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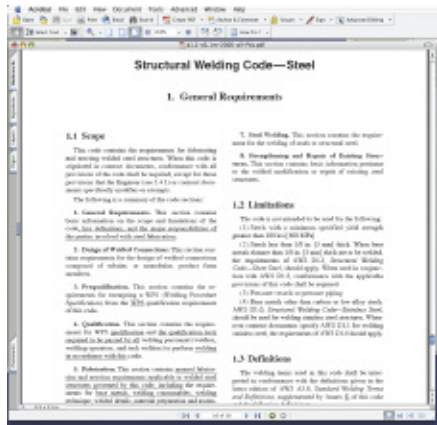


Table of Contents

Order Information	2
New Titles and Editions	3
Structural and Sheet Metal	4-5
Reference and Business	6-7
Safety and Health	8-9
Qualification.....	10-11
Training	11
Certification.....	12
Everyday Pocket Handbooks	13
Testing and Inspection	14
Operations	14
Base Metal Weldability	15
Thermal Spraying	16
Plastics	17
Food Processing Systems	17
Welding and Cutting Processes	18-19
Standard Welding Procedure Specifications	20-21
Brazing and Soldering	22
Pipe and Tubing.....	23
Filler Material Specifications	24-25
Automotive	26
Marine	26
Aerospace	26
Railroad	26
Machinery	27
Resistance Welding.....	28
Index	29-33
AWS Membership Application	35

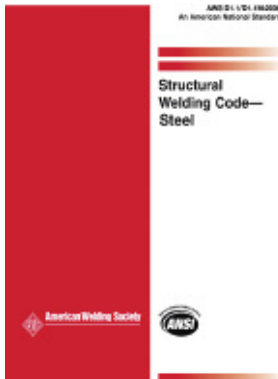
Unless otherwise stated, all publications are 8 1/2" x 11" in size. Nonmember prices are shown first, followed by discounted member prices.

NEW PUBLICATIONS AND EDITIONS IN THIS CATALOG

- A5.12M/A5.12:2009 (ISO 6848:2004 MOD), Specification for Tungsten and Oxide Dispersed Tungsten Electrodes for Arc Welding and Cutting (page 25)
- A5.14/A5.14M:2009, Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods (page 25)
- B2.1/B2.1M:2009, Specification for Welding Procedure and Performance Qualification (page 10)
- B2.1/B2.1M-BMG:2009, Base Metal Grouping for Welding Procedure and Performance Qualification (page 10)
- B5.14:2009, Specification for the Qualification of Welding Sales Representatives (page 10)
- C1.4M/C1.4:2009, Specification for Resistance Welding of Carbon and Low-Alloy Steels (page 15)
- C1.5:2009, Specification for the Qualification of Resistance Welding Technicians (page 10)
- C3.9M/C3.9:2009, Specification for Resistance Brazing (page 22)
- C4.2/C4.2M:2009, Recommended Practices for Safe Oxyfuel Gas Cutting Torch Operation (page 18)
- D1.8/D1.8M:2009, Structural Welding Code—Seismic Supplement (page 5)
- D14.5/D14.5M:2009, Specification for Welding of Presses and Press Components (page 27)
- D14.8M:2009, Standard Methods for the Avoidance of Cold Cracks (page 19)
- D16.3M/D16.3:2009, Risk Assessment Guide for Robotic Arc Welding (page 8)
- D18.1/D18.1M:2009 (ISO/TR 17844:2004 IDT), Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications (page 17)
- D18.2:2009, Guide to Weld Discoloration Levels on Inside of Austenitic Steel Tube (page 17)
- G2.3M/G2.3:2009, Guide for the Joining of Wrought Solid Solution Austenitic Stainless Steels (page 15)
- QC14:2009, Specification for the Certification of Welding Sales Representatives (page 12)
- ASTM Standards for Welding (page 5)
- Handbook of Plastics Joining, 2nd Edition (page 17)
- The Practical Reference Guide to Positioning (page 14)
- Welding Aluminum—Questions and Answers (page 15)

D1.1/D1.1M:2008, Structural Welding Code—Steel

For everyone involved in any phase of welding steel structures — engineers, detailers, fabricators, erectors, inspectors, etc. — the new D1.1 spells out the requirements for design, procedures, qualification, fabrication, inspection, and repair of pipe, plate, and structural shapes that are subject



to either static or cyclical stresses. D1.1 includes:

- Design of tubular and nontubular welded connections.
- Prequalification of welding procedures.
- Qualification of new procedures and personnel.
- Fabrication requirements, including base metals, consumables, and tolerances.
- Inspection requirements and acceptance criteria for various examination methods.
- Stud welding design, production, and inspection requirements.
- Strengthening and repair of existing structures.
- An extensive commentary annex that provides time-saving interpretation.
- Dozens of valuable reference tables, charts, and forms.

U.S. Customary and SI units of measurement. 562 pages, 21 annexes, 170 figures, 75 tables, (2008).

Order Code: D1.1/D1.1M **\$392/\$294**

D1.1-SWJ-WC:2008, Welded Joint Details for Structural Applications Wall Chart

A 36"-by-27" wall chart with selected joint details conforming to D1.1/D1.1M:2008, applicable to low-carbon steel plate and shapes for structural applications. (2008).

Order Code: D1.1-SWJ-WC:2008 **\$40/\$30**

D1.1-BI, The Official Book of D1.1 Interpretations

A collection of responses to formal inquiries about the requirements of AWS D1.1 from 1976 to 2006. An excellent reference for AWS D1.1 users. *54 pages, 6 figures, (2008).*

Order Code: D1.1-BI **\$64/\$48**

D1.2/D1.2M:2008, Structural Welding Code—Aluminum

Covers welding requirements for any type of structure made from aluminum structural alloys, except aluminum pressure vessels and fluid-carrying pipelines. Includes sections on design of welded connections, procedure and performance qualification, fabrication, inspection, stud welding, and strengthening and repair of existing structures. A commentary offers guidance on interpreting and applying the code. *226 pages, 59 figures, 24 tables, (2008).*

Order Code: D1.2/D1.2M **\$164/\$123**

D1.3/D1.3M:2008, Structural Welding Code—Sheet Steel

Covers arc welding of structural sheet/strip steels, including cold formed members, equal to or less than 3/16 in. (0.188 in./4.8 mm) nominal thickness and having a minimum specified yield point no greater than 80,000 psi (550 MPa). Applicable to welding of commonly used structural quality

low-carbon hot rolled and cold rolled sheet and strip steel, with or without zinc coating (galvanized), to other structural sheet steels or to supporting structural steel members. Three weld types unique to sheet steel — arc spot, arc seam, and arc plug welds — are included. Includes sections on design, procedure and performance qualification, fabrication, inspection and stud welding as well as a commentary. *98 pages, 7 annexes, 44 figures, 11 tables, 3 forms (2008).*

Order Code: D1.3/D1.3M **\$120/\$90**

D1.4/D1.4M:2005, Structural Welding Code—Reinforcing Steel

Covers welding of reinforcing steel in most reinforced concrete applications. Includes sections on allowable stresses, structural details, workmanship requirements, technique, procedure and performance qualification, and inspection. Figures clearly illustrate important welding considerations: unacceptable weld profiles, effective weld sizes, details of joints of anchorages, base plates, and inserts. New in this edition: A comprehensive approach to radiographic testing of reinforcing steel welds, a section on weld cleaning, welder qualification requirements and testing for fillet welds, and updated forms for welding, testing, and inspection. *80 pages, 7 chapters, 5 annexes, 18 figures, 10 tables, (2005), sixth edition.*

Order Code: D1.4/D1.4M **\$92/\$69**

D1.5M/D1.5:2008, Bridge Welding Code

Get the facts and code requirements for bridge building with carbon and low-alloy construction steels. Covers welding requirements of the American Association of State Highway and Transportation Officials (AASHTO) for welded highway bridges made from carbon and low-alloy construction steels. Chapters cover design of welded connections, workmanship, technique, procedure and performance qualification, inspection, and stud welding. Features the latest AASHTO revisions and nondestructive examination requirements, as well as a section providing a "Fracture Control Plan for Nonredundant Bridge Members." Other highlights:

- Inclusion of U.S. Customary Units
- Provisions for undermatching electrode usage
- Commentary section
- Requirements for the modified Welding Procedure Specification qualification tests

432 pages, 14 annexes, 86 figures, 37 tables, 7 forms, commentary (2008).

Order Code: D1.5M/D1.5 **\$264/\$198**

D1.6/D1.6M:2007, Structural Welding Code—Stainless Steel

Covers requirements for welding stainless steel structural assemblies/components (excluding pressure vessels or pressure piping) using gas metal arc welding, shielded metal arc welding, flux cored arc welding, submerged arc welding, and stud welding. Allows prequalified Welding Procedure Specifications for the austenitic stainless steels based on considerable experience with the most widely used stainless steels. Sections include design, procedure and performance qualification, fabrication, inspection, and stud welding. *292 pages, 14 annexes, 80 figures, 29 tables, (2007).*

Order Code: D1.6/D1.6M **\$160/\$120**

COMING SOON: D1.7/D1.7M:2009, Guide for Strengthening and Repairing Existing Structures

Approx. 60 pages, 6 figures, 7 tables, (2009).

Order Code: D1.7/D1.7M **\$108/\$81**

NEW EDITION: D1.8/D1.8M:2009, Structural Welding Code—Seismic Supplement

A supplement to AWS D1.1, *Structural Welding Code—Steel*. Applicable to welded joints in seismic load resisting systems designed in accordance with the Seismic Provisions of the American Institute of Steel Construction, Inc. Covers additional controls on detailing, materials, workmanship, testing, and inspection necessary to achieve adequate performance of welded steel structures under conditions of severe earthquake-induced inelastic straining. Includes a commentary offering guidance on interpreting and applying this supplement. *Approx. 116 pages, 9 annexes, commentary, 22 figures, 8 tables, (2009).*

Order Code: D1.8/D1.8M **\$132/\$99**

D1.9/D1.9M:2007, Structural Welding Code—Titanium

Covers requirements for design, welding, and inspection of any type of titanium structure. Includes qualification requirements for weld procedures and personnel. *160 pages, commentary, 6 annexes, 53 figures, 19 tables, (2007).*

Order Code D1.9/D1.9M **\$116/\$87**

NEW PUBLICATION: ASTM Standards for Welding

A compilation of all 59 ASTM standards referenced by AWS D1.1 *Structural Welding Code—Steel*. An excellent companion to D1.1, it can be ordered at a savings bundled with D1.1/D1.1M:2008. *450 pages, 59 standards, (2008).*

Order Code ASTMSW **\$479/\$359**

NEW! ASTM Standards bundled with D1.1/D1.1M:2008

Order Code ASTMD1 **\$799/\$599**

The Everyday Pocket Handbook on Welded Joint Details for Structural Applications *See page 13.*

D9.1M/D9.1:2006, Sheet Metal Welding Code

Covers arc and braze welding requirements for nonstructural sheet metal fabrications using commonly welded metals available in sheet form up to and including 3 gauge, or 6.4 mm (0.250 in.). Applications of the code include heating, ventilating, and air conditioning systems, food processing equipment, architectural sheet metal, and other nonstructural sheet metal applications. Sections include procedure and performance qualification, workmanship, and inspection. Nonmandatory annexes provide useful information on materials and processes. Not applicable when negative or positive pressure exceeds 30 kPa (5 psi). *70 pages, 29 figures, 10 tables, (2006).*

Order Code: D9.1M/D9.1 **\$72/\$54**

D1.3/D1.3M:2008, Structural Welding Code—Sheet Steel *See page 4.*

D8.9M:2002, Recommended Practices for Test Methods for Evaluating the Resistance Spot Welding Behavior of Automotive Sheet Steel Materials

See page 26.

Under strict American National Standards Institute (ANSI) procedures, AWS has developed more than 230 consensus-based standards (including codes, product specifications, recommended practices, methods, and guidelines) for welding and allied processes. Many are adopted by DoD and preferred by NASA.

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- D1.3/D1.3M:2008, *Structural Welding Code—Sheet Steel*
- D1.4/D1.4M:2005, *Structural Welding Code—Reinforcing Steel*
- D1.5M/D1.5:2008, *Bridge Welding Code*
- D1.6/D1.6M:2007, *Structural Welding Code—Stainless Steel*

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- D1.8/D1.8M:2009, *Structural Welding Code—Seismic Supplement*

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A1.1:2001, Metric Practice Guide for the Welding Industry

Explains the base, supplementary, and derived International System of Units (SI), and – most important – the rules. Also covers conversion factors and rules for converting customary inch-pound units to SI units. Contains style and usage recommendations for prefixes, punctuation, number grouping, etc. Includes valuable suggestions on managing transition. *40 pages, (2001).*

Order Code: A1.1 **\$60/\$45**

A2.4:2007, Standard Symbols for Welding, Brazing, and Nondestructive Examination

Establishes a method of specifying certain welding, brazing, and nondestructive examination information by means of symbols. Contains detailed information and examples for the construction and interpretation of these symbols. This system provides a means of specifying welding or brazing operations and nondestructive examination, as well as the examination method, frequency, and extent. *138 pages, (2007).*

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Easy-to-read laminated desk and wall charts to complement AWS A2.4:2007, *Standard Symbols for Welding, Brazing, and Nondestructive Examination*. For desktop, drafting table, shop, or classroom use. *(2007).*

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Includes welding cost analysis, modular construction, concepts of welding design, fatigue considerations, joint design, weld distortion and control, information for the welder, non-destructive examination, and defects and discontinuities. Contains 18 sections, each with a table of contents; numerous drawings, tables, charts, and checklists; and a bibliography and recommended reading list. *142 pages, (1999).*

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This alternative approach to the traditional design philosophy for calculating the correct fillet weld size will help quality-minded welding fabricators. Because this document is not a consensus standard, users also should refer to the standards relevant to their application. *28 pages, 8" x 10", (1997).*

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Jefferson's Welding Encyclopedia

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Welding Metallurgy, Carbon and Alloy Steels, Volume 1, Fundamentals

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Ninth Edition, Volume 1, Welding Science and Technology

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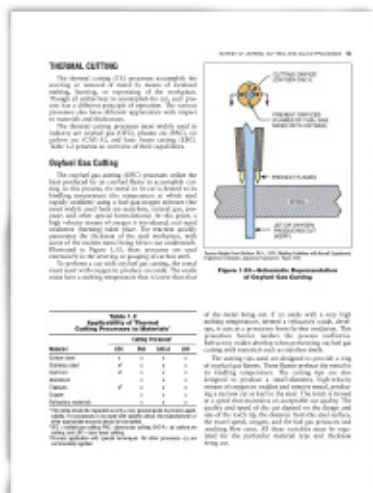
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C7.4/C7.4M:2008, Process Specification and Operator Qualification for Laser Beam Welding *See page 19*

D16.4M/D16.4:2005, Specification for the Qualification of Robotic Arc Welding Personnel

Provides requirements for the qualification of robotic arc welding support personnel at three different levels: CRAW-L1, CRAW-O, and CRAW-T. The revisions in this edition align education and experience requirements more realistically with those in industry. This standard is the basis for the AWS Certification of Robotic Arc Welding Personnel (CRAW) program. (See AWS QC19:2002 on page 14.) *22 pages, 2 annexes, 3 figures, 4 tables, (2005).*

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Now there's an AWS certification for welding supervisors and managers who want to lead their company's welding team to new heights of productivity and quality. A five-day course focuses on both the science and economics of welding, essential knowledge for boosting the performance of your welding operations. As an **AWS Certified Welding Supervisor**, you can make a difference in making your company more profitable and competitive!



American Welding Society

www.aws.org/certification/CWS

Testing and Inspection

For brazing inspection/testing standards, see page 22.

For plastics inspection/testing standards, see page 17.

For thermal spray inspection standards, see page 16.

B1.10:1999, Guide for the Nondestructive Examination of Welds

Addresses which examination method – visual, penetrant, magnetic, radiographic, ultrasonic, electromagnetic (eddy current), or leak testing – best detects various types of discontinuities. Note: Does not address acceptance criteria. 48 pages, 4 annexes, 29 figures, 4 tables, (1999), third edition.

