** The act of determining, verifying, and attesting in writing to the qualification of personnel in accordance with specified requirements.

**qualification.** Demonstrated training, skill, knowledge, and experience required for personnel to perform the duties of a specific job or function typically demonstrated by passing a performance test.

## 3. Levels of Qualification

This standard recognizes three levels of qualifications for welding inspection personnel. These levels are:

**3.1 Associate Welding Inspector (AWI).** A person meeting the qualification requirements of 5.1 and Clause 6.

**3.2 Welding Inspector (WI).** A person meeting the qualification requirements of 5.2 and Clause 6.

**3.3 Senior Welding Inspector (SWI).** A person meeting the qualification requirements of 5.3 and Clause 6.

## 4. Functions

### 4.1 Duties

**4.1.1 AWI.** All inspections performed by the AWI shall be made under the active supervision a SWI or WI. The SWI or WI shall maintain the responsibility for determining if welded assemblies conform to workmanship and acceptance criteria.

**4.1.2 WI.** The WI shall be able to supervise and train AWIs. The WI shall be able to perform inspections to applicable procedures and processes. The WI shall be able to conduct audits of suppliers and organizations providing materials or services to the project. The WI shall ensure the work performed and associated records are maintained and conform to the requirements of the applicable standards or other contract documents.

**4.1.3 SWI.** The SWI shall be able to perform inspections, supervise one or more WIs or AWIs, write welding procedure specifications, test and qualify welders, prepare inspection reports, and review and interpret joining procedures.

**4.2 Capabilities.** As specified by qualification level, the welding inspector shall, at a minimum, be able to perform the tasks listed in Table 1. This table does not restrict inspectors from performing tasks above their qualification level if their employer determines the inspector has the necessary skills to perform those higher level tasks (see 1.3).

---

<sup>1</sup> ANSI Z49.1 and AWS standards are published by the American Welding Society, 8669 Doral Blvd., Suite 130, Doral, FL 33166.

**Table 1**  
**Welding Inspection Capabilities Based on Qualification Level**

<b>Knowledge and Skills</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) prepare reports	X	X	X
(2) communicate effectively orally and written	X	X	X
(3) understand the fundamentals of SMAW, SAW, OFW, RW, GTAW, FCAW, GMAW, PAW, SW, ESW, and Thermal Spraying, Soldering, Mechanical Cutting, Thermal Cutting/Gouging, Brazing/Braze Welding	X	X	X
(4) understand the fundamentals of VT, MT, UT, PT, RT, LT, quality procedures and quality audits/surveillance	X	X	X
(5) understand the fundamentals of welding metallurgy		X	X
(6) understand welding symbols and drawings	X	X	X
(7) interpret drawings		X	X
<b>Standards</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) verify base material compliance	X	X	X
(2) verify filler metal compliance	X	X	X
(3) verify filler metal storage/handling compliance	X	X	X
(4) verify inspection records compliance	X	X	X
(5) verify proper documentation compliance	X	X	X
(6) verify base material and filler metal compatibility		X	X
(7) certify documented results compliance		X	X
(8) verify procedure qualification records compliance		X	X
(9) verify welding procedure compliance		X	X
(10) verify NDE procedures compliance		X	X
<b>Procedure Qualification</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) verify welding equipment appropriateness	X	X	X
(2) verify edge preparation compliance	X	X	X
(3) verify joint geometry compliance	X	X	X
(4) witness procedure qualification		X	X
(5) verify welding procedure qualification compliance		X	X
(6) review welding procedures for compliance with code and contract requirements		X	X
(7) write welding procedures			X
<b>Performance Qualification</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) witness welder performance qualification		X	X
(2) verify welder qualification compliance		X	X
(3) verify welder qualification records compliance		X	X
(4) request welder performance requalification		X	X
<b>Production</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) verify welder qualification appropriateness		X	X
(2) verify production welding compliance		X	X
(3) verify personnel qualifications		X	X

(Continued)

