

**AWS C3.2M/C3.2:2019**  
**An American National Standard**



# **Standard Method for Evaluating the Strength of Brazed Joints**



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**Approved by**  
**American National Standards Institute**  
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# **Standard Method for Evaluating the Strength of Brazed Joints**

**5th Edition**

**Supersedes AWS C3.2M/C3.2:2008**

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 describes the test methods used to obtain brazed strength data of the short-time testing of single-lap joints in shear, butt-tension, stress-rupture, creep-strength, four-point-bending, and ceramic-tensile-button specimens. Specimen preparation methods, brazing procedures, testing techniques, and methods for data analysis are detailed. Sample forms for recording data are presented. A graphical method of data presentation relates shear stress to overlap distance.



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This standard is subject to revision at any time by the AWS C3 Committee on Brazing and Soldering. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn.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 requested and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS C3 Committee on Brazing and Soldering 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 C3 Committee on Brazing and Soldering 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 NW 36 St, # 130, Miami, FL 33166.

## Foreword

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

Over the years, design engineers have sought a standard methodology to measure the strength of brazed joints under various loading conditions. In 1963, the American Welding Society (AWS) Committee on Brazing and Soldering completed a project whose objective was to develop a brazed test specimen that, when tested, would result in reproducible data in a variety of laboratories at a minimum expenditure of time and money. The results of this project were described in AWS C3.1-63, *Establishment of a Standard Test for Brazing Joints*.

Nearly two decades later, this widely used document and test procedure was reviewed and updated as AWS C3.2-82, *Standard Method for Evaluating the Strength of Brazed Joints in Shear*.

A variety of test specimens have been developed both overseas and in the United States. Comparison of test data from a variety of sources has become increasingly difficult, if not impossible. Every test specimen design yields a different result; thus, it is imperative that the specimen geometry used for measuring the strength of brazed joints be standardized and that all strength data be obtained using standard specimens.

Test specimens have been included to provide additional design data for butt brazed joints, creep strength, stress rupture data, four-point bending specimens for testing of brazed ceramics and similar low-ductility materials, and a section addressing ceramic tensile button strength testing. That clause includes a discussion of the preparation of tensile button test specimens, brazing procedures, leak checking, and mechanical testing. This edition updates Figure 6.3 Butt Brazed Tensile Specimen geometry and includes a renumbering of tables and figures.

Underlined text or a vertical line in the margin indicates a revision of that item from the previous edition. Revisions to tables, figures, or annexes are marked with a vertical line in the margin.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS C3 Committee on Brazing and Soldering, American Welding Society, 8669 NW 36<sup>th</sup> Street, Suite 130, Miami, FL 33166.

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# Standard Method for Evaluating the Strength of Brazed Joints

## 1. General Requirements

**1.1 Scope.** The purpose of this standard is to describe the test methods used to obtain reliable data on the strength of metallic-to-metallic, metallic-to-nonmetallic, and nonmetallic-to-nonmetallic brazed joints. Test specimens preparation and testing is described to provide consistent and proper fabrication, brazing practices, and test results. Interpretation of the test results is the responsibility of the user.

Documentation of the materials, brazing parameters, and test conditions are required to allow comparison of results with the joint strengths obtained by others using this standard method. General use of this standard method may permit a compilation of brazed joint strengths and brazing design criteria at some future time.

**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 in brackets ([ ]) or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore each system must be used independently.

**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.

## 2. Normative References

The documents listed below are referenced within this publication and are mandatory to the extent specified herein. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply.