

**AWS TSD 1.1:2011**

**Approved January 19, 2011  
by the AWS Technical Activities Committee**

**Specification for the Preparation of  
American Welding Society Standards**

3rd Edition

Supersedes AWS TSD 1.1:2006

Prepared by the  
American Welding Society (AWS) Technical Services Division

Under the Direction of the  
AWS Technical Activities Committee

**Abstract**

The standard *Specification for the Preparation of American Welding Society Standards*, AWS TSD 1.1:2006, prescribes the components, format, and styles to be used for the preparation of American National Standards and other standards developed by the American Welding Society. For clarity, descriptions and examples of the various document elements are presented. While the focus of this specification is on draft requirements, specifications for published standards are also included.



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**American Welding Society**  
550 N.W. LeJeune Road, Miami, FL 33126

## Example Copyright Page<sup>1</sup>

International Standard Book Number: X-XXXX-XXX-X  
American Welding Society  
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<sup>1</sup> This page is an example of the copyright page used in most AWS standards (see Annex A for additional examples). The content and language of this sample do not apply to TSD 1.1 but merely show where this information is to be located.

## Example Statement on the Use of American Welding Society Standards<sup>2</sup>

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 the 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. When 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 American Welding Society 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 not 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.

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 American Welding Society does not monitor 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](http://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 Managing Director Technical Services, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (see Annex L). With regard to technical inquiries made concerning AWS standards, oral opinions on AWS standards may be rendered. However, 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 [Committee number] Committee on [Committee name]. 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 [Committee number] Committee on [Committee name] 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 [Committee number] Committee on [Committee name] 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, 550 N.W. LeJeune Road, Miami, FL 33126.

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<sup>2</sup> This page is an example of the "Statement on Use" page used in most AWS standards (see Annex A for all examples). The content and language of this example do not apply to TSD1.1, but merely show where this document element is to be located.

## Personnel

### **AWS Technical Activities Committee Task Group on Rules**

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J. L. Gayler, Secretary	<i>American Welding Society</i>
D. A. Fink	<i>The Lincoln Electric Company</i>
D. D. Rager	<i>Rager Consulting, Incorporated</i>
J. J. Sekely	<i>Welding Services Inc</i>
A. Davis	<i>American Welding Society</i>

## Foreword

This foreword is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

The American Welding Society's (AWS) Technical Activities Committee (TAC) has approved AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, for implementation in the development of all AWS American National Standard (ANSI) standards as well as other standards developed by AWS.

The *Specification for the Preparation of American Welding Society Standards* is a compilation of the style preferences developed over the years by the committee members and staff who prepare standards. It represents a completely rewritten version of *The Style Manual for American Welding Society Standards*, published in 1999, which it supersedes. This specification is intended to be a model for the format, layout, and style required for AWS standards.

This specification cites reference documents rather than duplicating certain information published in them (see Clause 2 for normative references).

The American Welding Society issued its first style manual for standards in 1983. It was based on the ANSI style manual in effect at that time, slightly modified to suit the needs of the AWS standards-writing committees. In 1994, the Technical Services Division published an expanded reference titled *Style Manual for American Welding Society Standards*. The 1994 edition was superseded by *The Style Manual for American Welding Society Standards*, published in 1999. AWS TSD 1.1:2005 superseded the 1999 edition. AWS TSD 1.1:2005 superseded the 2005 edition. This edition supersedes the 2006 edition.

AWS TSD 1.1:2011, the 3<sup>rd</sup> edition under the TSD 1.1 designation, includes revisions to the Subclause 6.2 on scope, particularly safety and health boilerplate text.

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# Specification for the Preparation of American Welding Society Standards

## 1. Scope

This specification establishes the requirements for all American Welding Society (AWS) standards for the purpose of achieving uniformity of structure, terminology, and style in individual documents and between associated documents. Members of the standards-writing committees and AWS staff shall ensure that all new American National Standard standards and the revisions to existing standards that are in need of a substantial revision comply with the structure, format, and styles defined in this specification. Individual committees may continue to use their own style manuals, provided they comply with this specification.

This specification serves as a model of the structure and style specified for drafts of AWS standards, including those to be certified as American National Standards. Although the structure and content of the published standard will be the same as the draft, style differences (such as font size, column format, color covers, and others) between drafts and published documents exist. The specifications for published standards are presented in Annex C.

It is beyond the scope of this document to define the responsibilities of the members of standards-developing committees or AWS staff. These responsibilities are defined in other documents, such as the *Technical Activities Committee Rules of Operation* and the *Technical Activities Committee Policy Manual*.

It is recognized that it is not possible to cover every situation of format control in one document. Therefore, the organization that has the ultimate responsibility of publishing the document (Technical Activities Committee, Standards Council, etc.) has the authority to modify the requirements specified herein if appropriate to the application.

Pricing (including "free" statement) and availability (vendor(s), website, format, etc.) of AWS standards and publications shall not be addressed in drafts and published AWS standards as availability and pricing may change over time.

This standard makes sole use of U.S. Customary Units. Approximate mathematical equivalents in the International System of Units (SI) are provided for comparison in parentheses or in appropriate columns in tables and figure.<sup>3</sup>

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 other sources, including, but not limited to, ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*<sup>4</sup> and applicable federal and state regulations.

## 2. Normative References

The standards listed below contain provisions, which, through reference in this text, constitute mandatory provisions of this AWS standard. For undated references, the latest edition of the

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<sup>3</sup> The system of designating units of measure in examples contained in TSD 1.1:2011 may differ from this format.

<sup>4</sup> Note that this is an informative reference because of the nonmandatory language in which it is used.

referenced standard shall apply. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply.

AWS documents:<sup>5</sup>

AWS A1.1, *Metric Practice Guide for the Welding Industry*;  
AWS A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*;  
*AWS Board Policy Manual*;  
*AWS Patent Policy*;  
*AWS TACPM, Technical Activities Committee Policy Manual*;  
*AWS TACRO, Rules of Operation of the Technical Activities Committee*, and  
*Style Guidelines for Safety and Health Documents*, Safety and Health Fact Sheet No. 15.

Other documents:<sup>6</sup>

*The Chicago Manual of Style*,<sup>7</sup>  
*ANSI Procedures for the National Adoption of ISO and IEC Standards as American National Standards*, and  
*Webster's Third New International Dictionary*, 1986.

### 3. Terms and Definitions

For the purposes of this document, the following terms and definitions apply:

**clause.** The basic division of text in the body and annexes of a document. A clause may be comprised of subclauses, paragraphs, or a paragraph. This element was referred to as a “section” in the 1999 edition of *The Style Manual for American Welding Society Standards*.

**dated reference.** A cited source that includes the date of publication. The cited source is dated when a particular edition is used and when referencing particular information (e.g., sentences, paragraphs, subclauses, figures, tables, and so forth). Subsequent revisions or amendments to the reference are not applicable. All references to specific text, figures, or tables from another document are always dated.

**draft.** The status of a document at any stage prior to publication.

**hanging paragraph.** Text appearing between a heading and the first numbered subclause. An example of a hanging paragraph is shown below:

*Example:*

#### 7. Test Methods

XX. } Hanging paragraph

##### 7.1 Ultrasonic Examination

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<sup>5</sup> AWS standards are published by the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126.

<sup>6</sup> These documents are available at most bookstores.

<sup>7</sup> The University of Chicago, *The Chicago Manual of Style*, Chicago, Illinois, The University of Chicago Press.

XX.

## 7.2 Radiographic Examination

XX.

*NOTE: The paragraph that introduces the terms and definitions in Clause 3 of this specification is not considered a hanging paragraph as it introduces a list of terms and definitions, not numbered subclauses.*

**informative.** An adjective used to denote nonmandatory elements of this standard.

**informative annex.** An annex that is appended to the document to provide information that is not mandatory for the application of the standard.

**informative reference.** A cited source that is provided for information purposes only and is not necessary for the application of the standard. Informative references may be found in both normative and informative elements of a standard. Informative references are always referred to in nonmandatory language.

*Example:*

Further information about resistance brazing is presented in AWS C3.9M/C3.9, *Specification for Resistance Brazing*.

**normative.** An adjective used to denote the mandatory elements of this standard.

**normative annex.** An annex that is appended to the document to provide information that is necessary for the application of the standard.

**normative reference.** A cited source that is required for the application of the standard. Normative references are found only in normative elements of a standard. Normative references are always referred to in mandatory language.

*Example:*

Equipment setup shall be performed according to ASTM F 19, *Specification for the Testing of Tensile Button Specimens*.

**paragraph.** Subdivision of a clause or subclause. May be numbered or unnumbered.

**standard.** A document that provides rules or guidelines, is produced by consensus, and is approved by a recognized body. The term *standard* encompasses five AWS document formats: code, specification, recommended practice, guide, and method. These are defined in items 1 through 5 that follow below (see also Table 3.1):

**1. code.** A code is intended to be a mandatory document. It includes a set of conditions and requirements relating to a specific subject. A code describes industry-accepted procedures by which it can be determined that the requirements have been met. It is written to make it suitable for adoption by governmental entities, trade groups, insurance companies, and other

authorities as a part of a law or regulation or cited as a normative reference in other standards. A typical code is AWS D1.1, *Structural Welding Code—Steel*.

**2. specification.** A specification details, using the prescriptive *shall*, the essential technical requirements for a material, product, system, or service. It specifies the procedures, methods, qualifications, or equipment by which it can be determined that the requirements have been met. A specification is mandatory when cited as a normative reference by a mandatory document or agreed to be mandatory by the concerned individuals or agencies, such as when used for procurement purposes. A typical specification is AWS C3.4, *Specification for Torch Brazing*.

**3. method.** A method-type standard details industry-accepted procedures for performing a test, sampling technique, analysis, or measurement. It is a mandatory document when cited as a normative reference in a mandatory document or agreed to be mandatory by the concerned individuals or agencies. A typical method-type document is AWS B4.0, *Standard Methods for Mechanical Testing of Welds*.

**4. guide.** A guide provides general information regarding one or more methods to accomplish a specific task. It is a mandatory document when cited as a normative reference in a mandatory document or agreed to be mandatory by the concerned individuals or agencies. A typical guide is AWS D3.5, *Guide for Steel Hull Welding*.

**5. recommended practice.** A recommended practice document details one or more industry-accepted techniques for performing a specific operation, procedure, or process. It is mandatory when cited as a normative reference in a mandatory document or agreed to be mandatory by the concerned individuals or agencies. A typical recommended practice document is AWS D10.12, *Recommended Practices and Procedures for Welding Low-Carbon Steel Pipe*.

**Table 3.1**  
**Summary of Types of Standards and Their Applications**

Types of Standards	Provides	Use
1. Code	Requirements	Scope of work
2. Specification	Technical details	Product or service
3. Method	Detailed procedure	Measuring, testing, or analysis
4. Guide	Instructional guidance	Scope of work
5. Recommended Practice	Current preferred practice	Scope of work

**subclause.** The subdivision of a clause.

**undated reference.** A reference that does not include the date of publication. When a document is cited without a date, it is understood that the latest edition of the document shall be used.

#### **4. General Specifications for Drafts**

**4.1 Page Size.** The standard page size of drafts shall be 8-1/2 in by 11 in (215 mm by 280 mm) or letter size.

**4.2 Margin, Font, and Format Specifications.** Electronic files shall be created in Microsoft Word using the borders, margins, fonts, and formats shown in Table 4.1. The font sizes and

styles for the various elements are illustrated in the “Size” and “Font” columns of Table 4.1. Tables shall be prepared in Microsoft Word. Tables that require complex calculations may be created in Excel and inserted into Word.

**Table 4.1  
General Format and Font Specifications for Drafts**

<b>Element</b>	<b>Size</b>	<b>Font</b>	<b>Format</b>
Body text	12 point	Times New Roman	Left justified or Full justified;
Clause number and heading text	<b>12 point</b>	<b>Times New Roman, Bold</b>	Left justified
Column format	—	—	Single column
Explanatory statement after foreword and annex titles	10 point	Times New Roman (Roman font, italics for document title)	Centered
Figures (images, photos)	NA	NA	Any suitable format (hard copy, digital (300 dpi minimum, JPEG, BMP, TIFF etc.) capable of being inserted into the draft and used for publication.
Figure callouts	10 point or handwritten	Arial or legible handwriting	NA
Figure captions (see 7.5.8)	<b>10 point</b>	<b>Arial, Bold</b>	Centered
Figure credit line (see 7.5.7)	10 point	Arial	Right justified directly under figure
Figure key (see 7.5.5)	10 point	Arial	Left justified under figure
Figure labels (see 7.5.4.1)	10 point (or less if required)	Arial	Usually centered, but may vary
Figure source line (see 7.5.6)	10 point	Arial	Left justified, last line under figure (below footnotes, notes, and key, if any)
Footer and header margins	As suitable from top or bottom	—	—
Footer & header (see 4.4 & 4.6)	10 point	Arial	Footer left justified with center tab and right tab at right margin Header centered;
Footnote reference number (see 7.3)	Whatever size applies	Whatever font applies	Superscript
Footnote text and number (see 7.3)	10 point	Times New Roman	Left justified or full justified, Number in superscript



**4.3 Text Formatting.** Formatting of the text shall be kept to a minimum, as all files are subjected to conversion and translation routines upon submission to the graphic artist. Drafts shall not be produced in camera-ready format but shall be in suitable format for ease of review by committee members during draft preparation and balloting. Macros or other advanced or nonstandard features or fonts shall not be used or embedded in a document file at any time by either committee members or AWS staff.

The following conventions shall be followed when keying an electronic draft:

1. Do not change the font size or the margins to accommodate text in the body of the draft;
2. Use one space, not two, after periods, semicolons, and colons;
3. Permit the text to wrap automatically. Hard returns may be used at the end of paragraphs and after headings;
4. For the creation of lists, key in and number the text manually. Refrain from using the automatic numbering or bulleting functions;
5. Hyphenate compounds, words, or modifiers as needed, but do not break words at the end of lines. Turn off the automatic hyphenation feature;
6. Use the Symbol font for Greek characters;
7. Use the software's features to create subscripts and superscripts;
8. Use the software's built-in footnote feature to create all footnotes (see 7.3);
9. For in-text tabular material, use one tab, not multiple tabs or spaces made using the space bar, between items being converted into columns.

**4.4 Header.** Each page of the draft shall display the following header set in 10-point Arial font and centered:

This is a working document under consideration by an AWS committee. It is made available solely to solicit comments from interested parties, and may not be relied upon or utilized for any other purpose. Draft documents may change significantly in subsequent versions.

**4.5 Watermark.** Drafts for distribution shall bear a watermark consisting of the word "DRAFT" positioned diagonally across each page. The watermark shall be light enough to not obstruct text or other content.

**4.6 Footer.** Drafts shall display a footer on each page with the document's draft number, which is set flush left at the bottom of each text page. If the document has no designation, the title (if short enough) or a few key words from the title shall be used. The page number is to be set on the same line and centered using the centering tab. The draft issue date shall be added flush right. For ease of reference and file traceability, the footer shall also contain the file name of the document if the file name is different from the draft designation. The font shall be set as noted in Table 4.1. The following example shows a typical footer in which the file name (A5.8-E9-WD5.doc) uses the draft designation.

*Example:*

A5.8-E9-WD5

36

2/15/03

**4.7 Draft Designation Codes.** Drafts of AWS standards shall be designated in accordance with the rules in Tables 4.2 and 4.3.