**Table 1 (Continued)**  
**Welding Inspection Capabilities Based on Qualification Level**

<b>Inspection</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) perform visual examinations	X	X	X
(2) verify examination procedure compliance		X	X
(3) review examination results compliance		X	X
(4) develop visual inspection procedures (before, during, and after welding)		X	X
(5) provide NDE inspection planning and scheduling (before, during, and after a project)		X	X
(6) review welding inspection reports		X	X
(7) verify implementation of nondestructive and destructive evaluation methods		X	X
(8) prepare visual inspection requirements			X
(9) prepare NDE requirements			X
(10) report investigation results of quality inspection disputes			X
(11) prepare destructive testing requirements			X
<b>Safety</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) be knowledgeable of applicable safety requirements	X	X	X
<b>Quality Assurance</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) perform audits and surveillance		X	X
(2) implement weld inspection quality assurance plans		X	X
(3) prepare weld inspection quality assurance plans			X
(3) prepare base material control requirements			X
(4) prepare weld consumable control requirements			X
(5) prepare audit and surveillance plans			X
(6) prepare documentation control requirements			X
<b>Project Management</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) review contract requirements		X	X
(2) review vendor proposal compliance		X	X
(3) prepare weld inspection bid specifications			X
(4) prepare purchase specifications			X
(5) determine vendor capacity and capability			X
(6) select vendor			X
<b>Training</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) develop and provide a training program for the AWI		X	X
(2) develop visual inspection training		X	X
(3) verify implementation of visual inspection training		X	X
(4) develop and provide a training program for the WI			X
(5) provide technical leadership for welding inspectors			X
(6) verify implementation of quality assurance training			X
(7) provide guidance and direction to inspectors for maintaining and upgrading their individual qualifications			X
<b>Evaluation</b>	<b>AWI</b>	<b>WI</b>	<b>SWI</b>
(1) evaluate AWIs performance		X	X
(2) evaluate WIs performance			X
(3) perform inspection results trend analysis			X

## 5. Education and Experience Requirements

### 5.1 Associate Welding Inspector. An Associate Welding Inspector (AWI):

**5.1.1** Shall be a high school graduate, or hold a state or military approved high school equivalency diploma (e.g., GED).

**5.1.2** Shall have a minimum of two (2) years experience in an occupational function with a direct relationship to weldments fabricated to national or international standards and directly involved in one or more of the areas listed under 5.5.

**5.1.3** Alternatives to 5.1.1 and 5.1.2, with supporting documentation (e.g., copies of transcripts or letters of reference specifying earned credit hours of training) may be substituted as follows:

**5.1.3.1** Eighth grade level of schooling with a minimum of four years work experience in welding functions as defined under 5.5.

**5.1.3.2** Less than an eighth grade level of schooling with a minimum of six years experience in welding functions, as defined under 5.5.

**5.1.3.3** Eighth grade level of schooling with a minimum of one year of vocational education and training in a welding curriculum and a minimum of three years experience in welding functions, as defined under 5.5.

**5.1.3.4** Two years post-high school education in welding curriculum or engineering technology, engineering, or physical sciences, and a minimum of six months experience in welding functions, as defined under 5.5.

### 5.2 Welding Inspector. A Welding Inspector (WI):

**5.2.1** Shall be a high school graduate, or hold a state or military approved high school equivalency diploma (e.g., GED).

**5.2.2** Shall have a minimum of five (5) years experience in an occupational function that has a direct relationship to welded assemblies fabricated to national or international standards and be directly involved in one or more of the areas listed under 5.5.

**5.2.3** Alternatives to 5.2.1 and 5.2.2, with supporting documentation (e.g., copies of transcripts or letters of reference specifying earned credit hours of training) may be substituted as follows:

**5.2.3.1** Eighth grade level schooling with a minimum of 9 years work experience in welding functions as defined under 5.5.

**5.2.3.2** Less than an eighth grade level schooling with a minimum of 12 years work experience in welding functions as defined under 5.5.

**5.2.3.3** A maximum of four (4) years of post-high school education may be substituted for an equal number of years of the required five years experience, provided studies are relevant to any of the functions as defined under 5.5. Credit is given as follows:

(1) **Bachelor or Higher Degree in Welding.** Four years maximum if the degree is in welding engineering or welding technology.

(2) **Associate or Higher Degree.** Three years maximum if the degree is in welding or non-welding related engineering technology, engineering, or physical sciences.

(3) **Engineering/Technical School Courses.** Two years maximum, and only for successfully completed courses\* in a curriculum that can be (or could be) applied to (1) above.

(4) **Trade/Vocational Courses.** One year maximum, and only for successfully completed courses\* in a curriculum related to welding that can be (or could be) applied to (1) above.

