

Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components



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An American National Standard

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Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components

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Prepared by the
American Welding Society (AWS) C3 Committee on Brazing and Soldering

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This standard lists the necessary steps to assure the suitability of brazed components for critical applications. Although such applications vary widely, they have certain common considerations with respect to materials, design, manufacture, and inspection. It is the intent of this document to identify and explain these common considerations and the best techniques for dealing with them. It is beyond the scope of this document to provide specific details on these techniques, which the user must adapt to fit each particular application.



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Foreword

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

The American Welding Society (AWS) C3 Committee on Brazing and Soldering has prepared these recommended practices to provide a basic guide to ensure the suitability of brazed components for critical applications. Although such applications vary widely, certain common considerations with respect to materials, design, manufacture, and examination should not be overlooked.

It is the intent of this document to list and explain these common considerations and discuss the best techniques for dealing with them. It is beyond the scope of this document to provide specific details about these techniques, which the user must adapt to fit the particular application.

This is the fourth edition of AWS C3.3, *Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components*. This edition includes revisions to Tables 1, 2, and 3; updates to Subclauses 5.6, 5.8, 7.3.5, and 7.3.7; and the addition of Subclause 6.2.7. Revisions in this edition are identified by underlined text or a vertical line in the margin.

Document Development

AWS C3.3-80, *Recommended Practices for Design, Manufacture, and Inspection of Critical Brazed Components*

AWS C3.3:2002, *Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components*

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

AWS C3.3:2008 (R2016), *Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components*

Comments and suggestions for the improvement of this standard are welcome. These should be sent to the Secretary, AWS C3 Committee on Brazing and Soldering, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

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Recommended Practices for the Design, Manufacture, and Examination of Critical Brazed Components

1. General Requirements

1.1 Scope. These recommended practices encompass those procedures that should be followed in the design, manufacture, and examination of brazed joints for critical components in order to assure their reliability in service.

The procedures recommended represent the best current practice and are necessary to the control of brazed joint quality. These practices are applicable to all products and brazing processes. Whenever any or some of these practices are omitted when producing critical components, the omission should be the result of a rational decision, not the result of a lack of knowledge of the best practice.

This document is divided into clauses addressing materials, design, manufacturing, and examination. These clauses are followed by Annex A, which presents a list of informative references; Annex B, which presents sample specifications that are intended as guides for the preparation of the user's documents; Annex C, which presents a discussion of brazing risk management; Annex D, which presents a table relating to the quantification of the scope and magnitude of braze-induced discontinuities; Annex E, which presents systematic criteria for design of brazed components; and Annex F, which presents guidelines for the requesting of an official interpretation of an AWS standard.

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

1.2 Units of Measurement. This standard does not require units of measure. Therefore, no equivalents or conversions are contained except when they are cited in examples.

1.3 Safety. Safety and health issues and concerns are beyond the scope of this standard; some safety and health information is provided, but such issues are not fully addressed herein.

Safety and Health information is available from the following sources:

American Welding Society:

- (1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*
- (2) AWS Safety and Health Fact Sheets
- (3) Other safety and health information on the AWS website

Material or Equipment Manufacturers:

- (1) Safety Data Sheets supplied by the 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.