**Table 4.2  
Draft Designation Codes**

<b>Designation</b>	<b>Use</b>
WD1	Denotes the first draft balloted at the subcommittee level.
WDX	Denotes a subsequent draft balloted at the subcommittee level, where X represents the next sequential number.
CD1	Denotes the draft for the first ballot to the main committee (and to the subcommittee if both are balloted simultaneously).
CDX	Denotes the draft used for subsequent ballots to the main committee or subcommittee, where X represents the next sequential number (once a draft has been balloted to the main committee, it never reverts back to a "WD" draft).
DS1	Denotes the draft used for the first Technical Activities Committee (TAC) ballot.
DSX	Denotes the draft used for the next subsequent ballot required (at whatever level is required), where X represents the next sequential number (once a draft has been balloted to the TAC, it never reverts back to a "WD" or "CD" draft).
FDS	Denotes the final draft standard.

**Table 4.3  
Examples of Draft Designations<sup>a</sup>**

<b>Examples of Draft Designations when Using the Edition Number</b>	
A5.5-E5-WD1	A5.5, 5th edition, Working Draft #1
A5.5-E5-WD2	A5.5, 5th edition, Working Draft #2
A5.5-E5-CD1	A5.5, 5th edition, Committee Draft #1
A5.5-E5-CD2	A5.5, 5th edition, Committee Draft #2
A5.5-E5-DS1	A5.5, 5th edition, Draft Standard #1
A5.5-E5-DS2	A5.5, 5th edition, Draft Standard #2
Additional drafts and ballots.	Additional drafts may be needed in some cases and shall be numbered sequentially (WD3, WD4, and so forth; CD3, CD4, and so forth; DS3, DS4, and so forth). Also, once a draft has reached a certain balloting level, the continuation of the designation is at the highest level just balloted.  Example: If DS1 requires revisions per TAC comments, the draft that follows is DS2, not CDX or WDX.
A5.5-E5-FDS1	Final approved draft.
<b>Example of a Draft Designation when Using the Estimated Publication Year<sup>b</sup></b>	
A5.5-04-WD1	A5.5, 2004 publication target, Working Draft #1
<b>Example of a Draft Designation for Reaffirmation of Standards<sup>c</sup></b>	
A5.32-97R-06	A5.32, Published in 1997, being reaffirmed in 2006

<sup>a</sup> Designations for the published standards follow the requirements of Table 6.2.

<sup>b</sup> The sequence that follows is the same as the “edition” example pattern, with E5 being replaced by 04.

<sup>c</sup> For reaffirmed standards, the designation of the standard shall be the original designation followed by (RXXXX), where XXXX is the year of the reaffirmation, e.g., A5.32/A5.32M-97(R2006).

**4.8 Notes to Graphic Artist.** Notes to the graphic artist shall be enclosed in brackets and highlighted in green in color copies (e.g., on screen) and gray in black and white copies, as shown in the example below. When specific instructions must be shown for clarity near the requested change, hand-marked scans, text boxes, or other appropriate means may be used.

*Example:*

[Note to the graphic artist: Please reproduce in color.]

## **5 Front Matter Components**

**5.1 General.** The front matter consists of the title page, the copyright page, the “Statement of Use” page, the personnel listing, the foreword, the table of contents, and a listing of figures or tables or both, if these are included.

**5.1.1 Positioning.** The front matter is positioned before the body of the document.

**5.1.2 Pagination.** For ease of reference in drafts, pages shall be numbered using Arabic numbers, with the title page being page 1.

**5.2 Title Page.** The format and fonts for the various components of the title page shall conform to the specifications in Table 4.1.

**5.2.1 Document Designation.** The document designation that appears on the title page shall conform to the requirements specified in Table 6.2 and C2.1.

**5.2.2 Approval Date.** In the case of an ANSI-approved standard, the placeholder for the ANSI approval date shall appear below the designation.

**5.2.3 Title.** The title that appears on the title page shall be identical to that which will appear on the cover.

**5.2.4 Edition Number.** The edition number shall appear below the title. If the current edition supersedes a previous one, the text “Supersedes XXXXXX” shall appear two lines below the edition number. The XXXXX is the document designation of the previous edition as it was coded at the time of that edition’s publication.

**5.2.5 Preparation and Approval Credits.** The boilerplate text shown below shall be placed two lines below the “edition” or “supersedes” line.

Prepared by the  
American Welding Society (AWS) [*insert committee code*] Committee on [*insert committee title*]

Under the Direction of the  
AWS Technical Activities Committee

Approved by the  
AWS Board of Directors

**5.2.6 Abstract.** The abstract is a brief, descriptive summary of the contents of the standard. Whenever possible, the abstract should include the purpose(s) of the standard and the most important recommendation(s).

Complete sentences and standard terms shall be used. Unfamiliar terms, abbreviations, and symbols shall be defined the first time they occur in the abstract.

**5.2.7 Address Bar and Logo.** The address bar and AWS logo shall be placed at the bottom margin of the title page as shown in the title page of this specification.

**5.3 Copyright Page.** The copyright page shall include the copyright information, consisting of the International Standard Book Number (ISBN), the official name and address of the copyholder, the year of publication, and various copyright statements. These statements consist of the boilerplate disclaimer for liability and the boilerplate statement on photocopy rights.

**5.4 Statement on the Use of AWS Standards.** The applicable boilerplate text shall be inserted in the “Statement on Use” page of each standard (see Annex A to determine which text applies). The committee name and the appropriate annex letter shall be entered where indicated by brackets ([ ]).

The “Statement on Use” page shall contain essential elements such as are noted in Sample A.4 of Annex A. Any revisions to this normative sample shall be reviewed by legal counsel before release for use.

## **5.5 Personnel Listing (Committee and Subcommittee Rosters)**

**5.5.1 Composition.** The names and affiliations published in the new or revised document are those listed on the committee and subcommittee (if any) rosters in effect at the time of the final subcommittee (if any) and committee ballots for permission to publish the document. The accuracy of these names and affiliations shall be verified prior to publication. The committee chair may add the names of individuals who contributed significantly to the document but who were not active committee members at the time of the final ballot (see the “Personnel Listing” of this standard for an example).

For reaffirmations, the committee and subcommittee (if any) roster(s) listings shall contain the original committee/subcommittee roster and the reaffirming committee/subcommittee roster. The reaffirming committee/subcommittee roster(s) shall be placed before the original committee/subcommittee roster(s).

**5.5.2 Title.** The title “Personnel” shall be set at the top of the page. The designation and name of the committee and subcommittee (if any) shall be included below this title.

**5.5.3 Format (see Table 4.1).** The listing of officers and members shall be in two-column format, with the names of the officers and members listed on the left and their affiliations on the right. For precise identification, two initials shall be included in each name, except when an individual has no middle name. The officers of the committee shall be listed first followed by the committee members in alphabetical order. The affiliations of all officers and members shall be positioned in a column to the right of their names. Affiliations shall be the legal name of the institution and shall be set in italics.

Voting members shall be listed in alphabetical order immediately after the officers. Advisors shall be shown in a separate list titled “Advisors” that immediately follows the last voting member listed. Special contributors to the standard and who were not members of the committee or subcommittee at the last ballot shall be shown in a separate list titled “Special Contributors” that immediately follows the last advisor listed. Applicants, Correspondence Members, and Ex-Officios shall not be listed.

**5.6 Foreword.** The foreword contains useful but nonmandatory information about the content and history of the document and its sponsoring committee, when appropriate. As the foreword is included for informational purposes only, it shall be prefaced by the following statement set in 10-point Times New Roman italics font and centered:

*This foreword is not part of [insert document’s designation and title], but is included for informational purposes only.*

**5.6.1 Listing of Previous Editions.** In a revised document, the foreword shall contain a chronological listing of all previous revisions and a brief explanation of the manner in which the

document has changed since its original release. For an example, see the foreword of this specification.

**5.6.2 Identification of New Content.** All significant differences between the current standard and any document it supersedes should be listed or described to alert readers to the changes. If margin borders or underlined text are used to identify revision items, a brief explanation of the annotation method should be included.

**5.6.3 Errata.** If a committee desires to spell out specific editions of the Welding Journal and/or specific location on the AWS web page in which errata will be published, this shall be included in the Foreword.

**5.7 Table of Contents.** The table of contents lists the titles of the clauses and the titles of the primary subclauses only (see 6.1.2.1 for heading levels). The titles of subsequent heading levels shall not be listed. Annexes shall be listed by title only. For an example, see the Table of Contents of this specification.

Page numbers need not be included in the Table of Contents in drafts, as these will be included in the first page proofs of the published document.

## **5.8 Lists of Tables and Figures**

**5.8.1 List of Tables.** If tables are included in the body of the document, a list of tables and the page numbers where they appear (published documents only) shall be included following the table of contents.

**5.8.2 List of Figures.** If figures are included in the body of the document, a list of figures and the page numbers where they appear (published documents only) shall be included following the table of contents and the list of tables, if any. There are no figures in this specification, but a list of the samples contained in the annexes is shown.

**5.8.3** If the “List of Tables” and “List of Figures” are short (i.e., each occupying less than 1/2 page), they may be placed on the same page.

## **6. Required Body Components and Their Organization**

### **6.1 Organization and Numbering**

**6.1.1 Logical Order.** The components of the standard shall be sequenced in the order shown in Table 6.1. The components and their order apply to drafts and published standards. For published standards, additional components (cover, running headers, and so forth) are required as noted in Annex C.

**Table 6.1  
Positioning of the Components in a Standard**

<b>Type of Component</b>	<b>Position</b>	<b>Contains</b>
Front Matter	Title page	Document Designation Approval date Title Abstract Logo(s)
	Copyright page	Text
	Statement on the Use of AWS Standards	Text
	Personnel	Title Committee name Volunteers' names and affiliations
	Foreword	Text Footnotes*
	Table of Contents	Generated text
	List of Tables*	Generated text
	List of Figures*	Generated text
Body Elements	Title	Text
	Scope	Text Statement on use of units Statement on safety Footnotes*
	Normative References*	Dated and undated references Document sources Footnotes*
	Terms and Definitions*	Text Footnotes*
	Body	Clauses Subclauses Paragraphs Figures* Tables* Equations* Notes* Footnotes*
Annexes	Normative Annex(es)* (See 8.1 for requirements and sequencing exceptions)	Title Text Figures* Tables* Equations* Notes* Footnotes*
	Informative Annex(es) (See 8.2 for requirements and sequencing exceptions)	Title Text Guidelines for the Preparation of Technical Inquiries Figures* Tables* Equations* Notes* Footnotes*
Optional Additional Components	Footnotes*	Text
	<u>Informative References*</u>	Title Dated and undated references
	Index*	Generated text
Required Additional Components	Committee Document List(s)	Title List of documents Document sources

\* Optional.

**6.1.2 Headings.** No more than four heading levels shall be used (five, counting the document title).

**6.1.2.1** An example of the four heading levels and their indentations (first line only) as they appear in the draft is shown below.

*Example:*

**1. Heading 1** (clause)

**1.1 Heading 2** (primary subclause)

**1.1.1 Heading 3** (secondary subclause)

**1.1.1.1 Heading 4** (tertiary subclause)

**6.1.2.2** Cross-references to information at the clause level shall include the word “Clause” and the relevant numeral (e.g., see Clause 1). Cross-references to information at the subclause levels shall include only the relevant subclause number (e.g., see 1.1; see 1.1.1; and see 1.1.1.1).

**6.1.3 Numbering System.** This specification exemplifies the organization and numbering system that shall be used for AWS standards.

**6.1.4 Clauses.** Clauses are numbered with the Arabic numerals “1,” “2,” “3,” and so forth, beginning with “1” for “Scope,” but excluding annexes. The title of the clause shall follow the number.

**6.1.5 Subclauses.** Subclauses may be primary, secondary, or tertiary and are numbered consecutively (see 6.1.2). A fourth level of subclauses shall not be used. If additional levels of division are required beyond the tertiary level, vertical lists (see 7.1) may be used.

Text shall not be divided into subclauses unless at least two clauses appear at the same level (e.g., 5.1 and 5.2).

**6.1.5.1** Primary subclauses shall be numbered with Arabic numerals (e.g., 4.1, 4.2, 4.3, and so forth). All primary subclauses shall have a title, which shall be placed immediately following the number followed by a period (.). Primary subclauses of the body of the document are listed in the table of contents.

**6.1.5.2** Secondary subclauses (e.g., 4.1.1, 4.1.2, 4.1.3, and so forth) may have titles, in which case these are not included in the table of contents.

**6.1.5.3** Tertiary subclauses (e.g., 3.1.1.1, 3.1.1.2, 3.1.1.3, and so forth) may have titles, in which case these are not included in the table of contents.

**6.1.6 Paragraphs.** Paragraphs shall not be numbered. Hanging paragraphs are not permitted, as reference to these is ambiguous or difficult.

**6.2 General Requirements (Clause 1).** Clause 1 shall consist of a listing of general information about the document.

**6.2.1 Scope (Clause 1.1).** All standards shall include a paragraph in the “General Requirements titled “Scope”. The “Scope” paragraph shall present a concise description of the document’s subject matter, purpose and extent of applicability, including exclusions where applicable.

**6.2.2 Statement on Units of Measure (Clause 1.2).** All standards shall include a paragraph in the “General Requirements” titled “Units of Measurement”. The “Units of Measurement” paragraph shall incorporate the boilerplate text for one of the options shown in Table 6.2 verbatim. Option 1 or Option 2 should be used in lieu of Options 3 or 4. Standards that use SI Units should use the practices of AWS A1.1, *Metric Practice Guide for the Welding Industry*.

**Table 6.2  
Options for the Use of Units of Measure and Document Designations**

Option	Requirements and Explanation	Boilerplate Text
Option 1	Standards that are written solely in the International System of Units (SI) shall be designated using the letter “M” (e.g., AWS D1.1M:2001). Examples of typical dimensions in a document with this designation are “25 mm” and “100 MPa.”	This standard makes sole use of the International System of Units (SI).
Option 2	Standards that are dual dimensioned shall be dual designated (e.g., AWS D1.1/D1.1M:2004 or AWS D16.1M/D16.1:2004). Examples of typical dimensions in a document with this designation are “1 in [25 mm]” or “25 mm [1 in].”	This standard makes use of both <i>[Insert the system of units to be used first, e.g., U.S. Customary Units]</i> and <i>[Insert the corresponding system of units, e.g., the International System of Units (SI)]</i> . 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.
	For product standards, add as the last sentence.	The measurements are not exact equivalents; therefore, each system must be used independently when referring to material properties.
	For standards that utilize units of measure for labeling (such as the A5 Filler Metal Specifications), add this statement to the above statement in the “Scope”	Standard dimensions based on either system may be used for sizing of electrodes or packaging or both under A5.XX and A5.XXM specifications.
Option 3	Standards that are written solely in U.S. Customary Units but which require approximate SI equivalents for informational purposes shall be designated using the document number followed by a colon (:) and the year of publication (e.g., AWS B2.1:2000). An example of a typical dimension in a document with this designation is 3/4 in (19 mm).	This standard makes sole use of U.S. Customary Units. Approximate mathematical equivalents in the International System of Units (SI) are provided for comparison in parentheses or in appropriate columns in tables and figures.
Option 4	Standards that are written solely in the International System of Units (SI) but which require approximate U. S. Customary equivalents for informational purposes, shall be designated using the document number followed by a colon (:) and the year of publication (e.g., AWS D1.1M:2001). An example of a typical dimension in a document with this designation is 19 mm (3/4 in).	This standard makes sole use of International System of Units (SI). Approximate mathematical equivalents in U.S. Customary Units are provided for comparison in parentheses or in appropriate columns in tables and figures.
Option 5	For standards not requiring units of measure, the document designation shall be the same as in Option 3 using the document number followed by a colon (:) and the year of publication (e.g., AWS B5.1:2003).	This standard does not require units of measure. Therefore, no equivalents or conversions are contained except when they are cited in examples.