*\*NOTE: "Courses in a curriculum" means courses within a program toward a degree, diploma, or certificate, to be applied to item (1) above. "Successfully completed courses" means a completed quarter or semester with credit in that course. Documentation of the number of actual hours completed is necessary prior to notification of actual credit allowed.*



**5.3 Senior Welding Inspector.** A Senior Welding Inspector (SWI):

**5.3.1** Shall be a high school graduate, or hold a state or military approved high school equivalency diploma (e.g., GED).

**5.3.2** Shall have a minimum of fifteen (15) years experience in an occupational function that has a direct relationship to welded assemblies fabricated to national or international standards and shall be directly involved in three (3) or more of the areas listed in 5.5.

**5.3.3** Shall have been qualified as a WI.

**5.3.4** Alternatives to 5.3.1 and 5.3.2 with supporting documentation (e.g., copies of transcripts or letters of reference specifying earned credited hours of training) may be substituted as follows:

**5.3.4.1** A maximum of four (4) years of post-high school education may be substituted for an equal number of years of the required fifteen years experience, provided studies are relevant to any of the functions described under 5.5. Credit is given as follows:

(1) **Bachelor or Higher Degree in Welding.** Four years maximum if the degree is in welding engineering or welding technology.

(2) **Associate or Higher Degree.** Three years maximum if the degree is in engineering technology, engineering, or a physical science.

(3) **Engineering/Technical School Courses.** Two years maximum, and only for successfully completed courses\* in a curriculum that can be (or could be) applied to (1) above.

(4) **Trade/Vocational Courses.** One year maximum, and only for successfully completed courses\* in a curriculum related to welding that can be (or could be) applied to (1) above.

*\*NOTE: "Courses in a curriculum" means courses within a program toward a degree, diploma, or certificate, to be applied to item (1) above. "Successfully completed courses" means a completed quarter or semester with credit in that course. Documentation of the number of actual hours completed is necessary prior to notification of actual credit allowed.*

**5.4 Documentation.** Candidates shall submit verifiable documentation of education and employment.

**5.5 Qualifying Experience.** Candidates shall submit verifiable documentation of experience in an occupational function with a direct relationship to weldments fabricated to national or international standards and directly involved in at least three of the following:

**5.5.1** Experience in the development of procedures, inspection requirements, acceptance criteria, and specifications for weldments.

**5.5.2** Experience in planning, control, and application of base metals and filler metals in the preparation and completion of production weldments.

**5.5.3** Experience as a welder, welding operator, or tack welder in fabrication, manufacturing, or construction.

**5.5.4** Experience in the detection and measurement of weld discontinuities by application of visual or other nondestructive evaluation processes to a written procedure.

**5.5.5** Experience in planning, control, and application of repair welding.

**5.5.6** Experience in the preparation of written procedures for welding, nondestructive evaluation of weldments, or destructive tests of weldments.

**5.5.7** Experience in the qualification of welders or welding procedures to various codes, standards and specifications.

**5.5.8** Experience applying welding related codes, standards, or specifications.

**5.5.9** Experience in operational techniques and activities used to fulfill quality control requirements for weldments.

**5.5.10** Experience in teaching the occupational skill of welding or subjects related to welding; its application, control, materials, and processes.

## 6. Examination Requirements

The AWI, WI, or SWI shall meet the following examination requirements:

**6.1 Visual Requirements.** AWI, WI, and SWI shall have the ability to read Jaeger Number 2 letters or smaller at a minimum distance of 12 inches (or equivalent test) in at least one eye with or without correction. AWI, WI, or SWI shall take a color perception test and shall take a contrast differentiation shades of gray test.

*NOTE: Near vision acuity is considered essential to the proper performance of welding examination. Failure to meet the above level of acuity shall be a failure to meet this standard. Color perception and shades of gray contrast differentiation are desirable in some specific applications, but are not considered essential for all examinations. It shall be the employer's responsibility to establish and enforce visual requirements for those AWIs, WIs, and SWIs in his/her employ.*

**6.2 Written Test Requirements.** Shall pass each part of the applicable AWI, WI, or SWI examination.

The examination includes the following parts:

**6.2.1** A test on the requirements of a code, standard, or specification.

**6.2.2** A test on fundamental principles including, but not limited to: welding processes, nondestructive examination, safety, quality assurance, inspector's duties, weld discontinuities, welding symbols, joint design, mechanical properties of metals, and basic on-the-job mathematics.

**6.2.3** A test on practical application of welding inspection knowledge including, but not limited to, welding procedure qualification, welder qualification, mechanical testing, drawing and specification compliance, welding examination, and nondestructive testing processes.

