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Specification for the Preparation of American Welding Society Draft Standards

5th Edition

Revises AWS TSD 1.1:2015

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

Under the Direction of the AWS Technical Activities Committee

Abstract

This standard *Specification for the Preparation of American Welding Society Draft Standards*, AWS TSD 1.1:2020, prescribes the components, format, and styles to be used for the preparation of American Welding Society (AWS) standards by AWS technical committees and AWS staff. For clarity, descriptions and examples of the various document elements are presented. This specification is limited to requirements for draft standards; specifications for published AWS standards can be found in the *AWS Style Manual for AWS Standards*. There is a separate specification for typesetting AWS standards.



Foreword

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

The American Welding Society's (AWS) Technical Activities Committee (TAC) has approved AWS TSD 1.1:2020, *Specification for the Preparation of American Welding Society Draft Standards*, for implementation in the development of all AWS standards developed by AWS technical committees.

The specification is a compilation of the style preferences developed over the years by the committee members and staff who prepare draft 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 draft standards.

AWS draft standards differ in some formatting and style requirements from published AWS standards. Since it is desirable to have the draft standard in an easily revisable format, software that lends itself to this purpose is chosen. During the typesetting and publishing stages the draft is converted into software better suited for that purpose. Therefore, it is neither necessary nor desirable during the drafting of standards to make the drafts visually identical to final desired look since much of this work is eliminated during the import to the typesetting software. The drafts standard should, however, be in an easily reviewable and revisable form by the technical committees and easily importable into the software that will be used for typesetting and printing.

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 American National Standards Institute (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 1.1:2006 superseded AWS TSD 1.1:2005. AWS TSD 1.1:2011 superseded AWS TSD 1.1:2015.

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Specification for the Preparation of American Welding Society Draft Standards

1. General Requirements

This specification establishes requirements for drafting of American Welding Society (AWS) standards. It is intended to provide direction for technical committee members and AWS staff during the preparation of draft standards toward the ultimate goal of achieving uniformity of structure, terminology, and style within individual standards and among AWS standards.

Members of AWS standards-writing committees and AWS staff shall ensure that all new 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 use their own style manuals, provided they comply with this specification.

Although the general structure and content of the *published* standard will be the same as the *draft* standard, style requirements such as font size, column format, color covers, and others may be different. The specifications for published AWS standards can be found in AWS SM, *Style Manual for AWS Published Standards*.

It is recognized that it is not possible to cover every situation of format control in one document. Therefore, the committee responsible for the draft standard may deviate from these requirements if these requirements prevent a clear communication of technical requirements in an AWS standard.

2. Normative References

The documents listed below are referenced within this publication and are mandatory to the extent specified herein. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments or revisions of the publications may not apply since the relevant requirements may have changed.

American Welding Society (AWS) documents:

AWS A1.1, Metric Practice Guide for the Welding Industry

AWS A3.0M/A3.0, Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying

AWS Patent Policy

AWS TACPM, Technical Activities Committee Policy Manual

Style Guidelines for Safety and Health Documents, Safety and Health Fact Sheet No. 15

Other documents:

The Chicago Manual of Style

ANSI Procedures for the National Adoption of ISO and IEC Standards as American National Standards

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*.

committee draft. A document intended to become a standard that is under substantive review by a technical committee.

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.

draft standard. A document intended to become a standard that is under substantive review by the Technical Activities Committee (TAC).

informative, *adj*. Denoting a nonmandatory element of a standard.

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

informative reference. A source provided for informational purposes only and 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, *adj*. Denoting a mandatory element of a standard.

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

normative reference. A cited source 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 F19, *Specification for the Testing of Tensile Button Specimens*.

standard. A document providing rules or guidelines, produced by consensus, and approved by a recognized body. The term *standard* encompasses five AWS categories: code, specification, method, recommended practice, and guide. These are defined below (see also 4.3):

code. A standard having mandatory status that includes conditions and requirements relating to a specific subject, as well as industry-accepted procedures for use in determining if the requirements have been met. A code is prepared to be 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 mandatory reference in other standards. An example of a code is AWS D1.1/D1.1M, *Structural Welding Code—Steel*.

specification. A standard detailing the essential technical requirements for a material, product, system, or service. It includes the procedures, methods, qualifications, or equipment necessary to verify compliance. This standard is considered mandatory when cited by a mandatory document or when agreed upon by parties, such as for procurement purposes. An example of a specification is AWS A5.1/A5.1M, *Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding*.

method. A standard detailing the industry-accepted procedures for performing a test, sampling technique, analysis, or measurement. An example of a method is AWS B4.0, *Standard Methods for Mechanical Testing of Welds*.

recommended practice. A standard detailing one or more industry-accepted techniques for performing a specific operation, procedure, or process. An example of a recommended practice is AWS C3.3, *Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components*.

guide. A standard providing information and explanation regarding a general topic. An example of a guide is AWS D3.5, *Guide for Steel Hull Welding*.

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.

working draft. A document intended to become a standard that is under substantive review by a subcommittee.

4. Planning and Writing Draft Standards

- **4.1 Approval.** Prior to or shortly after starting work, the committee must receive permission to prepare an AWS standard. See AWS TACRO, *Rules of Operation of the Technical Activities Committee*, for the approval process.
- **4.2 Purpose.** The purpose of the standard must be established.
 - 1) Audience: who the standard is intended for.
 - 2) Use: how it will be used.
 - 3) Scope: what the standard will cover and not cover.

The scope of the document should be written first to summarize the standard's purpose. The preceding should be discussed and agreed to by the technical committee as a whole prior to drafting.

4.3 Category of AWS Standard. The category of AWS standard should be established early. AWS has five categories of standards: codes, specifications, methods, recommended practices, and guides. They are defined in Clause 3 and summarized in Table 1.

Table 1
Summary of Types of Standards and Their Applications

Category 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. Recommended Practice	Current preferred practice	Scope of work
5. Guide	General information and explanation	Scope of work

4.3.1 Codes, Specifications, and Methods. These standards are written in a predominantly authoritative tone. They establish requirements that are necessary, definitive, and enforceable. The content should be consistent throughout each standard and it should never contradict itself. The standard should ensure repeatable results.

Example of Appropriate 'Code' Language:

Mislocated holes shall be repaired by the following procedure:

4.3.2 Recommended Practices and Guides. These standards provide one or more suggestions on completing a task, or they provide a general overview on a broad topic. See also 7.2.7.

Example of Appropriate 'Guide' Language:

Repair of mislocated holes may be accomplished using a slagless welding process to eliminate the potential for slag entrapment. Prior to welding, any imperfection on the surface of the hole should be ground in order to achieve fusion.

4.4 Draft Standard Requirements vs. Published AWS Standards. The purpose of draft documents is to present a document's technical content to committees in an acceptable manner for review and approval. Draft documents are not intended nor required to be formatted exactly like published AWS standards. Clauses 5 through 13 provide general requirements for AWS draft documents.

4.5 Responsibilities in Draft Preparation

- **4.5.1 Committee Members.** Committee members are responsible for researching, preparing, proposing, reviewing, and eventually approving any technical content of the draft. The front matter (abstract, foreword, table of contents, etc.) and back matter (index, list of documents, etc.) are not the responsibility of the committee members.
- **4.5.2 AWS Staff.** AWS staff is charged with assisting committee members in researching, preparing, and reviewing drafts, within the limitations of the resources available to them. AWS staff assigned to technical committees may or may not have the technical background and knowledge to assist with every task. AWS staff is responsible for ensuring that the front matter and back matter conform to this specification. AWS staff is responsible for informing the committee members when portions of draft standards do not comply with this specification. Technical committees may request that AWS staff perform an editorial revision of draft standards to bring them in-line with this specification.
- **4.6 Initial Drafting of New Standards.** After the purpose and scope (4.2) is established, and the type of standard (4.3) is agreed to, an outline of the draft should be created and agreed to by the technical committee. Many committees will then assign task groups or individuals to write each clause or section defined in the outline. The sections are then compiled into one draft, early informal review and revision takes place, and a formatting and style review and revision by AWS staff is performed. The document is then balloted through the formal process described in the TAC Rules of Operation.

- **4.7 Citation of Research Articles and Academic Publications.** The citation of research articles and academic publications in standards is not necessary to lend weight to the veracity of the standard. The ANSI consensus process itself is considered to provide the necessary authority to support the standard. Research articles and academic publications may be included in a standard in an informative annex for further reading.
- **4.8 Summary of General Rules for Creating AWS Drafts.** The following is a list of general rules for drafting:
 - (1) Keep style and formatting basic and simple
- (2) Avoid excessive amounts of time on formatting; AWS staff will reformat the compiled document prior to first ballot to bring the draft in line with this specification
 - (3) Never use autoformatting (5.10)
- (4) Figures and tables can be kept in a separate file if necessary; avoid excessive amounts of time spent positioning tables and figures since these will be repositioned later during typesetting
- (5) Use terms consistently through the draft (not *workpiece*, *weldment*, and *assembly* when referring to same item)
 - (6) Avoid complex sentences if possible
 - (7) Use the active voice
 - (8) Use common terms (use instead of utilize, start instead of initiate)
 - (9) Avoid wordiness (during instead of in the course of)
 - (10) Avoid redundancy (maximum instead of not greater than a maximum of)

5. General Specifications for Drafts

5.1 Software and File Formats

- **5.1.1 Text.** Microsoft Word shall be the used for the text component of the draft.
- **5.1.2 Tables.** All tables should be prepared in Microsoft Word. Tables that require complex calculations may be created in Excel. If possible, the table should then be converted to a Word table. If not possible, the table may remain in a separate Excel file.
- **5.1.3 Line Drawings.** Line drawings may be submitted in any suitable format capable of being inserted into the draft and used for publication. Electronic files are preferred; however, if electronic files are not possible hard copies may be submitted to staff for inclusion in the draft. Line drawings 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. The following electronic files are preferred: TIF, EPS. Other acceptable files are: JPEG, BMP.
- **5.1.4 Images.** Original hardcopy images shall be properly labeled in pencil on the back (e.g., Figure 3.4—Tilting-Rotating Positioner) and shall be submitted as glossy images. Scans of images and digital images shall be high-resolution (300 dpi) or higher. It is preferred that images are submitted as TIF files. Images may be embedded in the draft with the text for reviewing purposes, but images rarely transfer out of the word processing file in condition to provide high quality images for the printed document; therefore provide original images to staff for typesetting.
- **5.1.5 File Size.** For larger drafts it may be more practical to break up the standard into more than one Word or other format files. The files can then be recombined into one Acrobat file when

necessary for review such as ballots. Likewise, drafts with many figures may have them placed at the end of the draft text, or as a separate file, for review.

