AWS D17.2/D17.2M:2013
An American National Standard

Specification for Resistance Welding for Aerospace Applications

American Welding Society®

AWS D17.2/D17.2M:2013
An American National Standard

Approved by the
American National Standards Institute
October 30, 2012

Specification for Resistance Welding for Aerospace Applications

2nd Edition

Supersedes AWS D17.2/D17.2M:2007

Prepared by the
American Welding Society (AWS) D17 Committee on Welding in the Aircraft and Aerospace Industry

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification provides the general resistance welding requirements for aerospace hardware. It includes, but is not limited to, resistance spot and resistance seam welding of aluminum, magnesium, iron, nickel, cobalt, and titanium-based alloys. There are requirements for machine and procedure qualification, production witness samples, and inspection and acceptance criteria for aerospace hardware.

International Standard Book Number: 978-0-87171-832-7
American Welding Society
8669 Doral Blvd., Suite 130, Doral, FL 33166
© 2013 by American Welding Society
All rights reserved
Printed in the United States of America

Photocopy Rights. No portion of this standard may be reproduced, stored in a retrieval system, or transmitted in any form, including mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright owner.

Authorization to photocopy items for internal, personal, or educational classroom use only or the internal, personal, or educational classroom use only of specific clients is granted by the American Welding Society provided that the appropriate fee is paid to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, tel: (978) 750-8400; Internet: <www.copyright.com>.

Statement on the Use of American Welding Society Standards

All standards (codes, specifications, recommended practices, methods, classifications, and guides) of the American Welding Society (AWS) are voluntary consensus standards that have been developed in accordance with the rules of the American National Standards Institute (ANSI). When AWS American National Standards are either incorporated in, or made part of, documents that are included in federal or state laws and regulations, or the regulations of other governmental bodies, their provisions carry the full legal authority of the statute. In such cases, any changes in those AWS standards must be approved by the governmental body having statutory jurisdiction before they can become a part of those laws and regulations. In all cases, these standards carry the full legal authority of the contract or other document that invokes the AWS standards. Where this contractual relationship exists, changes in or deviations from requirements of an AWS standard must be by agreement between the contracting parties.

AWS American National Standards are developed through a consensus standards development process that brings together volunteers representing varied viewpoints and interests to achieve consensus. While AWS administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in its standards.

AWS disclaims liability for any injury to persons or to property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this standard. AWS also makes no guarantee or warranty as to the accuracy or completeness of any information published herein.

In issuing and making this standard available, AWS is neither undertaking to render professional or other services for or on behalf of any person or entity, nor is AWS undertaking to perform any duty owed by any person or entity to someone else. Anyone using these documents should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. It is assumed that the use of this standard and its provisions is entrusted to appropriately qualified and competent personnel.

This standard may be superseded by new editions. This standard may also be corrected through publication of amendments or errata or supplemented by publication of addenda. Information on the latest editions of AWS standards including amendments, errata, and addenda is posted on the AWS web page (www.aws.org). Users should ensure that they have the latest edition, amendments, errata, and addenda.

Publication of this standard does not authorize infringement of any patent or trade name. Users of this standard accept any and all liabilities for infringement of any patent or trade name items. AWS disclaims liability for the infringement of any patent or product trade name resulting from the use of this standard.

AWS does not monitor, police, or enforce compliance with this standard, nor does it have the power to do so.

Official interpretations of any of the technical requirements of this standard may only be obtained by sending a request, in writing, to the appropriate technical committee. Such requests should be addressed to the American Welding Society, Attention: Managing Director, Technical Services Division, 8669 Doral Blvd., Suite 130, Doral, FL 33166 (see Annex D). With regard to technical inquiries made concerning AWS standards, oral opinions on AWS standards may be rendered. These opinions are offered solely as a convenience to users of this standard, and they do not constitute professional advice. Such opinions represent only the personal opinions of the particular individuals giving them. These individuals do not speak on behalf of AWS, nor do these oral opinions constitute official or unofficial opinions or interpretations of AWS. In addition, oral opinions are informal and should not be used as a substitute for an official interpretation.

This standard is subject to revision at any time by the AWS D17 Committee on Welding in the Aircraft and Aerospace Industry. 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 D17 Committee on Welding in the Aircraft and Aerospace Industry 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 D17 Committee on Welding in the Aircraft and Aerospace Industry 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, 8669 Doral Blvd., Suite 130, Doral, FL 33166.

This page is intentionally blank.

Personnel

AWS D17 Committee on Welding in the Aircraft and Aerospace Industries

S. H. Murray, Chair	*NASA—Kennedy Space Center*
G. W. Coleman, 1st Vice Chair	*The Boeing Company*
D. S. Ponder, 2nd Vice Chair	*Triumph Airborne Structures*
R. J. Ding, 3rd Vice Chair	*NASA—Marshall Space Flight Center*
A. L. Diaz, Secretary	*American Welding Society*
J. T. Amin	*Lockheed-Martin Aeronautics Division, Lockheed-Martin Corporation*
R. P. Beil	*Northrop Grumman Corporation*
C. Carl	*NASA—Kennedy Space Center*
P. E. Daum	*Rolls Royce Corporation*
H. S. Dilcher, III	*Lockheed Martin Aeronautics Division, Lockheed-Martin Corporation*
R. J. Durda	*Spirit AeroSystems*
J. Fournier	*Pratt & Whitney Canada*
E. C. Helder	*General Electric Aircraft Engines—Retired*
D. Lindland	*Pratt & Whitney*
R. B. Maust, III	*Raytheon Integrated Defense Systems*
M. C. Nordin	*Rolls Royce Corporation*
N. D. Rindal	*Exotic Metals Forming Company, LLC*
M. E. Sapp	*NAVAIR In-Service Support Center—Cherry Point*
C. Sauer	*NAVAIR In-Service Support Center—Cherry Point*
W. R. Schell	*The Boeing Company*
D. A. Senatore	*BG Inspections*
G. J. Stahle	*Navistar*
J. R. Thyssen	*General Electric Aviation*
G. E. Trepus	*Boeing Research and Technology*
B. D. Worley	*General Electric Aviation*