## 7. Examination Structure

Recommended examination subjects and recommended subject weights are given below.

### 7.1 WI/AWI Examination

<b>Code Applications</b>	<u>Percent of Total Questions<sup>2</sup></u>
Qualification	25
Fabrication	25
Inspection	25
Reports and Records	5
Material and Design	5
<b>Fundamentals</b>	<u>Percent of Total Questions<sup>3</sup></u>
Definitions and Terminology	12
Welding Processes	12
Symbols—Welding and NDE	10
Weld Examination	10
Welding Performance	9
Test Methods—NDE	8
Heat Control & Metallurgy (carbon and low-alloy steel)	6
Welding Related Calculations	6
Duties and Responsibilities	4
Destructive Tests	3
Cutting	2

<sup>2</sup> Percentages indicate the minimum required for each category in an examination.

<sup>3</sup> Percentages indicate the minimum required for each category in an examination.

<b>Practical Applications</b>	<u>Percent of Total Questions<sup>4</sup></u>
Welding Inspection and Flaws	34
Procedure and Welder Qualifications	28
Mechanical Test and Properties	8
NDE	8
Utilization of Specification and Drawings	8

## 7.2 SWI Examination

<b>Technical Fundamentals</b>	<u>Percent of Total Question<sup>5</sup></u>
Heat Control & Metallurgy (High Alloy Steel and Nonferrous Materials)	10
NDE fundamentals, techniques, and applicability (VT, PT, MT, RT, UT)	10
Welding and Allied Processes	5
Destructive Testing fundamentals, techniques, and applicability including groove welds, fillet welds, stud welds, and weldability testing	5
NDE applicability (LT)	1

### Administrative Fundamentals

Welding Procedure Qualification and Code Compliance	10
Welding Personnel Qualification and Certification	10
Welding Inspection and NDE Personnel Qualification and Certification	10
Quality Assurance/Quality Management, including:	10
Quality Programs	
Document Control	
Procurement and Supplier Control	
Calibration	
Quality Control	
Process Control	
Statistical Quality Control	
Trend Analysis	
Nonconformance Control	
Auditing and Surveillance	
Corrective Action	
Records	
Project Management	5
Personnel Management and Training Programs	5
Performance Evaluation	

**7.3 SWI Alternative Qualification.** Candidates for SWI shall be considered as meeting the examination requirements of 7.2 if they can demonstrate the successful completion of separate education courses or examinations that cover a minimum of 90% of the subjects in 7.2. There is no time limit for the completion of these courses or examinations.

## 8. Maintenance of Qualification

The WI/SWI shall demonstrate his/her continuing ability to perform the functions in Clause 4. Maintenance of qualification shall be no more than three years.

<sup>4</sup> Percentages indicate the minimum required for each category in an examination.

<sup>5</sup> Percentages indicate the minimum required for each category in an examination.

## Annex A (Informative)

### Reference Documents

This annex is not part of AWS B5.1:2013, *Specification for the Qualification of Welding Inspectors*, but is included for informational purposes only.

The examination questions may be taken from the following reference information. The reference documents are not limited to the following.

Number	Title	Applicability
ANSI Z49.1	<i>Safety in Welding, Cutting, and Allied Products</i>	AWI, WI, SWI
AWS A1.1	<i>Metric Practice Guide for the Welding Industry</i>	AWI, WI, SWI
AWS B1.10	<i>Guide for the Nondestructive Inspection of Welds</i>	AWI, WI, SWI
AWS B1.11	<i>Guide for the Visual Inspection of Welds</i>	AWI, WI, SWI
AWS B2.1	<i>Specification for Welding Procedure and Performance Qualification</i>	AWI, WI, SWI
AWS B4.0	<i>Standard Methods for Mechanical Testing of Welds</i>	AWI, WI, SWI
AWS B5.1	<i>Specification for the Qualification of Welding Inspectors</i>	AWI, WI, SWI
AWS QC1	<i>Standard for AWS Certification of Welding Inspectors</i>	AWI, WI, SWI
AWS	<i>Certification Manual for Welding Inspection</i>	AWI, WI, SWI
AWS	<i>Welding Inspection Handbook</i>	AWI, WI, SWI
AWS	<i>Welding Handbook, Vol. 1: Welding Science &amp; Technology</i>	AWI, WI, SWI
AWS	<i>Welding Handbook, Vol. 2: Welding Processes</i>	AWI, WI, SWI
AWS	<i>Welding Handbook, Vol. 3: Materials and Applications Part I</i>	AWI, WI, SWI
AWS	<i>Welding Handbook, Vol. 4: Materials and Applications Part II</i>	AWI, WI, SWI
ISO 9001	<i>Quality Management Systems—Requirements</i>	SWI
ASNT SNT-TC-1A	<i>Recommended Practice: Personnel Qualification and Certification in Nondestructive Testing</i>	WI, SWI

This page is intentionally blank.