- **5.2 Page Size.** The standard page size of drafts shall be 8-1/2 in by 11 in (215 mm by 280 mm), also referred to as letter size.
- **5.3 Margins.** Margins should be 1 inch at the top, bottom, and sides.
- **5.4 Font and Font Size.** Times New Roman should be used throughout the draft in the body text, tables, headers, footers, table notes, and figure notes. Font size should be 12 point. Deviations from Times New Roman, 12 point, are allowed if it aids in the review and comprehension of the technical content. Deviations should not be made for reasons of personal preferences.
- **5.5 Column Format.** Single column shall be used. Double column format in drafts shall not be used.
- **5.6 Line Spacing.** Single spacing shall be used throughout the document. If a space is necessary between blocks of text or paragraphs, use automatic spacing of 6 points after each paragraph.
- **5.7 Draft Designation Codes.** Drafts of AWS standards shall be designated in accordance with the rules in Tables 2 and 3. It is primarily staff's responsibility to ensure proper designation of drafts.

Table 2			
Draft Designation Codes			
Designation Use			
WD1	Working draft #1. Drafts are designated as working drafts until they are approved by the subcommittee, and all subcommittee comments are resolved.		
WDX	Subsequent working drafts, e.g. WD2, WD3, etc.		
CD1	Committee draft #1. Drafts are designated as committee drafts until they are approved by the technical committee, and all technical committee comments are resolved.		
CDX	Subsequent committee drafts, e.g. CD2, CD3, etc.		
DS1	Draft standard #1. Drafts are designated as draft standards until they are approved by the TAC, and all TAC comments are resolved.		
DSX	Subsequent draft standards, e.g. DS2, DS3, etc.		
FDS1	Denotes the final draft standard to be submitted as manuscript.		
FDSX	Editorial, style, and formatting corrections to FDS1, and changes during page proofs, e.g. FDS2, FDS3.		

Table 3 Examples of Draft Designations		
Examples of Draft Designations when Using the Edition Number		
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.	Once a draft has reached a certain balloting level, the continuation of the designation is at the highest level is used.	
	Example: If DS1 requires revisions per TAC comments, the draft that follows is DS2, not CDX or WDX, even though subcommittee and technical committee approval is needed for DS2.	
A5.5-E5-FDS1	Final approved draft.	
Example of a Draft Designation t	for Reaffirmation of Standards	
A5.32-97R-06	A5.32, Published in 1997, being reaffirmed in 2006	

- **5.8 Page Numbering.** Use the auto page numbering in Word. It is recommended that the "X page of X" format be used if practical. The draft should start with page 1; roman numerals shall not be used for the front matter.
- **5.9 Headers, Footers, and Draft Watermarks.** If the complete draft is comprised of subfiles (e.g., one Word file for text and tables, and one Word file for figures) then the headers, footers, and draft watermarks can be omitted from the subfiles and only applied to the final compiled draft file; for example, a pdf file comprised of both or all subfiles.
- **5.9.1 Headers.** Each page of the draft shall display the following text in the header:

This is a working draft under consideration by an AWS Committee. It should not be relied upon as if it were an official publication. Do not circulate this document outside of the technical committee without the approval of the committee chair.

The header shall be positioned or sized so that it does not interfere with the document contents. A border line is recommended between the header and the document contents. Smaller font, 10 point, is typically preferred to allow for more main content on the page.

5.9.2 Footer. Drafts shall display a footer on each page with the document's draft designation, which is set flush left at the bottom of each text page; if the document does not have a designation yet, the title (if short enough) or a few keywords 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 date shall be added flush right. A border line is recommended between the footer and the document contents. Smaller font, 10 point, is typically preferred to allow for more main content on the page.

Example:		
A5.8-E9-WD5	page 36 of 78	2/15/03

- **5.9.3 Draft 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.
- **5.10 Text Formatting.** The text in the body of the document should be left justified or fully justified, taking into account the conventions listed in this clause. Automatic formatting of the text shall not be used (except as specifically allowed by this document) since all files are

subjected to conversion and translation routines upon submission to the typesetter; often, automatic formatting does not convert or translate properly. Macros and other advanced or nonstandard features shall not be used or embedded in a document file.

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

- (1) Use one space, not two, at the end of sentences, after periods, semicolons, and colons.
- (2) Permit the text to wrap automatically. Hard returns may be used at the end of paragraphs and after headings.
- (3) For the creation of lists, key in and number the text manually. Do not use the automatic numbering or bulleting functions.
- (4) Hyphenate compounds, words, or modifiers as needed, but do not break words at the end of lines. Turn off the automatic hyphenation feature.
- (5) Use the symbol font for Greek characters.
- (6) Use the software's features to create subscripts and superscripts.
- (7) Use the software's built-in footnote feature to create all footnotes (see 8.3).
- (8) For in-text tabular material, use one tab, not multiple tabs or spaces made using the space bar, between items being converted into columns; see Annex A for an example of proper formatting.
- **5.11 Notes to Graphic Artist.** Notes to the graphic artist shall be enclosed in brackets and highlighted in yellow 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.]

- **5.12 Information on Pricing and Availability.** Pricing (including a "free" statement) and availability (vendor(s), website, format, etc.) of AWS standards and publications shall not be addressed in AWS standards.
- **5.13 Document Component Order.** The components of the draft shall be sequenced in the order shown in Table 4.

6. Front Matter Components

- **6.1 General.** The front matter consists of the document summary page, 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.
- **6.1.1 Responsibility.** The accuracy and updating of the front matter, except for the abstract and the foreword, is the responsibility of staff and is not subject to committee revision or approval; therefore, they are not necessary components of draft documents as they progress through the technical committee approval process. However, staff should seek assistance from the committee officers on writing the abstract and foreword, and be receptive to any suggestions from the committee members on those components. The Committee Chair shall have final approval for the abstract and foreword.
- **6.1.2 Front Matter that Should be Included in Drafts.** The title page (including abstract), foreword, and table of contents should be included in drafts as they aid in the understanding and review of the drafts during the approval process.

- **6.1.3 Front Matter that Should be Omitted from Drafts.** The copyright page, statement of use, and personnel listings should be omitted from draft standards, except that the personnel listings shall be inserted into the draft prior to TAC ballot. Placeholders should be left in the draft as a reminder to add these components later. If the committee or staff feels strongly that the inclusion of this material aids in the review of the document then the components may be included.
- **6.1.4 Positioning.** The front matter is positioned before the body of the document.
- **6.1.5 Pagination**. For ease of reference in drafts, pages shall be numbered using Arabic numbers, with the summary page being page 1.
- **6.2 Draft Document Summary Page.** The first page of the draft shall be a summary of the draft's history. This should be organized in a simple table with the following column headings: date, draft, initials (for the individual making the changes), and comments. Each row will have information for each draft, see Annex D.

Table 4 Positioning of the Components in a Standard		
Type of Component	Position	Contains
	Title page	Document Designation Approval date Title Abstract Logo(s)
	Copyright page reminder	Text
	Statement on the Use of AWS Standards reminder	Text
Front Matter	Personnel reminder Insert Personnel list prior to TAC ballot	Title Committee name Volunteers' names and affiliations
	Foreword	Text Footnotes*
	Dedication (optional)	Text
	Table of Contents	Generated text
	List of Tables*	Generated text
	List of Figures*	Generated text
	Title	Text
	Scope	Text Statement on use of units Statement on safety Footnotes*
	Normative References*	Dated and undated references
	Terms and Definitions*	Text Footnotes*
Body Elements	Body	Clauses Subclauses Paragraphs Figures* Tables* Equations* Notes* Footnotes*

	Normative Annex(es)* (See 9.1 for requirements and sequencing exceptions) Annexes Informative Annex(es) (See 9.2 for requirements and sequencing exceptions)	Title Text Figures* Tables* Equations* Notes* Footnotes*
Annexes		Title Text Figures* Tables* Equations* Notes* Footnotes*
Optional Additional Components	Commentary* Index*	Generated text
Required Additional Components	Committee Document List(s)	Title List of documents

^{*} Optional.

