

## Resistance Welding Literature

*A variety of publications, articles, videos, and manuals are available to further educate AWS members in the resistance welding process.*

### **PUBLICATIONS**

#### **Resistance Welding Manual, Revised 4<sup>th</sup> Edition**

The Resistance Welding Manufacturing Alliance has set the standard for resistance welding worldwide. RWMA's most authoritative text about the resistance welding industry is an absolute must for anyone who wants to increase production capabilities, upgrade product quality and maximize the use of manufacturing resources. The Resistance Welding Manual, Revised 4<sup>th</sup> Edition, describes the entire resistance welding process including theory, methods, materials, equipment and accessories. The revised edition includes many new features such as updated weld processes, new graphic format for easier reading of weld schedules and information on newer metal alloys, such as hot dip galvanized and electro-plated steel.

#### **C1.1M/C.1.1:2012 Recommended Practices for Resistance Welding (2012)**

This Recommended Practice is a collection of data and procedures that are intended to assist the user in setting up resistance welding equipment to produce resistance welded production parts. While the recommendations included are not expected to be final procedures for every production part or every welding machine, they serve as starting points from which a user can establish acceptable welding machine settings for specific production welding applications. In some cases, recommended machine data is not available. In these instances, some description of the process is given to assist the reader in determining if the process might be suitable for application.

#### **C1.3:1970 – Recommended Procedure for Resistance Welding of Coated Low Carbon Steels**

#### **C1.4M/C1.4:2009 Specification for Resistance Welding of Carbon and Low-Alloy Steels (2009)**

This specification provides the shear strength and weld button diameter requirements for carbon steel and low-alloy steel sheet resistance and projection welds.

#### **C1.5:2009 Specification for the Qualification of Resistance Welding Technicians (2009)**

This specification establishes the requirements for qualification of Resistance Welding Technicians (RWTs) employed in the welding industry. The minimum experience, examination, application, qualification, and requalification requirements and methods are defined herein. This specification is a method for technicians to establish a record of their qualification and abilities in welding industry work such as development of machine troubleshooting, processes controls, quality standards, problem solving, etc.

#### **QC20:2011 Specification for AWS Certification of Resistance Welding Technicians (2010)**

This specification defines the certification program of the American Welding Society for use in the Certification of Resistance Welding Technicians (CRWTs). These certifications require documentation

of experience, and satisfactory completion of a written examination. The examination tests the CRWT's knowledge of welding processes, welding procedures, destructive and nondestructive tests, welding terms, definitions, symbols, reports, safety, quality assurance and responsibilities, machine setup, and other related subjects. Successful completion of all requirements constitutes the basis for awarding a certification as a Resistance Welding Technician.

**D8.1M:2007 Specification for Automotive Weld Quality – Resistance Spot Welding of Steel (2007)**

This document contains both visual and measurable acceptance criteria for resistance spot welds in steels. The information contained herein may be used as an aid by designers, resistance welding equipment manufacturers, welded product producers, and others involved in the automotive industry and resistance spot welding of steels.

**D8.6:2005 Standard for Automotive Resistance Spot Welding Electrodes (2005)**

A supplement to Resistance Welder Manufacturers Association Bulletin 16, Resistance Welding Equipment Standards, this standard gives the names and description of the various types of electrodes, nose shapes and configurations, material structures, and chemical compositions of resistance spot weld RSW electrodes.

**D8.7M:2004 – Recommended Practices for Automotive Weld Quality-Resistance Spot Welding (2004)**

A concise quality checklist developed through the AWS SAE Joint Committee on Automotive Welding to assist automotive parts suppliers using bare and coated low-carbon steels. Tables provide minimum spot weld spacing, contact overlap, and minimum weld diameter.

**D8.9M: 2012- Test Methods for Evaluating the Resistance Spot Welding Behavior of Automotive Sheet Steel Materials (2012)**

This document presents standard test methods for evaluating the resistance spot welding behavior of automotive sheet steels. The document contains a number of tests and test methods useful in determining the resistance spot welding performance of coated and uncoated automotive sheet steels of all strength levels and compositions. The test methods are designed to assess current range, electrode endurance, and weld properties of automotive sheet steels. The weld property tests include tests for hold time sensitivity, weld hardness, shear tension strength, and cross tension strength.

**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 (2007)**

This specification 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. A definition of terms relevant to this measurement is included. CSC and system tests and calibration methods are described in detail. Detailed information that shall be made available to the user are prescribed.

**D17.2/D17.2M:2007 Specification for Resistance Welding for Aerospace Applications (2007)**

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. 11 figures, 13 tables.

**BULLETINS**

**Bulletin #5 – Resistance Welding Control Standards**

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).

**Bulletin #14 – Maintenance Manual for Resistance Welding**

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

**Bulletin #16 – Resistance Welding Equipment Standards**

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

**Bulletin #34 – Manufacturers' Cross Reference of Standard**

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

**POCKET HANDBOOKS****Resistance Welding Pocket Handbook**

This book contains basic information on resistance welding- important "do's" and "don'ts"- common weld defects and their probable causes- various charts including sample weld schedules.

**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 and health precautions for resistance welding, and more.

**DVD's****Introduction to Resistance Welding DVD**

Comprehensive training DVD 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).

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