Advisors to the AWS D17 Committee on Welding in the Aircraft and Aerospace Industries

D. E. Bell	*Boeing Product Standards*
H. D. Bushfield	*Bushfield and Associates*
W. Collier	*Delta Airlines—TechOps*
R. Freeman	*TWI—The Welding Institute*
W. P. Garrison	*Pratt & Whitney*
G. Guinasso	*The Boeing Company*
I. D. Harris	*Edison Welding Institute*
J. B. Jackson	*NASA—Safety Center*
E. M. Lorence	*Aircraft Welding & Manufacturing Corporation, LLC*
G. Loy-Kraft	*Oklahoma City Air Logistics Center, U.S. Air Force*
M. J. Lucas, Jr.	*Belcan Corporation*
A. Openshaw	*Atlantic Research Corporation*
J. B. Pearson, Jr.	*LTK Engineering Services*
C. K. Russell	*NASA—Marshall Space Flight Center*
J. G. Vollmer	*Boeing Satellite Systems*
M. E. Webber	*Raytheon Integrated Defense Systems*
B. D. Wright	*Advantage Aviation Technologies*

AWS D17D Subcommittee on Resistance Welding

W. R. Schell, Chair	*The Boeing Company*
P. E. Daum, Vice Chair	*Rolls Royce Corporation*
A. L. Diaz, Secretary	*American Welding Society*
R. K. Cohen	*WeldComputer Corporation*
R. K. Easterwood	*Honeywell International*
J. Fournier	*Pratt & Whitney Canada*
G. G. Gondyke	*Whitcraft, LLC*
P. F. Lang	*Pratt & Whitney*
D. Lindland	*Pratt & Whitney*
L. D. Morris	*Raytheon Integrated Defense Systems*
J. B. Pearson, Jr.	*LTK Engineering Services*
D. S. Ponder	*Triumph Airborne Structures*
N. D. Rindal	*Exotic Metals Forming Company, LLC*
M. E. Sapp	*NAVAIR In-Service Support Center—Cherry Point*
B. White	*Janda Company, Incorporated*

Advisors to the AWS D17D Subcommittee on Resistance Welding

R. P. Beil	*Northrop Grumman Corporation*
W. Jaxa-Rozen	*Bombardier Transportation*
G. Loy-Kraft	*Oklahoma City Air Logistics Center, U.S. Air Force*
R. B. Maust, III	*Raytheon Integrated Defense Systems*
A. Openshaw	*Atlantic Research Corporation*
L. P. Perkins	*U.S. Air Force*
D. S. Ponder	*Triumph Airborne Structures*
S. R. Potter	*SSP Consulting Services*
D. A. Senatore	*BG Inspections*
J. G. Vollmer	*Boeing Satellite Systems*

Foreword

This foreword is not part of AWS D17.2/D17.2M:2013, *Specification for Resistance Welding for Aerospace Applications*, but is included for informational purposes only.

In the mid 1990s, the AWS D17 Committee on Welding in the Aircraft and Aerospace Industries decided it was necessary to form a subcommittee to write a resistance spot and seam welding specification.

This is the second edition of the D17.2/D17.2M specification. This specification is intended to replace the following documents:

MIL-W-6858D, *Welding, Resistance: Spot and Seam*, March 28, 1978

AMS-W-6858A*, Welding, Resistance Spot and Seam*, April 1, 2000

MIL-W-6858D or AMS-W-6858A, or both, take precedence over this specification only when they are cited by the contract documents.

Underlined text in clauses, tables, or figures indicates an editorial or technical change from the 2007 edition. A vertical line in the margin also indicates a revision from 2007 edition.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS D17 Committee on Welding in the Aircraft and Aerospace Industries, American Welding Society, 8669 Doral Blvd., Suite 130, Doral, FL 33166.

This page is intentionally blank.

Table of Contents

Page No.

List of Tables

List of Figures

Specification for Resistance Welding for Aerospace Applications

1. General Requirements

1.1 Scope. This specification covers requirements for resistance spot and seam welding of the following metals and their alloys.

1.1.1 Material Groups

Group 1—Aluminum and magnesium

Group 2—Steel, nickel, and cobalt

Group 3—Titanium

1.1.2 Classification. Classification is based on the following:

Class A—A welded joint, whose failure during any operating condition would cause loss of the equipment or system or one of its major components.

Class B—A welded joint whose failure would reduce the overall strength of the equipment or system or limit the intended functioning or use of equipment.

Class C—A welded joint for which no stress analysis is required and whose failure would not affect the performance of the equipment or system.

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

1.3 Safety. Safety and health issues and concerns are beyond the scope of this standard and therefore are not fully addressed herein. Safety and health information is available from 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.