6.3 Title Page

- **6.3.1 Document Designation.** The document designation is assigned by staff and typically follows the following format: [technical committee designation].[number of standard in series], e.g., A5.32 is the 32nd standard published by the A5 Filler Metals Committee. Exceptions to this rule must receive approval. Designations previously assigned to standards that are now withdrawn or to standards that were never published, should not be reused.
- **6.3.2 Approval Date.** In the case of ANSI-approved standards, the placeholder for the ANSI approval date shall appear below the designation.
- **6.3.3 Title.** The title that appears on the title page shall be identical to that which will appear on the cover.
- **6.3.4 Edition Number.** The edition number shall appear below the title. If the current edition supersedes a previous one, the text "Revises 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.
- **6.3.5 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

- **6.3.6 Abstract.** The abstract is a brief (usually 100 words or less), 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). The text of the abstract is often published in literature catalogues to promote the document to prospective buyers. The abstract should be written with this purpose in mind. Complete sentences and standard terms shall be used. Unfamiliar terms, abbreviations, and symbols shall be defined the first time they occur in the abstract.
- **6.3.7** 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.
- **6.4 Copyright Page.** A placeholder or comment shall be included in the draft as a reminder to insert the copyright page during page proofs. Suggested text is, "<insert copyright page>" (see Annex E).
- **6.5 Statement on the Use of AWS Standards.** A placeholder or comment shall be included in the draft as a reminder to insert the statement of use during page proofs. Suggested text is, "<insert statement of use>" (see Annex E).
- **6.6 Personnel Listing (Committee and Subcommittee Rosters)**

6.6.1 Composition and Format. 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 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 voting members in alphabetical order. The committee secretary shall be included in the member's list just after the chair and vice chairs. Affiliations shall be the legal name of the institution and shall be set in italics.

Advisors shall be shown in a separate list titled "Advisors to the AWS <insert committee name>" that immediately follows the last voting member listed (see Annex D of this standard for an example).

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. Such special contributors 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.

The accuracy of these names and affiliations shall be verified just prior to publication by AWS staff.

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

- **6.6.2 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.
- **6.7 Foreword.** The foreword contains useful but nonmandatory information about the content and history of the document and its sponsoring committee, when appropriate (see Annex G). As the foreword is included for informational purposes only, it shall be prefaced by the following statement:

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

- **6.7.1 Listing of Previous Editions.** In a revised <u>or amended</u> 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.
- **6.7.2 Identification of New or Revised Content.** All significant revisions between the current standard and the <u>revised or amended</u> document it supersedes shall be listed or described to alert readers to the changes. Identification of new or revised content for non-standards (or other) is optional. If margin borders, underlined text, or italics are used to identify revised items, a brief explanation of the annotation method should be included.

6.7.3 Errata. The foreword shall include the following sentence:

All errata to a standard shall be published in the Welding Journal and posted on the AWS website.

6.7.4 Identification of Patented Items. Patented processes and products should not be included or referred to in the text of a standard except if absolutely essential. If so, the Foreword of that standard shall contain the following text in compliance with the AWS Patent Policy and ANSI Patent Policy:

NOTE – The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights.

By publication of this standard, no position is taken with respect to the validity of any such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, then details may be obtained from the standards developer.

<u>6.7.5 Notice of Stabilized Maintenance.</u> The Foreword of standards under stabilized maintenance shall include the following sentence:

This standard has been approved for stabilized maintenance because it addresses mature technology or practices, and as a result, is not likely to require revision. A request for maintenance of this standard may be submitted at any time by following the maintenance request given in the Statement on the Use of American Welding Society Standards at the front of this document.

- **6.8 Dedication (optional).** The committee may choose to dedicate an edition to an individual or individuals. The dedication shall appear on a page by itself and should be formatted as shown in Annex H.
- **6.9 Table of Contents.** The table of contents lists the titles of the clauses and the titles of the primary subclauses only (see 7.1.2 for heading levels). The titles of secondary and lower subclauses shall not be listed. Annexes shall be listed by title only. For an example, see the Table of Contents of this specification. Page numbers should not be included in the table of contents in drafts, as these will be included in the first page proofs of the published document.

6.10 Lists of Tables and Figures

- **6.10.1 List of Tables.** If tables are included in the body of the document, a list of tables shall be included following the table of contents. Page numbers should not be included in the list of tables in drafts, as these will be included in the first page proofs of the published document.
- **6.10.2 List of Figures.** If figures are included in the body of the document, a list of figures 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 Annex I. Page numbers should not be included in the list of figures in drafts, as these will be included in the first page proofs of the published document.
- **6.10.3** 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.

7. Required Body Components and Their Organization

7.1 Organization and Numbering

- **7.1.2 Headings.** No more than four heading levels shall be used (five, counting the document title).
- **7.1.2.1** Clause numbers and heading text shall be boldfaced. An example of the four heading levels and their indentations as they appear in the draft is shown below.

Example:

- **1. Heading 1**. This is heading 1 text.
- **1.1 Heading 2.** This is heading 2 text.
- **1.1.1 Heading 3.** This is heading 3 text.
- **1.1.1.1 Heading 4.** This is heading 4 text.
- **7.1.2.2** 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), unless the reference starts a sentence then "Subclause" shall be used (e.g., Subclause 1.1 shall be followed...).
- **7.1.3 Numbering System.** This specification exemplifies the organization and numbering system that shall be used for AWS draft standards.
- **7.1.4 Clauses.** Clauses are numbered with the Arabic numerals "1," "2," "3," and so forth, beginning with "1" for "General Requirements," but excluding annexes. The title of the clause shall follow the number. If text follows the Clause but precedes the first subclause, it shall be placed on the next line down, between the Clause and first subclause.
- **7.1.5 Subclauses.** Subclauses may be primary, secondary, or tertiary and are numbered consecutively (see 7.1.2). A fourth level of subclauses shall not be used. If additional levels of division are required beyond the tertiary level, vertical lists (see 8.1) may be used.

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

- **7.1.5.1** 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.
- **7.1.5.2** Secondary subclauses (e.g., 4.1.1, 4.1.2, 4.1.3, and so forth) may have titles; however, these are not included in the table of contents.
- **7.1.5.3** Tertiary subclauses (e.g., 3.1.1.1, 3.1.1.2, 3.1.1.3, and so forth) may have titles; however, these are not included in the table of contents.
- **7.2 General Requirements (Clause 1).** Clause 1 shall consist of a listing of general information about the document.
- **7.2.1 Scope** (**subclause 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.

7.2.2 Statement on Units of Measure (subclause 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 5 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 5
Options for the Use of Units of Measure and Document Designations

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 G1.10M: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:2010 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 [Insert the system of units to be used first, e.g., U.S. Customary Units] and [Insert the corresponding system of units, e.g., the International System of Units (SI)]. The latter are shown within brackets ([]) or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore, each system must be used independently.	
	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 B4.0:2007). 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 D3.6M:2010). 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 B5.15:2010).	This standard does not require units of measure. Therefore, no equivalents or conversions are contained except when they are cited in examples.	

- **7.2.3 Statement on Safety (subclause 1.3).** All standards shall include a paragraph in the "General Requirements" titled "Safety".
- **7.2.3.1 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 A2.4, *Standard Symbols for Welding, Brazing, and Nondestructive Examination*, and AWS A3.0M/A3.0, *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/D1.1M, Structural Welding Code—Steel, and AWS D14.3/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/C4.2M, Recommended Practices for Safe Oxyfuel Gas Cutting Torch Operation and A5.14/A5.14M, 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*.]
- **7.2.3.2 Sources of Information.** After the information required by 7.2.3.1, 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) Safety Data Sheets supplied by materials manufacturers
- (2) Operating Manuals supplied by equipment manufacturers

Applicable Regulatory Agencies

7.2.4 Coverage of Welding Safety and Health Issues

- **7.2.4.1** All safety and health information shall be consistent with <u>subclause 12.5 of this standard</u> and ANSI Z49.1.
- **7.2.4.2** For standards using the Scope language of 7.2.3.1(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 7.2.3.1(a) shall not be used.
- **7.2.4.3** For standards using the Scope language of 7.2.3.1(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.

- **7.2.4.4** For standards using the Scope language of 7.2.3.1(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.
- **7.2.4.5** For standards using the Scope language of 7.2.3.1(d), safety or health issues should be extensively addressed, consistent with other aspects of the Scope of the document.
- **7.2.5 Related Safety and Health Issues.** After the information required by 7.2.3.2, 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."

- **7.2.6** 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.
- **7.2.7 Statement of Mandatory Use for Recommended Practices and Guides.** Recommended practices and guides shall include a paragraph in the "Scope" incorporating the following standard text, verbatim:

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

7.3 Normative References (Clause 2)

7.3.1 Boilerplate Introductory Text. The boilerplate text below shall be used to introduce normative references, which can be either dated or undated:

The documents listed below are referenced within this publication and are mandatory to the extent specified herein. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments or revisions of the publications may not apply since the relevant requirements may have changed.

- **7.3.2 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 P). 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 J). 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 title. Subtitles may be omitted.
- (3) Arrange the references by designation in alphanumeric order. For styles, see Clause 2, "Normative References," in this standard; and Annex J.

7.4 Terms and Definitions (Clause 3)

7.4.1 AWS standards shall use standard terminology as specified in AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*. Alternate terms and definitions may be used provided the following guidelines are followed.

Technical terms and industry jargon of importance to the document's subject and which are not defined in AWS A3.0M/A3.0, shall be defined in this clause.

The terms defined in AWS A3.0M/A3.0 shall not be listed unless the definition of a term in AWS A3.0M/A3.0 is inappropriate for the meaning intended by the technical committee drafting the standard. In that case, the technical committee's definition of term shall be included in Clause 3. The technical committee shall bring their definition of that term to the attention of the committee responsible for AWS A3.0M/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.

Example of Common Usage Exception:

Engineer. The duly designated individual who acts for, and on behalf of, the Owner on all matters within the scope of the code.