**6.2.3 Statement on Safety (Clause 1.3).** All standards shall include a paragraph in the “General Requirements” titled “Safety”.

**6.2.3.1 Extent of Coverage.** The “Safety” paragraph shall begin with one of the following options, at the discretion of the responsible committee:

(a) “Safety and health issues and concerns are beyond the scope of this standard and therefore are not addressed herein.” [Examples include AWS 2.4 *Standard Symbols for Welding, Brazing and Nondestructive Examination*, and AWS 3.0 *Standard Welding Terms and Definitions*.]

(b) “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.” [Examples include AWS D1.1 *Structural Welding Code—Steel* and AWS D14.3 *Specification for Welding Earthmoving, Construction and Agricultural Equipment*.]

(c) “Safety issues and concerns are addressed in this standard, although health issues and concerns are beyond the scope of this standard.” [Examples include AWS C4.2 *Recommended Practices for Safe Oxyfuel Gas Cutting Torch Operation* and A5.14 *Specification for Nickel Bare Welding Electrodes & Rods*.]

(d) “Safety and health issues and concerns are addressed in this standard.” [Examples include ANSI Z49.1 *Safety in Welding, Cutting and Allied Practices*.]

**6.2.3.2 Sources of Information.** After the information required by 6.2.3.1, the following shall be included within the “Safety” clause:

“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”

## **6.2.4 Coverage of Welding Safety and Health Issues.**

**6.2.4.1** All safety and health information shall be consistent with ANSI Z49.1. Direct quotations of ANSI Z49.1 safety information should be used whenever possible. Safety and health information may be listed in the body of the standard or in an annex.

**6.2.4.2** For standards using the Scope language of 6.2.3.1(a), safety or health information shall not be included in the body nor the annex of the standard. If any safety or health information is included in the document, the language of 6.2.3.1a shall not be used.

**6.2.4.3** For standards using the Scope language of 6.2.3.1(b), safety or health information should be limited to unique concerns of interest involving the work, processes, materials or other circumstances surrounding the work. General welding safety and health information should not be included.

**6.2.4.4** For standards using the Scope language of 6.2.3.1(c), safety information should address all unique concerns of interest involving the work, processes, materials or other circumstances surrounding the work, and may extend beyond unique concerns of interest.

**6.2.4.5** For standards using the Scope language of 6.2.3.1(d), safety or health issues should be extensively addressed, consistent with other aspects of the Scope of the document.

**6.2.5 Related Safety and Health Issues.** After the information required by 6.2.3.2, the following shall be included within the “Safety” paragraph:

“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.”

**6.2.6** For adoption of ISO standards, the committee shall prepare a National Normative Annex that shall have a scope which includes safety and health information as specified within this specification.

## **6.3 Normative References (Clause 2)**

**6.3.1 Boilerplate Introductory Text.** The boilerplate text below shall be used to introduce normative (mandatory) references, which can be either dated or undated:

The standards listed below 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 revisions of, any of these publications do not apply.

**6.3.2 Listing of References.** Since only normative references are mandatory for the use of the document, they alone shall be listed in Clause 2. All other references shall be listed in an informative annex titled “Informative References” (see Annex E). The determination of which standards are normative and which are informative shall be based on their use and context (required or mandatory language = normative; nonmandatory language = informative) in the standard being prepared. The list of normative references shall be composed as follows:

1. Arrange references under separate headings by source when several references are cited from two or more sources (see Annex E). List AWS references first, followed by the

remaining groupings in alphabetical order. Names of organizations shall be spelled out followed by acronyms in parentheses;

2. List the document designation followed by a comma and then the complete title; and
3. Arrange the references by designation in alphanumeric order. For styles, see Clause 2, “Normative References,” in this standard; and Annex E.

**6.3.3 Document Sources.** Document sources for the normative references listed in Clause 2 shall be listed in footnotes under this clause only (see Clause 2 and Annex E for examples). Note that footnotes are considered informative.

## **6.4 Terms and Definitions (Clause 3)**

**6.4.1** Technical terms and industry jargon of importance to the document's subject and which are not defined in AWS A3.0, *Standard Welding Terms, and Definitions Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*, shall be defined in this clause.

The terms defined in AWS A3.0 shall not be listed unless the definition of a term in AWS A3.0 is inappropriate for the meaning intended by the technical committee drafting the standard. In that case, the technical committee shall bring the technical committee's definition of that term to the attention of the committee responsible for AWS A3.0.

Common dictionary terms shall not be included unless these are used with a specific connotation that differs from the dictionary definition. The terms and definitions included in Clause 3 shall be processed as required by TAC Policy 004 of the TAC Policy Manual.

**6.4.2** The list of terms and definitions shall be introduced by the following boilerplate text:

For the purposes of this document, the following terms and definitions apply:

**6.4.3** Terms shall be left justified in bold font with no numbering. All terms shall be set in lowercase, except proper names, acronyms, or common usage exceptions.

**6.4.4** Terms shall be arranged in alphabetical order. In rare cases when multiple definitions are required or when a list of terms needs to be grouped under a term, the items shall be listed numerically (see the term "standard" in Clause 3 for an example).

**6.5 Body Text.** The body text shall be as clear, concise, accurate, and consistent as possible. Uniformity of structure, style, and terminology shall be maintained within individual standards as well as within series of associated documents. With respect to content, they shall be complete within the boundaries specified by their scope.

**6.5.1 Style and Language.** The rules established in Clause 10, "Style" and Clause 11, "Language," shall be observed in the development of the text of the document.

**6.5.2 Commercial Terms and Conditions.** Provisions involving business relations between buyer and seller such as guarantees, warranties, and other commercial terms and conditions shall not be included in an American National Standard.

**6.5.2.1** Generally, it is not acceptable to include proper names or trademarks of specific companies or organizations in the text of a standard or in an annex (or the equivalent). In the event it is necessary to use proper names or trademarks of organizations or companies, the provisions of the *AWS Patent Policy* shall be followed.

**6.5.2.2** It is not acceptable to include manufacturer lists, service provider lists, or similar material in the text of a standard or in an annex (or the equivalent). Where a sole source exists for essential equipment, materials, or services necessary to determine compliance with the standard, it is permissible to supply the name and address of the source in a footnote or informative annex as long as the words "or the equivalent" are added to the reference.

**6.5.2.3** In connection with standards that relate to the determination of whether products or services conform to one or more standards, the process or criteria for determining conformity can be standardized as long as the description of the process or criteria is limited to technical and engineering concerns and does not include what would otherwise be a commercial term or proper name.

## 7. Optional Body Components

### 7.1 Vertical Lists

**7.1.1 Introductory Phrases.** Vertical lists shall be introduced using the words “the following” or “as follows” followed by a colon (:).

**7.1.2 Numbering.** Automatic numbering shall not be used in manuscript preparation. The items in the list are indented and numbered consecutively using Arabic numbers.

**7.1.3 Structure.** The items in a list shall be uniform (parallel) in structure. For example, if the first word of the first item is a verb, every item that follows shall be a verb (e.g., use, position, insert, remove, and the like). The same rules apply to nouns, articles, or other parts of speech.

*Example 1:*

The operator shall start the production cycle as follows:

1. Insert the key in the ignition.
2. Turn the key clockwise until the engine starts.
3. Press the “*START*” button to initiate production.

*Example 2:*

To complete the safety inspection before proceeding to operate the equipment, check the following:

1. the condition of the tires
2. the operation of the brakes
3. the operation of all safety interlocks

**7.1.4 Capitalization.** The first word of the items in a list shall be capitalized if the item is a complete sentence; otherwise, the first word shall be lowercase, unless it is a proper noun.

**7.1.5 Punctuation.** No punctuation is necessary to separate the items in the list (see Example 1 below) except if the item is a complete sentence then a period should be added. If the list’s concept is not clearly understandable without punctuation, then a comma (,) shall be used to separate the items in the list, provided these items contain no internal punctuation. When the items contain internal punctuation, and the list’s meaning is not clearly understandable without end line punctuation, a semicolon (;) shall be used to separate the items (see Example 2 below). The word “or” shall be used following the penultimate item if the list indicates a choice is necessary.

*Example 1:*

Personal protective equipment (PPE) shall include the following:

1. safety helmet
2. respirator
3. protective gloves
4. heavy clothing

*Example 2:*

Designers routinely apply knowledge of the following areas:

1. mechanical and physical properties of metals and weldments;
2. welding processes, costs, and variations in welding procedures;
3. filler metals and properties of weld metals;
4. communication of the weld design to the shop, including the use of welding symbols.

**7.1.6 Headings in List Items.** When headings are used to summarize the list items, the heading may be a word or phrase. These item headings shall be italicized to set them off.

*Example:*

**4.2 Form.** Brazing filler metals are available in several different physical shapes and sizes that should be specified by the user as follows:

1. *wire*. diameter, length, and dimensions of the formed shape; temper, if for use in automatic feeding equipment;
2. *foil*. thickness, width, and length; temper, if for use in automatic feeding equipment;
3. *powder*. particle size or size distribution, or both;
4. *paste*. binder type and percentage, and powder particle size;
5. *plasticized tape*. thickness, width, percent density, and binder type;
6. *brazing sheet*. cladding thickness, composition, and plating (electrolytic and electroless).<sup>8</sup>

## 7.2 Equations

**7.2.1 General.** Equations shall be prepared using the Equation Editor function in Microsoft Word or in *MathType*. Simple, unnumbered equations may be set off (displayed) or incorporated in the text. All numbered and complex equations shall be set off. Whether set-off or displayed, equations shall form part of a full sentence and read clearly grammatically (i.e., the sentence has a subject and a verb at a minimum). The equation and the list of defining terms that follow are the continuation of that full sentence.

The use of symbols to denote variables shall be consistent wherever they appear in the document (equations, text, figures, and tables). Only one symbol shall be used per variable (e.g., thickness is denoted using only *t*, not *t* and *T*). All variables shall be italicized.

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<sup>8</sup> Adapted from American Welding Society C3 Committee on Brazing and Soldering, AWS C3.2:2002, *Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components*, Miami: American Welding Society, p. 4, 4.2.

When the equation requires more than one set of enclosures, the standard order, beginning with the parentheses, is as follows:

$$[ \{ ( \{ [ ( ) ] \} ) \} ]$$

Additional information about the usage and style of equations is provided in *The Chicago Manual of Style*.

**7.2.2 Set-Off Equations.** Set-off equations are equations that are not incorporated in the same line as the sentence but are displayed on a separate line or lines.

**7.2.2.1 Introduction in Text.** Set-off equations shall be introduced in the text. The introductory phrases “as follows” and “the following” shall be followed by a colon (:). The introductory terms “Hence,” “Thus,” “Therefore,” “For instance,” and “For example” shall be followed by a comma (,).

**7.2.2.2 Definition of Variables.** The variables (symbols or abbreviated terms) of each set-off equation shall be defined in list form immediately following the equation. The introductory term “where” shall be used to introduce the list of variables.

Unless the equation is dimensionless, the units of measure shall be specified for each term, as needed. Unless otherwise required by technical criteria, the symbols shall be listed in alphabetical order in the following sequence:

1. Upper case Latin letters followed by lower case Latin letters (e.g.,  $A, a, B, b, C, c$ , and so forth);
2. Letters without subscripts preceding letters with subscripts ( $A, a, B, b, C, C_M, C_2, D, d, d_{int}$ , and so forth);
3. Greek letters following Latin letters (e.g.,  $a, \alpha, b, \beta$ , and so forth); and
4. Special symbols.

**7.2.2.3 Form.** In the list of definitions for set-off equations, the equal sign (=) with a space on both sides shall be used rather than the words “is” or “are.” When the standard is dual dimensioned, the primary unit of measure is specified first followed by secondary unit, which is enclosed in brackets. When units are included, they shall be separated from the definition with a comma (,). In addition, a semicolon shall be used at the end of the item, except for the last item, which shall end with a period (.) The word “and” shall be used in addition to the semicolon at the end of the penultimate item.

*Example:*

$$S = 0.2 \frac{A_w}{t} + 0.05 d \tag{1}$$

where

- $S$  = Transverse shrinkage, mm [in];
- $A_w$  = Cross-sectional area of weld, mm<sup>2</sup> [in<sup>2</sup>];
- $t$  = Thickness of plates, mm [in]; and
- $d$  = Root opening, mm [in].

**7.2.2.4 Alignment and Indentation.** The word “where,” used to introduce the definitions of variables, shall be set flush left on a separate line.

Equations that are set off shall be indented from the left margin. Equations that are longer than the width of the column (publication format) or page (draft format) shall be divided per the guidelines specified in *The Chicago Manual of Style*.

**7.2.2.5 Numbering.** Equations shall be numbered using Arabic numbers enclosed in parentheses [e.g., (1), (2), (3)] and right justified. Equations in the body of the text shall be numbered sequentially [e.g., Equation (1), Equation (2), and so forth] Subdivisions of equations (e.g., 1a, 1b, 1c) shall not be used. When an equation cannot be presented in dual units, parallel equations shall be used.

### 7.2.3 Equations Incorporated in the Text

**7.2.3.1 General.** Equations incorporated in text shall be simple and expressed in mathematically correct form. A solidus (/) shall be used as necessary to reduce the equation to a single line (e.g., a/b).

To avoid ambiguity, parentheses shall be used to identify the complete numerator or denominator. For example, the expression “log a/b” is ambiguous. It could mean either “log (a/b)” or “(log a)/b.” In cases of potential ambiguity, parentheses shall be used to clarify (e.g., If “a/b + c” is written but “a/(b + c)” is meant, parentheses shall be used).

The multiplication symbol ( $\times$ ), found in the “Symbols” font, shall be used in place of the letters “x” or “X,” or a point ( $\bullet$ ) to indicate multiplication.

**7.2.3.2 Definition of Variables.** Equations incorporated in text shall also include a list of definitions and the corresponding units of measure introduced by the word “where.” A semicolon shall be used to separate the items in the list of definitions.

*Example:*

This value can be found using the expression  $v = l/t$ , where  $v$  denotes velocity in miles per hour (mph) or kilometers per hour (kph);  $l$  denotes the distance traveled in miles (mi) or kilometers (km); and  $t$  denotes the duration in minutes (min).

## 7.3 Footnotes

**7.3.1 Use.** Footnotes shall be used to supply nonmandatory information only.

**7.3.2 Generation.** Footnotes shall be generated automatically using the automated function of the appropriate software (in *Microsoft Word™*, use the “Insert/Reference/Footnotes” feature).<sup>9</sup>

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<sup>9</sup> This is an example of a generated footnote.

**7.3.3 Numbering.** Footnotes shall be numbered sequentially throughout the document starting with a superscripted number 1, beginning with the first page of the text of the standard and continuing through the annexes, if any. See Table 4.1 for font and format specifications.

## **7.4 Informative References**

**7.4.1 General.** All informative references may be displayed in footnotes, source lines, or listed in the “Informative References” annex (see 9.1). (As previously explained, normative references are mandatory documents required by the mandatory language of a standard and are listed in Clause 2.) The most recent edition of all sources (books, handbooks, codes, standards, and so forth) shall be cited in the document unless a dated reference is required. As the titles of standards often change during the revision process, all cited titles and other information about the reference shall be verified for completeness and accuracy.

### **7.4.2 Reproducing and Adapting Information from Other Standards**

**7.4.2.1 Listing of References to Other AWS Documents and Standards.** When necessary and appropriate, AWS Technical Committee documents and standards shall include references to other pertinent AWS documents (especially core documents such as AWS A1.1, AWS A3.0, AWS A2.4, AWS B2.1, AWS B4.0, and so forth). Reproducing information (e.g., text, tables, and figures) verbatim shall be avoided because the information cited could become obsolete when the source document is revised. All AWS documents from which material is adapted or reproduced shall be listed as dated references in the source lines of the reproduced or adapted figures or tables, in footnotes for text, and the “Informative References” annex.