## Annex B (Informative)

# Guidelines for the Preparation of Technical Inquiries

This annex is not part of AWS B5.1:2013, *Specification for the Qualification of Welding Inspectors*, but is included for informational purposes only.

### B1. Introduction

The American Welding Society (AWS) Board of Directors has adopted a policy whereby all official interpretations of AWS standards are handled in a formal manner. Under this policy, all interpretations are made by the committee that is responsible for the standard. Official communication concerning an interpretation is directed through the AWS staff member who works with that committee. The policy requires that all requests for an interpretation be submitted in writing. Such requests will be handled as expeditiously as possible, but due to the complexity of the work and the procedures that must be followed, some interpretations may require considerable time.

### B2. Procedure

All inquiries shall be directed to:

Managing Director  
Technical Services Division  
American Welding Society  
8669 Doral Blvd., Suite 130  
Doral, FL 33166

All inquiries shall contain the name, address, and affiliation of the inquirer, and they shall provide enough information for the committee to understand the point of concern in the inquiry. When the point is not clearly defined, the inquiry will be returned for clarification. For efficient handling, all inquiries should be typewritten and in the format specified below.

**B2.1 Scope.** Each inquiry shall address one single provision of the standard unless the point of the inquiry involves two or more interrelated provisions. The provision(s) shall be identified in the scope of the inquiry along with the edition of the standard that contains the provision(s) the inquirer is addressing.

**B2.2 Purpose of the Inquiry.** The purpose of the inquiry shall be stated in this portion of the inquiry. The purpose can be to obtain an interpretation of a standard's requirement or to request the revision of a particular provision in the standard.

**B2.3 Content of the Inquiry.** The inquiry should be concise, yet complete, to enable the committee to understand the point of the inquiry. Sketches should be used whenever appropriate, and all paragraphs, figures, and tables (or annex) that bear on the inquiry shall be cited. If the point of the inquiry is to obtain a revision of the standard, the inquiry shall provide technical justification for that revision.

**B2.4 Proposed Reply.** The inquirer should, as a proposed reply, state an interpretation of the provision that is the point of the inquiry or provide the wording for a proposed revision, if this is what the inquirer seeks.

### **B3. Interpretation of Provisions of the Standard**

Interpretations of provisions of the standard are made by the relevant AWS technical committee. The secretary of the committee refers all inquiries to the chair of the particular subcommittee that has jurisdiction over the portion of the standard addressed by the inquiry. The subcommittee reviews the inquiry and the proposed reply to determine what the response to the inquiry should be. Following the subcommittee's development of the response, the inquiry and the response are presented to the entire committee for review and approval. Upon approval by the committee, the interpretation is an official interpretation of the Society, and the secretary transmits the response to the inquirer and to the *Welding Journal* for publication.

### **B4. Publication of Interpretations**

All official interpretations will appear in the *Welding Journal* and will be posted on the AWS web site.

### **B5. Telephone Inquiries**

Telephone inquiries to AWS Headquarters concerning AWS standards should be limited to questions of a general nature or to matters directly related to the use of the standard. The *AWS Board Policy Manual* requires that all AWS staff members respond to a telephone request for an official interpretation of any AWS standard with the information that such an interpretation can be obtained only through a written request. Headquarters staff cannot provide consulting services. However, the staff can refer a caller to any of those consultants whose names are on file at AWS Headquarters.

### **B6. AWS Technical Committees**

The activities of AWS technical committees regarding interpretations are limited strictly to the interpretation of provisions of standards prepared by the committees or to consideration of revisions to existing provisions on the basis of new data or technology. Neither AWS staff nor the committees are in a position to offer interpretive or consulting services on (1) specific engineering problems, (2) requirements of standards applied to fabrications outside the scope of the document, or (3) points not specifically covered by the standard. In such cases, the inquirer should seek assistance from a competent engineer experienced in the particular field of interest.