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

AWS A3.0M/A3.0, *Standard Welding Terms and Definitions*, provides the basis for terms and definitions used herein. However, the following terms and definitions are included below to accommodate usage specific to this document.

- **7.4.3** Terms shall be bold font. Each term and definition shall use a hanging indent. All terms shall be set in lowercase, except proper names, acronyms, or common usage exceptions as determined by the originating committee.
- **7.4.4** Terms shall be arranged in alphabetical order.
- **7.5 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.
- **7.5.1 Style and Language.** The rules established in Clause 11, "Style" and Clause 12, "Language," shall be observed in the development of the text of the document.
- **7.5.2 Contract Language, Commercial Terms, and Conditions.** Provisions involving guarantees, warranties, and other commercial terms and conditions shall not be included in an American National Standard.
- **7.5.2.1** 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. See 6.7.4 for appropriate boilerplate when patented materials or processes are mentioned in a standard.

7.5.2.2 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.

8. Optional Body Components

8.1 Vertical Lists

- **8.1.1 Introductory Phrases.** Vertical lists shall be introduced using words such as "the following" or "as follows" followed by a colon (:).
- **8.1.2 Numbering.** Automatic numbering shall not be used in manuscript preparation. The items in the list are indented and numbered consecutively using Arabic numbers.
- **8.1.3 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 begin with a verb (e.g., use, position, insert, remove). 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
- **8.1.4 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.
- **8.1.5 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.
- **8.1.6 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 boldfaced 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).

8.2 Equations

8.2.1 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. All variables shall be italicized.

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

```
[{({[()]})}]
```

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

- **8.2.2 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.
- **8.2.2.1 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 (,).
- **8.2.2.2 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, α , b, β , and so forth)
 - (4) special symbols
- **8.2.2.3 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];

 $A_w = \text{Cross-sectional area of weld, mm}^2 [\text{in}^2];$

t = Thickness of plates, mm [in]; and

d = Root opening, mm [in].

8.2.2.4 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*.

8.2.2.5 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.

8.2.3 Equations Incorporated in the Text

8.2.3.1 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 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.

8.2.3.2 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).

8.3 Footnotes

- **8.3.1** Use. Footnotes shall be used to supply nonmandatory information only.
- **8.3.2 Generation.** Footnotes shall be generated automatically using the automated function of the appropriate software (in *Microsoft Word TM*, use the "Insert/Reference/Footnotes" feature).
- **8.3.3 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.

8.4 Referencing Sources

8.4.1 General. Source information on publications not included in Clause 2 as normative references may be displayed in footnotes, source lines, or listed in an Informative Annex (see 10.1). 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.

8.4.2 Reproducing and Adapting Information from Other Standards

8.4.2.1 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 should 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 and in footnotes for text.

8.4.2.2 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 should 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 or in footnotes for text.

8.4.3 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 11.8) 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.

8.4.4 Standards, Books, and Other Literature

8.4.4.1 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.

8.4.4.2 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 11.8), italicized, and 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.

8.4.4.3 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.

8.4.5 Chapters in Books

Example:

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

- **8.4.6 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 11.8) 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.

8.4.7 Online Sources

8.4.7.1 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.

8.4.7.2 Books. Online 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/>.

8.4.7.3 Journal Articles. Articles in online 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>.

- **8.5 Figures.** Figures may consist of images, charts, or line drawings.
- **8.5.1 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)."
- **8.5.1.1** Figures shall be labeled 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). The first option should be used with smaller standards with fewer figures, and the second option may be used with larger standards with numerous figures. Whichever option is used, it shall be used consistently throughout the draft.
- **8.5.1.2** Figures may be placed wherever is convenient during document development. Whatever option is used, it shall be used consistently throughout the draft. If an individual figure covers multiple pages, it may be placed in an annex. Final placement of figures in the published document is a typesetting decision to be made by AWS staff; AWS staff should seek input from committee officers when necessary and appropriate.
- **8.5.3 Dual Dimensioning.** For simple figures in dual-dimensioned standards, dimensions shall be shown in both units (see 7.2.2) 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 K), figures (see Annex L), and annexes.

8.5.4 Labels and Callouts

- **8.5.4.1 Labels.** See Annex K for examples.
- **8.5.4.2 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 K.1 for an example of a callout). Notes to the graphic artist shall be set off in brackets and highlighted in yellow (see 5.13).
- **8.5.5 Key.** When abbreviations, symbols, or variables occur in a figure, these shall be defined in a key located below the figure. 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

 σ = Stress, psi [MPa]

 $\varepsilon = Strain, in/in [mm/mm]$

8.5.6 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), 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.

8.5.7 Credit Line. To use images 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 right justified under the graphic. No period (.) shall be used at the end of the line.

Example:	
	Photograph
	Photograph courtesy of Honeywell International

8.5.8 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 propositions 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 font as shown in the following examples and Annex K.

8.5.8.1 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 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 J.2 for an example).

The figure caption shall meet all requirements of 8.5.8. 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

8.5.8.2. 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)

- **8.5.9 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 M).
- **8.5.10** 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 8.5.1.2 for location of a figure covering more than six pages.)

Example:

Figure 33 (Continued)—Parts of a Weld

8.5.11. References to Figures. All figures included in the document shall be referred to and introduced in text by phrases such as "as shown in Figure 8," "(see Figure 8)," or similar terminology.

8.6 Tables

8.6.1 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.

- **8.6.2 Orientation.** All tables should be created in vertical (portrait) orientation when possible. Landscape orientation may be used for wide, complex tables.
- **8.6.3 Margins.** All tables should be set within the standard one-inch margins in drafts.
- **8.6.4 Numbering and Positioning.** All tables shall be introduced sequentially and discussed in the text.
- **8.6.4.1** 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).
- **8.6.4.2** 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.
- **8.6.5 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 bold.

Example:

Table 4.11 Chemical Composition Limits and Ranges for SAW Electrodes

- **8.6.6 Column Heading.** Column headings shall be set in bold type and centered within the columns.
- **8.6.7 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 within one column or variable). 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 K), figures (see Annex L), and annexes if the standard is dual-dimensioned.
- **8.6.8 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]).
- **8.6.9 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.

- **8.6.10 Absence of Numerical Data.** In cells in which no data are specified, an em-dash (—) shall be centered within the cell.
- **8.6.11 Shading.** In long, complex tables, shading (either vertical or horizontal) may be used to facilitate the reading of columns and rows.
- **8.6.12 Use of Rules (Borders).** The tables in draft documents may employ horizontal or vertical rules or both to separate the rows and columns. Rules are optional, based on the need to present the information in the optimum manner (see Annex K).
- **8.6.13** Use of Braces. Braces ({ }) may be used in tables to group data that relate to one entry in an adjacent column.
- **8.6.14 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 K).
- **8.6.15 Continuation of Tables.** Tables of two or more pages shall flow without the need for repetition of titles or column heads (see K.3 for an example) unless they are needed for clarity. See 8.6.4.2 for location of tables covering more than six pages.

8.6.16 Table Footnotes

- **8.6.16.1** Footnotes in tables shall be identified with a superscript, beginning with the letter "a" (e.g., ^{a, b}) and continuing in sequential order starting on the left side of the top row and moving left to right on each row.
- **8.6.16.2** Table footnotes shall be listed immediately below the table in the order presented. Table footnotes shall be left justified and lower case. No introductory word, such as "Notes," shall be used for table footnotes.
- **8.6.16.3** When a table footnote on composition requirements (which is entirely expressed in terms of weight percent) contains additional composition requirements (such as "S shall be 0.0005 maximum"), no % symbol shall be used following the quantity.
- **8.6.17 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 K, Sample K.1). The notes shall be numbered sequentially starting with "1." Notes to any subsequent tables shall likewise be numbered starting with "1."
- **8.6.18 Source Line.** Tables that are not specifically created for the document but are reproduced or adapted from another source shall carry a source line 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.

8.6.19 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 N 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.

8.6.20 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.

8.7 Notes in Text

- **8.7.1 General.** Explanatory or informative statements requiring emphasis may be set off as notes. Notes shall not contain requirements or mandatory information.
- **8.7.2 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 (:).
- **8.7.3 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.

9. Annexes

9.1 Normative Annexes

9.1.1 Location. Normative annexes precede informative annexes (see 9.2) when both types are included in the standard.

9.1.2 Title and Numbering

- **9.1.2.1** 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].
- **9.1.2.2** 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 A1, Figure A2, Figure A3; Table A1, Table A2; and so forth).
- **9.1.3 Preface.** All normative annexes shall be prefaced (under the title) by the following text:

This annex is part of this standard and includes mandatory elements for use with this standard.

9.2 Informative Annexes

9.2.1 Location. Informative annexes follow normative annexes, if any, except as noted in 9.1.1.

9.2.2 Title and Numbering

- **9.2.2.1** 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.)
- **9.2.2.2** 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 C1, Figure C2, Figure C3; Table C1, Table C2; and so forth.).
- **9.2.3 Preface.** All informative annexes shall be prefaced (under the title) by the following text:

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

9.2.4 Requesting an Official Interpretation on an AWS Standard. A placeholder for the annex on "Requesting an Official Interpretation on an AWS Standard" shall be included in all draft standards (see Annex O). The annex will be incorporated into the draft during typesetting.

10. Additional Informative Components

10.1 Informative References. Documents that are cited for informative purposes shall be listed in a separate informative annex titled "Informative References." See Annex P for an example. The Informative References annex shall directly precede the index, if an index is included.

NOTE: Documents that are cited under normative references shall be referenced in Clause 2, "Normative References" only.