**7.4.2.2 Listing of References to Other Organizations’ Documents and Standards.** The verbatim reproduction of information (e.g., text, tables, and figures) from documents and standards published by other organizations shall be avoided. If it is absolutely necessary to reproduce or adapt information from a document published by another organization, permission shall be obtained in writing from the organization if the material is copyrighted. All documents from which material is adapted or reproduced shall be listed as dated references in the source lines of the reproduced or adapted figures or tables, in footnotes for text, and the “Informative References” annex.

**7.4.3 Articles in Periodicals.** References to articles in periodicals shall be set as follows:

1. Name of author(s), surname first, each initial followed by a period, initials separated by a space; followed by a comma;
2. Year of issue followed by a comma;
3. Title of article (see 10.8) followed by a comma (no quotation marks or italics are used);
4. Title of periodical in italics;
5. Volume number;
6. Issue number in parentheses followed by a colon and a space; and
7. First and last pages of article, separated by an en-dash (–). Full page numbers shall be used (e.g., use “1025–1029,” not “1025–29”).

*Examples:*

Boulton, C. F., 1997, Acceptance Levels of Weld Defects for Fatigue Service, *Welding Journal* 56(10): 49–52.

Grant, W. B., I. V. Zuev, Y. V. Kuzmenko, and W. W. Gainor, 1999, Hidden Arc Welding. *Welding Journal* 79(2): 149-s–152-s.

#### **7.4.4 Standards, Books, and Other Literature**

##### **7.4.4.1** References to standards shall be set as follows:

1. The alphanumeric designation of the dated or undated standard (e.g., ANSI Z49.1:2005) followed by a comma;
2. The complete title of the standard followed by a comma; and
3. The publisher's name.

*Example:*

ANSI Z49.1:2005, *Safety in Welding, Cutting, and Allied Processes*, American Welding Society.

##### **7.4.4.2** References to books and other types of literature shall be set as follows:

1. Name of first author(s) or editor(s), surname first, initials separated by a space, followed by a comma. In the case of subsequent authors, initials are followed by the surname and a comma;
2. Year of publication followed by a comma;
3. Title of book (see 10.8), italicized, followed by a comma;
4. Volume number (if any), edition number (if any);
5. Editor(s) (if any) followed by a comma;
6. City and state (spelled out) followed by a colon; and
7. Name of publisher, followed by a period.

*Examples:*

Cary, H. B., 1997, *Modern Welding Technology*, 4th ed., Columbus, Ohio: Prentice Hall.

Oates, W. R., and A. M. Saiita, eds., 1998, *Materials and Applications—Part 2*, Vol. 3 of *Welding Handbook*, 8th ed., Miami, Florida: American Welding Society.

**7.4.4.3** When a publication has no author's name, it should be listed by the organization, even if the name is repeated as the publisher.

*Example:*

Aluminum Association (AA), 2003, *Aluminum Brazing Manual*, New York: Aluminum Association.

#### **7.4.5 Chapters in Books**

*Example:*

Ogilvy, D., 1995, The Creative Welder, in *The Creature Organization*, ed. Gary A. Steiner, Chicago: Illinois: University of Chicago Press.

**7.4.6 Bulletins and Reports.** The following information should be included when referencing bulletins and reports:

1. Name of first author(s) or editor(s), surname first, initials separated by a space, followed by a comma. In the case of subsequent authors, initials followed by the surname and a comma; Author(s) names followed by a comma;
2. Year of publication followed by a comma;
3. Title (see 10.8) followed by a comma;
4. Bulletin name or number or report name italicized;
5. Location of publication, followed by a colon; and
6. Publisher followed by a period.

*Example:*

Lundin, C. D., J. R. Martin, and R. Yao, 2003, The Significance of Weld Discontinuities—A Review of Current Literature, *WRC Bulletin 222*, New York: Welding Research Council.

#### **7.4.7 On-Line Sources**

**7.4.7.1 Web Pages.** Web pages shall be cited using the author's name, the title of the site, the date of access, and the uniform resource locator (URL) enclosed in angled brackets (<, >). URLs shall not be hyphenated. If the URL must be divided, division shall occur only after the double solidus (/).

*Example:*

American Welding Society (AWS), *Home Page*, June 24, 2003, <<http://www.aws.org>>.

**7.4.7.2 Books.** On-line books shall be referenced using the author's or the editor's name, the original publication date, the title of the work (italicized), the date of access, and the URL.

*Example:*

Barsky, R. F., 1997, *Noam Chomsky: A Life of Dissent*, Cambridge: Massachusetts Institute of Technology (MIT) Press, May 10, 2002, <<http://mitpress.mit.edu/chomsky/>>.

**7.4.7.3 Journal Articles.** Articles in on-line periodicals are referenced using the author's name, the date of publication, the title of the article, the name of the journal (italicized) and the volume number and issue number, the total number of pages or paragraphs, the date of access, and the URL.

*Example:*

Pereira, M. J., 2002, Corrosion in Welded Joints, *Welding and Joining* 3(8), 24 pars., April 6, 2002, <<http://www.weldingandjoining.com>>.

**7.5 Figures.** Figures may consist of photographs, charts, or line drawings.

**7.5.1 Numbering and Positioning.** All figures shall be introduced sequentially in the text by verbiage similar to “Figure 8 shows,” or “as shown in Figure 8,” or “(see Figure 8).”

**7.5.1.1** Figures shall be cited in the text as “Figure X,” where X is a sequential number (e.g., 1, 2, 3, and so forth) or the clause number in which the figure is used followed by a sequential number (e. g., 3.1, 3.2, 3.3, and so forth).

**7.5.1.2** Wherever possible, figures shall be positioned immediately following the paragraph containing the first mention of the figure. When it is not possible or practical to imbed them close to their citation, figures shall be inserted at the end of the clause in which they are first mentioned. If an individual figure covers more than six pages, it shall be located in an annex or at the end of the clause in which it is first mentioned to maintain text continuity.

**7.5.2 Quality and Specifications.** Figures shall be of adequate detail (to illustrate clearly what is intended to be shown) and image quality to permit acceptable reproduction for review, balloting, and publication purposes. Original photographs that are properly labeled in pencil on the back (e.g., Figure 3.4—Tilting-Rotating Positioner) shall be submitted as glossy images, slides, or high-resolution (800 dpi) images or scans. Line art shall be submitted in any suitable format that is clear and legible.

**7.5.3 Dual Dimensioning.** For simple figures in dual-dimensioned standards, dimensions shall be shown in both units (see 6.2.2) whenever possible. If the figures are complex and dual-dimensioning could cause confusion or is impossible, two sets of figures—one set dedicated to the SI Units, labeled “SI Units,” plus a matching set dedicated to U.S. Customary Units, labeled “U.S. Customary Units” may be used. This requirement of providing *both* systems of measure applies to all parts of the text, tables (see Annex F), figures (see Annex G), and annexes.

#### **7.5.4 Labels and Callouts**

**7.5.4.1 Labels.** Labels (including axis labels, component labels, and labels for other figure elements) shall be set in 10-point Arial font (unless a smaller font is essential to fit the text properly) in upper case except for the abbreviations of units of measure, which shall be set in the case applicable to the unit (e.g., mm, MPa, and so forth). See Annex G for examples.

**7.5.4.2 Callouts.** Callouts are notations that are not part of the figure but are used to convey special requirements or instructions to the graphic artist. These notations may be made by hand or electronic text in any convenient format, but they must be clearly identified that they are not part of the figure (see Figure G.1 for an example of a callout). Notes to the graphic artist shall be set off in brackets and highlighted in green (see 4.8).

**7.5.5 Key.** When abbreviations, symbols, or variables occur in a figure, these shall be defined in a key located below the figure. The items in the key shall be set in 10-point Arial font. The first letter of the first word in each definition shall be capitalized. Include the units of measure following the definitions. No punctuation shall be used in the list of definitions.

*Example:*

Key:

$E$  = Modulus of elasticity  
 $\sigma$  = Stress, psi [MPa]  
 $\varepsilon$  = Strain, in/in [mm/mm]

**7.5.6 Source Line.** Line drawings and other figures that are not specifically created for the document but are reproduced or adapted from other sources shall carry a source line to reference the source of the material as shown in Examples 3 through 5 below. If the source of the reproduced material is copyright protected, written permission shall be obtained from the holder of the copyright and acknowledgement of this permission shall also be included in the source line. For revisions of documents, sources of existing figures should be determined if possible.

Figures reprinted or adapted from other AWS publications shall carry source lines as shown in the examples that follow. The source line shall be positioned below the figure footnotes (if any) and figure notes (if any) in 10-point Arial font, and italicized as shown in the examples that follow.

*Example 1.* For figures adapted (modified) from other AWS publications:

*Source:* Adapted from AWS A3.0:2001, *Standard Welding Terms and Definitions*, Figure 33, American Welding Society.

*Example 2.* For figures reproduced (without change) from other AWS publications:

*Source:* Reproduced from AWS D1.1/D1.1M:2004, *Structural Welding Code —Steel*, Figure 4.3, Miami: American Welding Society.

*Example 3.* For figures adapted (modified) from non-AWS sources:

*Source:* Adapted, with permission, from American Society of Mechanical Engineers *ASME Boiler and Pressure Vessel Code, 2004 Section VIII, Division 1*, New York: American Society of Mechanical Engineers, Appendix 4, Figure 4.1.

*Example 4.* For figures reproduced without change from non-AWS sources:

*Source:* Reprinted, with permission, from Kou, S., 1987, *Welding Metallurgy*, New York: John Wiley and Sons, Figure 5.12.

*Example 5.* For tables and figures created by the committee using data from other sources:

*Source:* Data from Eagar, T. W., and N. S. Tsai, 1983, Temperature Fields Produced by Traveling Distributed Heat Sources, *Welding Journal* 62(12): 346-s–355-s.

**7.5.7 Credit Line.** To use photographs that are not the property of AWS, written permission shall be obtained from the owner (individual or corporate), and the figures shall carry a credit line to acknowledge their source and that they are being used with their permission. The credit line shall be set in 9-point Arial font and right justified under the graphic. No period (.) shall be used at the end of the line.

*Example:*

Photograph
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Photograph courtesy of Honeywell International

**7.5.8 Captions.** Figure captions consist of the word “Figure,” the figure number, and the title. The figure number shall be separated from the title by an em-dash (—). All important words in the caption shall be capitalized (i.e., articles and prepositions are not capitalized unless they are the first word in the title). Figure captions shall be numbered consecutively (1, 2, 3, and so forth; or X.1, X.2, X.3, and so forth where X is the clause number) using Arabic numbers. They are centered under the figure in bold, 10-point Arial font as shown in the examples to follow and Annex G.

**7.5.8.1 Captions for Figures with Multiple Elements.** When the figure consists of several separate components, a description of each part shall be presented. Identification of each part and the format of the figure caption shall be done in the following way.

When figures have multiple parts and one figure caption is used for all parts, alphabetical captions in uppercase, bold, 10-point Arial font enclosed in parentheses [e.g., (A), (B), and so forth] shall be placed below each figure part. Such part captions may contain additional descriptive text in mixed case and may be centered or left justified under the figure part (see Figure G.2 for an example).

The figure caption shall meet all requirements of 7.5.8. The word “and” shall be used to join two descriptions, whereas a semicolon (;) shall be used to separate three or more descriptions.

*Examples:*

**Figure 7.44—Distortion Caused by Angular Change: (A) a Free Joint and (B) a Restrained Joint**

**Figure 8.45—Combinations of Symbols: (A) Welding and Nondestructive Examination; (B) Multiple Nondestructive Examination Methods; and (C) Symbols with Side and No-Side Significance**

**7.5.8.2. Etchants and Photomicrographs.** If the figure contains photomicrographs, the level of magnification shall be specified in parentheses at the end of the caption. If an etchant was used, the type of etchant shall also be specified. If magnification and etchant type are unknown (historical photomicrographs), the caption shall contain the phrase, “Magnification and Etchant Type Unknown.”

*Example:*

**Figure 4.11—Typical Lamellar Appearance of Pearlite (1500X Magnification; Etchant: Picral)**

**7.5.9 Permission to Publish Facial Images.** For AWS to use pictures that contain facial images of individuals, written permission to use their picture shall be obtained from the individuals who appear in photos (see Annex J).

**7.5.10 Continuation of Figures.** When a figure continues beyond one page, a caption shall appear on each additional page specifying the figure number followed by the word “Continued” in parentheses and the title. (See 7.5.1.2 for location of a figure covering more than six pages.)

*Example:*

**Figure 33 (Continued)—Parts of a Weld**

## 7.6 Tables

**7.6.1 General.** Tables summarize and illustrate information presented in the document and often supply information in a format that cannot be presented in any other way, e.g., chemical compositions of filler materials, test values.

When a table cannot be presented in dual units of measure, parallel tables shall be used. All variables used shall be defined (even if already defined in text), and units of measure shall be specified. A key (legend) shall be used if there are variables in the table.

**7.6.2 Orientation.** All tables should be created in vertical (portrait) orientation when possible. Landscape orientation may be used for wide, complex tables.

**7.6.3 Margins.** All tables should be set within the standard one-inch margins in drafts.

**7.6.4 Numbering and Positioning.** All tables shall be introduced sequentially and discussed in the text.

**7.6.4.1** Tables shall be cited in the text as “Table X,” where X is a sequential number (e.g., 1, 2, 3, and so forth) or the clause number in which the figure is used followed by a sequential number (e. g., 3.1, 3.2, 3.3, and so forth).

**7.6.4.2** Wherever possible, tables shall be positioned immediately following the paragraph containing the first mention of the table. Where it is not possible or practical to imbed them immediately following their citation, tables shall be inserted at the end of the clause in which they are first mentioned. If a table covers more than six pages, it shall be located in an annex or at the end of the clause in which it is first mentioned to maintain text continuity.

**7.6.5 Table Title.** All tables shall have a title that is centered above the table. The title consists of the table number and the title on two separate lines. Table titles shall be concise and shall clearly describe the material presented. The font for table titles shall be 10-point Arial bold.

*Example:*

**Table 4.11**  
**Chemical Composition Limits and Ranges for SAW Electrodes**

**7.6.6 Column Heading.** **Column** headings shall be set in Arial 10-point bold type and centered within the columns.

**7.6.7 Units of Measure.** All variables shall have their units of measure, as applicable, specified in the column and line headings. Units should be consistent for each individual variable unless inappropriate throughout the table (e.g., avoid the use of minutes and seconds, inches and feet, and so forth). If needed, two tables—one dedicated to SI Units, labeled “SI Units,” and the other dedicated to U.S. Customary Units, labeled “U.S. Customary Units”—may be used. The primary system of measurement shall be listed in the first table. This requirement of providing *both* systems of measure applies to all mandatory parts of the text, tables (see Annex F), figures (see Annex G), and annexes if the standard is dual-dimensioned.

**7.6.8 Abbreviations.** Abbreviations shall be used in column headings and in the body of the table. In dual-dimensioned standards, the secondary unit abbreviation shall be enclosed in brackets (e.g., mm [in]).

**7.6.9 Format and Alignment of Numbers.** Decimal forms shall be used unless fractions are commonly used in industry. If the number is less than 1, a zero (0) shall precede the decimal point (e.g., 0.5, 0.010). Numbers shall be aligned according to the decimal point.

For numbers greater than or equal to 1000, commas shall not be used to separate groups of numbers (e.g., 1000, 10 000, 100 000, 1 000 000, and so forth) because commas are used as decimals in some countries. For numbers greater than or equal to 10 000, spaces may be used as shown in the preceding sentence.