Order Code: B1.10 \$104/\$78

B1.11:2000, Guide for the Visual Examination of Welds

Provides guidance on visual examination of welds, including sections on prerequisites, fundamentals, surface conditions, and equipment. Sketches and color photographs illustrate common weld discontinuities. 42 pages, 3 annexes, 48 figures, (2000).

Order Code: B1.11 \$104/\$78

B4.0:2007, Standard Methods for Mechanical Testing of Welds

Describes the most common mechanical test methods applicable to welds and welded joints. Each test method gives details concerning specimen preparation, test parameters, testing procedures, and suggested report forms. Acceptance criteria are not included. Three new weldability tests (WIC, trough, and GBOP) and resistance weld tests have been included in this new edition. (Note: Joint tests for brazements are covered in AWS C3.2M/C3.2.) U.S. Customary Units. 152 pages, 97 figures, (2007).

Order Code: B4.0 \$104/\$78

B4.0M:2000 (metric only)

Metric only: 114 pages, 64 figures, (2000).

Order Code: B4.0M \$88/\$66

WI:2000, Welding Inspection Handbook

This invaluable training reference helps inspectors, engineers, and welders evaluate the difference between discontinuities and rejectable defects. Includes chapters on:

- Operations
- Safety
- Ferrous Welding Metallurgy
- Discontinuities
- Qualification of Welders
- Proof Tests
- Metrics
- Symbols
- Inspection
- QA
- Preheating/Postweld Heat Treating
- Qualification of Procedures
- Destructive Testing
- Nondestructive Examination
- Standards

254 pages 18 chapters, index, 108 figures, 16 tables, 6½" x 9", (2000), third edition.

Order Code: WI \$76/\$57

WIT-T:2008, Welding Inspection Technology

For at-home study, this official reference textbook for the three-day AWS core seminar for CWI exam preparation is readable, informative, and comprehensive. 329 pages, 10 chapters, 379 figures and photographs, (2008).

Order Code: WIT-T \$272/\$204

WIT-W:2008, Welding Inspection Technology Workbook

A companion to *Welding Inspection Technology*. 83 pages, (2008).

Order Code: WIT-W \$72/\$54

WIT-E:2008, Welding Inspection Technology Sample CWI Fundamentals Examination

This study aid, used at the CWI seminar, is also a good home-study tool for exam preparation. Contains approximately 224 practice questions, 2 tables, and answer key. 44 pages, (2008), sixth edition.

Order Code WIT-E \$60/\$45

The Practical Reference Guide for Radiographic Inspection Acceptance Criteria

Easy orientation to the levels of potential weld discontinuities that won't affect the weldments form, fit, or function. Provides three levels of conditions that can be specified to determine radiographic acceptance of welds. 36 pages, charts and diagrams, (1995).

Order Code: PRG \$56/\$41

The Everyday Pocket Handbook for Visual Inspection and Weld Discontinuities—Causes and Remedies See page 29.

The Everyday Pocket Handbook for Visual Inspection of AWS D1.1 Structural Welding Code's Fabrication and Welding Requirements See page 29.

The Practical Reference Guide for Welding Inspection Management—Visual Inspection of Pressure Vessels and Pressure Piping See page 23.

G1.2M/G1.2:1999, Specification for Standardized Ultrasonic Welding Test Specimen for Thermoplastics See page 17.

G1.6:2006, Specification for the Qualification of Plastics Welding Inspectors for Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds See page 17.

G1.10M:2001, Guide for the Evaluation of Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds See page 17.

Operations

NEW PUBLICATION: The Practical Reference Guide to Positioning

Describes the basic operation of weldment positioners and welding head manipulators and gives information on their selection and use. 74 pages, 58 figures, 1 table, (2008).

Order Code: PRGP \$56/\$42

Total Welding Management See page 6.

The Independent Shop's Guide to Welding Safety and Health See page 9.

Design and Planning Manual for Cost-Effective Welding See page 6.

D16.2M/D16.2:2007, Guide for Components of Robotic and Automatic Arc Welding Installations See page 19.

NEW EDITION: C1.4M/C1.4:2009, Specification for Resistance Welding of Carbon and Low-Alloy Steels

Provides the shear strength and weld button diameter requirements for carbon steel and low-alloy steel sheet resistance and projection welds. *30 pages, 5 figures, 6 tables, (2009).*

Order Code: C1.4M/C1.4 **\$56/\$42**

D11.2-89(R2006), Guide for Welding Iron Castings

Briefly presents the history and metallurgy of cast iron and its welding processes. A weldability test is described, with instructions for its application in specific cases. Qualification of procedures and welders and quality control practice are also included. *135 pages, 69 figures, 26 tables, (Reaffirmed 2006).*

Order Code: D11.2 **\$96/\$72**

G2.1M/G2.1:2002, Guide for the Joining of Wrought Nickel-Based Alloys

Definitive guide to welding metals and alloys not covered by other standards. Guidelines for welding different wrought nickel-based alloys, including solid-solution and precipitation-hardening alloys. *56 pages, 5 figures, 17 tables, (2003).*

Order Code: G2.1M/G2.1 **\$64/\$48**

NEW PUBLICATION: G2.3M/G2.3:2009, Guide for the Joining of Wrought Solid Solution Austenitic Stainless Steels

Presents a description of wrought solid solution austenitic stainless steels and the processes and procedures that can be used for the joining of these materials. Discusses the welding processes and welding parameters, qualifications, inspection and repair methods, cleaning, and safety considerations. *88 pages, 8 figures, 27 tables, (2009)*

Order Code G2.4/G2.4M **\$76/\$57**

G2.4/G2.4M:2007, Guide for the Fusion Welding of Titanium and Titanium Alloys

Best practices to allow first-time users of titanium as well as established fabricators to join titanium parts into quality components. *52 pages, 5 annexes, 8 figures, 20 tables, (2007)*

Order Code G2.4/G2.4M **\$64/\$48**

The Practical Reference Guide for Corrosion of Welds—Causes and Cures

Succinct introduction to basic corrosion mechanisms. Includes pitting, intergranular corrosion, stress corrosion cracking, erosion, crevice and galvanic corrosion, and selective leaching. Clear advice on how to avoid and correct corrosion, including alloying for resistance. *28 pages, 44 photos, (1999).*

Order Code: PRGC **\$52/\$39**

The Practical Reference Guide for High Quality Fusion Welding of Aluminum

Gives engineers, designers, and technicians step-by-step directions in proper use of cleaning tools, assembling, and welding procedures. *20 pages, illustrations, photos, (2001).*

Order Code: PRGQA **\$52/\$39**

The Practical Reference Guide to Welding Titanium

Topics include backing gas shielding, chambers, joint design, equipment, consumables, filler metal transfer, and special welding conditions for gas tungsten arc welding, gas metal arc welding, plasma arc welding, electron and laser beam welding, and resistance welding. *16 pages, 5 tables, (1999).*

Order Code: PRGT **\$48/\$36**

The Practical Reference Guide to Welding Aluminum in Commercial Applications

Covers mechanical properties of aluminum affected by welding alloy and temper designations, filler metal selection, prewelding preparation, GTAW, GMAW, and SMAW defects, and discontinuities and problems in qualifying welding procedures. *38 pages, 24 figures, 14 tables, (2002).*

Order Code: PRGWA **\$56/\$41**

The Practical Reference Guide to Welding Metallurgy—Key Concepts for Weldability

An intelligent introduction for the engineer new to welding, and the up-and-coming senior technician. Tables and figures support these topics: metal structures, metal forms, diffusion, solid solubility, residual stress, shielding and purging, phase transformation, hardness and hardenability, grain size, stainless steels, aluminum and its alloys, copper and its alloys, refractory alloys, and repair welding. *34 pages, 32 figures, (1999).*

Order Code: PRGWM **\$56/\$41**

NEW PUBLICATION: Welding Aluminum—Questions and Answers

This practical guide to troubleshooting aluminum welding-related problems is based on real-life questions and answers from author Tony Anderson's long-running column in the *Welding Journal*. Includes dozens of color photos. *170 pages, hard cover, 70 figures, 10 tables, (2008).*

Order Code: WQA **\$124/\$93**

The Professional's Advisor on Welding of Stainless Steels

Focuses mainly on austenitic stainless steels (200 and 300 series). Also covers ferritic and martensitic (400 series), precipitation-hardening series, and duplex stainless steels. Contains chapters on definitions, stainless steel filler materials, preweld cleaning and preparation, welding and cutting of stainless steels, postweld cleaning, heat treatments, weld discontinuities and defects, stainless steels in welding codes and standards, and safety and health considerations. *103 pages, 13 figures, 47 tables, spiral-bound. 5 1/2" x 8 1/2", (1999).*

Order Code: PASS **\$84/\$63**

Welding Zinc-Coated Steels

Results of a four-year work program sponsored by the International Lead Zinc Research Organization, provides procedures and safe practices. *144 pages, (1972).*

Order Code: WZC **\$100/\$75**

Guide to Weldability: Carbon and Low-Alloy Steels

Aimed at those responsible for the operation of fabrication shops and maintenance/repair facilities, this guide helps the non-welding engineer in the selection of method, materials, and procedures to produce the "desired results and stay out of trouble." Compiled from information taken from the *Welding Handbook*, George E. Linnert's *Welding Metallurgy*, *ASM Handbook*, and *Jefferson's Welding Encyclopedia*, among others. *51 pages, 9 chapters, 2 appendices, 20 figures, 14 tables, (2005).*

Order Code: GTW **\$60/\$45**

NEW EDITION: B2.1/B2.1M-BMG:2009, Base Metal Grouping for Welding Procedure and Performance Qualification

See page 10.

C2.16/C2.16M:2002, Guide for Thermal-Spray Operator Qualification

Recommendations for thermal-spray operator qualification based on knowledge and skill testing. Twelve individual thermal-spray operator qualification tests are included for engineering and corrosion control applications: one each for job knowledge, high-velocity oxygen fuel (HVOF) spraying and flame spray-fusing; two for arc spraying; and three each for flame spraying and air-plasma spraying. *86 pages, (2002).*

Order Code: C2.16 \$76/\$57

C2.18-93, Guide for the Protection of Steel with Thermal Sprayed Coatings of Aluminum and Zinc and Their Alloys and Composites

Authoritative guide to select, plan, and control thermal sprayed coatings for preservation of steel. Indispensable for purchasers, architects, managers, supervisors, and contractors in the construction, marine, railroad, fabrication, and repair industries. *40 pages, 13 tables, (1993).*

Order Code: C2.18 \$60/\$45

C2.20/C2.20M:2002, Specification for Thermal Spraying Zinc Anodes on Steel Reinforced Concrete

Explains metalized zinc cathodic protection systems for corrosion protection of concrete structures with steel reinforcing. Useful to departments of transportation, port facilities, power plants, and other operations responsible for repair and maintenance of concrete structures affected by corrosion of steel reinforcement. Includes information on job safety, passfail reference standards, feedstock materials, needed equipment, and instructions for surface preparation, thermal spraying, and quality control. *40 pages, 3 figures, 5 tables, (2003).*

Order Code: C2.20/C2.20M \$60/\$45

C2.21M/C2.21:2003, Specification for Thermal Spray Equipment Acceptance Inspection

Specifies thermal spray equipment acceptance requirements for plasma, arc-wire, flame-powder, flame-wire, flame-rod, and flame-cord, and high-velocity oxygen fuel equipment. Contains inspection report forms. *28 pages, (2004).*

Order Code: C2.21M/C2.21 \$52/\$39

C2.23M/C2.23:2003, Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel

Covers safety, job reference standards, equipment setup and preparation, surface preparation, aluminum and zinc application, and sealer and topcoat application. Does not cover design and fabrication, thermal spray equipment qualification, coating selection, and operator and inspector certification. Same as NACE No. 12, SSPC-CS 23.00. *48 pages, 9 figures, 5 tables, (2003).*

Order Code: C2.23M/C2.23 \$60/\$45

C2.25/C2.25M:2002, Specification for Thermal Spray Feedstock—Solid and Composite Wire and Ceramic Rods

Classifies solid and composite wires and ceramic rods for thermal spraying, based on their as-manufactured chemical composition. Includes requirements for standard sizes, marking, manufacturing, and packaging. *26 pages, 4 figures, 7 tables, (2002).*

Order Code: C2.25/C2.25M \$52/\$39

Thermal Spray Manual

Introduction to thermal spraying, including fundamentals, sequencing the job, applications, processes, coating selection, finishing, training, certification, and safety. Excellent training manual. *176 pages, 12 chapters, glossary, (1996).*

Order Code: TSM \$112/\$84

Thermal Spraying Practice, Theory, and Application

The thermal spraying processes are specialized, yet have a wide ranging utilization in both manufacturing and maintenance. There are many components and variables involved, which, when working together and properly applied, produce an effect far greater than indicated when they are considered individually. Yet each component and variable must be understood to permit the proper selection and operation of a particular process. With this background, the user is then in a position to tailor the process to a particular application. *194 pages, 48 figures, 59 tables (1985).*

Order Code: TSS \$120/\$90

When inspectors aren't inspecting, they're talking shop on the AWS live forums



The live forums at www.aws.org provide a fast way to get tips and advice from your inspection colleagues and other welding pro's. Search thousands of helpful postings or post your own inquiries and watch the suggestions pour in. **Just surf to http://www.aws.org/cgi-bin/mwfl/forum_show.pl** or follow the forum link on www.aws.org.

B2.4:2006, Specification for Welding Procedure and Performance Qualification for Thermoplastics

Includes requirements for qualification of Welding Procedure Specifications, welders, and welding operators for manual, semi-automatic, mechanized, and automatic welding. Covers electrofusion, hot gas, socket fusion, butt contact fusion, infrared, extrusion welding, and flow fusion welding processes, as well as base materials, filler materials, qualification variables, and testing requirements. *Adopted by NBIC. 42 pages, 21 figures, 11 tables, 1 mandatory annex, 1 non-mandatory annex, (2006).*

Order Code: B2.4 **\$60/\$45**

G1.1M/G1.1:2006, Guide to Ultrasonic Assembly of Thermoplastics

Details the ultrasonic equipment and processes used in fabricating thermoplastic parts. *94 pages, 45 figures, 9 tables, (2006).*

Order Code G1.1M/G1.1 **\$72/\$54**

G1.2M/G1.2:1999, Specification for Standardized Ultrasonic Welding Test Specimen for Thermoplastics

Helps minimize variations in the geometry, welding, and testing of the ultrasonic welding test sample for thermoplastics. Detailed figures show tolerances on critical dimensions that may affect weldability. Use this specification for studies on the ultrasonic welding of thermoplastics, weldability studies, and optimizations. *28 pages, (1999).*

Order Code: G1.2M/G1.2 **\$52/\$39**

G1.6:2006, Specification for the Qualification of Plastics Welding Inspectors for Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds

Defines the qualification requirements for plastics welding inspectors. *22 pages, (2006).*

Order Code G1.6 **\$52/\$39**

G1.10M:2001, Guide for the Evaluation of Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds

Lists and describes defects in welded joints in thermoplastic materials, and classifies each into one of three quality grades, allowing specific defects to be excluded or kept within limits. *44 pages, (2001).*

Order Code: G1.10M **\$60/\$45**

Handbook of Plastics Joining

Provides detailed descriptions of joining processes and an extensive compilation of data on the joining of particular plastic materials. Divided into two main parts: processes and materials. The processing part is divided into 18 chapters, each discussing a different joining technique. The second part covers material-specific joining information. Includes 25 generic polymer families. In addition, the book contains an international suppliers directory and a glossary of the key terms used in plastics joining. *Second edition, 591 pages, 450 illustrations, (2008).*

Order Code: HPJ **\$325**

Food Processing Systems

NEW EDITION: D18.1/D18.1M:2009, Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications

Specifies requirements for gas tungsten arc welding of austenitic stainless steel tube and pipe at least 1/4 inch (6 mm) diameter in the fabrication of sanitary processing systems for handling products for human and animal consumption. May also be applied to maintenance of food processing equipment. Addresses procedure and performance qualification, fabrication, visual examination requirements, and documentation. *34 pages, 2 figures, (2009).*

Order Code: D18.1 **\$56/\$42**

NEW EDITION: D18.2:2009, Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube

Laminated sheet with color photograph showing degrees of coloration on the inside of an austenitic stainless steel tube with increasing amounts of oxygen in the backing shielding gas. Suitable as a specifying tool and visual examination guide. Includes two-page instruction sheet. *(2009).*

Order Code: D18.2 **\$40/\$30**

D18.3/D18.3M:2005, Specification for Welding of Tanks, Vessels, & Other Equipment in Sanitary (Hygienic) Applications

Covers issues not addressed by D18.1, including welding of carbon steels, stainless steels, and nickel alloys for construction of new tanks and other equipment. Includes welding of pipe to sanitary equipment. *38 pages, 3 nonmandatory annexes, 2 figures, 3 tables, (2005).*

Order Code: D18.3/D18.3M **\$56/\$42**



**FABTECH
INTERNATIONAL & AWS
WELDING SHOW**

Nov. 15-18, 2009 in Chicago
www.aws.org/show

C1.1M/C1.1:2000 (R2006), Recommended Practices for Resistance Welding

Covers spot, seam, projection, flash, and upset welding, as well as weld bonding for uncoated and coated carbon and low-alloy steels, aluminum alloys, stainless steels, nickel, nickel-base alloys, cobalt-base alloys, copper and alloys, and titanium and alloys. Details equipment and setup, welding variables, joint preparation, cleaning, welding schedules and parameters, weld quality testing, safety, and health. *116 pages, 36 figures, 59 tables, (Reaffirmed 2006).*

Order Code: C1.1M/C1.1 **\$88/\$66**

C4.1-77 Set, Criteria for Describing Oxygen-Cut Surfaces, and Oxygen Cutting Surface Roughness Gauge

Consists of a plastic gauge with samples of oxygen-cut surfaces, a list of descriptive terms, and an accompanying chart. *5 pages.*

Order Code: C4.1 SET **\$56/\$42**

NEW EDITION: C4.2/C4.2M:2009, Recommended Practices for Safe Oxyfuel Gas Cutting Torch Operation

Describes the oxyfuel gas cutting process and latest procedures and safety requirements, using terminology compatible with ISO documents. Illustrations show torch and nozzle configurations, and examples of production-cut surfaces. *Approx. 62 pages, 20 figures, 4 tables, (2009).*

Order Code: C4.2/C4.2M **\$68/\$52**

C4.3/C4.3M:2007, Recommended Practices for Safe Oxyfuel Gas Heating Torch Operation

Describes the best and most practical methods for safe and effective operation of oxyfuel gas heating torches, including information on equipment safety, setup, shutdown and operating procedures, and equipment maintenance. *36 pages, 10 figures, 4 tables, (2007).*

Order Code: C4.3/C4.3M **\$56/\$42**

C4.4/C4.4M:2007, Recommended Practices for Heat Shaping and Straightening with Oxyfuel Gas Heating Torches

Describes methods and techniques for shaping and straightening metal parts (including steel plate, pipes, angles, channel, T bar, and compound structures) by careful application of heat. Presents theory and mathematical formulas for developing heat shaping patterns. Topics include oxyfuel gas equipment (torches, tips, regulators, fuel gases, gas cylinders, and bulk supply); torch procedures for spot, line, and V heating patterns; and safety procedures. Figures show where to place heating patterns for straightening, forming, or bending. *56 pages, 39 figures, 4 tables, (2007).*

Order Code: C4.4/C4.4M **\$64/\$48**

C4.5M:2006, Uniform Designation System for Oxyfuel Nozzles

Proposes a marking system that includes the name, registration trademark, correct fuel gas symbol, nozzle cutting capacity, and a code or part number to permit easy reference to the manufacturer's operating data. Provides a common identification system that will result in the safe operation of oxyfuel nozzles, including cutting, welding, heating, and brazing. *18 pages, SI (metric) units, (2006).*

Order Code: C4.5M **\$48/\$36**

C4.6M:2006 (ISO 9013:2002 IDT), Thermal Cutting—Classification of Thermal Cuts—Geometric Product Specification and Quality Tolerances

Provides the quantitative and qualitative methods for describing and classifying oxyfuel flame, plasma, and laser cutting. *48 pages, 5 annexes, 27 figures, 8 tables, (2006).*

Order Code C4.6M **\$60/\$45**

C5.1-73, Recommended Practices for Plasma Arc Welding

Presents a description of the process and practical procedures as applied to joining parts and surfacing. Applies to a wide variety of metals and represents methods used in industry. *76 pages, (1973).*

Order Code: C5.1 **\$72/\$54**

C5.2:2001, Recommended Practices for Plasma Arc Cutting and Gouging

A great tool to optimize and troubleshoot your plasma arc cutting operations. Discusses basics of the process, components, controls, power supplies, and recommended process consumables and parameters, and gives you methods of optimizing cut quality and parameter settings. Also deals with safety and health aspects of the process, and methods for control of pollution and other hazards. *52 pages, 22 figures, 3 tables, (2001).*

Order Code: C5.2 **\$64/\$48**

C5.3:2000, Recommended Practices for Air Carbon Arc Gouging and Cutting

Helps the operator establish the correct air pressure, amperage, voltage, and techniques. Includes gouging recommendations and a handy troubleshooting guide. *32 pages, 11 figures, 10 tables, (2000).*

Order Code: C5.3 **\$56/\$42**

C5.4-93, Recommended Practices for Stud Welding

These recommended practices for stud welding, prepared by the Subcommittee on Stud Welding of the AWS Committee on Arc Welding and Cutting, are intended to serve as a basic guide for those interested in attaching fasteners by arc and capacitor discharge stud welding. The variations of the process, stud design, equipment, welding procedures, quality control, and safety precautions are discussed. The information presented will guide the designer and the shop in the utilization of studs in many fields including automotive manufacture, boiler and building construction, farm and industrial equipment, railroads and shipbuilding, aircraft and aerospace, metal furniture, and other metal working industries. *44 pages, 37 figures, 11 tables, (1993).*

Order Code: C5.4 **\$60/\$45**

C5.5/C5.5M:2003, Recommended Practices for Gas Tungsten Arc Welding

Provides a fundamental explanation of the gas tungsten arc welding process, describes basic practices and concepts, and outlines advanced methods and applications. Addresses current uses of gas tungsten arc welding in the metal-fabricating industry, new applications, and advances in research and development. Presents many practical recommendations on the use of gas tungsten arc welding, and a handy trouble-shooting section. Includes process advantages and limitations; equipment and supplies; tungsten electrodes; gas shielding, purging, and backing; fixturing and tooling; welding techniques; quality control; troubleshooting and safety; joint design, preparation, and

welding positions; and welding characteristics of selected alloys. *130 pages, 79 figures, 22 tables, (2003).*

Order Code: C5.5/C5.5M **\$96/\$72**

C5.6-89R, Recommended Practices for Gas Metal Arc Welding

Learn from this document about the basic concepts of the gas metal arc welding (GMAW) process, including metal transfer modes, the nature of the process variables, and the necessary equipment and consumables. You'll obtain a fundamental understanding of GMAW and its variations, such as short circuit, spray, and pulse modes of metal transfer. *76 pages, (Reaffirmed 1994).*

Order Code: C5.6 **\$72/\$54**

C5.7:2000 (R2006), Recommended Practices for ElectroGas Welding

Fundamentals of the process, including the various methods of welding. Equipment, consumables, applications, and metallurgical advantages and limitations are discussed. Covers selection of process variables and operating conditions and typical EGW procedures. Inspection of welds, and training and qualification of welding procedures and operators are described. A troubleshooting guide, safety considerations, and a supplementary reading list are presented. *68 pages, 23 figures, 14 tables. (Reaffirmed 2006).*

Order Code: C5.7 **\$68/\$52**

C5.10/C5.10M:2003, Recommended Practices for Shielding Gases for Welding and Cutting

Covers six industrial gases – argon, carbon dioxide, helium, hydrogen, nitrogen, and oxygen – and various mixtures. Covers gas properties, uses, safe handling, distribution, mixtures and effects of shielding gases on arc characteristics and welds for flux cored arc welding, gas tungsten arc welding, gas metal arc welding, electrogas welding, plasma arc welding, plasma arc cutting, laser welding, and laser cutting. Includes sections on gas purging and backing gases as well as shielding and cutting gas safety. *64 pages, 26 figures, 17 tables, (2003).*

Order Code: C5.10/C5.10M **\$68/\$52**

C6.1-89(R2009), Recommended Practices for Friction Welding

Describes friction welding fundamentals and basic equipment requirements. Suggested procedure qualification, inspection methods, and joint designs are detailed. Typical mechanical property data are referenced. *36 pages, 3 appendices, 9 figures, 2 tables. (Reaffirmed 2009).*

Order Code: C6.1 **\$56/\$42**

C6.2/C6.2M:2006, Specification for Friction Welding of Metals

Provides for the qualification of friction welding machines, procedures, and training of welding operators. Qualification of welding procedure specifications includes the material specifications involved, weld joint design, and destructive and nondestructive examination requirements, as well as guidelines for categories of quality assurance. Qualification of welding equipment includes weld parameter control and weld reproducibility. *32 pages, 1 table, 4 forms, (2006).*

Order Code: C6.2/C6.2M **\$56/\$42**

C7.1M/C7.1:2004, Recommended Practices for Electron Beam Welding

Presents descriptions of electron beam welding equipment and procedures for welding a wide range of similar and dissimilar metals and thicknesses. Includes sections on safety, process fundamentals, equipment and maintenance,

metallurgical and general process considerations, inspection and testing of welds, training and qualification of operators, weld process and procedure development, practical examples, and power curves for various alloys. *128 pages, 64 figures, 11 tables, (2004).*

Order Code: C7.1 **\$92/\$69**

C7.2:1998, Recommended Practices for Laser Beam Welding, Cutting, and Drilling

Recommended practices for laser beam welding, cutting, and drilling. Covers common applications of the process. Processes definitions, safe practices, general process requirements and inspection criteria are provided. *116 pages, (1998).*

Order Code: C7.2 **\$88/\$66**

C7.3:1999R, Process Specification for Electron Beam Welding

Sister publication to C7.1, *Recommended Practices for Electron Beam Welding*, this standard discusses applicable specifications, safety, requirements, fabrication, quality examination, equipment calibration and maintenance, approval, and delivery of work. Includes sample WPS and PQR forms, as well as a Nondestructive Evaluation Discontinuity Limits chart. *18 pages. (Reaffirmed 2003).*

Order Code: C7.3 **\$48/\$36**

C7.4/C7.4M:2008, Process Specification and Operator Qualification for Laser Beam Welding

Covers processing and quality control requirements for laser beam welding. *34 pages, 1 table. (2008).*

Order Code: C7.4 **\$56/\$42**

NEW PUBLICATION: D14.8M:2009 (ISO/TR 17844:2004 IDT), Standard Methods for the Avoidance of Cold Cracks

The U.S. adoption of ISO 17844:2004, *Welding – Comparison of standardized methods for the avoidance of cold cracks*. Retains the technical content, structure, and wording of the ISO document. Compares currently available methods for determining welding procedures for avoiding hydrogen induced cold cracking during fabrication. *92 pages, 27 figures, 28 tables. (2009)*

Order Code: D14.8M **\$80/\$60**

D16.2M/D16.2:2007, Guide for Components of Robotic and Automatic Arc Welding Installations

Performance recommendations for evaluating components of a typical robotic or automatic welding installation. A pin arrangement and specific pin function for each location in a standardized 37-pin connector are proposed. *32 pages, 4 figures, 4 tables. (2007)*

Order Code: D16.2M/D16.2 **\$56/\$42**

Arc Welding with Robots: Do's and Don'ts

Provides the novice as well as the seasoned user of industrial robots with information that can promote and expand successful use of robots in GMAW and FCAW applications. *36 pages. (1995).*

Order Code: AWR **(25 copies) \$24/\$18**

The Practical Reference Guide for Hardfacing

Introduction to hardfacing, the surfacing process that helps protect against wear or corrosion exactly where needed. An excellent companion to A5.212001, *Specification for Bare Electrodes and Rods for Surfacing*. *20 pages, 4 figures, 12 tables, (2002).*

Order Code: PRGHF **\$52/\$39**

Development and qualification of welding procedures can be time-consuming and expensive.

	BASE METAL	THICKNESS	PROCESS	FILLER METAL	CONDITION	ORDER NO.	
SHEET METAL							
SHEET METAL	CARBON STEEL	Carbon Steel	10 – 18 gauge	GMAW-S	ER70S-6	As-welded, with or w/o backing	B2.1-1-004
		Carbon Steel	10 – 18 gauge	GTAW	ER70S-2 or -3	As-welded, with or w/o backing	B2.1-1-008
		Carbon Steel	10 – 18 gauge	SMAW	E6010 or E6013	As-welded, with or w/o backing	B2.1-1-012
	GALVANIZED	Galvanized Steel	10 – 18 gauge	GMAW-S	ER70S-6	As-welded, with or w/o backing	B2.1-1-003
		Galvanized Steel	10 – 18 gauge	GTAW	ER70S-2 or -3	As-welded, with or w/o backing	B2.1-1-007
		Galvanized Steel	10 – 18 gauge	SMAW	E6010 or E6013	As-welded, with or w/o backing	B2.1-1-011
	M-1 TO M-8	Carbon to Stainless	10 – 18 gauge	GMAW-S	ER309	As-welded, with or w/o backing	B2.1-1/8-006
		Carbon to Stainless	10 – 18 gauge	GTAW	ER309	As-welded, with or w/o backing	B2.1-1/8-010
		Carbon to Stainless	10 – 18 gauge	SMAW	E309-15,-16 or -17	As-welded, with or w/o backing	B2.1-1/8-014
	STAINLESS	Stainless Steel	10 – 18 gauge	GMAW-S	ER3XX	As-welded, with or w/o backing	B2.1-8-005
		Stainless Steel	10 – 18 gauge	GTAW	ER3XX	As-welded, with or w/o backing	B2.1-8-009
		Stainless Steel	10 – 18 gauge	SMAW	E3XX-15,-16 or -17	As-welded, with or w/o backing	B2.1-8-013
	AL	Aluminum	10 – 18 gauge	GTAW	ER4043 or R4043	As-welded, with or w/o backing	B2.1-22-015

PIPE OR PLATE (ALL STANDARDS BELOW ARE ADOPTED BY NATIONAL BOARD INSPECTION CODE)

PIPE OR PLATE	CARBON STEEL	Carbon Steel	3/16" – 7/8"	GTAW	ER70S-2 or -3	As-welded, with or w/o backing	B2.1-1-002
		Carbon Steel	1/8" – 1-1/2"	GTAW followed by SMAW	ER70S-2 & E7018	As-welded or PWHT	B2.1-1-021
		Carbon Steel	3/16" – 3/4"	SMAW	E7016 & E7018	As-welded, with backing	B2.1-1-001
		Carbon Steel	1/8" – 1-1/2"	SMAW	E7018	As-welded or PWHT	B2.1-1-016
		Carbon Steel	1/8" – 1-1/2"	SMAW	E6010	As-welded or PWHT	B2.1-1-017
		Carbon Steel	1/8" – 1-1/2"	SMAW	E6010 & E7018	As-welded or PWHT	B2.1-1-022
		Carbon Steel	1/8" – 1-1/2"	SMAW	E6010* & E7018	As-welded or PWHT	B2.1-1-026
		Carbon Steel	1/8" – 1-1/2"	FCAW, self-shielded	E71T-8	As-welded	B2.1-1-018
		Carbon Steel	1/8" – 1/2"	FCAW, self-shielded	E71T-11	As-welded	B2.1-1-027
		Carbon Steel	1/8" – 1-1/2"	FCAW-G, CO ₂ gas-shielded	E70T-1 or E71T-1	As-welded	B2.1-1-019
		Carbon Steel	1/8" – 1-1/2"	FCAW-G, Ar-CO ₂ gas-shielded	E70T-1 or E71T-1	As-welded or PWHT	B2.1-1-020-
		STAINLESS	Stainless Steel	1/16" – 1-1/2"	GTAW	ER3XX	As-welded
	Stainless Steel		1/8" – 1-1/2"	GTAW followed by SMAW	ER3XX & E3XX-XX	As-welded	B2.1-8-025
	Stainless Steel		1/8" – 1-1/2"	SMAW	E3XX-XX	As-welded	B2.1-8-023

*Downhill progression on root pass. All other vertical position passes are uphill.

