AWS C6.2/C6.2M:2006
An American National Standard

Specification for Friction Welding of Metals

American Welding Society

Approved American National Standard
ANSI

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Specification for Friction Welding of Metals

1st Edition

Prepared by the
American Welding Society (AWS) C6 Committee on Friction Welding

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification provides for the qualification of friction welding machines, procedures, and training of welding operators. Qualification of the welding procedure specification (WPS) includes the material specifications involved, weld joint design, destructive and nondestructive examination requirements, as well as guidelines for different categories of quality assurance. Qualification of welding equipment includes weld parameter control and weld reproducibility.

Welding operators require training in the proper operation of friction welding equipment. The requirements for requalification of the WPS and equipment are also given.

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1. Scope

This document specifies the requirements for the manufacture and quality assurance of friction weldments. It also contains requirements for the qualification of welding machines, welding procedures, and welding operators. This specification is directly applicable to inertia, direct-drive, and friction stir variants of friction welding, but may also be used with orbital, angular reciprocating, and linear reciprocating variants.

This standard makes use of both the U.S. Customary Units and the International System of Units (SI). The latter is 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.

Safety and health issues and concerns are beyond the scope of this standard, and therefore not fully addressed herein. Safety and health information is available from other sources, including, but not limited to, ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*[1] and applicable federal and state regulations.

2. Normative References

The following normative (mandatory) references contain provisions which, through reference in this text, constitute provisions of this AWS standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this AWS standard are encouraged to investigate the possibility of applying the most recent editions of the documents shown below. For undated references, the latest edition of the standard referred to applies.

AWS Documents:[2]

1. AWS A2.4, *Standard Symbols for Welding, Brazing, and Nondestructive Examination*;

2. AWS A3.0, *Standard Welding Terms and Definitions*;

3. AWS B1.10, *Guide for the Nondestructive Examination of Welds*;

4. AWS B2.1, *Specification for Welding Procedure and Performance Qualification*;

5. AWS B4.0 and/or B4.0M, *Standard Methods for Mechanical Testing of Welds*;

6. AWS C6.1, *Recommended Practices for Friction Welding*;

Other Documents:

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

3. Terms and Definitions

The following includes friction welding terms not listed in AWS A3.0, *Standard Terms and Definitions.* Standard terms found in AWS A3.0 are listed in *italics*. Lightface indicates nonstandard terms. For the purpose of this document, the following terms and definitions apply:

angular reciprocating friction welding. A variation of the friction welding process in which the relative motion between the faying surfaces describes an arc of less than 180° and reverses direction repeatedly during the friction phase.

braking delay. The period of time between the cessation of the drive producing relative motion of the workpieces, and the start of external braking.

braking phase. That portion of the welding cycle during which the external brake is applied.

[1] ANSI Z49.1 is published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

[2] AWS standards are published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.