- **10.1.1** All references shall be arranged alphabetically.
- **10.1.2** References to standards shall be listed as required in 8.4.4.1 with the standard's designation (dated or undated), the complete title, followed by the publisher's name (e.g., ANSI Z49.1:2012, *Safety in Welding, Cutting, and Allied Processes*, American Welding Society).
- **10.1.3** References to other sources shall be listed as noted in 8.4.3 through 8.4.7. 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.
- **10.2 Commentary.** AWS standards are not required to include commentaries; however, many committees have found that the inclusion of a commentary section assists in many ways. Commentaries can be used to clarify the standard's intent. It can be used to record a history of a certain provision. It can be used to provide source(s) for a provision. Commentaries sections shall be designated to match with specific code provisions and shall be identified with a "C-" preceding each sequential clause number (e.g., C-1.1 is commentary on Subclause 1.1, C-Figure 2 is commentary on Figure 2, etc.). When commentary is included in a standard, the omission of Annex C is recommended to avoid confusion.

10.3 Index

- **10.3.1** To assist readers in readily locating specific topics, an index may be included in any standard that is long or complex.
- **10.3.2** Topics shall be indexed alphabetically by keywords. Subtopics shall be arranged beneath the main topics in the same manner (see Annex Q).
- **10.3.3** 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.
- **10.4 List of Documents Prepared by the Committee.** A placeholder on the last page in the draft may be included for a list of documents prepared by the committee. This list, including designations and full titles, is intended to assist readers in finding related publications. The current list will be inserted during typesetting (see Annex O).

11. Style

- **11.1 Spelling.** Webster's Third New International Dictionary should be the 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 the 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"). Online American English dictionaries such as Dictionary.com may also be used as a spelling reference.
- **11.2 Hyphenation.** Hyphenation of compound words shall be in accordance with *The Chicago Manual of Style*. The use of hyphens in technical compound wordage should follow the industry usage of that term in formal publications, preferable following a recognized standard such as AWS A3.0M/A3.0.
- **11.3 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 A.

11.4 Units of Measurement

- **11.4.1 Units and Symbols.** Use of inch-pound units and symbols shall comply with Annex B. Use of SI units shall comply with AWS A1.1, *Metric Practice Guide for the Welding Industry*.
- **11.4.2 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].

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 -0.030 in [0.1 mm - 0.8 mm].

- **11.5 Numerical Conversions and Equivalents.** All conversions shall comply with AWS A1.1, *Metric Practice Guide for the Welding Industry.*
- **11.6 Italics.** Italic font shall be used to highlight keywords, 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]. Italics can also be used to identify any new material inserted from one

document edition to another, as long as it is identified as such in the Foreword of the document (see 6.7.2).

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.

- **11.7 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.

11.8 Capitalization

- **11.8.1** The *Chicago Manual of Style* shall be consulted for the rules governing capitalization. The norms specified in the following subclauses shall be observed.
- **11.8.2** 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

11.8.3 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, 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

11.8.4 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 technical committee unanimously passed the consumable inserts specification.

11.8.5 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.

11.8.6 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.

11.8.7 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.

11.9 Representation of Numbers and Numerical Values

11.9.1 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.

11.9.2 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.

11.9.3 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.

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

Example:

Fifteen drawbacks were noted as well as five advantages.

11.9.5 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.

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

11.9.7 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.

11.9.8 Digits shall be used when followed by a unit symbol.

Examples:

5 in, 3 kg, 9%, 9°10'30", 4 s

11.9.9 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.

11.9.10 Digital notations shall be used after abbreviations.

Example:

Vol. 26, Fig. 2

11.9.11 Numbers used to modify other numbers shall be spelled out.

Example:

fifteen 25 mm rods

11.9.12 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.

11.9.13 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.

11.9.14 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 = $(ABC)^{-1} = 1/(ABC)$.

11.9.15 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].

11.9.16 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:

9999

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	

12. Language

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

12.2 Special Word Usage

12.2.1 Modal Auxiliaries. Modal auxiliaries have very specific meanings. These connotations are summarized below and in Table 6.

Table 6					
Modal Au	xiliaries and Their Meanings				
Modal Auxiliary	Modal Auxiliary Connotation				
	Requirement				
Shall	Is to; is required to; is mandatory				
Shall not	Is not permitted or acceptable				
	Recommendation				
Should	It is recommended; ought to				
Should not	It is not recommended; ought not				
	Permission				
May	Is permitted or allowed; is permissible				
Need not	Is not required				
Capacity and Possibility					
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				

- **12.2.1.1 Shall.** The modal auxiliary "shall" denotes a requirement. This word shall be used when compliance with the standard requires no deviation.
- **12.2.1.2 Should.** The modal auxiliary "should" shall be used to denote a recommendation or non-mandatory condition.
- **12.2.1.3 May.** The auxiliary verb "may" shall be used to denote permission. When permission is based on a condition, the condition shall be stated.
- **12.2.1.4 Can.** The auxiliary verb "can" shall be used to denote capability or possibility.
- **12.2.2 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, sock linings, or both nuts, screws, and/or bolts → nuts, screws, bolts, or a combination thereof

12.3 Nonbiased Language

12.3.1 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 7.

Table 7
Examples of Nonbiased Language

Term to Avoid	Nonbiased Term
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

12.3.2 Pronoun Use. Nongender specific pronouns shall be used. When possible, sentences should be written to use the plural form of the antecedent instead of the singular to avoid problems. The use of the singular 'they' is acceptable. The use of 'he or she' is nonpreferred due to wordiness of choice. The use of 'he/she' is not allowed.

Example (preferred):

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

Example (acceptable):

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

Example (nonpreferred):

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.

Example (not permissible):

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

12.4 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., TM or ®) and identify the holder of the trademark in a footnote.

Example:

Heliarc^{®3} is a term that was commonly used in the past to denote the gas tungsten arc welding (GTAW) process.

- **12.5 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.
- **12.6 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 included as part of a standard, the latest TAC and AWS patent policies shall be complied with.

13. Adoption of ISO or IEC Standards

When adopting ISO standards, the committee shall follow the style and formatting guidelines in ANSI Procedures for the National Adoption of ISO and IEC Standards as American National Standards and ISO/IEC Guide 21-1, Regional or national adoption of International Standards and other International Deliverables -- Part 1: Adoption of International Standards. The draft shall also comply with the following specifications.

- **13.1 Method of Adoption.** All ISO standards adopted as AWS standards shall be adopted by the republication and redrafting method as explained in ISO/IEC Guide 21-1.
- **13.2 Foreword Language.** In addition to the procedures set in 6.7, the Foreword of adopted ISO or IEC standards should include the following according to Guide 21-1:
- (1) An introduction that notes the original ISO document title (if it has been changed), explains the reason for pursuing the adoption, and identifies the method in which deviations and new content are presented.
 - (a) Deviations should be listed within the Foreword if there are few [see 13.6(1)] or listed in a separate annex if there are many [see 13.6(2)].
 - (b) Deviations and new content should be identified within the body of the document using italics or any other method as described 6.7.2.
- **13.3 Common Language and Usage Substitutions.** When adopting ISO standards, certain words, phrases, punctuation, spelling, and other usage in the ISO standard may not be appropriate for American users. The following changes should be made:
 - (1) substitution of a decimal comma by a decimal point
- (2) deletion of text in one or several languages other than English from a multilingual International Standard
 - (3) substitution of "this international standard" with "this standard"
- (4) addition, for informative purposes, of recalculated values of quantity units where a different measurement system is used in an adopting country
 - (5) deletion of informative preliminary material from the International Standard

- (6) replacement of single words or phrases by synonyms to reflect common language use in the United States (e.g., "elevators" for "lifts", "color" for "colour")
- **13.4 Safety and Health Information.** For adoption of ISO standards, the committee shall do one of the following:
- (1) Prepare a National Normative Annex that shall have a scope which includes safety and health information.
- (2) Replace existing safety and health clause in ISO standard with safety and health information relevant to U.S. applications, or add safety and health information relevant to U.S. applications if no clause exists in the ISO standard.
- **13.5 Location of National Normative Annexes.** Any annexes that AWS adds shall be placed after the complete ISO standard (including annexes), shall be arranged with the normative national annexes first and the informative national annexes following, using the next letter after the last ISO annex (e.g., if the last ISO annex is C, the first national annex is D), and shall be preceded by the heading "National Annexes".

13.6 Methods of Indicating Deviation from Adopted ISO Standards

(1) Where deviations are few, they should be placed in the Foreword. They shall be listed in a two-column format that clearly identifies the component and the modification made to it. Each modification shall begin with either "Added," "Replaced," or "Deleted."

Example:

Clause/Subclause 4 Test Conditions and Permissible Tolerances Added "requirements for the testing of accuracy for the total vertical clearance of connecting parts" in the test items Replaced "25°C \pm 2°C" with 40°C \pm 1°C" and "as close as possible to 75% and within a range of 70% to 80%" with "80% \pm 5%"

(2) Where deviations are many, they should be placed in an appropriate annex after the <u>Requesting an Official Interpretation on an AWS Standard</u> Annex. Deviations shall be listed in a two-column format that clearly describes the component and the modifications made to it. Each modification shall begin with either "Added," "Replaced," or "Deleted." See Annex R for an example of this method.

Per Guide 21-1, technical deviations should include an explanation for the reasoning of the deviation.

Annex A (Normative)

Abbreviations with ExamplesThis annex is part of this standard and includes mandatory elements for use with this standard.