Specifications with order numbers indicated in red are adopted by ASME with additional requirements.

PRICES:

The one-time user-license fee for each SWPS is \$186 (\$248 for nonmembers).

AWS publishes Standard Welding Procedure Specifications (SWPSs), which are reviewed and validated by the Welding Procedures Committee of the Welding Research Council. They are balloted through the AWS standards-development program as American National Standards. Standard Welding Procedure Specifications may be used on work covered by the AWS D1.1, *Structural Welding Code—Steel* with the engineer's approval. The *National Board Inspection Code* has adopted all pipe SWPSs except B2.1-1-202. SWPSs with red order numbers may be used on ASME Boiler and Pressure Vessel work with additional requirements spelled out in Section IX of ASME *Boiler & Pressure Vessel Code*. All licenses are good for unlimited intracompany applications.

Let AWS Standard Welding Procedure Specifications (SWPSs) do the work for you.

	BASE METAL	THICKNESS	PROCESS	FILLER METAL	CONDITION	ORDER NO.	
PRIMARILY PIPE							
ALL STANDARDS BELOW ARE ADOPTED BY <i>NATIONAL BOARD INSPECTION CODE</i> , except B2.1-1-202							
PRIMARILY PIPE	CARBON STEEL	Carbon Steel	1/8" – 1-1/2"	GMAW-S followed by FCAW-G	ER70S-3 & E70T-1M, E71T-1M or -12M	As-welded or PWHT	B2.1-1-232
		Carbon Steel	1/8" – 1-1/2"	GMAW-S followed by GMAW spray transfer	ER70S-3	As-welded or PWHT	B2.1-1-233
		Carbon Steel	1/8" – 1-1/2"	FCAW-G, Ar-CO ₂ shielded	E70T-1M, E71T-1M, or E71T-12M	As-welded or PWHT	B2.1-1-234
		Carbon Steel	1/8" – 1-1/2"	GMAW spray transfer	ER70S-3	As-welded or PWHT	B2.1-1-235
		Carbon Steel	1/8" – 1-1/2"	GTAW	ER70S-2	As-welded or PWHT	B2.1-1-207
		Carbon Steel	1/8" – 1-1/2"	GTAW followed by SMAW	ER70S-2 & E7018	As-welded or PWHT	B2.1-1-209
		Carbon Steel	1/8" – 1-1/2"	GTAW, consumable inserts	INMs-1 & ER70S-2	As-welded or PWHT	B2.1-1-210
		Carbon Steel	1/8" – 1-1/2"	GTAW, consumable inserts/SMAW	INMs-1, E70S-2 & E7018	As-welded or PWHT	B2.1-1-211
		Carbon Steel	1/8" – 3/4"	SMAW	E6010 & E7018	As-welded	B2.1-1-201
		Carbon Steel	1/8" – 3/4"	SMAW	E6010* & E7018	As-welded	B2.1-1-202
		Carbon Steel	1/8" – 3/4"	SMAW	E6010	As-welded	B2.1-1-203
		Carbon Steel	1/8" – 3/4"	SMAW	E6010*	As-welded	B2.1-1-204
		Carbon Steel	1/8" – 1-1/2"	SMAW	E6010 & E7018	As-welded or PWHT	B2.1-1-205
		Carbon Steel	1/8" – 1-1/2"	SMAW	E6010* & E7018	As-welded or PWHT	B2.1-1-206
		Carbon Steel	1/8" – 1-1/2"	SMAW	E7018	As-welded or PWHT	B2.1-1-208
PRIMARILY PIPE	M-1 TO M-8	Carbon to Stainless	1/16" – 1-1/2"	GTAW	ER309(L)	As-welded	B2.1-1/8-227
		Carbon to Stainless	1/8" – 1-1/2"	GTAW followed by SMAW	ER309(L) & E309(L)-15,-16 or -17	As-welded	B2.1-1/8-229
		Carbon to Stainless	1/16" – 1-1/2"	GTAW, consumable inserts	IN309 and ER309(L)	As-welded	B2.1-1/8-230
		Carbon to Stainless	1/8" – 1-1/2"	GTAW, consumable inserts/SMAW	IN309, ER309 & E309-15,-16 or -17, or ER309(L) & E309(L)-15,-16 or -17	As-welded	B2.1-1/8-231
		Carbon to Stainless	1/8" – 1-1/2"	SMAW	E309(L)-15,-16 or -17	As-welded	B2.1-1/8-228
PRIMARILY PIPE	STAINLESS	Stainless Steel	1/16" – 1-1/2"	GTAW	ER3XX	As-welded	B2.1-8-212
		Stainless Steel	1/8" – 1-1/2"	GTAW followed by SMAW	ER3XX & E3XX-XX	As-welded	B2.1-8-214
		Stainless Steel	1/8" – 1-1/2"	GTAW, consumable inserts	IN3XX & ER3XX	As-welded	B2.1-8-215
		Stainless Steel	1/8" – 1-1/2"	GTAW, consumable inserts/SMAW	IN3XX, ER3XX & E3XX-XX	As-welded	B2.1-8-216
		Stainless Steel	1/8" – 1-1/2"	SMAW	E3XX-XX	As-welded	B2.1-8-213
PRIMARILY PIPE	CHROME-NIOLY STEEL	Cr-Mo (M-4/P-4)	1/8" – 3/4"	GTAW	ER80S-B2	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-4-217
		Cr-Mo (M-4/P-4)	1/8" – 1-1/2"	GTAW followed by SMAW	ER80S-B2 & E8018-B2	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-4-219
		Cr-Mo (M-4/P-4)	1/8" – 3/4"	GTAW, consumable inserts	IN515 & ER80S-B2	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-4-220
		Cr-Mo (M-4/P-4)	1/8" – 1-1/2"	GTAW, consumable inserts/SMAW	IN515, ER80S-B2, & E8018-B2	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-4-221
		Cr-Mo (M-4/P-4)	1/8" – 1-1/2"	SMAW	E8018-B2	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-4-218
		Cr-Mo (M-5A/P-5A)	1/8" – 3/4"	GTAW	ER90S-B3	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-5A-222
		Cr-Mo (M-5A/P-5A)	1/8" – 1-1/2"	GTAW followed by SMAW	ER90S-B3 & E9018-B3	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-5A-224
		Cr-Mo (M-5A/P-5A)	1/8" – 3/4"	GTAW, consumable inserts	IN521 & ER90S-B3	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-5A-225
		Cr-Mo (M-5A/P-5A)	1/8" – 1-1/2"	GTAW, consumable inserts/SMAW	IN521, ER90S-B3, & E9018-B3	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-5A-226
		Cr-Mo (M-5A/P-5A)	1/8" – 1-1/2"	SMAW	E9018-B3	As-welded (<1/2") or PWHT (all thicknesses)	B2.1-5A-223

Brazing and Soldering

C3.2M/C3.2:2008, Standard Method for Evaluating the Strength of Brazed Joints

Describes the test methods used to obtain reliable data on the strength of metal-to-metal, metal-to-nonmetal, and nonmetal-to-nonmetal joints. *42 pages, 16 figures, 4 tables, (2008).*

Order Code: C3.2M/C3.2 **\$60/\$45**

C3.3:2008, Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components

Procedures that should be followed in the design, manufacture, and examination of brazed joints to ensure reliability of critical components. *42 pages, 4 tables, 1 figure (2008).*

Order Code: C3.3 **\$60/\$45**

C3.4M/C3.4:2007, Specification for Torch Brazing

Provides the minimum fabrication, equipment, process procedure requirements, and inspection requirements for the torch brazing of copper, copper alloys, heat and corrosion-resistant alloys, and other materials that can be adequately torch brazed. *24 pages, (2007)*

Order Code: C3.4 **\$56/\$42**

C3.5M/C3.5:2007, Specification for Induction Brazing

The minimum fabrication, equipment, material, process procedure requirements, and inspection requirements for the induction brazing of steels, copper, copper alloys, and heat and corrosion-resistant alloys and other materials that can be adequately induction brazed. Criteria for classifying induction brazed joints based on loading and consequences of failure, and quality assurance criteria defining limits of acceptability of each class. Defines acceptable induction brazing equipment, materials, and procedures, as well as required inspection for each class of joint. *24 pages, (2007)*

Order Code: C3.5 **\$56/\$42**

C3.6M/C3.6:2008, Specification for Furnace Brazing

Provides the minimum fabrication, equipment, material, process procedure, and inspection requirements for the furnace brazing of steels, copper, copper alloys, nickel, heat and corrosion-resistant alloys, and other materials that can be adequately furnace brazed. Provides criteria for classifying furnace-brazed joints based on loading and the consequences of failure and quality assurance criteria defining the limits of acceptability in each class. *26 pages, (2008).*

Order Code: C3.6 **\$56/\$42**

C3.7M/3.7:2005, Specification for Aluminum Brazing

The minimum fabrication, equipment, material, process procedure, and inspection requirements for the brazing of aluminum by atmosphere furnace, vacuum furnace, and flux processes. Criteria for classifying aluminum brazed joints based on loading and the consequences of failure and quality assurance criteria defining the limits of acceptability of each class. *26 pages, (2005).*

Order Code: C3.7 **\$52/\$39**

C3.8M/C3.8:2005, Specification for the Ultrasonic Examination of Brazed Joints

Specifies requirements for the ultrasonic examination of brazed joints. Provides the minimum requirements for equipment, procedures, and the documentation of such tests. *18 pages, 1 nonmandatory annex, 3 figures, (2005).*

Order Code: C3.8M/C3.8 **\$48/\$36**

NEW PUBLICATION: C3.9M/C3.9:2009, Specification for Resistance Brazing

Minimum fabrication, equipment, material, and process procedure requirements for resistance brazing of steels, copper and alloys, and heat- and corrosion-resistant materials, and other materials that can be resistance brazed. Criteria for classifying resistance-brazed joints based on loading and consequences of failure, and quality assurance criteria. *24 pages, (2009).*

Order Code: C3.9M/C3.9 **\$52/\$39**

D10.13/D10.13M:2001, Recommended Practices for the Brazing of Copper Tubing and Fittings for Medical Gas Systems

Provides the minimum requirements for brazing of copper tubing for medical gas and vacuum distribution systems in health-care facilities. Contains criteria for preparation and cleanliness of materials and equipment, joint heating and filler metal application techniques, and inspection and testing options. *20 pages, 1 figure, 3 tables, (2001).*

Order Code: D10.13/D10.13M **\$56/\$42**

Brazing Footprints

A collection of case studies in high-temperature brazing, compiled from Robert L. Peaslee's "Brazing Q&A" column in the *Welding Journal*. *299 pages, (2003).*

Order Code: BFP **\$160**

International Brazing & Soldering Conference Proceedings

2009 proceedings in book form. *425 pages, 74 papers.*

Order Code: IBSC2009HC **\$100/\$75**

2009 proceedings on CD. *425 pages, 74 papers, CD-ROM.*

Order Code: IBSC2009 **\$84/\$63**

2006 proceedings. *414 pages, 68 papers, on CD-ROM.*

Order Code: IBSC2006 **\$84/\$63**

2003 proceedings. *619 pages, 88 papers, on CD-ROM.*

Order Code: IBSC2003 **\$84/\$63**

Brazing Handbook

A comprehensive, organized survey of the basics of brazing, processes, and applications. Addresses the fundamentals of brazing, brazement design, brazing filler metals and fluxes, safety and health, and many other topics. Includes new chapters on induction brazing and diamond brazing. A must-have for all brazers, brazing engineers, and students. *740 pages, 36 chapters, 3 appendices, 308 figures, 116 reference tables, fifth edition, (2007).*

Order Code: BRH **\$136/\$102**

Soldering Handbook

Covers soldering fundamentals, technology, materials, substrate materials, fluxes, pastes, assembly processes, inspection, and environment. Covers today's advanced joining applications and emphasizes new materials, including higher strength alloys; predictive performance; computer modeling; advanced inspection techniques; new processing concepts, including laser heating; and the resurgence in ultrasonic soldering. *579 pages, 299 figures, 112 tables, (1999).*

Order Code: SHB **\$152/\$114**

Braze Safely *See page 8.*

A5.8/A5.8M:2004, Specification for Filler Metals for Brazing and Braze Welding *See page 25.*

A5.31-92R, Specification for Fluxes for Brazing and Braze Welding *See page 25.*

B2.2-91, Standard for Brazing Procedure and Performance Qualification *See page 10.*

B2.3/B2.3M:2008, Specification for Soldering Procedure and Performance Qualification *See page 10*

Pipe and Tubing

D10.4-86R, Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing

Detailed discussion of the metallurgical characteristics and weldability of many grades of austenitic stainless steel used in piping and tubing. The delta ferrite content as expressed by ferrite number (FN) is explained, and its importance in minimizing hot cracking is discussed. Figures and tables illustrate recommended joint designs and procedures. Appendix A presents information on the welding of high-carbon stainless steel cast pipe fittings. *42 pages, (Reaffirmed 2000).*

Order Code: D10.4 **\$60/\$45**

D10.6/D10.6M:2000, Recommended Practices for Gas Tungsten Arc Welding of Titanium Piping and Tubing

Incorporates results of research on the effects of atmospheric exposure during welding. Provides coverage on power sources, tungsten electrodes, titanium base metal grades, filler metals, joint design and preparation, pickling and cleaning, fitting and tacking, preweld cleaning, gas shielding, welding procedures and techniques, and preheat and postweld heat treatment. *28 pages, 4 figures, 7 tables, (2000).*

Order Code: D10.6/D10.6M **\$52/\$40**

D10.7M/D10.7:2008, Guide for the Gas Shielded Arc Welding of Aluminum and Aluminum Alloy Pipe

A comprehensive guide for the selection of filler metals which incorporates all the important weld metal characteristics. 56 different base metals and 13 filler metals are evaluated for weldability, strength, ductility, corrosion resistance, service temperature and color matching. *42 pages, 5 figures, 13 tables, (2008).*

Order Code: D10.7M/D10.7 **\$60/\$45**

D10.8-96, Recommended Practices for Welding of Chromium-Molybdenum Steel Piping and Tubing

Recommendations for welding chromium-molybdenum steel pipe and tubing to itself and to various other materials. Covered in detail are filler metal selection, joint design, preheating, and postheating. Emphasis is placed on maintaining interpass temperature and dangers inherent in interrupted heating cycles. *18 pages, 1 figure, 4 tables, (1996).*

Order Code: D10.8 **\$48/\$36**

D10.10/D10.10M:1999(R2009), Recommended Practices for Local Heating of Welds in Piping and Tubing

Provides information on recommended practices, equipment, temperature control, insulation, and advantages and disadvantages for the methods presently available for local heating of welded joints in pipe and tubing. *116 pages, 8 annexes, 23 figures, 16 tables, (Reaffirmed 2009).*

Order Code: D10.10/D10.10M **\$88/\$66**

D10.11M/D10.11:2007, Guide for Root Pass Welding of Pipe Without Backing

Presents guidelines for welding the root pass of metal pipe butt joints with an open root or a consumable insert. Joint designs, assembly, consumable insert configurations, base metals, filler metals, and purging are discussed. Applicable arc welding processes and techniques are described. *34 pages, 11 figures, (2007)*

Order Code: D10.11M/D10.11 **\$56/\$42**

D10.12M/D10.12:2000, Guide for Welding Mild Steel Pipe

Contains recommended practices for welding piping systems of sizes DN 200 (NPS 8) and under and wall thickness of 13mm (0.5 in) and under for low-pressure heating, air conditioning, refrigeration, and water supply, as well as some gas and chemical systems. Covers carbon steels such as ASTM A 53, A 106, A 135, A 179, A 524, A 587, and API-5L, Grades A25, A and B, and X42 joined using oxyacetylene, shielded metal arc, gas tungsten arc, gas metal arc, and flux cored arc welding. Explains techniques for preheating, joint preparation, alignment and positioning, fittings, and root and hot passes. Does not address the needs of pipe steels or service conditions which may require post weld heat treatment. *48 pages, 19 line drawings and photographs, 10 tables, (2000).*

Order Code: D10.12M/D10.12 **\$56/\$42**

D10.13/D10.13M:2001, Recommended Practices for the Brazing of Copper Tubing and Fittings for Medical Gas Systems *See page 22.*

COMING SOON: D10.14M:2009, Guide for Multipass Orbital Machine Pipe Groove Welding

Extensive guidance on multipass orbital machine pipe groove welding for both plant and transmission applications.

Order Code: D10.14M **CALL FOR PRICE**

COMING SOON: D10.17M:2009, Guide for Welding Tubular Steel Vehicle Structures

Covers low-carbon steels and chromium-molybdenum steel tubing and components with a maximum wall thickness of 3 mm intended for limited production tubular frame vehicles such as race cars.

Order Code: D10.17M **CALL FOR PRICE**

D10.18M/D10.18:2008, Guide for Welding Ferritic/Austenitic Duplex Stainless Steel Piping and Tubing

Enables you to take advantage of the increased corrosion resistance and higher mechanical strength of duplex stainless steels. The metallurgy of duplex stainless steels is explained and methods for obtaining a high-quality root pass are given for manual, automatic and orbital welding. Provides guidance for the selection of joint types and dimensions and filler metals. *34 pages, 5 tables, 5 figures (2008).*

Order Code: D10.18M/D10.18 **\$56/\$42**

The Practical Reference Guide for Welding Inspection Management—Visual Inspection of Pressure Vessels and Pressure Piping

A planning survey for visual inspectors new to major in-service inspections of pressure vessels or pressure piping. Contains an annex on discontinuities. *32 pages, (1999).*

Order Code: PRGVT **\$52/\$39**

NEW EDITION: D18.1/D18.1M:2009, Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications *See page 17.*

D18.2:2009, Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube *See page 17.*

F4.1:2007, Safe Practices for the Preparation of Containers and Piping for Welding and Cutting *See page 8.*

For pipe welding Standard Welding Procedure Specifications (SWPSs), see page 21.

Save when you buy multiple A5 Filler Metal Specs

These crucial specifications give the purchaser and distributor of filler metals a dependable, efficient recognition system. The classifications defined in these standards allow you to identify filler metals uniformly, without consideration of manufacturers' trade names or brand names. *AWS A5 Filler Metal Specifications are ANSI Approved and Dept. of Defense Adopted.*

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AWS Filler Metal Specifications by Material and Welding Process

	OFW	SMAW	GTAW, GMAW, PAW	FCAW	SAW	ESW	EGW	BRAZING	THERMAL SPRAYING
Carbon Steel	A5.2/A5.2M	A5.1/A5.1M	A5.18/A5.18M	A5.20/A5.20M	A5.17/A5.17M	A5.25/A5.25M	A5.26/A5.26M	A5.8/A5.8M & A5.31	C2.25/C2.25M
Low-Alloy Steel	A5.2/A5.2M	A5.5/A5.5M	A5.28/A5.28M	A5.29/A5.29M	A5.23/A5.23M	A5.25/A5.25M	A5.26/A5.26M	A5.8/A5.8M & A5.31	C2.25/C2.25M
Stainless Steel		A5.4/A5.4M	A5.9/A5.22	A5.22	A5.9/A5.9M	A5.9/A5.9M	A5.9/A5.9M	A5.8/A5.8M & A5.31	C2.25/C2.25M
Cast Iron	A5.15	A5.15	A5.15	A5.15				A5.8/A5.8M & A5.31	
Nickel Alloys		A5.11/A5.11M	A5.14/A5.14M	A5.34/A5.34M	A5.14/A5.14M	A5.14/A5.14M		A5.8/A5.8M & A5.31	C2.25/C2.25M
Aluminum Alloys		A5.3/A5.3M	A5.10/A5.10M					A5.8/A5.8M & A5.31	C2.25/C2.25M
Copper Alloys		A5.6/A5.6M	A5.7/A5.7M					A5.8/A5.8M & A5.31	C2.25/C2.25M
Titanium Alloys			A5.16/A5.16M					A5.8/A5.8M & A5.31	
Zirconium Alloys			A5.24/A5.24M					A5.8/A5.8M & A5.31	
Magnesium Alloys			A5.19					A5.8/A5.8M & A5.31	
Tungsten Electrodes			A5.12/A5.12M						
Brazing Alloys and Fluxes								A5.8/A5.8M & A5.31	
Surfacing Alloys	A5.21	A5.13	A5.21	A5.21	A5.21				C2.25/C2.25M
Consumable Inserts			A5.30/A5.30M						
Shielding Gases			A5.32/A5.32M	A5.32/A5.32M			A5.32/A5.32M		
Ceramics									C2.25/C2.25M

A4.2M:2006 (ISO 8249: 2000 MOD), Standard Procedures for Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic and Duplex Ferritic-Austenitic Stainless Steel Weld Metal

Calibration procedures include those for the Magnet-Gauge, Ferritescope, and Inspector Gauge, using primary standards. Appendix discusses problems in measuring ferrite content. 56 pages, 17 figures, 14 tables, 7 annexes, (2006).

Order Code: A4.2M \$64/\$48

A4.3-93 (R2006), Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding

26 pages, (Reaffirmed 2006).

Order Code: A4.3 \$52/\$39

A4.4M: 2001 (R2006), Standard Procedures for Determination of Moisture Content of Welding Fluxes and Welding Electrode Flux Coverings

32 pages, 4 figures, 3 tables, (Reaffirmed 2006).

Order Code: A4.4M \$56/\$42

A5.01M/A5.01:2008 (ISO 14344:2002 MOD), Procurement Guidelines for Consumables—Welding and Allied Processes—Flux and Gas Shielded Electrical Welding Processes

Essential to today's purchaser. Describes how to state required filler metal specifications clearly, concisely, and completely,

including heat, lot, testing, and certification requirements. 38 pages, 12 tables (2008).

Order Code: A5.01 \$52/\$39

A5.02/A5.02M:2007, Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes

Prescribes size, package, appearance, and identification requirements for filler metals for solid, tubular, bare, covered, and strip electrodes used in fusion processes, but not brazing, braze welding, thermal spraying, or granular products such as SAW fluxes. 28 pages, 4 figures, 4 tables, (2007).

Order Code: A5.02/A5.02M \$52/\$39

FMC:2000, Filler Metal Comparison Charts

- Contains:
- 83 national and international suppliers, with their mailing address, telephone, fax, and Web site address.
 - Handy indexes arranged by classification numbers (1,500) and brand names (11,000) for finding information quickly.
 - AWS classifications used as "chapters."
- 494 pages, (2000).

Order Code: FMC \$168/\$126

IFS:2002, International Index of Welding Filler Metal Classifications

55 pages, 4 figures, 42 tables. (2002.) CD-ROM only.

Order Code: IFS CD \$52/\$39

User's Guide to Filler Metals

130 pages, (1995).

Order Code: UGFM \$68/\$52

AWS A5 Filler Metal Specifications

—D1.1 REFERENCED		ORDER CODE	PRICE
A5.1/A5.1M:2004	Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding (54 pages)	A5.1/A5.1M	\$52/\$39
A5.2/A5.2M:2007	Specification for Carbon and Low Alloy Steel Rods for Oxyfuel Gas Welding (26 pages)	A5.2/A5.2M	\$52/\$39
A5.3/A5.3M:1999(R2007)	Specification for Aluminum and Aluminum-Alloy Electrodes for Shielded Metal Arc Welding (28 pages)	A5.3/A5.3M	\$52/\$39
A5.4/A5.4M:2006	Specification for Stainless Steel Electrodes for Shielded Metal Arc Welding (52 pages)	A5.4/A5.4M	\$52/\$39
A5.5/A5.5M:2006	Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding (54 pages)	A5.5/A5.5M	\$52/\$39
A5.6/A5.6M:2008	Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding (36 pages)	A5.6/A5.6M	\$52/\$39
A5.7/A5.7M:2007	Specification for Copper and Copper Alloy Bare Welding Rods and Electrodes (30 pages)	A5.7/A5.7M	\$52/\$39
A5.8/A5.8M:2004	Specification for Filler Metals for Brazing and Braze Welding (46 pages)	A5.8/A5.8M	\$52/\$39
A5.9/A5.9M:2006	Specification for Bare Stainless Steel Welding Electrodes and Rods (40 pages)	A5.9/A5.9M	\$52/\$39
A5.10/A5.10M:1999(R2007)	Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods (40 pages)	A5.10/A5.10M	\$52/\$39
A5.11/A5.11M:2005	Specification for Nickel and Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding (48 pages)	A5.11/A5.11M	\$52/\$39
NEW! A5.12M/A5.12:2009 (ISO 6848:2004 MOD)	Specification for Tungsten and Tungsten-Alloy Electrodes for Arc Welding and Cutting (36 pages)	A5.12M/A5.12	\$52/\$39
A5.13:2000	Specification for Surfacing Electrodes for Shielded Metal Arc Welding (36 pages)	A5.13	\$52/\$39
NEW! A5.14/A5.14M:2009	Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods (38 pages)	A5.14/A5.14M	\$52/\$39
A5.15-90 (R2006)	Specification for Welding Electrodes and Rods for Cast Iron (32 pages)	A5.15	\$52/\$39
A5.16/A5.16M:2007	Specification for Titanium and Titanium-Alloy Welding Electrodes and Rods (36 pages)	A5.16/A5.16M	\$52/\$39
A5.17/A5.17M-97(R2007)	Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding (40 pages)	A5.17/A5.17M	\$52/\$39
A5.18/A5.18M:2005	Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding (42 pages)	A5.18/A5.18M	\$52/\$39
A5.19-92(R2006)	Specification for Magnesium Alloy Welding Electrodes and Rods (26 pages)	A5.19	\$52/\$39
A5.20/A5.20M:2005	Specification for Carbon Steel Electrodes for Flux Cored Arc Welding (48 pages)	A5.20/A5.20M	\$52/\$39
A5.21:2001	Specification for Bare Electrodes and Rods for Surfacing (40 pages)	A5.21	\$52/\$39
A5.22-95(R2005)	Specification for Stainless Steel Electrodes for Flux Cored Arc Welding and Stainless Steel Flux Cored Rods for Gas Tungsten Arc Welding (Reaffirmed 2005, 44 pages)	A5.22	\$52/\$39
A5.23/A5.23M:2007	Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding (58 pages)	A5.23/A5.23M	\$52/\$39
A5.24/A5.24M:2005	Specification for Zirconium and Zirconium-Alloy Welding Electrodes and Rods (18 pages)	A5.24/A5.24M	\$52/\$39
A5.25/A5.25M-97(R2009)	Specification for Carbon and Low-Alloy Steel Electrodes and Fluxes for Electroslag Welding (Reaffirmed 2009, 34 pages)	A5.25/A5.25M	\$52/\$39
A5.26/A5.26M-97(R2009)	Specification for Carbon and Low-Alloy Steel Electrodes for Electrogas Welding (Reaffirmed 2009, 34 pages)	A5.26/A5.26M	\$52/\$39
A5.28/A5.28M:2005	Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding (46 pages)	A5.28/A5.28M	\$52/\$39
A5.29/A5.29M:2005	Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding (48 pages)	A5.29/A5.29M	\$52/\$39
A5.30/A5.30M:2007	Specification for Consumable Inserts (36 pages)	A5.30/A5.30M	\$52/\$39
A5.31-92R	Specification for Fluxes for Brazing and Braze Welding (Reaffirmed 2003, 20 pages)	A5.31	\$52/\$39
A5.32/A5.32M-97(R2007)	Specification for Welding Shielding Gases (28 pages)	A5.32/A5.32M	\$52/\$39
A5.34/A5.34M:2007	Specification for Nickel Alloy Electrodes for Flux Cored Arc Welding (40 pages)	A5.34/A5.34M	\$52/\$39
C2.25/C2.25M:2002	Specification for Thermal Spray Feedstock—Solid and Composite Wire and Ceramic Rods (26 pages)	C2.25/C2.25M	\$52/\$39

D8.1M:2007, Specification for Automotive Weld Quality—Resistance Spot Welding of Steel

Establishes acceptance criteria for resistance spot welds in autos fabricated from steels, including Advanced High Strength Steels. *38 pages, 24 figures, 4 tables, (2007).*

Order Code: D8.1M **\$56/\$42**

D8.6:2005, Specification for Automotive Resistance Spot Welding Electrodes

Supplement to RWMA Bulletin 16, *Resistance Welding Equipment Standards*. Specifies chemical composition, physical requirements, dimensions, and identification of various shapes and nose configurations of electrodes, electrode caps, and cap-adaptor shanks used in the automotive industry. Annexes describe recommended electrode material for spot welding similar and dissimilar metals, and standard gauges for confirmation of RWMA electrode tapers. *98 pages, 8 annexes, 47 figures, 37 tables, (2006).*

Order Code: D8.6 **\$80/\$60**

D8.7M:2005, Recommended Practices for Automotive Weld Quality – Resistance Spot Welding

Presents recommended practices and criteria for evaluating resistance spot welds typical of automotive sheet steel applications. Contains weld characteristics, metrics, and testing methods useful in evaluating spot welding quality on coated and uncoated automotive sheet steels of all strength levels and compositions. The test methods are designed to assess static and dynamic properties of automotive sheet steel welds. *28 pages, 18 figures, 3 tables, (2005).*

Order Code: D8.7M **\$52/\$39**

D8.8M:2007, Specification for Automotive Weld Quality—Arc Welding of Steel

Provides the minimum quality requirements for arc welding of various types of automotive and light truck components. Covers the arc and hybrid arc welding of coated and uncoated steels. *26 pages, 17 figures, (2007).*

Order Code: D8.8M **\$52/\$39**

D8.9M:2002, Recommended Practices for Test Methods for Evaluating the Resistance Spot Welding Behavior of Automotive Sheet Steel Materials

Helps predict performance of sheet steel that is resistance spot welded for use in auto manufacturing. Also addresses equipment setup, electrode installation and dressing, electrode endurance testing, and current level and range assessment. *78 pages, 3 annexes, 30 figures, 12 tables, (2002).*

Order Code: D8.9M **\$72/\$54**

D8.14M:2008, Specification for Automotive Weld Quality—Arc Welding of Aluminum

Covers the arc welding of automotive and light truck components that are manufactured from aluminum alloys. *32 pages, 18 figures, 3 tables, (2008).*

Order Code: D8.14M **\$56/\$42**

COMING SOON: D10.17M:2009, Guide for Welding Tubular Steel Vehicle Structures
*See page 23.***D14.3/D14.3M:2005, Specification for Welding Earthmoving, Construction, and Agricultural Equipment** *See page 27.***D3.5-93R, Guide for Steel Hull Welding**

Best practical methods to weld steel hulls for ships, barges, mobile offshore drilling units, and other marine vessels. Includes information on steel plates, shapes, castings, and forgings, their selection, and their weldability. *118 pages, 72 illustrations, 9 tables, (Reaffirmed 2000).*

Order Code: D3.5 **\$88/\$66**

D3.6M:1999, Specification for Underwater Welding

Covers the requirements for the underwater welding of structures or components in wet and dry environments. *144 pages, 6 annexes, (1999).*

Order Code: D3.6M **\$100/\$75**

D3.7:2004, Guide for Aluminum Hull Welding

Guidance on proven processes, techniques, and procedures for welding aluminum hulls and related ship structures. Applies chiefly to aluminum hulls over 30 ft. (9 m) long and made of sheet and plate 3/16 in. (4.8 mm) thick and greater. Sections on hull materials, construction preparation, welding equipment and processes, procedure and performance qualification, welding techniques, and safety. *86 pages, (2004).*

Order Code: D3.7 **\$76/\$57**

Aerospace

D17.1:2001, Specification for Fusion Welding for Aerospace Applications

Specifies general welding requirements for welding aircraft and space hardware. Includes fusion welding of aluminum-based, nickel-based, iron-based, cobalt-based, magnesium-based, and titanium-based alloys using arc and high energy beam welding processes. Includes sections on design of welded connections, personnel and procedure qualification, fabrication, inspection, repair of existing structures and nonflight hardware acceptance. Additional requirements cover repair welding of existing hardware. *94 pages, 5 annexes, commentary, 47 figures, 14 tables, (2001).*

Order Code: D17.1 **\$160/\$120**

D17.2/D17.2M:2007, Specification for Resistance Welding for Aerospace Applications

Requirements for aerospace resistance spot and seam welding of aluminum, magnesium, steel, nickel, cobalt, titanium, and their alloys. Intended to replace MIL-W-6858D and AMS-W-6858A. *42 pages, 13 figures, 13 tables (2007).*

Order Code: D17.12/D17.2M **\$60/\$45**

Railroad

D15.1/D15.1M:2007, Railroad Welding Specification for Cars and Locomotives

Specifies requirements for the manufacture and maintenance of railroad equipment. Includes procedure and performance qualification, including welder operator and tack welder qualification, design of welded joints, inspection, and acceptance criteria. Not applicable to tank car tanks or rails. *224 pages, 7 appendices, 85 figures, 33 tables, (2007).*

Order Code: D15.1/D15.1M **\$132/\$99**

D15.2:2003, Recommended Practices for the Welding of Rails and Related Rail Components for Use by Rail Vehicles

Covers the joining, repair, maintenance, and inspection of rail welds, and welding of related components. Processes include thermite welding and flash welding. Contains a special annex on welding austenitic manganese steel. *48 pages, annex, charts and figures, (2003).*

Order Code: D15.2 **\$60/\$45**

D14.1/D14.1M:2005, Specification for Welding of Industrial and Mill Cranes and Other Material Handling Equipment

Specifies requirements for welding of all principal structural weldments and all primary welds used to manufacture cranes for industrial, mill, powerhouse, and nuclear facilities. Also applies to other overhead material-handling machinery and equipment that support and transport loads within the design rating, vertically or horizontally, during normal operations. Additionally, when agreed upon between the owner and manufacturer, it may apply to loading caused by abnormal operations or environmental events, such as seismic loading. All provisions apply equally to strengthening and repairing of existing overhead cranes and material handling equipment. Contains figures and tables with prequalified joint details, allowable stress ranges, stress categories, and nondestructive examination techniques. Does not apply to construction or crawler cranes or welding of rails. *150 pages, 60 figures, 21 tables (2005).*

Order Code: D14.1/D14.1M **\$104/\$78**

D14.3/D14.3M:2005, Specification for Welding Earthmoving, Construction, and Agricultural Equipment

For Self-Propelled, On- and Off-Highway Machinery and Agricultural Equipment

Specifies requirements for structural welds used in the manufacture of crawlers, tractors, graders, loaders, off-highway trucks, power shovels, backhoes, mobile cranes, draglines, and other heavy earthmoving, construction, and agricultural equipment. Provides exhaustive illustrations of prequalified complete and partial penetration welded joints (butt, corner, T-, or combination) for shielded metal arc welding, submerged arc welding, gas metal arc welding, and flux cored arc welding. Includes variables for prequalified fillet welds. Emphasizes workmanship and welder qualification. Annexes include a forms collection and "Recommended Practices for Treatment of Shielded Metal Arc and Flux Cored Arc Electrodes." Tables include "Weldability Classification—Typical Steel Products" and "Minimum Preheat and Interpass Temperature for Prequalified Procedures." *114 pages, 42 figures, 4 forms, 14 tables, 1 mandatory annex, 6 nonmandatory annexes, (2005).*

Order Code: D14.3/D14.3M **\$88/\$66**

D14.4/D14.4M:2005, Specification for Welded Joints in Machinery and Equipment

Specifies common acceptance criteria for carbon and low-alloy steel welded joints in machines and equipment subject to static and dynamic loading. Covers classification of welded joints, weld joint design, workmanship, quality control requirements and procedures, welding operator and welding procedure qualification, weld joint inspection (visual, radiographic, ultrasonic, magnetic particle, liquid penetrant), repair, and post weld treatments. Describes the effect of weld joint geometry, welding practices, and quality control on allowable stress levels,

and provides practices for qualification and examination of welded joints in machinery and equipment fabrication. Contains figures and tables with prequalified joint details, nondestructive examination techniques, and weld-inspection criteria. *132 pages, 1 mandatory annex, 2 nonmandatory annexes (including a bibliography), 68 figures, 20 tables, (2005).*

Order Code: D14.4/D14.4M **\$96/\$72**

NEW EDITION: D14.5/D14.5M:2009, Specification for Welding of Presses and Press Components

Presents the current minimum standards and guidelines for the welded fabrication and repair of presses and press components. Addresses classification, weld joint design, stresses, tolerances, welder qualification, and a welding quality program. *158 pages, 69 figures, 24 tables, 3 forms (2009).*

Order Code: D14.5/D14.5M **\$104/\$78**

D14.6/D14.6M:2005, Specification for Welding of Rotating Elements of Equipment

Specifies requirements for weld joint detail and welding of rotating elements in new equipment of a few inches to over 200 inches (5 m) in diameter. Also applies to modification or repair welding of rotating elements in existing equipment. Equipment types covered by this specification include crushers, fans, gears, crankshafts, flywheels, centrifugal impellers, kilns, air moving devices, and blowers. Includes sections on materials, welding processes, procedure and performance qualification, fabrication requirements, inspection and quality control, modification and repair. Contains a useful updated table on ferrous and nonferrous material groupings for procedure qualification. Not applicable to steam or combustion turbine rotors or blading, camshafts, or power transmission shafts. *222 pages, 42 figures, 18 tables, (2005).*

Order Code: D14.6/D14.6M **\$132/\$99**

D14.7/D14.7M:2005, Recommended Practices for Surfacing and Reconditioning of Industrial Mill Rolls

Provides guidance on surfacing, repair, and reconditioning of industrial mill rolls in the heavy metals, paper, plastic, and lumber industries. Emphasizes the use of submerged arc welding, but also addresses gas metal arc welding, and flux cored arc welding, with suitable modifications. Applicable to electroslag cladding. Covers welding, postweld heat treating, finish machining, inspection, and record keeping. Provides detailed guidelines, tables, figures, and forms for use in establishing documented, qualified Welding Procedure Specifications. *66 pages, 20 figures, 13 tables, (2005).*

Order Code: D14.7/D14.7M **\$68/\$52**

NEW PUBLICATION: D14.8M:2009(ISO/TR 17844:2004 IDT), Standard Methods for the Avoidance of Cold Cracks *See page 19.*



Fully searchable Welding Journals from 1919 to 2008 are now available in their entirety on DVDs

The entire history of modern welding is now yours to own and preserve. Every Welding Journal issue from the very first has been faithfully reproduced in its entirety. Research papers, industry briefs, feature articles, people profiles, and AWS Society news—and even the vintage ads—are all at your fingertips. Every issue is indexed and completely searchable, presented as it was originally published, in its original colors and pagination, but in easy-to-use universal PDF format. Nine decades of American Welding Society Welding Journals are a must for any serious library. **See page 6.**

RWMA Bulletin #5: Resistance Welding Control Standard

Discusses weld controls, timing diagrams, input/output connections, SCR sizing, and terminal markings. Explains voltage compensation and other critical performance standards, plus safety, construction, installation, and operation standards. 62 pages, (1994).

Order Code: RW5 **\$55/\$42**

RWMA Bulletin #14: Maintenance Manual for Resistance Welding Machines

Explains installation, maintenance, and operation of a resistance welding machine's electrical, pneumatic, hydraulic and cooling systems. Includes a trouble-shooting section. Useful for maintenance personnel and operators. (1996).

Order Code: RW14 **\$38/\$29**

RWMA Bulletin #16: Resistance Welding Equipment Standards

RWMA standards for welding equipment, including electrical, electrode, and fluid-power standards. *In a 1 1/2" three-ring binder*, (1996).

Order Code: RW16 **\$150/\$115**

RWMA Bulletin #34: Manufacturer's Cross Reference of Standard Resistance Welding Electrode Numbers and Alloys

An extensive cross-reference of standard resistance welding electrodes and alloys recognized by the RWMA. 13 pages, (1997).

Order Code: RW34 **\$39/\$30**

RWMA Resistance Welding Manual, Revised Fourth Edition

The latest and most complete compilation of basic information on resistance welding available anywhere. 468 pages, 25 chapters, 2 appendices (including an index), 308 figures, 85 tables. 8 3/4" x 11 1/4", (2003).

Order Code: RWM **\$125/\$94**

Introduction to Resistance Welding Video

Comprehensive training video illustrates technique, control, and application. Covers spot, projection, seam, and flash/butt welding. Explains basic principles, machine components and setup, electrodes, tooling, controls, and transformers. Ideal for classroom and seminar use, and for introducing a company's personnel to resistance welding. DVD, 52 minutes, (1999).

Order Code: RWVID **\$415/\$320**

The Professional's Advisor on Resistance Welding

This fits-in-a-briefcase book accompanies the busiest professionals on resistance welding worksites. Addresses welding definitions, resistance welding electrodes, spot and seam welding parameters, multiple thickness combinations, projection and flash welding, defects and their causes in resistance welding, testing, safety/health precautions for

resistance welding, and more. 74 pages, 9 chapters (tabbed for quick access), spiral-bound. 5 1/2" x 8 1/2", (1998).

Order Code: PARW **\$76/\$57**

A10.1M:2007, Specification for Calibration and Performance Testing of Secondary Current Sensing Coils and Weld Current Monitors used in Single-Phase AC Resistance Welding

Sets forth accepted methods for testing and describing the performance of Rogowski-type air core current sensing coils (CSC) and weld current monitors (WCM) used in the measurement of single-phase AC resistance welding currents. Definitions of terms relevant to this measurement are included. CSC and system tests and calibration methods are described in detail. Detailed information that shall be made available to the user is prescribed. 54 pages, 15 figures, 5 tables, (2007).

Order Code: A10.1M **\$64/\$48**

C1.1M/C1.1:2000 (R2006), Recommended Practices for Resistance Welding See page 18.

NEW EDITION: C1.4M/C1.4:2009, Specification for Resistance Welding of Carbon and Low-Alloy Steels See page 15.

NEW EDITION: C1.5:2009, Specification for the Qualification of Resistance Welding Technicians See page 10.

NEW PUBLICATION: C3.9M/C3.9:2009, Specification for Resistance Brazing See page 22.

D8.1M:2007, Specification for Automotive Weld Quality—Resistance Spot Welding of Steel See page 26.

D8.6:2005, Specification for Automotive Resistance Spot Welding Electrodes See page 26.

D8.7M:2005, Recommended Practices for Automotive Weld Quality – Resistance Spot Welding See page 26.

D8.9M:2002, Recommended Practices for Test Methods for Evaluating the Resistance Spot Welding Behavior of Automotive Sheet Steel Materials See page 26.

D17.2/D17.2M:2007, Specification for Resistance Welding for Aerospace Applications See page 26.

The Emmet A. Craig RESISTANCE WELDING SCHOOL is coming to Chicago!

This two-day certificate program is a resistance welding school sponsored by the American Welding Society and the Resistance Welding Manufacturing Alliance, and taught by industry specialists with extensive resistance welding experience. It covers the basics of resistance welding, reviews the process, and offers enrichment opportunities. Each participant may learn at their own pace, and discuss specific welding concerns with the instructors. Tuesday & Wednesday, November 17 & 18, 2009 at the FABTECH INT'L and AWS WELDING SHOW, Chicago.

For more information, visit www.aws.org/show.

Subject Index

AEROSPACE

D17.1	Specification for Fusion Welding for Aerospace Applications	26
D17.2/D17.2M	Specification for Resistance Welding for Aerospace Applications	26

ALUMINUM

B2.1-22-015	Standard Welding Procedure Specification (Aluminum)	20
C3.7/C3.7M	Specification for Aluminum Brazing	22
D1.2/D1.2M	Structural Welding Code—Aluminum	4
D3.7	Guide for Aluminum Hull Welding	26
D8.14M/D8.14	Specification for Automotive Weld Quality—Arc Welding of Aluminum	26
D10.7M/D10.7	Guide for the Gas Shielded Arc Welding of Aluminum and Aluminum Alloy Pipe	23
PHB-8	The Everyday Pocket Handbook for Gas Metal Arc Welding (GMAW) of Aluminum	13
PRGQA	The Practical Reference Guide for High Quality Fusion Welding of Aluminum	15
PRGWA	The Practical Reference Guide to Welding Aluminum in Commercial Applications	15
WQA	Welding Aluminum—Questions and Answers	15

AUTOMOTIVE

D8.1M	Specification for Automotive Weld Quality—Resistance Spot Welding of Steel	26
D8.6	Specification for Automotive Resistance Spot Welding Electrodes	26
D8.7M	Recommended Practices for Automotive Weld Quality – Resistance Spot Welding	26
D8.8M	Specification for Automotive Weld Quality—Arc Welding of Steel	26
D8.9M	Recommended Practices for Test Methods for Evaluating the Resistance Spot Welding Behavior of Automotive Sheet Steel Materials	26
D8.14M/D8.14	Specification for Automotive Weld Quality—Arc Welding of Aluminum	26

BRAZING AND BRAZE WELDING

A5.8/A5.8M	Specification for Filler Metals for Brazing and Braze Welding	25
A5.31	Specification for Fluxes for Brazing and Braze Welding	25
B2.2	Standard for Brazing Procedure and Performance Qualification	10
BFP	Brazing Footprints	22
BRH	Brazing Handbook	22
BRS	Braze Safely	8
C3.2M/C3.2	Standard Method for Evaluating the Strength of Brazed Joints	22
C3.3	Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components	22
C3.4M/C3.4	Specification for Torch Brazing	22
C3.5M/C3.5	Specification for Induction Brazing	22
C3.6M/C3.6	Specification for Furnace Brazing	22
C3.7M/C3.7	Specification for Aluminum Brazing	22
C3.8M/C3.8	Specification for the Ultrasonic Examination of Brazed Joints	22
C3.9M/C3.9	Specification for Resistance Brazing	22
D9.1M/D9.1	Sheet Metal Welding Code	5
D10.13/D10.13M	Recommended Practices for the Brazing of Copper Tubing and Fittings for Medical Gas Systems	22
IBSC	International Brazing & Soldering Conference Proceedings	22

BRIDGES

D1.5M/D1.5	Bridge Welding Code	4
------------	-------------------------------	---

CARBON STEEL

A5.1/A5.1M	Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding	25
A5.2/A5.2M	Specification for Carbon and Low-Alloy Steel Rods for Oxyfuel Gas Welding	25
A5.17/A5.17M	Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding	25
A5.18/A5.18M	Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding	25
A5.20/A5.20M	Specification for Carbon Steel Electrodes for Flux Cored Arc Welding	25
GTW	Guide to Weldability: Carbon and Low-Alloy Steels	15

CAST IRON

A5.15	Specification for Welding Electrodes and Rods for Cast Iron	25
D11.2	Guide for Welding Iron Castings	15

CERTIFICATION (SEE ALSO QUALIFICATION)

CM	Certification Manual for Welding Inspectors	11
CMWS	Certified Welding Supervisor Manual	12
QC1	Standard for AWS Certification of Welding Inspectors	12
QC4	Standard for Accreditation of Test Facilities for AWS Certified Welder Program	12
QC5	Standard for AWS Certification of Welding Educators	12
QC7	Standard for AWS Certified Welders	12
QC10	Specification for Qualification and Registration of Level I — Entry Welders	12
QC11	Specification for Qualification and Certification for Level II — Advanced Welders	12
QC12	Specification for Qualification and Certification for Level III — Expert Welders	12
QC13	Specification for the Certification of Welding Supervisors	12
QC14	Specification for the Certification of Welding Sales Representatives	12
QC15	Specification for the Certification of Radiographic Interpreters	12
QC17	Specification for AWS Accreditation of Certified Welding Fabricators	12
QC19	Standard for the AWS Certification of Robotic Arc Welding Personnel	12

CHARTS

A2.1 WC & DC	Welding Symbol Charts	6
D1.1-SWJ-WC	Welded Joint Details Wall Chart	4
D18.2	Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube	17
F2.2	Lens Shade Selector	8

CONSUMABLE INSERTS (SEE FILLER METALS)

CORROSION RESISTANCE

C2.20/C2.20M	Specification for Thermal Spraying Zinc Anodes on Steel Reinforced Concrete	16
C2.23M/C2.23	Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel	16
PRGC	The Practical Reference Guide for Corrosion of Welds—Causes and Cures	15
PRGHF	The Practical Reference Guide for Hardfacing	19

CUTTING (SEE ALSO OXYFUEL WELDING AND CUTTING)

A5.12M/A5.12 (ISO 6848 MOD)	Specification for Tungsten and Tungsten-Alloy Electrodes for Arc Welding and Cutting	25
AWS	Arc Welding and Cutting Safety	8
C4.6M (ISO 9013 IDT)	Thermal Cutting—Classification of Thermal Cuts—Geometric Product Specification and Quality Tolerances	18
C5.2	Recommended Practices for Plasma Arc Cutting and Gouging	18
C5.3	Recommended Practices for Air Carbon Arc Gouging and Cutting	18
C5.10/C5.10M	Recommended Practices for Shielding Gases for Welding and Cutting	19
C7.2	Recommended Practices for Laser Beam Welding, Cutting, and Drilling	19
F4.1	Safe Practices for the Preparation of Containers and Piping for Welding and Cutting	8
FSW	Fire Safety in Welding and Cutting	9
PCWC	Preparing Containers for Welding or Cutting	9

DESIGN

DPW	Design and Planning Manual for Cost-Effective Welding	6
FWSH	Design Handbook for Calculating Fillet Weld Sizes	6

EDUCATION AND TRAINING (SEE ALSO REFERENCE)

API M	Study Guide for API Standard 1104	11
CCRM	Code Clinic—Structural Welding Code—Steel	11
CM	Certification Manual for Welding Inspectors	11
CMWS	Certified Welding Supervisor Manual	12
EG2.0	Curriculum Guide for Training and Qualification of Welding Personnel: Entry Welder	11
EG3.0	Guide for the Training and Qualification of Welding Personnel: Level II — Advanced Welders	11

Subject Index

EG4.0	Guide for the Training and Qualification of Welding Personnel: Level III—Expert Welders	11
GWF	Guide for Setting Up a Welder Training Facility	11
QC5	AWS Standard for Certification of Welding Educators	12
VW-M	Visual Inspection Workshop Reference Manual	11
WIT-T	Welding Inspection Technology	14
WIT-W	Welding Inspection Technology Workbook	14

ELECTRODES (SEE FILLER METALS)

ELECTROGAS WELDING

A5.25/A5.25M	Specification for Carbon and Low-Alloy Steel Electrodes and Fluxes for Electroslag Welding	25
A5.26/A5.26M	Specification for Carbon and Low-Alloy Steel Electrodes for Electrogas Welding	25
C5.7	Recommended Practices for Electrogas Welding	19

ELECTRON BEAM WELDING

C7.1M/C7.1	Recommended Practices for Electron Beam Welding	19
C7.3	Process Specification for Electron Beam Welding	19

FILLER METALS

A4.2M	Standard Procedures for Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic and Duplex Ferritic-Austenitic Stainless Steel Weld Metal	24
A4.3	Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding	24
A4.4M	Standard Procedures for Determination of Moisture Content of Welding Fluxes and Welding Electrode Flux Coverings	24
A5.01M/A5.01 (ISO 14344 MOD)	Procurement Guidelines for Consumables—Welding and Allied Processes—Flux and Gas Shielded Electrical Welding Processes	24
A5.02/A5.02M	Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes	24
A5.1/A5.1M	Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding	25
A5.2/A5.2M	Specification for Carbon and Low-Alloy Steel Rods for Oxyfuel Gas Welding	25
A5.3/A5.3M	Specification for Aluminum and Aluminum-Alloy Electrodes for Shielded Metal Arc Welding	25
A5.4/A5.4M	Specification for Stainless Steel Electrodes for Shielded Metal Arc Welding	25
A5.5/A5.5M	Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding	25
A5.6/A5.6M	Specification for Copper and Copper-Alloy Electrodes for Shielded Metal Arc Welding	25
A5.7/A5.7M	Specification for Copper and Copper-Alloy Bare Welding Rods and Electrodes	25
A5.8/A5.8M	Specification for Filler Metals for Brazing and Braze Welding	25
A5.9/A5.9M	Specification for Bare Stainless Steel Welding Electrodes and Rods	25
A5.10/A5.10M	Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods	25
A5.11/A5.11M	Specification for Nickel and Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding	25
A5.12M/A5.12 (ISO 6848:2004 MOD)	Specification for Tungsten and Tungsten-Alloy Electrodes for Arc Welding and Cutting	25
A5.13	Specification for Surfacing Electrodes for Shielded Metal Arc Welding	25
A5.14/A5.14M	Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods	25
A5.15	Specification for Welding Electrodes and Rods for Cast Iron	25
A5.16/A5.16M	Specification for Titanium and Titanium-Alloy Welding Electrodes and Rods	25
A5.17/A5.17M	Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding	25
A5.18/A5.18M	Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding	25
A5.19	Specification for Magnesium Alloy Welding Electrodes and Rods	25
A5.20/A5.20M	Specification for Carbon Steel Electrodes for Flux Cored Arc Welding	25
A5.21	Specification for Bare Electrodes and Rods for Surfacing	25
A5.22	Specification for Stainless Steel Electrodes for Flux Cored Arc Welding and Stainless Steel Flux Cored Rods for Gas Tungsten Arc Welding	25
A5.23/A5.23M	Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding	25

A5.24/A5.24M	Specification for Zirconium and Zirconium-Alloy Welding Electrodes and Rods	25
A5.25/A5.25M	Specification for Carbon and Low-Alloy Steel Electrodes and Fluxes for Electroslag Welding	25
A5.26/A5.26M	Specification for Carbon and Low-Alloy Steel Electrodes for Electrogas Welding	25
A5.28/A5.28M	Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Metal Arc Welding	25
A5.29/A5.29M	Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding	25
A5.30/A5.30M	Specification for Consumable Inserts	25
A5.31	Specification for Fluxes for Brazing and Braze Welding	25
A5.34/A5.34M	Specification for Nickel-Alloy Electrodes for Flux Cored Arc Welding	25
FMC	Filler Metal Comparison Charts (Book)	24
IFS CD	International Index of Welding Filler Metal Classifications	24
UGFM	User's Guide to Filler Metals	24

FLUX CORED ARC WELDING (SEE GAS METAL ARC)

FLUXES (SEE FILLER METALS)

FOOD PROCESSING SYSTEMS

D18.1	Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications	17
D18.2	Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube	17
D18.3/D18.3M	Specification for Welding of Tanks, Vessels, and Other Equipment in Sanitary (Hygienic) Applications	17

FRICTION WELDING

C6.1	Recommended Practices for Friction Welding	19
C6.2/C6.2M	Specification for Friction Welding of Metals	19

GAS METAL ARC WELDING

C5.6	Recommended Practices for Gas Metal Arc Welding	19
PHB-4	Everyday Pocket Handbook for Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW)	13
PHB-8	Everyday Pocket Handbook for Gas Metal Arc Welding (GMAW) of Aluminum	13

GAS TUNGSTEN ARC WELDING

A5.22	Specification for Stainless Steel Electrodes for Flux Cored Arc Welding and Stainless Steel Flux Cored Rods for Gas Tungsten Arc Welding	25
C5.5/C5.5M	Recommended Practices for Gas Tungsten Arc Welding	18
D10.6/D10.6M	Recommended Practices for Gas Tungsten Arc Welding of Titanium Piping and Tubing	23

GOUGING (SEE CUTTING)

HEALTH (SEE SAFETY AND HEALTH)

INSPECTION

B1.10	Guide for the Nondestructive Examination of Welds	14
B1.11	Guide for the Visual Examination of Welds	14
B4.0	Standard Methods for Mechanical Testing of Welds, U.S. Customary Only	14
B4.0M	Standard Methods for Mechanical Testing of Welds, Metric Only	14
C3.3	Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components	22
C3.8M/C3.8	Specification for the Ultrasonic Examination of Brazed Joints	22
D18.2	Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube	17
G1.2M/G1.2	Specification for Standardized Ultrasonic Welding Test Specimen for Thermoplastics	17
G1.6	Specification for the Qualification of Plastics Welding Inspectors for Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds	17
PHB-2	Everyday Pocket Handbook for Visual Inspection and Weld Discontinuities—Causes and Remedies	13
PHB-6	Everyday Pocket Handbook for Visual Inspection of AWS D1.1 Structural Welding Code's Fabrication and Welding Requirements	13
PRG	The Practical Reference Guide for Radiographic Inspection Acceptance Criteria	14
PRGVT	The Practical Reference Guide for Welding Inspection Management—Visual Inspection of Pressure Vessels and Pressure Piping	23
QC1	Standard for AWS Certification of Welding Inspectors	12

Subject Index

QC15	Specification for the Certification of Radiographic Interpreters	12	D18.1	Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications	17
VW-M	Visual Inspection Workshop Reference Manual	11	D18.2	Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube	17
WI	Welding Inspection Handbook	14	F4.1	Safe Practices for the Preparation of Containers and Piping for Welding and Cutting	8
WIT-E	Welding Inspection Technology Sample CWI Fundamentals Examination	14	PRGVT	The Practical Reference Guide for Welding Inspection Management—Visual Inspection of Pressure Vessels and Pressure Piping	23
WIT-T	Welding Inspection Technology	14			
WIT-W	Welding Inspection Technology Workbook	14			
LASER BEAM WELDING					
C7.2	Recommended Practices for Laser Beam Welding, Cutting, and Drilling	19	PLASMA ARC WELDING AND CUTTING		
C7.4/C7.4M	Process Specification and Operator Qualification for Laser Beam Welding	19	C5.1	Recommended Practices for Plasma Arc Welding	18
MACHINERY AND EQUIPMENT					
D14.1/D14.1M	Specification for Welding of Industrial and Mill Cranes and Other Material Handling Equipment	27	C5.2	Recommended Practices for Plasma Arc Cutting and Gouging	18
D14.3/D14.3M	Specification for Welding Earthmoving, Construction, and Agricultural Equipment	27	C5.10/C5.10M	Recommended Practices for Shielding Gases for Welding and Cutting	19
D14.4/D14.4M	Specification for Welded Joints in Machinery and Equipment	27	PLASTICS		
D14.5/D14.5M	Specification for Welding of Presses and Press Components	27	B2.4	Specification for Welding Procedure and Performance Qualification for Thermoplastics	17
D14.6/D14.6M	Specification for Welding of Rotating Elements of Equipment	27	G1.1M/G1.1	Guide to Ultrasonic Assembly of Thermoplastics	17
D14.7/D14.7M	Recommended Practices for Surfacing and Reconditioning of Industrial Mill Rolls	27	G1.2M/G1.2	Specification for Standardized Ultrasonic Welding Test Specimen for Thermoplastics	17
D14.8M	Standard Methods for the Avoidance of Weld Cracks	19	G1.6	Specification for the Qualification of Plastics Welding Inspectors for Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds	17
MANAGEMENT AND ECONOMICS					
DPW	Design and Planning Manual for Cost-Effective Welding	6	G1.10M	Guide for the Evaluation of Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds	17
TIH	The Industrial Hobart's	6	HPJ	Handbook of Plastics Joining	17
TWM	Total Welding Management	6	POWER SOURCES		
MARINE					
D3.5	Guide for Steel Hull Welding	26	PAPS	The Professional's Advisor on Arc Welding Power Sources and Related Equipment	6
D3.6M	Specification for Underwater Welding	26	QUALIFICATION: PROCEDURES AND PERSONNEL		
D3.7	Guide for Aluminum Hull Welding	26	B2.1/B2.1M	Specification for Welding Procedure and Performance Qualification	10
METALLURGY					
PRGWM	The Practical Reference Guide to Welding Metallurgy: Key Concepts for Weldability	15	B2.1-X	Standard Welding Procedure Specifications	20-21
WM1.4	Welding Metallurgy, Carbon and Alloy Steels, Volume 1, Fundamentals	6	B2.1/B2.1M-BMG	Base Metal Grouping for Welding Procedure and Performance Qualification	10
NICKEL					
G2.1M/G2.1	Guide for the Joining of Wrought Nickel-Based Alloys	15	B2.2	Standard for Brazing Procedure and Performance Qualification	10
OXYFUEL WELDING AND CUTTING					
C4.1-77 SET	Criteria for Describing Oxygen-Cut Surfaces, and Oxygen Cutting Surface Roughness Gauge	18	B2.3/B2.3M	Specification for Soldering Procedure and Performance Qualification	10
C4.2/C4.2M	Recommended Practices for Safe Oxyfuel Gas Cutting Torch Operation	18	B2.4	Specification for Welding Procedure and Performance Qualification for Thermoplastics	17
C4.3/C4.3M	Recommended Practices for Safe Oxyfuel Gas Heating Torch Operation	18	B5.1	Specification for the Qualification of Welding Inspectors	10
C4.4/C4.4M	Recommended Practices for Heat Shaping and Straightening with Oxyfuel Gas Heating Torches	18	B5.2	Specification for the Qualification of Welding Inspector Specialists and Welding Inspector Assistants	10
C4.5M	Uniform Designation System for Oxyfuel Nozzles	18	B5.4	Specification for the Qualification of Welder Test Facilities	10
C4.6M	Thermal Cutting — Classification of Thermal Cuts — Geometric Product Specification and Quality Tolerances	18	B5.5	Specification for the Qualification of Welding Educators	10
OWS	Oxyfuel Gas Welding, Cutting, and Heating Safely	9	B5.9	Specification for the Qualification of Welding Supervisors	10
PIPING AND TUBING					
D10.4	Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing	23	B5.14	Specification for the Qualification of Welding Sales Representatives	10
D10.6/D10.6M	Recommended Practices for Gas Tungsten Arc Welding of Titanium Piping and Tubing	23	B5.15	Specification for the Qualification of Radiographic Interpreters	10
D10.7M/D10.7	Guide for the Gas Shielded Arc Welding of Aluminum and Aluminum Alloy Pipe	23	B5.16	Specification for the Qualification of Welding Engineers	10
D10.8	Recommended Practices for Welding of Chromium-Molybdenum Steel Piping and Tubing	23	B5.17	Specification for the Qualification of Welding Fabricators	10
D10.10/D10.10M	Recommended Practices for Local Heating of Welds in Piping and Tubing	23	C1.5	Specification for the Qualification of Resistance Welding Technicians	10
D10.11M/D10.11	Guide for Root Pass Welding of Pipe Without Backing	23	C2.16/C2.16M	Guide for Thermal-Spray Operator Qualification	16
D10.12M/D10.12	Guide for Welding Mild Steel Pipe	23	C7.4/C7.4M	Process Specification and Operator Qualification for Laser Beam Welding	19
D10.13/D10.13M	Recommended Practices for the Brazing of Copper Tubing and Fittings for Medical Gas Systems	22	D16.4M/D16.4	Specification for the Qualification of Robotic Arc Welding Personnel	11
D10.18M/D10.18	Guide for Welding Ferritic/Austenitic Duplex Stainless Steel Piping and Tubing	23	G1.6	Specification for the Qualification of Plastics Welding Inspectors for Hot Gas, Hot Gas Extrusion, and Heated Tool Butt Thermoplastic Welds	17
			PAPQV	The Professional's Advisor on Procedure Qualification Variables	11
RADIOGRAPHY (SEE ALSO INSPECTION)					
			B5.15	Specification for the Qualification of Radiographic Interpreters	10
			PRG	The Practical Reference Guide for Radiographic Inspection Acceptance Criteria	14
			QC15	Specification for the Certification of Radiographic Interpreters	12