**7.6.10 Absence of Numerical Data.** In cells in which no data are specified, an em-dash (—) shall be centered within the cell.

**7.6.11 Shading.** In long, complex tables, shading (either vertical or horizontal) may be used to facilitate the reading of columns and rows.

**7.6.12 Use of Rules (Borders).** The tables in draft documents may employ horizontal and/or vertical rules to separate the rows and columns. Rules are optional, based on the need to present the information in the optimum manner (see Annex F, Sample Draft Table Formats).

**7.6.13 Use of Braces.** Braces ( { } ) may be used in tables to group data that relate to one entry in an adjacent column.

**7.6.14 Ditto Marks.** The ditto marks (") used in some publications to indicate "same as above" shall not be used in AWS standards. Instead, either (1) repeat the data, (2) modify the heading to include the repeated words, or (3) modify the format so braces can be used to achieve the same purpose (see Annex F, Sample Draft Table Formats).

**7.6.15 Continuation of Tables.** Tables of two or more pages shall flow without the need for repetition of titles or column heads (see Table 4.1 for an example) unless they are needed for clarity. See 7.6.4.2 for location of tables covering more than six pages.

#### **7.6.16 Table Footnotes**

**7.6.16.1** Table footnotes in tables and figures with tables shall be identified with a superscript, beginning with the letter "a" (e.g., <sup>a, b</sup>) and continuing in sequential order starting on the left side of the top row and moving left to right on each row.

**7.6.16.2** Table footnotes shall be listed immediately below the table in the order presented in the table using left justified, lower case, 9-point Arial font. No introductory word, such as "Notes," shall be used for table footnotes.

**7.6.16.3** When a table footnote on composition requirements (which is entirely expressed in terms of weight percent) contains additional composition requirements (such as "Be shall be 0.0005 maximum"), no % symbol shall be used following the quantity.

**7.6.17 Table Notes.** Table notes generally apply to the whole table and have no superscripts anywhere in the table. Table notes shall be introduced below the table and after table footnotes (if any) using the word "Note" or "Notes" (see Annex F, Sample F.1). The notes shall be numbered sequentially starting with "1." Notes to any subsequent tables shall likewise be numbered starting with "1."

**7.6.18 Source Line.** Tables that are not specifically created for the document but are reproduced or adapted from another source shall carry a source line in 9-point Arial font to reference the source of the material. The source line is placed below the table footnotes (if any) and table notes (if any). Tables reprinted or adapted from other publications shall carry the complete information as noted in the examples that follow. If the table or figure has been modified or adapted in any way, the source line shall be prefixed with the words “Adapted from” as shown in Example 3.

*Example 1.* For tables reproduced without change from other AWS publications:

*Source:* AWS A5.8/A5.8M:2003, *Specification for Filler Metals for Brazing and Braze Welding*, Table 2, American Welding Society.

*Example 2.* For tables reproduced without change from sources outside of AWS:

*Source:* Reprinted, with permission, from Kou, S., 1987, *Welding Metallurgy*, New York: John Wiley and Sons, Table 5.12.

*Example 3.* For tables and figures created by the committee using data from other sources:

*Source:* Adapted from AWS A3.0:2001, *Standard Welding Terms and Definitions Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*, Table 2, American Welding Society.

**7.6.19 Permission to Reprint.** When reproducing or adapting a table whose copyright is held by another publisher, written permission shall be obtained to reprint the material. See Annex K for a sample Request Permission to Republish Information Copyrighted by Others form. An example of a source line used in this case is as follows:

*Source:* Adapted, with permission, from American National Standards Institute (ANSI), ANSI/RIA 15.06-1999, *American National Standard for Safety Requirements for Industrial Robots and Robot Systems*, Figure A.3.

**7.6.20. References to Tables.** All tables included in the document shall be referred to and introduced in text by phrases such as “as shown in Table 8,” “(see Table 8),” or similar terminology.

## **7.7 Notes in Text**

**7.7.1 General.** Explanatory or informative statements requiring emphasis may be set off as notes. Notes shall not contain requirements or mandatory information.

**7.7.2 Format.** Notes shall be set off from the rest of the text, italicized, and indented. They shall be introduced by the word “*NOTE*” followed by a colon (:).

**7.7.3 Placement.** Notes shall be placed at the end of the clause, subclause, or paragraph to which they refer. When several notes are presented, these shall be numbered sequentially (e.g., *NOTE 1*, *NOTE 2*, *NOTE 3*, and so forth). When only one note is needed, no number is required.

*Example:*

*NOTE 1: If the proper sequence (noted above) is not followed, the test results may be invalid.*

*NOTE 2: If a step was missed, the whole sequence should be repeated.*

## **8. Annexes**

### **8.1 Normative Annexes**

**8.1.1 Location.** Normative annexes precede informative annexes (see 8.2) when both types are included in the standard.

An exception to this rule applies to ISO adoptions. When adopted ISO standards contain normative and informative annexes within them, these shall not be separated from the body of the ISO standard to meet the sequencing rule. Any annexes which AWS adds shall follow the complete ISO standard (including annexes) and shall be sequenced as noted here and in 8.2.

#### **8.1.2 Title and Numbering**

**8.1.2.1** Individual normative annexes shall be listed in alphabetical order starting with “A” followed by “Normative” in parentheses [e.g., Annex A (Normative), Annex B, (Normative), and so forth].

**8.1.2.2** Clauses, subclauses, figures, tables, and equations in annexes shall be numbered using a prefix consisting of the alphabetical designation of the annex (e.g., A1., A1.1, A1.1.1, A2., A3.; Figure A.1, Figure A.2, Figure A.3; Table A.1, Table A.2; and so forth.).

**8.1.3 Preface.** All normative annexes shall be prefaced (under the title) by the following text in 10-point Times New Roman font. The text is Roman font and the title is italicized as shown below:

This annex is part of [insert document designation, *insert title*], and includes mandatory elements for use with this standard.

### **8.2 Informative Annexes**

**8.2.1 Location.** Informative annexes follow normative annexes, if any, except as noted in 8.1.1.

#### **8.2.2 Title and Numbering**

**8.2.2.1** Individual annexes shall be listed in alphabetical order as follows:

1. If no normative annexes exist, the informative annexes start with “A” followed by “Informative” in parentheses (e.g., Annex A (Informative), Annex B (Informative), and so forth).

2. If normative annexes exist, the first informative annex starts with the next alphabetical letter followed by “Informative” in parentheses (e.g., if Annexes A and B are normative, the first informative annex would be labeled Annex C (Informative), and subsequent ones would follow the same format.)

**8.2.2.2** Clauses, subclauses, figures, tables, and equations in annexes shall be numbered using a prefix consisting of the alphabetical designation of the annex (e.g., C1., C1.1, C1.1.1, C2., C3.; Figure C.1, Figure C.2, Figure C.3; Table C.1, Table C.2; and so forth.).

**8.2.3 Preface.** All informative annexes shall be prefaced (under the title) by the following text in 10-point Times New Roman font italicized where shown:

*This annex is not part of [insert document designation, insert title], but is included for informational purposes only.*

**8.2.4 Guidelines for the Preparation of Technical Inquiries.** An annex titled “Guidelines for the Preparation of Technical Inquiries” shall be included in all standards (see Annex L).

## **9. Additional Informative Components**

**9.1 Informative References.** Documents that are cited for informative purposes shall be listed in a separate informative annex titled “Informative References.” See Annex H for a sample. The Informative References annex shall directly precede the index, if an index is included.

*NOTE: Documents that are cited as both normative and informative references shall be referenced in Clause 2, “Normative References” only.*

**9.1.1** All references shall be arranged alphabetically.

**9.1.2** References to standards shall be listed as required in 7.4.4.1 with the standard’s designation (dated or undated), the complete title, followed by the publisher’s name (e.g., ANSI Z49.1:2005, *Safety in Welding, Cutting, and Allied Processes*, American Welding Society).

**9.1.3** References to other sources shall be listed as noted in 7.4.3 through 7.4.7. When the word “The” is part of the author’s name, it shall not be considered for purposes of alphabetization. For corporate authors, the company is listed as the author. The Latin abbreviation “et al.” shall not be used to replace the authors’ names in informative references.

## **9.2 Index**

**9.2.1** To assist readers in readily locating specific topics, an index may be included in any standard that is long or complex.

**9.2.2** Topics shall be indexed alphabetically by key words. Subtopics shall be arranged beneath the main topics in the same manner (see Annex I).

**9.2.3** The numbered component (e.g., subclause or paragraph) in which the topic is discussed shall be used as the reference rather than the page number.

**9.3 List of Documents Prepared by the Committee.** The last page in the document shall contain a list of documents prepared by the committee. This list, including designations and full titles, is intended to assist readers in finding related publications.

## **10. Style**

**10.1 Spelling.** *Webster’s Third New International Dictionary* shall be the normative spelling reference for AWS standards. American English shall be used as opposed to British English spelling (e.g., use “color” rather than “colour”). When alternate spellings are indicated in this dictionary, the first (preferred) spelling shall be used. When a variation spelling is shown, the preferred spelling shall be used (e.g., use “gauge” rather than “gage”).

**10.2 Hyphenation.** Hyphenation of compound words shall be in accordance with *The Chicago Manual of Style*.

**10.3 Abbreviations and Acronyms.** All abbreviations and acronyms shall be defined (i.e., spelled out in full) the first time they are used in the document. Standard abbreviations are listed in Annex B.

**10.4 Measurement Ranges and Tolerances.** When specifying a measurement range, the units of measure shall be included for each unit of the range. The word “to” shall be used to indicate ranges globally (e.g., 1 mm to 5 mm), except where space is limited and precludes the use of “to.” In the latter case, an en-dash (–) may be used in place of the “to” except for ranges of negative units.

*Example:*

Shot peening is beneficial when it changes the residual stresses at the weld face from tension to compression for a depth of 0.005 in to 0.030 in [0.1 mm to 0.8 mm].

**10.5 Numerical Conversions and Equivalents.** All conversions shall comply with AWS A1.1, *Metric Practice Guide for the Welding Industry*. If metric (SI) equivalents (not conversions) are used in a standard, the equivalents shall be those typically used in the industries which use metric measurements. The following examples show the differences between conversions (“hard,” enclosed in parentheses) and equivalents (“soft,” enclosed in brackets):

*Example 1:*

Conversion for 2 inches: 2 in (50.8 mm)

*Example 2:* Equivalent for 2 inches: 2 in [50 mm]

**10.6 Italics.** Italic font shall be used to highlight key words, titles of books and periodicals, notes, special terms, and foreign phrases. Italics are also used to denote text to be inserted, e.g., [*insert AWS designation and title*].

In a block of italicized text, the unitalicized font shall be used for contrast to highlight the titles of books and periodicals, special terms, and foreign phrases.

*Example:*

*NOTE: For details on the use of italicization see Webster’s Third New International Dictionary, p. 1545.*

**10.7 Boldface Type.** Boldface type shall be used for the following purposes only:

1. Titles of clauses and subclauses,
2. Titles of figures and tables,
3. Column headings, and
4. The words “**DANGER**” or “**WARNING**” used in hazards communication.

## **10.8 Capitalization**

**10.8.1** The *Chicago Manual of Style* shall be consulted for the rules governing capitalization. The norms specified in the following subclauses shall be observed.

**10.8.2** The first letter of all nouns, pronouns, adjectives, verbs, adverbs, and subordinating conjunctions (*if, because, that,* and so forth.) used in headings, captions, and table titles shall be capitalized.

*Example:*

**Table 1—Threshold Limits for Fume Exposure That Meet OSHA Requirements**

**10.8.3** The first letter of all articles (e.g. a, an, the), coordinating conjunctions (and, but, or, for, nor), units of measure (except where the unit is capitalized, such as MPa and others), and prepositions of less than five letters in length (e.g., at, after, by, down, for, from, in, of, on, over, to, and so forth) shall be in lower case. The word “to” in infinitives shall also be set in lower case unless it is the first word in the title.

*Examples:*

**Figure 8—Micrograph of a 20 in [600 mm] Long Weld**

**Figure 12—Lengths and Widths to Measure with a Borescope**

**10.8.4** The initial letters of common nouns such as *committee, council, specification, guide,* and so forth shall be set in lower case in general contexts.

*Example:*

The main committee unanimously passed the consumable inserts specification.

**10.8.5** The initial letters of specific committee names and officers’ titles shall be capitalized using the rules cited above.

*Example:*

The presiding officer at the last meeting of the A5 Committee on Filler Metals and Allied Materials, Vice Chair Jeffrey Mason, seconded the committee’s motion.

**10.8.6** The initial letters of the terms *volume, part, clause, paragraph, figure, table, test, specimen, grade,* and so on, shall be capitalized when these serve as proper names.

*Examples:*

Volume 2, Figure 8, Table 3, Test 5, Specimen A, Grade B

However, when these serve as common nouns, the initial letter should be in lower case.

*Examples:*

This volume contains 35 chapters.

The coefficient of expansion is shown in the same figure.

**10.8.7** Full capital letters should be used in text for switch labels and control positions.

*Example:*

Turn the ignition switch to the *ON* position, then press and hold the *START* button.

## **10.9 Representation of Numbers and Numerical Values**

**10.9.1** The 10 single-digit whole numbers zero through nine (0 through 9) shall be spelled out in text. Digits shall be used for all other numbers.

*Examples:*

Mix the first five parts; then add the remaining two ingredients.

The 10 advantages and 12 drawbacks are not realistic.

**10.9.2** Digits shall be used for all numbers in sentences containing both single-digit (0 through 9) and larger numbers.

*Example:*

All 15 drawbacks are obvious, whereas the 5 advantages are not.

**10.9.3** The digital equivalent may be inserted in parentheses after a spelled-out number whenever desired.

*Example:*

The formula has three (3) variables and two (2) constants.

**10.9.4** A number used as the first word in the sentence shall be spelled out.

*Example:*

Fifteen drawbacks were noted as well as five advantages.

**10.9.5** Digits shall be used when the quantity is not a whole number.

*Examples:*

1.1, 1-1/2

For clarity, the fractional keys  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ ,  $\frac{1}{16}$ , and so forth shall not be used; instead, fractions shall be set using individual key strokes.

*Examples:*

1/4, 1/2, 3/4, 1/16.

**10.9.6** The root of a number set in text shall be expressed as a fractional value rather than using the square root (radical,  $\sqrt{\quad}$ ) sign;

*Example:*

The square root of two is written as  $2^{1/2}$  or  $(2)^{1/2}$

*NOTE: The fraction keys shall not be used for exponents; instead, separate keystrokes shall be used, e.g., number-solidus-number (See 10.9.5.)*

**10.9.7** Digits shall be used for all numbers raised to a power.

*Example:*

The answer for  $2^3$  is 8, while  $8^{1/3}$  is 2.

**10.9.8** Digits shall be used when followed by a unit symbol.

*Examples:*

5 in, 3 kg, 9%, 9°10'30", 4 s

**10.9.9** Digital notations shall be used in a series of connected statements implying precision.

*Example:*

Select 6 parts from each of the 3 production runs for further testing.

**10.9.10** Digital notations shall be used after abbreviations.

*Examples:*

Vol. 26, Fig. 2

**10.9.11** Numbers used to modify other numbers shall be spelled out.

*Examples:*

fifteen 25 mm rods, 15 twenty-five millimeter rods

**10.9.12** A zero shall be inserted before the decimal point of digital values less than one (< 1.0).

*Example:*

The limiting values are 0.4 ppm and 0.7 ppm, respectively.

**10.9.13** Ratios shall be expressed using the word "to."

*Example:*

A ratio of 1 to 10 shall be maintained across the full width of the sample.