Abbreviation	Meaning	Example
0.0	alternating current (noun and	Use 110 V ac with domestic ac
ac	adjective forms).	appliances.
avg	average	Minimum avg $I_{MAX} = 10 \text{ kA}$.
&	ampersand, used only in specific	The firm to contact is Black &
α	business names	Veatch Engineers.
	degree: (1) unit of temperature;	(1) - 40°C [- 40°F];
	(2) unit of angular measure	(2) A 90° right angle
0	Alt-0176	
	do not use superscript "O" or	
	"o", use the symbol for degree in	
	Word	100 1
dia.	diameter	100 mm dia.
	direct current (noun and adjective	The output is 6 V dc.
dc	form)	The output is o v dc.
	for example	Calculate the area, A, using length, L,
e.g.	Tor example	times width, W , e.g., $A = 5 \text{ m} \times 3 \text{ m} =$
e.g.		15 m ² .
	greater than	For materials >25 mm thick, use
>	8	procedure B.
	greater than or equal to	For materials ≥25 mm thick, use
	2265 ALT-X	procedure C.
<u>≥</u>	do not underline the greater than	procedure c.
_	symbol, use the greater than or	
	equal to symbol in Word	
HD	Brinell Hardness	The material has a maximum
НВ		hardness of 200 HB.
	Knoop Hardness	The maximum hardness in the heat-
HK		affected-zone shall be less than 300
		HK.
110	Rockwell Hardness, B Scale	A hardness of 80 HR _B indicates a
HR_B		tensile strength of approximately 500
	Desless II Headanes C Costs	MPa.
HR_{C}	Rockwell Hardness, C Scale	The hardness of the abrasion-resistant
	Vickers Hardness	plate is approximately 43 HR _C . The maximum hardness in the spot
HV	VICKCIS HAIGHCSS	weld nugget shall be less than 400
11 4		HV.
ID	inside diameter	The pipe measures 5.0 in ID.
	that is	The finished sample shall be flat, i.e.,
i.e.		no distortion is allowed.

	less than	If the diameter is <25 mm, this
<		procedure is not applicable.
	less than or equal to	If the diameter is \leq 25 mm, see 5.2.3.
	2264 ALT-X	
<u>≤</u>	do not underline the less than	
	symbol, use the less than or equal	
	to symbol in Word	
M	$Mega = 1 \times 10^6 = 1\ 000\ 000$	The resistance totals 1 M Ω .
max.	maximum	The max. current for this conductor
	<u> </u>	size is 15 A.
min.	minimum	Cool Time: 1 h min. before heat
		treating.
	multiplication symbol (not the	The diameter of the pipe shall not
×	uppercase letter "X" or lowercase	exceed $3T \times 5.6R$.
	"x") ALT-0215	
	niobium (columbium)	When first used in text, it shall be
	moorum (corumorum)	cited as niobium (columbium)
		because it had been referred to a
Nb		columbium (Cb) in the past. After its
		first use, it shall be referred to as
		niobium or Nb.
OD	outside diameter	The pipe has an OD of 5.25 in [130
OD		mm].
%	percent	An increase of more than 10% in the
70		welding current.
nnm	parts per million	The limiting values are 0.4 ppm and
ppm		0.7 ppm, respectively.
_	Typical	1 in [25 mm] typ
Typ.	often used in drawings to indicate	
	repeated instructions	
	plus or minus, used for tolerances	The tolerance for this variable is
	ALT-0177	±10%.
±	do not underline the plus symbol,	
	use the plus or minus symbol in Word	
1/x	root, also x ^{-y} or (x) ^{-y} .	If $A^{1/3} = 3$ then $A = 27$
	weight percent	Maximum carbon content (wt %):
wt %	weight percent	0.35
		0.55

Annex B (Normative) Inch-Pound Units and Abbreviations with Examples

This annex is part of this standard and includes mandatory elements for use with this standard.

Inch-Pound Abbreviation	Meaning	Example
Cps	cycles per second, Hz, s ⁻¹ , frequency.	The abbreviation cps is rarely used any more to express frequency. The preferred symbol is Hz.
°F	Fahrenheit temperature scale	Pure water boils at 212°F.
Ft	foot or feet Note: Never use an apostrophe (') to denote foot or feet.	The length of the sample shall be 1.5 ft [450 mm].
ft ²	square foot or square feet	The minimum area required for the test is 200 ft ² [20 m ²].
ft•lbf	foot-pound force	The minimum mean Charpy impact energy is 15 ft·lbf at 0°F.
Gal	gallon(s)	The capacity of the gasoline tank is 20 gal.
In	inch(es) Note: Do not use (") symbol for inches. "Inch" or "inches" should be spelled out in text if in the context of the sentence it could be confused with the word "in".	The sample length shall be 10 in [250 mm] or greater. The pipe shall be 10 inches [250 mm] in diameter.
in ² (Also sq in)	square inch(es)	The area of the sample shall be a minimum of 100 in².
Ksi	kips per square inch, or one thousand (k) pounds per square inch	The minimum tensile strength for an E7018 electrode is 70 ksi.
Lb	pound	The part shall not be more than 1 lb 5 oz.
Lbs	pounds	The part shall not weigh more than 5 lbs.
,	minute, unit of angular measure = 1°/60′	The angle measures 45° 15′ from the vertical plane.
psi (Also lb/in²)	pounds per square inch	The minimum tensile strength of a class 70 electrode, e.g., E7018, is 70,000 psi.
lb/in² (Also psi)	pounds per square inch	The minimum tensile strength of a class 70 electrode, e.g., E7018, is 70 000 lb/in².
Rpm	revolutions per minute	Maximum engine speed: 6000 rpm
"	second, angular measure "= 1/60' Note: Do not use " or "for inches or ditto marks.	A 45°15′30″ angle
sq ft (Also ft²)	square feet	The minimum area required for the test is 200 sq ft (20 m²).
sq in (Also in ²)	square inch(es)	The area of the sample shall be a minimum of 100 sq in [625 mm ²].

Annex C (Informative) Example of Proper Formatting of Tabular Content

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

INCORRECT: (Note both TABS AND SPACE BARS WERE USED BELOW):

Please note, not only are there no TABS used below in the yellow highlighted section, but there are space bars (ranging from 3 to 20) used to align the columns. PLEASE DO NOT DO THIS! All these space bars have to be stripped out during typesetting, and THEN the single space bars remaining need to be turned into tabs! This cannot be a global search and replace because the space bars need to remain in Flanges & Fittings.

[Note to Graphic Artist:] Insert the following five (3) lines in after the ASTM A182 M#10H GradeF51 listing with the margin border: Standard Base Metal Material Group Type Grade or UNS: Specification Number Number Alloy Designation Number Type of Base Metal ASTM → A182 → 10H → 1 F55 S32750 Flanges & Fittings ASTM → A182 → 10H → 1 F55 S32760 Flanges & Fittings ASTM → A182 → 10H → 1 → F60 S32205 Flanges & Fittings ASTM → A182 → 10H → 1 → F60 S32550 Flanges & Fittings

BETTER WAY (using tabs)

Tabs should be set up so that double tabs between columns are NOT used. (In other words, set up just the tabs you need and then just use the same ones for all subsequent additions.)

-		Base Meta	al →	Materi	al →	Gro	up →	Type, C	rade, or	•	UNS¶		
Standard	•	Specificat	ion -	 Number 	er →	Nun	nber →	Alloy D	esignation	→	Number	-	Product Form¶
ASTM	→	A182	-	10H	-	1	-	F53	→		S32750	-	Flanges & Fittings¶
ASTM	•	A182	-	10H	-	1	-	F55	-		S32760	-	Flanges & Fittings
ASTM	-	A182	-	10H	-	1	-	F60	-		S32205	-	Flanges & Fittings
ASTM	→	A182	•	10H	→	1	-	F61	-		S32550	→	Flanges & Fittings¶

BETTER WAY (using Table)

Tables should be set up so there are no BLANK columns.

1	Base Metal¶	Material¶	Group¶	Type, Grade, or¶	UNS¶	1
Standardo	Specification	Number¤	Number□	Alloy Designation	Numbero	Product Form
ASTM ^o	A182¤	10H□	1¤	F53¤	S32750¤	Flanges and Fittingso
ASTM ^o	A182¤	10H□	1¤	F55¤	S32750¤	Flanges and Fittingso
ASTM□	A182¤	10H□	1¤	F60¤	S32750¤	Flanges and Fittingso
ASTM ^a	A182¤	10H□	1º	F61 ^a	S32750¤	Flanges and Fittings

INCORRECT: Don't use more than 2 hyphens to represent an EM dash (—):

Use EM dashes in your document (—) (ALT+0151), two hyphens is the perfect number of hyphens to use because those can be searched and replaced with EM dashes in one pass.

Standard…	·Base·Metal····	·Material···	····Group····	··Type·Grade·or······	···UNS·¶	
	"Specification"	···Number··	···Number	··Alloy Designation	···Number····	····Product·Form
AS	1548	1	2	·····5-490······		·····Plate······¶
AS	1548	1	1	·····7-430·····		·····Plate······¶
AS	1548	1	$\cdots \cdots \widetilde{\widetilde{2}} \cdots \cdots$	······7-460······		·····Plate···¶

INCORRECT: Here's an example of < being underlined to create ≤:

Please use the appropriate symbol and not underlines! (Same thing with degree symbols: ° (ALT_0176), NOT superscripted letter "oh"!!! Also, please don't use non-breaking hyphens (those have to be stripped out also) unless the word should absolutely not be hyphenated, e.g., x-ray, WPHY-42, etc. This applies to text only.