Subject Index

RAILROADS

- D15.1/D15.1M Railroad Welding Specification for Cars and Locomotives 26
- D15.2 Recommended Practices for the Welding of Rails and Related Rail Components for Use by Rail Vehicles 26

REFERENCE

- A1.1 Metric Practice Guide for the Welding Industry 6
- A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination 6
- A3.0 Standard Welding Terms and Definitions 6
- JWE Jefferson's Welding Encyclopedia 6
- PHB-5 The Everyday Pocket Handbook on Metric Practices for the Welding Industry 13
- PRGP Practical Reference Guide to Positioning 14
- WJ-XXXX Welding Journal DVDs 6
- WHB-X.X Welding Handbooks 7

RESISTANCE WELDING

- A10.1M Specification for Calibration and Performance testing of Secondary Current Sensing Coils and Weld Monitors used in Single-Phase AC Resistance Welding 28
- C1.1M/C1.1 Recommended Practices for Resistance Welding 18
- C1.4M/C1.4 Specification for Resistance Welding of Carbon and Low-Alloy Steels 15
- C1.5 Specification for the Qualification of Resistance Welding Technicians 10
- C3.9M/C3.9 Specification for Resistance Brazing 22
- D8.1M Specification for Automotive Weld Quality—Resistance Spot Welding of Steel 26
- D8.6 Specification for Automotive Resistance Spot Welding Electrodes 26
- D8.7M Recommended Practices for Automotive Weld Quality – Resistance Spot Welding 26
- D17.2/D17.2M Specification for Resistance Welding for Aerospace Applications 26
- PARW The Professional's Advisor on Resistance Welding 28
- RWM Resistance Welding Manual 28
- RWVID Introduction to Resistance Welding Video 28
- RW5.14, 16, 34 RWMA Bulletins 28

ROBOTIC WELDING

- AWR Arc Welding with Robots: Do's and Don'ts 19
- D16.1M/D16.1 Specification for Robotic Arc Welding Safety 8
- D16.2M/16.2 Guide for Components of Robotic and Automatic Arc Welding Installations 19
- D16.3M/ D16.3 Risk Assessment Guide for Robotic Arc Welding 8
- D16.4M/D16.4 Specification for the Qualification of Robotic Arc Welding Personnel 11
- PRGP Practical Reference Guide to Positioning 14
- QC19 Standard for the AWS Certification of Robotic Arc Welding Personnel 12

SAFETY AND HEALTH

- AWN Arc Welding and Cutting Noise 8
- AWR Arc Welding with Robots: Do's and Don'ts 19
- AWS Arc Welding and Cutting Safety 8
- BRS Braze Safety 8
- CAWF Characterization of Arc Welding Fume 9
- D16.3M/D16.3 Risk Assessment Guide for Robotic Arc Welding 8
- EWH-1 thru 13 Effects of Welding on Health, Vol. I through XIII 9
- F1.1M Method for Sampling Airborne Particulates Generated by Welding and Allied Processes 8
- F1.2M Laboratory Method for Measuring Fume Generation Rates and Total Fume Emission of Welding and Allied Processes 8
- F1.3 A Sampling Strategy Guide for Evaluating Contaminants in the Welding Environment 8
- F1.5M Methods for Sampling and Analyzing Gases from Welding and Allied Processes 8
- F1.6 Guide for Estimating Welding Emissions for EPA and Ventilation Permit Reporting 8
- F2.2 Lens Shade Selector 8
- F2.3M Specification for Use and Performance of Transparent Welding Curtains and Screens 8
- F3.2M/F3.2 Ventilation Guide for Weld Fume 8
- F4.1 Safe Practices for the Preparation of Containers and Piping for Welding and Cutting 8
- FSW Fire Safety in Welding and Cutting 9
- FUMES & GASES Fumes and Gases in the Welding Environment 9

- LVOS Laboratory Validation of Ozone Sampling with Spill-Proof Impingers 9
- OWS Oxyfuel Gas Welding, Cutting, and Heating Safety 9
- PCWC Preparing Containers for Welding or Cutting 9
- SGSH The Independent Shop's Guide to Welding Safety and Health 9
- SHF Safety and Health Fact Sheets 9
- SP Safe Practices 9
- ULR Ultraviolet Reflectance of Paint 9
- Z49.1 Safety in Welding, Cutting, and Allied Processes 8

SHEET METAL

- B2.1-X Standard Welding Procedure Specifications 20
- D1.2/D1.2M Structural Welding Code—Aluminum 4
- D1.3/D1.3M Structural Welding Code—Sheet Steel 4
- D9.1M/D9.1 Sheet Metal Welding Code 5

SHIELDED METAL ARC WELDING

- PHB-7 The Everyday Pocket Handbook for Shielded Metal Arc Welding (SMAW) 13

SHIELDING GASES

- A5.32/A5.32M Specification for Welding Shielding Gases 25
- C5.10/C5.10M Recommended Practices for Shielding Gases for Welding and Cutting 19

SOLDERING

- SHB Soldering Handbook 22
- B2.3/B2.3M Specification for Soldering Procedure and Performance Qualification 10

STAINLESS STEEL

- A4.2M Standard Procedures for Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic and Duplex Ferritic-Austenitic Stainless Steel Weld Metal 24
- A5.4/A5.4M Specification for Stainless Steel Electrodes for Shielded Metal Arc Welding 25
- A5.9/A5.9M Specification for Bare Stainless Steel Welding Electrodes and Rods 25
- A5.22 Specification for Stainless Steel Electrodes for Flux Cored Arc Welding and Stainless Steel Flux Cored Rods for Gas Tungsten Arc Welding 25
- B2.1-X Standard Welding Procedure Specifications 21-22
- D1.6/D1.6M Structural Welding Code—Stainless Steel 4
- D10.4 Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing 23
- D10.18M/D10.18 Guide for Welding Ferritic/Austenitic Duplex Stainless Steel Piping and Tubing 23
- D18.1 Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications 17
- D18.2 Guide to Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube 17
- G2.3M/G2.3 Guide for the Joining of Wrought Solid Solution Austenitic Stainless Steels 15
- PASS The Professional's Advisor on Welding of Stainless Steels 15

STEEL (SEE ALSO CARBON STEEL, STAINLESS STEEL, STRUCTURAL WELDING)

- ASTMSW ASTM Standards for Welding 5
- PHB-1 The Everyday Pocket Handbook for Arc Welding Steel 13

STRUCTURAL WELDING

- ASTMSW ASTM Standards for Welding 5
- D1.1/D1.1M Structural Welding Code—Steel 4
- D1.1-BI The Official Book of D1.1 Interpretations 4
- D1.1 CCRM Code Clinic for Study of AWS D1.1 Structural Welding Code—Steel, Reference Manual 11
- D1.1-SWJ-WC Welded Joint Details Wall Chart 4
- D1.2/D1.2M Structural Welding Code—Aluminum 4
- D1.3/D1.3M Structural Welding Code—Sheet Steel 4
- D1.4/D1.4M Structural Welding Code—Reinforcing Steel 4
- D1.5M/D1.5 Bridge Welding Code 4
- D1.6:/D1.6M Structural Welding Code—Stainless Steel 4
- D1.8/D1.8M Structural Welding Code—Seismic Supplement 5
- D1.9/D1.9M Structural Welding Code—Titanium 5
- PHB-3 The Everyday Pocket Handbook on Welded Joint Details for Structural Applications 13

Subject Index

PHB-6 The Everyday Pocket Handbook for Visual Inspection of D.1.1 Structural Welding Code's Fabrication & Welding Requirements 13

STUD WELDING

C5.4 Recommended Practices for Stud Welding 18
 D1.1/D1.1M Structural Welding Code—Steel 4
 D1.2/D1.2M Structural Welding Code—Aluminum 4
 D1.5M/D1.5 Bridge Welding Code 4
 D1.6/D1.6M Structural Welding Code—Stainless Steel 4

SURFACING (SEE ALSO THERMAL SPRAYING)

A5.13 Specification for Surfacing Electrodes for Shielded Metal Arc Welding 25
 A5.21 Specification for Bare Electrodes and Rods for Surfacing 25

SYMBOLS

A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination 6

TERMINOLOGY

A3.0 Standard Welding Terms and Definitions 6

TESTING (SEE INSPECTION)

THERMAL SPRAYING

C2.16/C2.16M Guide for Thermal-Spray Operator Qualification 16
 C2.18 Guide for the Protection of Steel with Thermal Sprayed Coatings of Aluminum and Zinc and Their Alloys and Composites 16
 C2.20/C2.20M Specification for Thermal Spraying Zinc Anodes on Steel Reinforced Concrete 16

C2.21M/C2.21 Specification for Thermal Spray Equipment Acceptance Inspection 16
 C2.23M/C2.23 Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel 16
 C2.25/C2.25M Specification for Thermal Spray Feedstock—Solid and Composite Wire and Ceramic Rods 25
 TSM Thermal Spray Manual 16
 TSS Thermal Spraying Practice, Theory and Application 16

THERMITE WELDING

D15.2 Recommended Practices for the Welding of Rails and Related Rail Components for Use by Rail Vehicles 26

TITANIUM

A5.16/A5.16M Specification for Titanium and Titanium-Alloy Welding Electrodes and Rods 25
 D1.9/D1.9M Structural Welding Code—Titanium 5
 D10.6/D10.6M Recommended Practices for Gas Tungsten Arc Welding of Titanium Piping and Tubing 23
 G2.4/G2.4M Guide for the Fusion Welding of Titanium and Titanium Alloys 15
 PRGT The Practical Reference Guide to Welding Titanium 15

WELDING CURTAINS AND SCREENS

F2.3M Specification for Use and Performance of Transparent Welding Curtains and Screens 8

ZINC COATINGS

WZC Welding Zinc-Coated Steels 15

Index of Publications by Code Number

A1.1:2001 6	B2.1-X:YYYY 20-21	C5.10/C5.10M:2003 19	D16.1M/D16.1:2004 8
A2.1 WC & DC 6	B2.1/B2.1M-BMG:2009 10	C6.1-89(R2009) 19	D16.2M/D16.2:2007 19
A2.4:2007 6	B2.2-91 10	C6.2/C6.2M:2006 19	D16.3M/D16.3:2009 8
A3.0:2001 6	B2.3/B2.3M:2008 10	C7.1M/C7.1:2004 19	D16.4M/D16.4:2005 11
A4.2M:2006 24	B2.4:2006 17	C7.2:1998 19	D17.1:2001 26
A4.3-93(R2006) 24	B4.0:2007 14	C7.3:1999R 19	D17.2/D17.2M:2007 26
A4.4M:2001(R2006) 24	B4.0M:2000 14	C7.4/C7.4M:2008 19	D18.1:2009 17
A5.01M/A5.01:2008 24	B5.1:2003 10	D1.1/D1.1M:2008 4	D18.2:2009 17
A5.02/A5.02M:2007 24	B5.2:2001 10	D1.2/D1.2M:2008 4	D18.3/D18.3M:2005 17
A5.1/A5.1M:2004 25	B5.4:2005 10	D1.3/D1.3M:2008 4	EG2.0:2008 11
A5.2/A5.2M:2007 25	B5.5:2000 10	D1.4/D1.4M:2005 4	EG3.0-96 11
A5.3/A5.3M:1999(R2007) 25	B5.9:2006 10	D1.5M/D1.5:2008 4	EG4.0-96 11
A5.4/A5.4M:2006 25	B5.14:2009 10	D1.6/D1.6M:2007 4	F1.1M:2006 8
A5.5/A5.5M:2006 25	B5.15:2003 10	D1.7/D1.7M:2009 5	F1.2M:2006 8
A5.6/A5.6M:2008 25	B5.16:2006 10	D1.8/D1.8M:2009 5	F1.3:2006 8
A5.7/A5.7M:2007 25	B5.17:2008 10	D1.9/D1.9M:2007 5	F1.5M:2003 8
A5.8/A5.8M:2004 25	C1.1M/C1.1:2000 18	D3.5-93R 26	F1.6:2003 8
A5.9/A5.9M:2006 25	C1.4M/C1.4:2009 15	D3.6M:2009 26	F2.2:2001 8
A5.10/A5.10M:1999(R2007) 25	C1.5:2009 10	D3.7:2004 26	F2.3M:2001 8
A5.11/A5.11M:2005 25	C2.16/C2.16M:2002 16	D8.1M:2007 26	F3.2M/F3.2:2001 8
A5.12M/A5.12:2009 25	C2.18-93 16	D8.6:2005 26	F4.1:2007 8
A5.13:2000 25	C2.20/C2.20M:2002 16	D8.7M:2005 26	G1.1M/G1.1:2006 17
A5.14/A5.14M:2009 25	C2.21M/C2.21:2003 16	D8.8M:2007 26	G1.2M /G1.2:1999 17
A5.15-90(R2006) 25	C2.23M/C2.23:2003 16	D8.9M:2002 26	G1.6:2006 17
A5.16/A5.16M:2007 25	C2.25/C2.25M:2002 25	D8.14M:2008 26	G1.10M:2001 17
A5.17/A5.17M-97(R2007) 25	C3.2M/C3.2:2008 22	D9.1M/D9.1:2000 5	G2.1M/G2.1:2002 15
A5.18/A5.18M:2005 25	C3.3:2008 22	D10.4-86R 23	G2.3M/G2.3:2009 15
A5.19-92(R2006) 25	C3.4M/C3.4:2007 22	D10.6/D10.6M:2000 23	G2.4/G2.4M:2007 15
A5.20/A5.20M:2005 25	C3.5M/C3.5:2007 22	D10.7M/D10.7:2008 23	ISO 6848:2004 MOD 25
A5.21:2001 25	C3.6M/C3.6:2008 22	D10.8-96 23	ISO 8249:2000 MOD 24
A5.22-95(R2006) 25	C3.7M/C3.7:2005 22	D10.10/D10.10M:1999 (R2009) 23	ISO 9013:2002 IDT 18
A5.23/A5.23M:2007 25	C3.8M/C3.8:2005 22	D10.11M/D10.11:2007 23	ISO 14344:2002 MOD 24
A5.24/A5.24M:2005 25	C3.9M/C3.9:2009 22	D10.12M/D10.12:2000 23	QC1:2007 12
A5.25/A5.25M-97(R2009) 25	C4.1-77 SET 18	D10.13/D10.13M:2001 22	QC4-89 12
A5.26/A5.26M-97(R2009) 25	C4.2/C4.2M:2009 18	D10.18M/D10.18:2008 23	QC5-91 12
A5.28/A5.28M:2005 25	C4.3/C4.3M:2007 18	D11.2-89(R2006) 15	QC7-93 12
A5.29/A5.29M:2005 25	C4.4/C4.4M:2007 18	D14.1/D14.1M:2005 27	QC10:2008 12
A5.30/A5.30M:2007 25	C4.5M:2006 18	D14.3/D14.3M:2005 27	QC11-96 12
A5.31-92R 25	C4.6M:2006 18	D14.4/D14.4M:2005 27	QC12-96 12
A5.32/A5.32M-97(R2007) 25	C5.1-73 18	D14.5/D14.5M:2009 27	QC13:2006 12
A5.34/A5.34M:2007 25	C5.2:2001 18	D14.6/D14.6M:2005 27	QC13:2006 12
A10.1M:2007 28	C5.3:2000 18	D14.7/D14.7M:2005 27	QC14:2009 12
ASTMSW 5	C5.4-93 18	D14.8M:2009 19	QC17:2008 12
B1.10:1999 14	C5.5/C5.5M:2003 18	D15.1/D15.1M:2007 26	QC19:2002 12
B1.11:2000 14	C5.6-89R 19	D15.2:2003 26	Z49.1:2005 8
B2.1/B2.1M:2009 10	C5.7:2000 19		