**10.9.14** Reciprocals set in text shall be expressed as either a negative superscript or 1/n form (use parentheses to clarify the denominator).

*Example:*

The reciprocal of ABC =  $(ABC)^{-1} = 1/(ABC)$ .

**10.9.15** Like items shall be kept together in ranges and series to simplify conversions.

*Examples:*

The range is 100°C to 200°C (212°F to 392°F).

Use 2 kg, 4 kg, or 6 kg [4 lb, 8 lb, or 13 lb].

**10.9.16** When using SI units, a space (not a comma) shall be used to divide long numbers into groups of three on either side of the decimal point.

*Example 1:*

12 250 050; 10 000; 2.687 789

However, four-digit numbers shall not be separated with a space except when grouped with numbers having 5 or greater digits as shown in Example 3.

*Example 2:*

The space may be added to four-digit numbers in columnar listings with longer numbers to provide for alignment of the thousands digit.

*Example 3:*

3 512.0
4 634.654 567 65
48 756.321 219 899

## 11. Language

**11.1 Terminology.** The terminology used throughout the document shall conform to AWS A3.0, *Standard Welding Terms and Definitions*. Terms not contained in AWS A3.0 and which require definition shall be defined in the clause titled “Definitions.”

### 11.2 Special Word Usage

**11.2.1 Modal Auxiliaries.** Modal auxiliaries have very specific meanings. These connotations are summarized below and in Table 11.1.

**Table 11.1**  
**Modal Auxiliaries and Their Meanings**

Modal Auxiliary	Connotation
<b>Requirement</b>	
Shall	Is to, is required to, is mandatory
Shall not	Is not permitted or acceptable
<b>Recommendation</b>	
Should	It is recommended; ought to
Should not	It is not recommended; ought not
<b>Permission</b>	
May	Is permitted or allowed; is permissible
Need not	Is not required
<b>Capacity and Possibility</b>	
Can	Is able to, has the capacity to, it is possible to
Cannot	Is unable to, does not have the capacity to, it is not possible to

**11.2.1.1 Shall.** The modal auxiliary “shall” denotes a requirement. This word shall be used when compliance with the standard requires no deviation.

**11.2.1.2 Should.** The modal auxiliary “should” shall be used to denote a recommendation or non-mandatory condition.

**11.2.1.3 Can.** The auxiliary verb “can” shall be used to denote capability or possibility.

**11.2.1.4 May.** The auxiliary verb “may” shall be used to denote permission.

**11.2.2 And/Or.** Use of the term “and/or” shall be avoided. The statement shall be rewritten as shown in the examples below to clarify the meaning:

*Examples:*

heel pads and/or sock linings ➔ heel pads or sock linings, or both

nuts, screws, and/or bolts ➔ nuts, screws, bolts, or a combination thereof

### 11.3 Nonbiased Language

**11.3.1** Nonbiased language treats all individuals equally, making no unwarranted assumptions about the members of any particular group. Nonbiased, gender-neutral, and nonsexist terms shall be used. For example, use neutral job titles that do not imply whether a job is held by a man or a woman and avoid words and phrases that unnecessarily imply gender. Some examples of nonbiased language and biased terms to avoid are presented in Table 11.2.

**Table 11.2**  
**Examples of Nonbiased Language**

<b>Term to Avoid</b>	<b>Nonbiased Term</b>
Chairman, chairwoman	Chair
Executives and their wives	Executives and their spouses
Foreman	Supervisor
Workman	Worker, employee
Man	People, human beings
Mankind	Humanity
Manmade	Synthetic, artificial
Manpower	Human resources, work force

**11.3.2 Pronoun Use.** The pronouns “he” and “she” shall be used to refer to a singular antecedent of an unspecified gender (e.g., worker, employee, inspector, manager, client, and so forth).

*Example:*

A supervisor shall be knowledgeable of all aspects of the job. He or she should have a background in engineering and a basic knowledge of metallurgy.

The plural form of the antecedent may be used to avoid using dual pronouns.

*Example:*

Supervisors shall be knowledgeable of all aspects of the job. They should have a background in engineering and a basic knowledge of metallurgy.

**11.4 Trade Names.** Generic terms shall be used whenever possible to avoid reference to trademarks or other proprietary designations (e.g., use “tissue paper” instead of “Kleenex”).

When reference to trademarked items is unavoidable, the first mention of the item shall carry the appropriate symbol (e.g., <sup>TM</sup> or ®) and identify the holder of the trademark in a footnote.

*Example:*

Heliarc<sup>®10</sup> is a term that was commonly used in the past to denote the gas tungsten arc welding (GTAW) process.

**11.5 Precautionary Information.** Precautionary information shall conform to the guidelines established in *Style Guidelines for Safety and Health Documents*, Safety and Health Fact Sheet No. 15.

**11.6 Patent Policy.** Patented processes or products should not be included or referred to in text unless absolutely essential for the standard. If a patented process or product is used as part of a standard, the latest requirements in AWS TACRO, *Rules of Operation of the Technical Activities Committee* shall apply.

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<sup>10</sup> Heliarc is a registered trademark of ESAB Incorporated.

**Annex A (Normative)**  
**Examples of Copyright and Statement on Use Pages**

*This annex is part of AWS TSD 1.1:2011, Specification for the Preparation of American Welding Society Standards, and includes mandatory elements for use with this standard.*

**Sample A.1**  
**Copyright Page Content for Most AWS Technical Standards and AWS-Published ANSI Standards Except Site-Licensed Documents**

International Standard Book Number: X-XXXX-XXX-X  
American Welding Society  
550 N.W. LeJeune Road, Miami, FL 33126  
©2011 by American Welding Society  
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Printed in the United States of America

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**Annex A (Normative)**  
**Examples of Copyright and Statement on Use Pages (Continued)**

This annex is part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*,  
and includes mandatory elements for use with this standard.

**Sample A.2**  
**Copyright Page Content for AWS Site-Licensed Standards (e.g., AWS B2.1-1-003:2002)**

International Standard Book Number: X-XXXX-XXX-X  
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Printed in the United States of America

**Annex A (Normative)**  
**Examples of Copyright and Statement on Use Pages (Continued)**

This annex is part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*,  
and includes mandatory elements for use with this standard.

**Sample A.3**  
**Copyright Page Content for AWS Safety and Health Fact Sheets**

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## **Annex A (Normative)**

### **Examples of Copyright and Statement on Use Pages (Continued)**

This annex is part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, and includes mandatory elements for use with this standard.

#### **Sample A.4**

#### **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 the 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. When 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 American Welding Society 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.

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Finally, the American Welding Society does not monitor 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 (<<http://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 Managing Director Technical Services, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (see Annex [\[Annex Letter\]](#)). With regard to technical inquiries made concerning AWS standards, oral opinions on AWS standards may be rendered. However, 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 [\[Committee number\]](#) Committee on [\[Committee name\]](#). 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 [\[Committee number\]](#) Committee on [\[Committee name\]](#) 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 [\[Committee number\]](#) Committee on [\[Committee name\]](#) 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, 550 N.W. LeJeune Road, Miami, FL 33126.

**Annex A (Normative)**  
**Examples of Copyright and Statement on Use Pages (Continued)**

This annex is part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, and includes mandatory elements for use with this standard.

**Sample A.5**  
**Statement on Use Page for ANSI Standards Published by AWS (e.g., ANSI Z49.1)**

**American National Standards**

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he/she has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute.

**CAUTION NOTICE:** *This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to periodically reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.*

## Annex B (Normative) Symbols and Abbreviations with Examples<sup>11</sup>

This annex is part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, and includes mandatory elements for use with this standard.

Abbreviation or Symbol	Meaning	Example
ac	alternating current (noun and adjective forms).	Use 110 V ac with domestic ac appliances.
A	Ampere(s), unit of electric current.	$A = E/R = \text{volts/resistance } (\Omega)$
avg	average	Minimum avg $I_{MAX} = 10 \text{ kA}$ .
&	ampersand, used only in specific business names	The firm to contact is Black & Veatch Engineers.
C	Coulomb, unit of electric charge	$1 \text{ C} = 1 \text{ A} \times \text{s}$
°C	Celsius temperature scale	Pure water boils at 100°C.
cps	cycles per second, Hz, $\text{s}^{-1}$ , frequency.	The abbreviation cps is rarely used any more to express frequency. The preferred symbol is Hz.
°	degree: (1) unit of temperature; (2) unit of angular measure	(1) - 40°C [- 40°F]; (2) A 90° right angle
dia.	diameter	The diameter of the pipe shall be no less than 100 mm.
dc	direct current (noun and adjective form)	The output is 6 V dc.
e.g.	for example	Calculate the area, $A$ , using length, $L$ , times width, $W$ , e.g., $A = 5 \text{ m} \times 3 \text{ m} = 15 \text{ m}^2$ .
F	Farad, unit of capacitance	$1 \text{ F} = (1 \text{ C})/(1 \text{ V})$
°F	Fahrenheit temperature scale	Pure water boils at 212°F.
ft	foot or feet <i>Note: Never use an apostrophe (') to denote foot or feet.</i>	The length of the sample shall be 1.5 ft [450 mm].
ft <sup>2</sup>	square foot/feet	The minimum area required for the test is 200 ft <sup>2</sup> [20 m <sup>2</sup> ].
ft·lbf	foot-pound force	The minimum mean Charpy impact energy is 15 ft·lbf at 0°F.
g	gram(s)	Sample A weighs 15 g. Use a 25 g sample.

<sup>11</sup> This list is not exhaustive. Standard abbreviations and symbols not listed may be used where appropriate.

gal	gallon(s)	The capacity of the gasoline tank is 20 gal.
>	greater than	For materials >25 mm thick, use procedure B.
≥	greater than or equal to	For materials ≥25 mm thick, use procedure C.
h	hour(s)	Heat treat for 4 h; then gradually cool in furnace.
H	Henry, unit of inductance	1 H = (1 Wb)/(1 V)
HB	Brinell Hardness	The material has a maximum hardness of 200 HB.
HK	Knoop Hardness	The maximum hardness in the heat-affected-zone shall be less than 300 HK.
HR <sub>B</sub>	Rockwell Hardness, B Scale	A hardness of 80 HR <sub>B</sub> indicates a tensile strength of approximately 500 MPa.
HR <sub>C</sub>	Rockwell Hardness, C Scale	The hardness of the abrasion-resistant plate is approximately 43 HR <sub>C</sub> .
HV	Vickers Hardness	The maximum hardness in the spot weld nugget shall be less than 400 HV.
Hz	frequency	The frequency of household current in the United States is 60 Hz.
ID	inside diameter	The pipe measures 5.0 in ID.
i.e.	that is	The finished sample shall be flat, i.e., no distortion is allowed.
in	inch(es) <i>Note: Do not use (") symbol for inches.</i>	The sample length shall be 10 in [250 mm] or greater.
in <sup>2</sup> (Also sq in)	square inch(es)	The area of the sample shall be a minimum of 100 in <sup>2</sup> .
J	Joule, unit of work or energy, Newton/meter <i>Note: Use a space before the "J" unless a prefix is used.</i>	1. Min. impact energy: 15 J @ -40°C 2. Max. heat input: 4 kJ/mm
K	Kelvin scale; absolute zero = 0 K <i>Note: Use a space instead of a degree (°) symbol</i>	Water boils at 373 K.
ksi	one thousand (k) pounds per square inch	The minimum tensile strength for an E7018 electrode is 70 ksi.

<	less than	If the diameter is <25 mm, this procedure is not applicable.
≤	less than or equal to	If the diameter is ≤25 mm, see 5.2.3.
L	liter(s)	Add 1 L of H <sub>2</sub> O to the mix.
M	Mega = 1 × 10 <sup>6</sup> = 1 000 000	The resistance totals 1 MΩ.
m	meter <i>Note: See unit prefixes for parts of or increments of this unit.</i>	Test 2 m of weld.
max.	maximum	The max. current for this conductor size is 15 A.
min.	minimum	Cool Time: 1 h min. before heat treating.
min	minute	Heat treat time: 15 min before bending.
‘	minute, unit of angular measure = 1°/60	The angle measures 45° 15' from the vertical plane.
×	multiplication symbol (not the uppercase letter “X” or lowercase “x”)	The diameter of the pipe shall not exceed 3T × 5.6R.
N	Newton, unit of force	1 N = 1 kg · m/s <sup>2</sup>
Nb	niobium (columbium)	When first used in text, it shall be cited as niobium (columbium) because it had been referred to a columbium (Cb) in the past. After its first use, it shall be referred to as niobium or Nb.
Ω	Ohms, units of electrical resistance	1 Ω = (1 V)/(1 A)
OD	outside diameter	The pipe has an OD of 5.25 in [130 mm].
Pa	Pascal, unit of pressure or stress	1 Pa = 1 N/m <sup>2</sup>
ppm	parts per million	The limiting values are 0.4 ppm and 0.7 ppm, respectively.
psi (Also lb/in <sup>2</sup> )	pounds per square inch	The minimum tensile strength of a class 70 electrode, e.g., E7018, is 70,000 psi.
lb/in <sup>2</sup> (Also psi)	pounds per square inch	The minimum tensile strength of a class 70 electrode, e.g., E7018, is 70 000 lb/in <sup>2</sup> .
±	plus or minus, used for tolerances	The tolerance for this variable is ±10%.
rad	radian, unit of angle measurement	1 rad = 57.295 827 degrees
rpm	revolutions per minute	Maximum engine speed: 6000 rpm

$1/x$	root, also $x^{-y}$ or $(x)^{-y}$ .	If $A^{1/3} = 3$ then $A = 27$
$s^{-1}$	frequency, Hz, cycles per second (cps)	1 Hz = $1 s^{-1}$
s	second(s), unit of time	Immersion time in etchant: 20 s
"	second, angular measure " $= 1/60'$ <i>Note: Do not use " or "</i> for inches or ditto marks.	A $45^{\circ}15'30''$ angle
S	Siemens, unit of conductance	$1 S = 1 \Omega^{-1}$
sq ft (Also $ft^2$ )	square feet	The minimum area required for the test is 200 sq ft (20 $m^2$ ).
sq in (Also $in^2$ )	square inch(es)	The area of the sample shall be a minimum of 100 sq in [625 $mm^2$ ].
Unit prefixes	Unit prefixes	
G	giga or $10^9$	Hard drive capacity: 20 Gbytes
M	mega or $10^6$	100 000 psi = 689.4757 MPa
k	kilo or $10^3$	1 km = 1000 m
da	deca or $10^1$	1 dal = 10 l
d	deci or $10^{-1}$	10 dm = 1 m
c	centi or $10^{-2}$	100 cm = 1 m
m	milli or $10^{-3}$	1000 mm = 1 m
$\mu$	micro or $10^{-6}$	1 $\mu m = 0.000001$ m or 1 000 000 $\mu m = 1$ m
V	Volt, electromotive force (emf) or electrical potential)	Max. rating of insulation: 1000 V
W	(1) Watt, electrical power unit; (2) symbol for tungsten	(1) $10 A \times 110 V = 110 W$ (2) Max. % weight: 0.001 W
wt %	weight percent	Maximum carbon content (wt %): 0.35
Wb	Weber, unit of magnetic flux	$1 Wb = 1 V \cdot s$

## **Annex C (Normative) Specifications for Publications**

This annex is part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, and includes mandatory elements for use with this standard.

### **C1. Scope and General Requirements**

**C1.1 Scope.** While the rest of this specification is dedicated to the structure of AWS standards and draft requirements, this annex documents the requirements for the published format and style of AWS standards.

**C1.2 General Requirements.** The elements and structure of published standards shall be the same as those required for drafts. Where format and style specifications differ from the draft requirements, the publication specifications in this annex shall prevail for the published document.