1	1548	7.460	635	67/14	Dlote	CIT
1	1548	7-460	> .625 < 1.56	67/43	··Plate·····	···C¶
	· · · · · · · · · · · · · · · · · · ·		The state of the s			"
1	1548	/-400	··>·1.56·≤·3.125······	0 //40	···Plate·····	
1	1548	7-460	>3 125.<.6	.67/38	Plate	···C¶
1	2	7-490	< .625	··71/46·····	-Plate	···C¶

Annex D (Informative) Example of Draft Document Summary Page

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This document is not an AWS standard. This is a working document under consideration by an AWS committee, and should not be relied upon or utilized for any other purpose. You agree not to circulate this working document outside of the technical committee without the approval of the committee chair.

DOCUMENT SUMMARY PAGE B5.5, 2nd Edition

Specification for the Qualification of Welding Educators

Date	Draft	Initials	Comments
7/19/2000	WD1	jlg	B5.5, 1 st edition
2007	WD2	dt	First effort by B5E chair to revise standard. Proposed draft sent to Education Committee.
9/22/2007	WD3	dt	Includes revisions from comments by Education Committee
9/22/2007	WD4	jlg	Includes resolution of comments from B5E ballot, Rochester, MN meeting.
4/16/2008	WD5	jlg	Includes revisions from previous draft review.
4/16/2008	WD6	jlg	Includes revisions from previous draft review.
1/15/2009	WD7	jlg	Includes changes from comment resolutions on B5.5-E02-WD6 ballot to SC and MC. Also includes format and consistency editing by committee secretary
4/27/2009	WD8	jlg	Reinserted missing subclauses in 8.2. These were inadvertently left out in a previous draft.
6/17/2009	DS1	jlg	Same as WD8 with no substantive or editorial changes.
2/4/2010	DS2	jlg	Several editorial and substantive changes made due to comments received from TAC on ballot B5.5-E02-DS1-BT
11/16/2010	DS3	jlg	Incorporates a few minor editorial changes identified during previous ballot and resolution of comments. There are no substantive changes between DS2 and DS3.
3/8/2011	FDS1	jlg	Incorporates a few minor editorial changes identified during previous ballot and resolution of comments. There are no substantive changes between DS3 and FDS1.

B5.5-E02-FDS1 page 1 of 18 March 8, 2011

Annex E (Informative) Example of Placeholder Page for Front Matter in Drafts

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This document is not an AWS standard. This is a working document under consideration by an AWS committee, and should not be relied upon or utilized for any other purpose. You agree not to circulate this working document outside of the technical committee without the approval of the committee chair. Copyright Page <to be inserted during final publication stage> Statement on Use of AWS Standards <to be inserted during final publication stage> Personnel **AWS Personnel & Facility Qualification Committee** <to be inserted during final publication stage> **AWS B5A Subcommittee for Welding Inspectors** <to be inserted during final publication stage> B5.1-E02-CD1 3 December 15, 2010

Annex F (Informative) Example of Personnel List

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AWS Personnel & Facilities Qualification Committee

P. R. Evans, Chair PCI Energy Services

W. F. Behnke, 1st Vice Chair Fairbanks Morse Engine

P. A. Michalski, 2nd Vice Chair Dominion East Ohio

J. L. Gayler, Secretary American Welding Society

K. W. Coryell Consultant

J. A. Grantham Welding & Joining Mgmt Group

P. A. Grimm Modern Welding Company

V. Kuruvilla Genesis Quality Systems

B. W. Phillips Oil States Industries, Incorporated

J. R. Reid Cianbro

M. R. Stone Canadian Welding Bureau

D. L. Twitty Dona Ana Community College

T. West Mississippi Welders Supply

Advisors to the AWS Personnel & Facilities Qualification Committee

B. W. Phillips Oil States Industries, Incorporated

J. R. Reid Cianbro

AWS B5N Subcommittee on Welding Sales Representatives

T. West, Chair Mississippi Welders Supply

J. L. Gayler, Secretary American Welding Society

R. L. Arn Holtech International

N. A. Chapman *Entergy*

F. J. Fascenda Mitsubishi Power Systems

B. W. Phillips Oil States Industries, Incorporated

R. C. Pierce Welding Engineering Supply Company

Advisors to the AWS B5N Subcommittee on Welding Sales Representatives

R. L. Smith Consultant

Annex G (Informative) Example of Foreword Page

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

Foreword

This foreword is not part of this standard 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

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, [technical committee], American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

Annex H (Informative) Example of Dedication Page

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

Dedication

The AWS D9 Committee on Welding, Brazing, and Soldering of Sheet Metal dedicates this edition of the D9.1M/D9.1, *Sheet Metal Welding Code*, to James E. Roth for his significant contribution to both sheet metal and welding, and to the memory of Paul B. Dickerson.

In 1978, Jim recognized the need for a standard for welding nonstructural sheet metal and spearheaded the effort soliciting support from SMACNA, the Sheet Metal National Training Fund, the American Welding Society, and the welding community at large in the development of D9.1. Under his leadership, D9.1 has become the internationally accepted "standard" for welding sheet metal.

Paul was an AWS Fellow and contributed unselfishly to several technical committees of the American Welding Society, including D9. He is missed by all for whom he so generously shared his prodigious knowledge and wisdom.

Annex I (Informative) Example of List of Tables and Figures

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

List of Tables

Table	Page No.
B1 Acetylene Withdrawal	
List of Figures	
Figure	Page No.
1 Description of Oxyfuel Gas Cutting	
2 Oxygen Cylinder	
3 Typical Fuel Gas Cylinders	
4 Pressure Regulators	
5 Hoses and Fittings	
6 Manual Oxygen Cutting Torch	
7 Combination Torch	
8 Three Hose Machine Torch	
9 Torches Classified According to Method of Mixing	
10 Oxyfuel Gas Cutting Tips	
11 Oxyfuel Gas Cutting Tips—One and Two Piece Designs	
12 Carburizing Flame	
13 Neutral Flame	
14 Oxidizing Flame	
15 Cutting Torch Starting a Cut and in Action	
16 Lead Torch Angle for Straight Line Cutting	
17 Oxygen Lance	
18 Special Application Tips	
19 Oxygen Orifice Design for Washing Tips	
20 Bevel Cutting	

Annex J (Informative) Example of Clause 2, Normative References

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

2. Normative References

The documents listed below are referenced within this publication and are mandatory to the extent specified herein. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments or revisions of the publications may not apply since the relevant requirements may have changed.

American Welding Society (AWS) standards:

AWS A1.1, Metric Procedure Guide for the Welding Industry

AWS A5.01, Filler Metal Procurement Guidelines

AWS B4.0, Standard Methods for Mechanical Testing of Welds

American Society for Testing and Materials (ASTM) standards:

ASTM E29, Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

ASTM E38, Standard Methods for Chemical Analysis of Nickel-Chromium and Nickel-Chromium-Iron Alloys

ASTM E76, Standard Methods for Chemical Analysis of Nickel-Copper Alloys

International Organization for Standardization (ISO) standard:

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

Annex K (Informative) Example of Draft Table Formats

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

Sample K1 Example of Table Using Dual Units in Brackets (per Option 2), Table Footnotes, and Table Notes

Table 4.3 Recommended Undercut Criteria

Weld Class ^a	Base Metal Thickness ^b in [mm]	Permissible Depth (max.) in [mm]	Undercut Length (max.) in [mm]
	< 1 [25]	1/32 [1]	Unlimited
0, 1	> 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

^a See Table A1 for weld classes.

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 K2 Table Showing Use of Dual Units in Separate Columns (per Option 2)

Table 4
Minimum Fillet Weld Size for Small-Diameter Studs

Stud I	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

^b Nominal thickness of the base metal in which the undercut occurs.

Annex K (Informative) Example of Draft Table Formats (Continued)

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

Sample K3 Complex Table in Landscape Orientation with Table Notes

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

			Composition, wt % ^b										
AWS Classification	UNS Number ^a	Cu	Ag	Zn	Sn	Fe	Mn	Ni	P	Pb	Al	Si	Other Elements, Total ^c
BCu-1	C14180	99.90 min.	_	_	_	_	_	_	0.075	0.02	0.01*	_	0.10^{d}
BCu-1a	_	99.00 min.e	_	_	_		_	_	_			_	0.30
BCu-1b	C11000	99.90 min.			_	_	_	_	_			_	0.10
BCu-2 ^f		86.50 min.e	_	_	_	_	_	_	_	_		_	0.50
BCu-3g	C10200	99.95 min.	_	_	_	_	_	_	_	_	_		0.05
RBCuZn-A	C47000	57.0–61.0 ^h	_	Remainder	0.25- 1.00	*	*	_	_	0.05*	0.01*	*	0.50 ^d
RBCuZn-B	C68000	56.0–60.0 ^h	_	Remainder	0.80– 1.10	0.25- 1.20	0.01- 0.50	0.20- 0.80 ^h	_	0.05*	0.01*	0.04- 0.20	0.50 ^d
RBCuZn-C	C68100	56.0–60.0 ^h	_	Remainder	0.80– 1.10	0.25- 1.20	0.01- 0.50	_	_	0.05*	0.01*	0.04- 0.15	0.50 ^d

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			Composition, wt % ^b										
AWS Classification	UNS Number ^a	Cu	Ag	Zn	Sn	Fe	Mn	Ni	P	Pb	Al	Si	Other Elements, Total ^c
RBCuZn-D	C77300	46.0–50.0 ^h	_	Remainder	_	_	—	9.0- 11.0 ^h	0.25	0.05*	0.01*	0.04- 0.25	0.50 ^d
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	1.82.2	_	_		— <u>-</u>	_	6.8–7.2		_	_	0.15
BCuP-7	C55282	Remainder	4.8–5.2	_	_			_	6.57.0		_	_	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

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

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^b Single values are maximum unless noted.

