AWS C1.1M/C1.1:2012
An American National Standard

Recommended Practices for Resistance Welding

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Approved by the
American National Standards Institute
February 17, 2012

Recommended Practices for Resistance Welding

5th Edition

Supersedes AWS C1.1M/C1.1:2000

Prepared by the
American Welding Society (AWS) C1 Committee on Resistance Welding

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This Recommended Practices 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 the application.

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International Standard Book Number: 978-0-87171-803-7
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This standard is subject to revision at any time by the AWS C1 Committee on Resistance Welding. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn. Comments (recommendations, additions, or deletions) and any pertinent data that may be of use in improving this standard are required and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS C1 Committee on Resistance Welding and the author of the comments will be informed of the Committee's response to the comments. Guests are invited to attend all meetings of the AWS C1 Committee on Resistance Welding to express their comments verbally. Procedures for appeal of an adverse decision concerning all such comments are provided in the Rules of Operation of the Technical Activities Committee. A copy of these Rules can be obtained from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

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Foreword

This foreword is not part of AWS C1.1M/C1.1:2012, *Recommended Practices for Resistance Welding*, but is included for informational purposes only.

The data contained in these Recommended Practices have been compiled by the AWS Committee on Resistance Welding, by reviewing the data in the previous documents, by canvassing users of the resistance welding processes and correlating the data thus obtained. The resulting welding schedules shown in the tables were circulated for comments and, in addition, some tests were conducted to ascertain that welds of the specified strengths could be obtained.

The present edition of Recommended Practices represents an updated combination and extension of data presented in the previous edition of AWS C1.1M/C1.1:2000, *Recommended Practices for Resistance Welding*. Practices for new materials have been added and practices for materials which are not currently resistance welded in commercial production have been deleted. The new materials include high-strength low-alloy steels, both coated and uncoated

The AWS Committee on Resistance Welding has prepared these Recommended Practices in the hope that they will serve as an incentive for industry to develop methods and procedures improving upon the practice presented herein; which will permit the raising of quality and performance standards. If this is achieved, the Committee will have been amply repaid for the time and effort it has devoted to this work.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS C1 Committee on Resistance Welding, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

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Recommended Practices for Resistance Welding

1. General Requirements

1.1 Scope. It is the intent of this publication to present current concepts and practices for resistance welding (and related processes) of ferrous and nonferrous metals including coated and dissimilar metals. Where practical, welding schedules are included. In other instances where schedules are too varied or the state-of-the-art is not sufficiently developed, descriptive guidelines are included to enable the user to establish welding procedures to meet its requirements.

It is important to recognize that these recommended practices are not the only means to weld the materials and thickness shown. When developing a welding schedule(s) for a particular application, the workpiece geometry, equipment employed, and production requirements will all influence the parameters and effectiveness of the process.

In using the data shown in the tables, it is imperative that reference be made to the appropriate text. Failure to refer to the text may result in misinterpretation of the data in the tables. The text has been kept as brief as possible and all extraneous comments have been omitted.

For more detailed information on the fundamentals of the resistance welding processes and the types of equipment utilized for the different processes, consult the current AWS *Welding Handbook*.

1.2 Units of Measurement. This standard makes use of both the International System of Units (SI) and U.S. Customary Units. The latter are shown within brackets [ ] or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore, each system shall be used independently.

1.3 Safety. Safety issues and concerns are addressed in this standard, although health issues and concerns are beyond the scope of this standard. Safety and health information is available from the following sources:

American Welding Society:

(1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

(2) AWS Safety and Health Fact Sheets

(3) Other safety and health information on the AWS website

Material or Equipment Manufacturers:

(1) Material Safety Data Sheets supplied by materials manufacturers

(2) Operating Manuals supplied by equipment manufacturers

Applicable Regulatory Agencies

Work performed in accordance with this standard may involve the use of materials that have been deemed hazardous, and may involve operations or equipment that may cause injury or death. This standard does not purport to address all safety and health risks that may be encountered. The user of this standard should establish an appropriate safety program to address such risks as well as to meet applicable regulatory requirements. ANSI Z49.1 should be considered when developing the safety program.