### **C2. Designation, Cover, and Spine Specifications, and Hard Copy Publication Formats**

**C2.1 Designation (Standard's Code)** The letter designations for the various standards are grouped by the application of a standard as shown in Table C.1.

**C2.1.1 New or Revised Standards.** The designation shall contain the abbreviation "AWS" followed by the document's alphanumeric designator and the publication year, which are separated by a colon (e.g., AWS D1.1/D1.1M:2006). The format shall follow whichever option applies in Table 6.2. For standards approved by ANSI, the words "An American National Standard" shall be located just below the designation.

Publications that are not ANSI approved shall carry the AWS designation in the upper right-hand corner of the front cover. The designation shall contain the abbreviation "AWS" followed by the document's alphanumeric designator and the publication year, which are separated by a colon (e.g., AWS TSD 1.1:2011).

**C2.1.2 Reaffirmed Standards.** For reaffirmed standards, the original designation shall be used followed by (RYYYY) where the YYYY is the latest year of reaffirmation as noted by the following example: AWS C5.6-89 (R2000).

**C2.1.3 ISO Adoptions.** Designations for ISO adoptions shall follow one of the methods in C2.1.3.1 through C2.1.3.3 and the respective designation code noted in the example.

**C2.1.3.1 Identical Adoptions.** The document designation shall use the format of the following example: AWS A5.14/A5.14M:200X (ISO 18274:2005 IDT), where "X" is the year of publication or revision. This method is used when an ISO document is adopted without any technical changes. Editorial changes are allowed as long as they are clearly identified.

**C2.1.3.2 Adoptions with Modification.** The document designation shall use the format of the following example: AWS A4.2M:200X (ISO 8249:2000 MOD), where "X" is the year of publication or revision. This method is used when an ISO document is adopted with technical changes. All technical and editorial changes need to be clearly identified.

**C2.1.3.3 Not Equal Adoptions.** The document designation shall use the format of the following example: AWS A4.5:200X (ISO 15792-3:2000 NEQ), where “X” is the year of publication or revision. This method is used when an ISO document is adopted with technical changes that are not identified.

**C2.1.4 Amendments.** Amendments shall be coded as follows:

CC.C-YY-AMDX(Z.z.z), where

CC.C is the document code;

YY are the last two digits of the year of the current published edition;

X is the amendment number (1, 2, etc.); and

(Z.z.z) is the subclause being amended.

**C2.1.5 Addenda.** Addenda shall be coded as follows:

CC.C-YY-ADDX(Z.z.z), where

CC.C is the document code;

YY are the last two digits of the year of the current published edition; and

X is the amendment number (1, 2, etc.).

**Table C.1  
Letter Designations for the Types of Standards and Committees**

<b>Letter Designation</b>	<b>Committee/Standard Type</b>
A	Committees/Standards on Fundamentals
B	Committees/Standards on Inspection and Qualification
C	Committees/Standards on Processes
D	Committees/Standards on Industrial Applications
F	Committees/Standards on Safety and Health
G	Committees/Standards on Materials
J	Committees/Standards on Welding Equipment

**C2.2 Style, Design, and Colors.** Published AWS standards shall have covers that are uniform in style and design. The colors vary by committee groupings as shown in Table C.2.

**Table C.2  
Cover Colors for Published Standards**

<b>Committee</b>	<b>Cover Color</b>	<b>Pantone Matching System (PMS) Number</b>
A1 and A2	Brown	PMS 463
A5	Gray	PMS 423C
B1, B2, B4, and B5	Green	PMS 355
C1, C2, C3, C4, C5, C6, and C7	Blue	PMS 286
D1, D3, D8, D10, D11, D14, D15, D16, D17, and D18	Red	PMS 199

Safety and Health	Yellow	PMS 116
G1 and G2	Copper	PMS 471
J	Purple	PMS 258U

**C2.3 Logos.** The logos of the American Welding Society and the American National Standards Institute shall appear in all published standards. The ANSI logo shall not appear on documents that are not ANSI approved.

**C2.4 Spine.** The spine of the document shall contain the document title, its designation, and the AWS logo, size and thickness permitting.

### **C2.5 Hard Copy Publication Format**

**C2.5.1 New or Revised Standards.** All standards shall be published in bound, 3-ring hole-punched format with a uniform size of 8.5 in by 11 in (216 mm by 279 mm).

**C2.5.2 Errata Sheet(s).** All errata shall be published in loose-leaf, 3-ring hole-punched format with a uniform size of 8.5 in by 11 in (216 mm by 279 mm).

**C2.5.3 Amendments and Addenda.** All amendments and addenda shall be published in loose-leaf, 3-ring hole-punched format with a uniform size of 8.5 in by 11 in (216 mm by 279 mm). Each amendment or addenda item shall be properly coded per C2.1.4 and C2.1.5 and printed on colored paper. If more than one amendment or addenda item is published per edition, different colors shall be used for each item.

### C3. Specifications for Content Format and Style

**C3.1** Specifications for the format and style of the content of published standards are shown in Table C3.1.

**C3.2** These specifications shall apply to only published standards not drafts.

**Table C.3  
General Format and Font Specifications for Published Technical Documents**

<b>Element</b>	<b>Size</b>	<b>Font</b>	<b>Format</b>
ANSI logo and text on cover page	20 mm high, 30 mm wide 8 point text	Helvetica	Left justified at center margin adjacent to colored half, 64 mm from bottom edge of page
AWS logo and text on cover page	<b>24 point</b>	<b>Helvetica bold, white</b>	Centered in colored half, 59 mm from bottom edge of page
Body text, abstract body text, and all text on title page except designation, ANSI approval text, title, and editon text	10 point	Times	Full justified. Maximum 2 hyphenated words in a row. Minimum 2 lines of type at bottom or top of column. Single-word widows are acceptable at the end of a paragraph as long as last word isn't hyphenated. No hyphenated words on bottom of odd numbered pages. No splitting of numbers and modifiers (e.g., 25 mm, 3 kg, etc.)
Clause number and heading text	<b>14 point</b>	<b>Times Bold</b>	Left justified, no hyphenation
Column format	—	—	Double column (columns 19 picas wide)
Document designation and text underneath it on cover and title page	<b>12 Point</b>	<b>Helvetica bold</b>	Right justified
Document title – cover page	<b>28</b>	<b>Helvetica</b>	Left justified at center margin adjacent to colored half

	<b>Point</b>	<b>Bold</b>	
Document title and abstract title on title page	<b>18 Point</b>	<b>Helvetica bold</b>	Right justified, double space
Edition text on title page	<b>14 point</b>	<b>Times Bold</b>	Right justified
Explanatory statement after foreword and annex titles	10 point	Times ( <i>italics for title</i> )	Centered
Figures (images, photos)	NA	NA	EPSs for Line Art 300 dpi TIFs for Photos
Figure callouts	8 POINT	HELVETICA (CAPS)	Varies
Figure captions	<b>12 point</b>	<b>Helvetica Bold</b>	Centered
Figure credit line (Courtesy of...)	8 point	Helvetica	Right justified directly under figure
Figure key	8 point	Helvetica	Left justified under figure
Figure labels [(A), (B), etc.]	<b>8 point</b>	<b>Helvetica Bold (Initial Caps)</b>	Centered
Figure source line	8 point	Helvetica	Full justified directly under figure
Header (Running)	8 POINT	HELVETICA (CAPS)	2.5 picas from top of page
Footnote reference number	Whatever size applies	Whatever font applies	Superscript
Footnote rule (text)	0.5 point		3 picas long over first footnote in series
Footnote text and number	<sup>9</sup> point	Times	Left justified, number in superscript
Headings of front matter (table of contents, Foreword, etc.), document title (before body), and Annex titles	<b>18 point</b>	<b>Helvetica Bold</b>	Centered
Line spacing	—	—	Single
Line spacing after text	—	—	6 points below

divisions (clauses, subclauses, paragraphs)			
Notes in text	10 point	<i>Times Italic</i>	Full justified
Page margins	5-1/2 picas	—	—
Page number	10 point	Times	Centered 3 picas from bottom of page
Page running header	10 point	Arial AWS F1.5M:2003 (left hand page)  AWS F1.5M:2003 (right hand page)	A running head showing the designation (e.g., AWS F1.5M:2003) of the document is displayed on each page. The running head shall be set flush left for left-hand pages and flush right for right hand pages.
Pagination	—	—	Roman numerals for front matter; Arabic numbers for remainder
Personnel listing	10 point	Times	Two-column, centered: Name <i>Affiliation</i>
Subclause number and heading (if applicable)	<b>10 point</b>	<b>Times Bold</b>	Left justified or run-on sentence.
Table body	9 point	Times	Formatted as suitable
Table column heads/subheads	9 point	Times	First column left justified (if text; centered if numbers), balance of columns centered. Repeated on top of each page of multiple-page tables.
Table continuation	9 point	Times	The word ( <i>Continued</i> ), italicized and enclosed in parentheses, shall be placed at the bottom of each preceding page to indicate to the reader that the table extends onto the following page.
Table footnotes	8 point	Times	Full justified, directly under table

Table notes	8 point	Times	Full justified, directly under table footnotes (if any)
Table rules	0.5 point single rules, 0.5 double rule with 2 point gap		0.5 point rules above and below title, heading/subheading separators, at bottom of table, double 0.5 rule (2 pt. gap) under headings. Additional horizontal/vertical rules as needed in complex tables.
Table source line	8 point	Times	Left justified, last line under table (below footnotes and notes)
Table title	<b>11 point</b>	<b>Helvetica Bold</b>	Centered Repeated on top of each page of multiple-page tables.

**C4. Specifications for Reaffirmed Standards.** The following items shall be replaced or added when a standard is reaffirmed:

1. Replace the “Statement on Use” page with the latest approved text,
2. Replace the cover with the latest style and color,
3. Replace the text of the annex on how interpretations are handled with the latest text, and
4. Add the roster(s) of the committee and subcommittee (if applicable) reaffirming the standard just before the roster of the original committee. If the standard is subsequently reaffirmed again, the latest reaffirmation roster(s) replace the previous one(s), with the original committee roster(s) remaining the same.

## Annex D (Informative) Sample Foreword

This annex is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

### Sample D.1 Foreword

This foreword is not part of AWS A5.24/A5.24M:2005, *Specification for Zirconium and Zirconium-Alloy Welding Electrodes and Rods*, but is included for informational purposes only.

This document is the first of the A5.24 specifications which 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 *Metric Practice Guide for the Welding Industry* (AWS A1.1) 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 make use of both U.S. Customary and SI Units, which with the application of the specified tolerances provides for interchangeability of products in both the U.S. Customary and SI Units.

AWS A5.24:2005, *Specification for Zirconium and Zirconium-Alloy Welding Electrodes and Rods*, is the third revision (4th edition) of the document issued initially in 1976. Other than the deletion of the ERZr1 classification in 1979 and the check analysis tolerances in 1990, there has been no major change in the requirements of the specification over the past several years. With this revision, information concerning the **Acceptance** and **Certification** clauses has been added to Annex A. Previous editions of the document are as follows:

ANSI/AWS A5.24-76, *Specification for Zirconium and Zirconium Alloy Bare Welding Rods and Electrodes*

ANSI/AWS A5.24-79, *Specification for Zirconium and Zirconium Alloy Bare Welding Rods and Electrodes*

ANSI/AWS A5.24-90, *Specification for Zirconium and Zirconium Alloy Bare Welding Rods and Electrodes*

## Annex E (Informative) Sample Clause 2

This annex is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

### Sample E.1 Example of Clause 2, “Normative References”

#### 2. Normative References

The standards listed below 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 revisions of, any of these publications do not apply.

American Welding Society (AWS) standards:<sup>1</sup>

AWS A1.1, *Metric Procedure Guide for the Welding Industry*;  
AWS A5.01, *Filler Metal Procurement Guidelines*; and  
AWS B4.0, *Standard Methods for Mechanical Testing of Welds*.

American Society for Testing and Materials (ASTM) standards:<sup>2</sup>

ASTM E 29, *Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*;  
ASTM E 38, *Standard Methods for Chemical Analysis of Nickel-Chromium and Nickel-Chromium-Iron Alloys*; and  
ASTM E 76, *Standard Methods for Chemical Analysis of Nickel-Copper Alloys*.

International Organization for Standardization (ISO) standard:<sup>3</sup>

ISO 544, *Welding consumables – Technical delivery conditions for welding filler materials – Type of product, dimensions, tolerances and markings*

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<sup>1</sup> AWS standards are published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

<sup>2</sup> ASTM standards are published by The American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

<sup>3</sup> ISO standards are published by the International Organization for Standardization, 1, Rue de Varembe, Case Postale 56 CH-1211 Geneva 20, Switzerland.

**Annex F (Informative)**  
**Sample Draft Table Formats**

This annex is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

**Sample F.1**  
**Table Showing Use of Dual Units in Brackets (per Option 2), Table Footnotes, and Table Notes**

**Table 4.3**  
**Recommended Undercut Criteria**

Weld Class <sup>a</sup>	Base Metal Thickness <sup>b</sup> in [mm]	Permissible Depth (max.) in [mm]	Undercut Length (max.) in [mm]
0, 1	< 1 [25]	1/32 [1]	Unlimited
	> 1 [25]	1/16 [2]	2 in [50] in 12 in [300 mm]
2, 3	All	1/16 [2]	Unlimited
4	All	1/32 [1]	Unlimited
5	All	0.01 [0.25]	Unlimited

<sup>a</sup> See Table A1 for weld classes.

<sup>b</sup> Nominal thickness of the base metal in which the undercut occurs.

Notes:

1. Examination of the weld is usually made optically without the use of magnification. However, in certain circumstances the use of magnification (e.g., magnifying glass) may be necessary to ascertain a correct measurement.
2. The maximum permissible depth and undercut length should be measured with a suitable instrument to obtain the necessary accuracy.

Source: Reprinted, with permission, from Kou, S., 1987, *Welding Metallurgy*, New York: John Wiley and Sons, Table 5.12.