^c 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."

d 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."

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

f 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.

^g The maximum allowable oxygen for this alloy is 0.001.

^h Includes residual silver.

ⁱ Includes residual cobalt.

Annex K (Informative) Example of Draft Table Formats (Continued)

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

Sample K4 Complex Table with Table Footnotes

Table 7
Chemical Composition Requirements for Weld Metal

			<u> </u>	emical comp	0311101	rtoquii		ght Per				
							7761	grit F e	Cent			
AWS Cla	ssification	UNS										Combined Limit for
A5.1	A5.1M	Numberb	С	Mn	Si	Р	S	Ni	Cr	Мо	V	Mn + Ni + Cr + Mo + V
E6010	E4310	W06010)									
E6011	E4311	W06011										
E6012	E4312	W06012										
E6013	E4313	W06013	0.20	1.20	1.00	N. S.c	N. S.	0.30	0.20	0.30	0.08	N. S
E6019	E4319	W06019	ſ									
E6020	E4320	W06020										
E6027	E4327	W06027	J									
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]	4.00	0.00	0.005	0.005	0.00	0.00	0.00	0.00	4.75
E7048	E4948	W07048	0.15	1.60	0.90	0.035	0.035	0.30	0.20	0.30	0.08	1.75
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.

^a Single values are maximum.

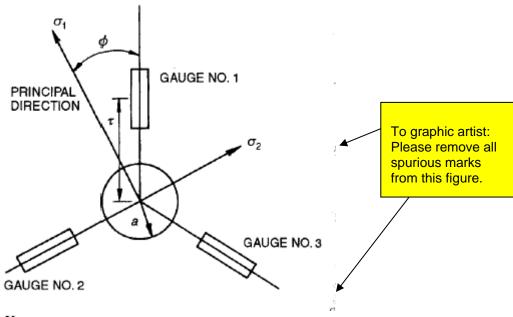
^b ASTM DS-56/SAE HS-1086, *Metals & Alloys in the Unified Numbering System,* ASTM International.

^c N. S. = Not specified.

Annex L (Informative) Example of Draft Figures

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

Sample L1
Figure with Key and Note to the Graphic Artist



Key:

- σ_I = Stress component in the principal direction indicated as direction 1, psi [MPa]
- ϕ = Angle between the centerline of Gauge No. 1 and the principal direction, degrees
- τ = Radial distance of the measuring point from the center of the drill hole, in [mm]
- σ_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.

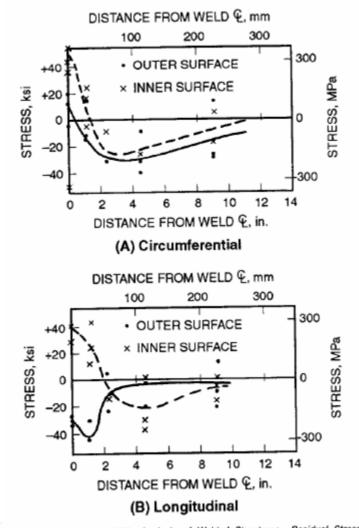
[Note to graphic artist: remove all extraneous marks as indicated.]

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

Annex L (Informative) Example of Draft Figures (Continued)

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

Sample L2
Figure with "Data from" and Source Lines with a Note to the Graphic Artist



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:"]

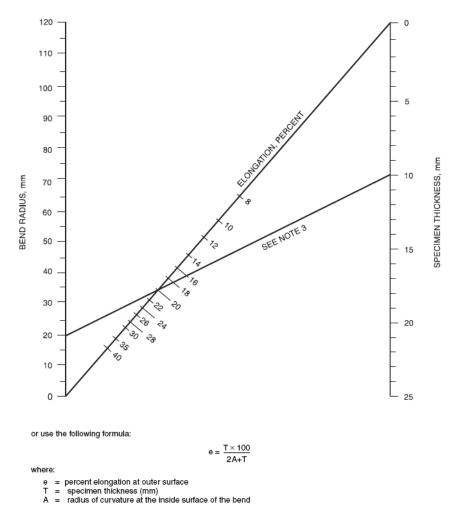
Source: Adapted from Jenney, C. L., and A. O'Brien, eds., 2001, *AWS Welding Handbook*, 9th Edition, Vol. 1, Miami: American Welding Society, Figure 7.23.

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

Annex L (Informative) Example of Draft Figures (Continued)

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

Sample L3 Sample Figure with Key, Notes, and Note to the Graphic Artist



- 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.
- Required accuracy of measurement is as follows: (1) Specimen thickness: ±0.5 mm
- (2) Elongation: ±1 percent (3) Bend radius: ±1.6 mm
- 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 M (Informative) **Model Release Form**

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

American Welding Society

Founded in 1919 to Advance the Science, Technology and Application of Welding



Model Release	
Date	
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(c) To use my name in connection therewith if the Society so chooses.	
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This authorization and release shall also ensure to the benefit of the legal representatives, and assigns of American Welding Society as well as the person (s) for whom the photog taken.	
I am over the age of twenty-one. I have read the foregoing and fully understand the con	tents thereof.
Witnessed by:	re
Signature	
550 N.W. Leleune Rd. Miami Florida 33126	

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Annex N (Informative) Request for Permission to Republish Information Copyrighted by Others This annex is not part of this standard but is included for informational purposes only.

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Annex O (Informative) Examples of Placeholder for Back Matter Pages

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

Annex B (Informative)

Requesting an Official Interpretation on an AWS Standard

This annex is not part of this standard but is included for informational purposes only. <to be inserted during typesetting>

List of AWS Documents on Machinery and Equipment (last page)

<to be inserted during typesetting>

Annex P (Informative) Example of Informative References Annex

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

Sample Informative References

- American Conference of Governmental Industrial Hygienists (ACGIH), 1998, *Industrial Ventilation: A Manual of Recommended Practice*, 23rd ed., Cincinnati: American Conference of Governmental Industrial Hygienists.
- American Welding Society (AWS) Safety and Health Committee, 1977–1999, *Effects of Welding on Health*, Vols 1 through 12, Miami: American Welding Society.
- ASME 2004 Boiler and Pressure Vessel Code, Section IX Welding and Brazing Qualifications, American Society of Mechanical Engineers.
- API 2009:1995, Safe Welding and Cutting Practices in Refineries, Gasoline Plants, and Petrochemical Plants, American Petroleum Institute.
- AWS D1.1/D1.1M:2002, Structural Welding Code—Steel, American Welding Society.
- Compressed Gas Association (CGA), 1999, *Handbook of Compressed Gases*, 4th ed., Boston: Kluwer Academic.
- Malvic, C. R., and J. W. Wright, 2003, Fixturing in Robotic Operations, in Proceedings of the 7th Annual Conference on Robotics, February 2–5, 2003, San Diego, California, ed. J. Gao, Ann Arbor, Michigan: Robotics Industries Association.
- O'Brien, R. L., ed., 1991, Welding Processes, Vol. 2 of Welding Handbook, 8th ed., Miami: American Welding Society.
- Occupational Safety and Health Act, 1970, 91st Congress, Public Law 91-596, Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office.
- Occupational Safety and Health Administration (OSHA), 1999, *Welding, Cutting, and Brazing*, March 17, 2003, http://www.osha.gov>.
- Reed, R. P., H. McHenry, and M. B. Kasan, 1979, *A Fracture Mechanics Evaluation of Flaws in Pipeline Girth Welds*, Welding Research Council Bulletin No. 245, New York: Welding Research Council.

Annex Q (Informative) Example of Index Page

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

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Note on Annex Q: Underlined text denotes changes to subclauses in this edition.

Annex R (Informative) Example of Deviations from Adopted ISO Standard Annex

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

This is a working document under consideration by an AWS Committee.

It is made 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.

Annex B (Informative) Deviations from Adopted ISO Standard

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

Clause/Subclause	Modifications
General	Added U.S. Customary Units
General	Replaced commas used for decimals with periods
General	Replaced the previous title of the standard: Welding consumables — Test methods — Part 3: Classification testing of positional capacity and root penetration of welding consumables in a fillet weld
General	Replaced "part of ISO 15792" with "Standard"
Scope	Added "Safety and Health issues and concerns are beyond the scope of this standard and are, therefore, 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, and applicable federal and state regulations"
2 Normative References	Deleted "Members of ISO and IEC maintain registers of currently valid International Standards"
2 Normative References	Replaced "ISO 6947, Welds — Working positions — Definition of angles of slope and rotation" with "AWS A3.0M/A3.0, Standard Welding Terms and Definitions."
5.2	Replaced "5°C [40°F]" with "15°C [60°F]."
6.1	Deleted "Throat thickness and"
6.1	Replaced "points" with "locations"
6.1	Added "test plates welded with" in third sentence
6.1; last sentence	Replaced with "For test plates welded with a continuous consumable or with only one covered electrode"
6.2	Deleted "throat,"
Figure 1—Preparation of fillet weld test piece; top of figure	Deleted "Dimensions in millimeters"

Figure 2—Dimensions of fillet welds; Key, note b	Added "or concavity"
Figure 1—Preparation of fillet weld test piece; Key; note b	Added "(for SMAW electrodes only)"
7 Test report	Replaced "lack of root penetration" with "incomplete fusion"
7(d) test results	Deleted "theoretical throat of the fillet;"
7(d) test results	Added "or flaws"

Annex S (Informative) Informative References

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

AWS Board Policy Manual, American Welding Society.

AWS SM, Style Manual for AWS Published Standards, American Welding Society.

AWS TACRO, Rules of Operation of the Technical Activities Committee, American Welding Society.