**Sample F.2**  
**Table Showing Use of Dual Units in Separate Columns (per Option 2)**

**Table 4**  
**Minimum Fillet Weld Size for Small-Diameter Studs**

Stud Diameter		Fillet Weld Size (min.)	
in	mm	in	mm
1/4 to 7/16	6 to 11	0.187	5
1/2	13	0.25	6
5/8 to 7/8	16 to 22	0.312	8
1	25	0.375	10

**Annex F (Informative)  
Sample Draft Table Formats (Continued)**

**Sample F.3  
Complex Table in Landscape Orientation with Table Notes**

**Table  
Chemical Composition Requirements for Copper, Copper-Zinc, and Copper-Phosphorus Filler Metals**

AWS Classification	UNS Number <sup>a</sup>	Composition, wt % <sup>b</sup>											
		Cu	Ag	Zn	Sn	Fe	Mn	Ni	P	Pb	Al	Si	Other Elements, Total <sup>c</sup>
BCu-1	C14180	99.90 min.	—	—	—	—	—	—	0.075	0.02	0.01*	—	0.10 <sup>d</sup>
BCu-1a	—	99.00 min. <sup>e</sup>	—	—	—	—	—	—	—	—	—	—	0.30
BCu-1b	C11000	99.90 min.	—	—	—	—	—	—	—	—	—	—	0.10
BCu-2 <sup>f</sup>	—	86.50 min. <sup>e</sup>	—	—	—	—	—	—	—	—	—	—	0.50
BCu-3 <sup>g</sup>	C10200	99.95 min.	—	—	—	—	—	—	—	—	—	—	0.05
RBCuZn-A	C47000	57.0–61.0 <sup>h</sup>	—	Remainder	0.25–1.00	*	*	—	—	0.05*	0.01*	*	0.50 <sup>d</sup>
RBCuZn-B	C68000	56.0–60.0 <sup>h</sup>	—	Remainder	0.80–1.10	0.25–1.20	0.01–0.50	0.20–0.80 <sup>h</sup>	—	0.05*	0.01*	0.04–0.20	0.50 <sup>d</sup>
RBCuZn-C	C68100	56.0–60.0 <sup>h</sup>	—	Remainder	0.80–1.10	0.25–1.20	0.01–0.50	—	—	0.05*	0.01*	0.04–0.15	0.50 <sup>d</sup>
RBCuZn-D	C77300	46.0–50.0 <sup>h</sup>	—	Remainder	—	—	—	9.0–11.0 <sup>h</sup>	0.25	0.05*	0.01*	0.04–0.25	0.50 <sup>d</sup>
BCuP-2	C55181	Remainder	—	—	—	—	—	—	7.0–7.5	—	—	—	0.15

BCuP-3	C55281	Remainder	4.8–5.2	—	—	—	—	—	5.8–6.2	—	—	—	0.15
BCuP-4	C55283	Remainder	5.8–6.2	—	—	—	—	—	7.0–7.5	—	—	—	0.15
BCuP-5	C55284	Remainder	14.5–15.5	—	—	—	—	—	4.8–5.2	—	—	—	0.15
BCuP-6	C55280	Remainder	1.8–2.2	—	—	—	—	—	6.8–7.2	—	—	—	0.15
BCuP-7	C55282	Remainder	4.8–5.2	—	—	—	—	—	6.5–7.0	—	—	—	0.15
BCuP-8	C55285	Remainder	17.2–18.0	—	—	—	—	—	6.0–6.7	—	—	—	0.15
BCuP-9	—	Remainder	—	—	6.0–7.0	—	—	—	6.0–7.0	—	—	0.01–0.4	0.15

<sup>a</sup> ASTM DS-56/SAE HS-1086, *Metals & Alloys in the Unified Numbering System*, ASTM International.

<sup>b</sup> Single values are maximum unless noted.

<sup>c</sup> The filler metal shall be analyzed for those specific elements for which values or asterisks (\*) are shown in this table. If the presence of other elements is indicated in the course of this work, the amount of those elements shall be determined to ensure that their total does not exceed the limit specified in "Other Elements, Total."

<sup>d</sup> The total of all other elements, including those for which a maximum value or an asterisk (\*) is shown, shall not exceed the value specified in "Other Elements, Total."

<sup>e</sup> The balance is oxygen, which is present as cuprous oxide. Oxygen is not to be included in "Other Elements."

<sup>f</sup> These chemical composition requirements pertain only to the cuprous oxide powder and do not include requirements for the organic vehicle in which the cuprous oxide is suspended, when supplied in paste form.

<sup>g</sup> The maximum allowable oxygen for this alloy is 0.001.

<sup>h</sup> Includes residual silver.

<sup>i</sup> Includes residual cobalt.

**Annex F (Informative)  
Sample Draft Table Formats (Continued)**

**Sample F.4  
Complex Table with Table Footnotes**

**Table 7  
Chemical Composition Requirements for Weld Metal**

AWS Classification			Weight Percent <sup>a</sup>										Combined Limit for Mn + Ni + Cr + Mo + V
			C	Mn	Si	P	S	Ni	Cr	Mo	V		
A5.1	A5.1M	UNS Number <sup>b</sup>											
E6010	E4310	W06010	0.20	1.20	1.00	N. S. <sup>c</sup>	N. S.	0.30	0.20	0.30	0.08	N. S.	
E6011	E4311	W06011											
E6012	E4312	W06012											
E6013	E4313	W06013											
E6019	E4319	W06019											
E6020	E4320	W06020											
E6027	E4327	W06027											
E6018	E4318	W06018	0.03	0.60	0.40	0.025	0.015	0.30	0.20	0.30	0.08	N.S.	
E7015	E4915	W07015	0.15	1.25	0.90	0.035	0.035	0.30	0.20	0.30	0.08	1.50	
E7016	E4916	W07016	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08	1.75	
E7018	E4918	W07018	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08	1.75	
E7014	E4914	W07014	0.15	1.25	0.90	0.035	0.035	0.30	0.20	0.30	0.08	1.50	
E7024	E4924	W07024	0.15	1.25	0.90	0.035	0.035	0.30	0.20	0.30	0.08	1.50	
E7027	E4927	W07027	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08	1.75	
E7028	E4928	W07028	0.15	1.60	0.90	0.035	0.035	0.30	0.20	0.30	0.08	1.75	
E7048	E4948	W07048											
E7018M	E4918M	W07018	0.12	0.40 to 1.60	0.80	0.030	0.020	0.25	0.15	0.35	0.05	N. S.	

<sup>a</sup> Single values are maximum.

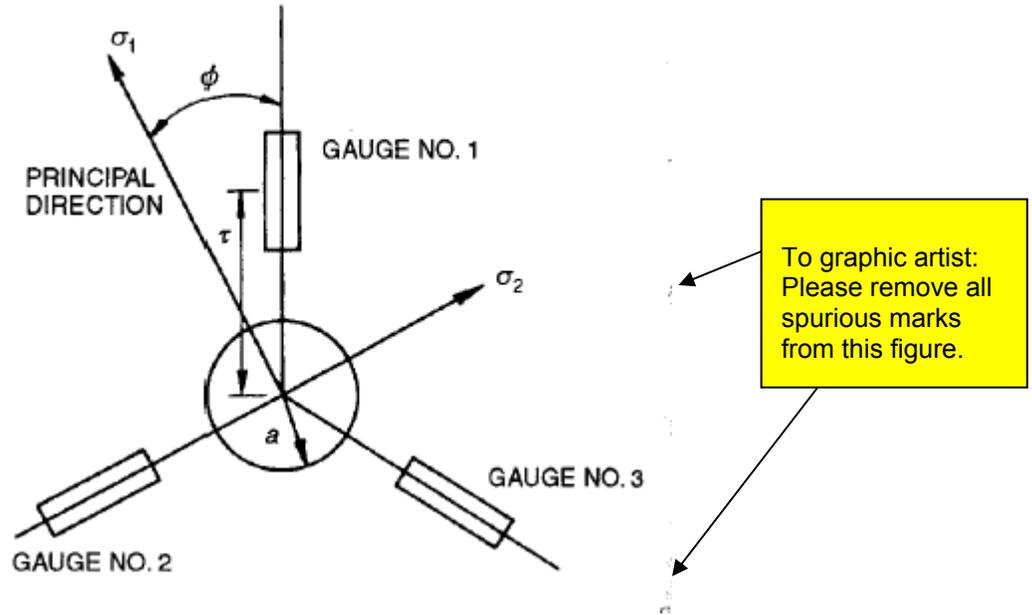
<sup>b</sup> ASTM DS-56/SAE HS-1086, *Metals & Alloys in the Unified Numbering System*, ASTM International.

<sup>c</sup> N. S. = Not specified.

## Annex G (Informative) Sample Figures

This annex is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

### Sample G.1 Figure with Key and Note to the Graphic Artist



Key:

- $\sigma_1$  = Stress component in the principal direction indicated as direction 1, psi [MPa]
- $\phi$  = Angle between the centerline of Gauge No. 1 and the principal direction, degrees
- $\tau$  = Radial distance of the measuring point from the center of the drill hole, in [mm]
- $\sigma_2$  = Stress component in the direction perpendicular to the principal direction, psi [MPa]
- $a$  = Radius of the drilled hole, in [mm]

Source: Adapted from Jenney, C. and A. O'Brien, eds., 2001, *AWS Welding Handbook*, 9th Edition, Vol. 1, Miami: American Welding Society, Figure 7.17.

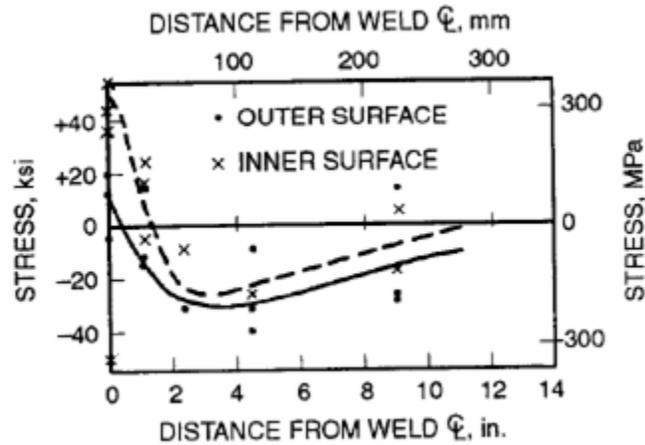
**[Note to graphic artist: remove all extraneous marks as indicted.]**

**Figure 7.17—Star Arrangement (120°) of Strain Gauges for the Mather-Soete Drilling Technique**

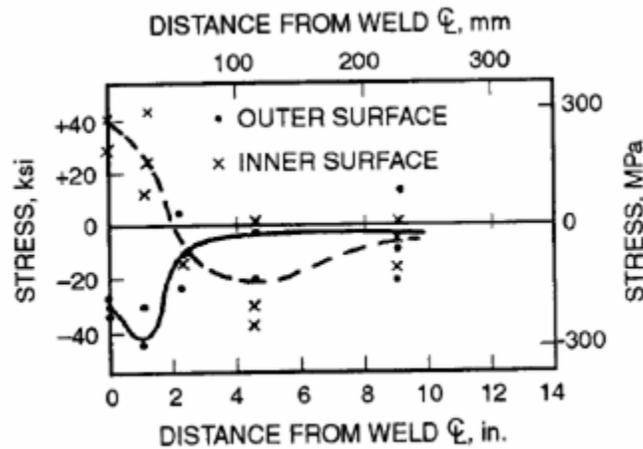
**Annex G (Informative)**  
**Sample Figures (Continued)**

**Sample G.2**

**Figure with “Data from” and Source Lines with a Note to the Graphic Artist**



**(A) Circumferential**



**(B) Longitudinal**

*Source: Masubuchi, K., 1980, Analysis of Welded Structures—Residual Stresses, Distortion and Their Consequences, New York: Pergamon Press, Figure 6.21; data from Burdekin, F. M., 1963, Local Stress Relief of Circumferential Butt Welds in Cylinders, British Welding Journal 10(9): 483–490.*

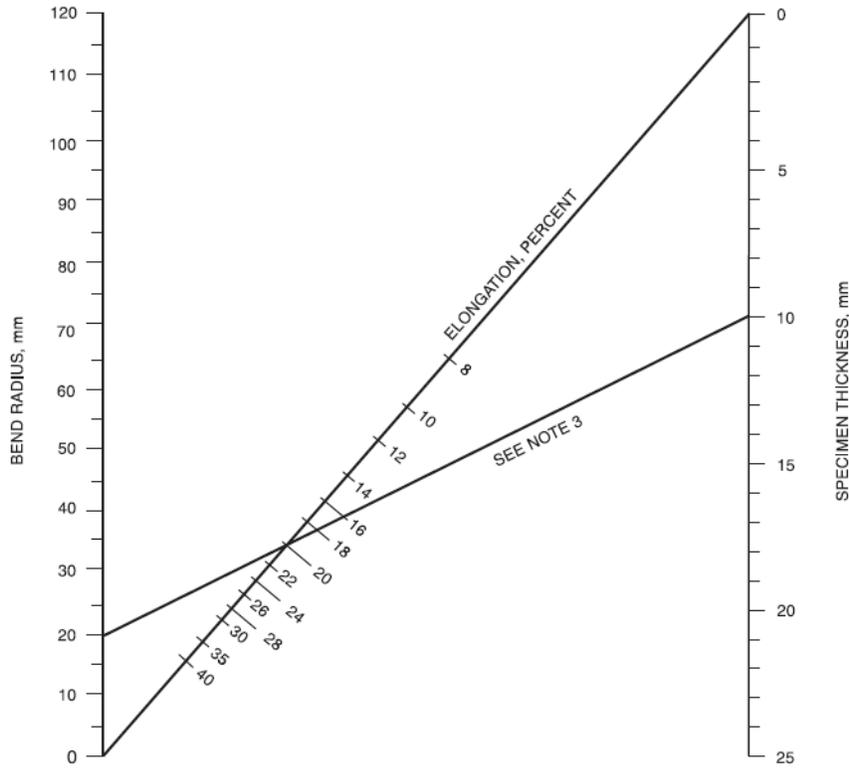
**Note to graphic artist: Pls. change the word “Source:” above to “Data from:”**

Source: Adapted from Jenney, C. L., and A. O’Brien, eds., 2001, *AWS Welding Handbook*, 9th Edition, Vol. 1, Miami: American Welding Society, Figure 7.23.

**Figure 7.23—Residual Stress in a Girth Weld in a Low-Carbon Steel Pipe:  
 (A) Circumferential and (B) Longitudinal**

**Annex G (Informative)  
Sample Figures (Continued)**

**Sample G.3  
Sample Figure with Key, Notes, and Note to the Graphic Artist**



or use the following formula:

$$e = \frac{T \times 100}{2A + T}$$

where:

- e = percent elongation at outer surface
- T = specimen thickness (mm)
- A = radius of curvature at the inside surface of the bend

**Notes:**

1. It is generally recommended that the specimen thickness for the bend tests be approximately 10 mm. However, the specimen thickness may be any value within the range given above as dictated by the material thickness, available equipment, or the applicable specification.
2. Required accuracy of measurement is as follows:
  - (1) Specimen thickness:  $\pm 0.5$  mm
  - (2) Elongation:  $\pm 1$  percent
  - (3) Bend radius:  $\pm 1.6$  mm
3. Example: If a standard requires a minimum elongation of 20 percent and if the specimen is 10 mm thick, a line is drawn between these two points and extended to determine the appropriate bend radius which would be 20 mm.

[Note to graphic artist: Pls.(1) capitalize the first word of the items in the Key. (2) In the Key, change "percent elongation at outer surface" to "Elongation at the outer surface, %" (3) Change the word "percent" to the symbol "%" globally; and (4) add periods to the end of the notes; and (5) use MS Equation Editor to recreate equation using italicize variables as needed; (6) Change to "For example, if a standard..."]

Source: Adapted from AWS B4.0M:2000, *Standard Methods for Mechanical Testing of Welds*, American Welding Society, Figure A4.

**Figure 8—Bend Test Nomograph**

## Annex H (Informative) Sample Informative References Annex

This annex is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

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## Annex I (Informative) Sample Index

This annex is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

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**Annex J (Informative)  
Model Release Form**

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**American Welding Society**

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## **Annex L (Informative)**

### **Guidelines for the Preparation of Technical Inquiries**

This annex is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

#### **L1. 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.

#### **L2. Procedure**

All inquiries shall be directed to:

Managing Director  
Technical Services Division  
American Welding Society  
550 N.W. LeJeune Road  
Miami, FL 33126

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.

**L2.1 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.

**L2.2 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.

**L2.3 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.

**L2.4 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.

### **L3. 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.

### **L4. Publication of Interpretations**

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

### **L5. 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.

### **L6. 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.

**Annex M (Informative)**  
**Sample List of Documents**

This list is not part of AWS TSD 1.1:2011, *Specification for the Preparation of American Welding Society Standards*, but is included for informational purposes only.

**List of AWS Documents on Structural Welding**

<b>Designation</b>	<b>Title</b>
D1.1/D1.1M	<i>Structural Welding Code—Steel</i>
D1.2/D1.2M	<i>Structural Welding Code—Aluminum</i>
D1.3	<i>Structural Welding Code—Sheet Steel</i>
D1.4	<i>Structural Welding Code—Reinforcing Steel</i>
D1.5/D1.5M	<i>Bridge Welding Code</i>
D1.6	<i>Structural Welding Code—Stainless Steel</i>