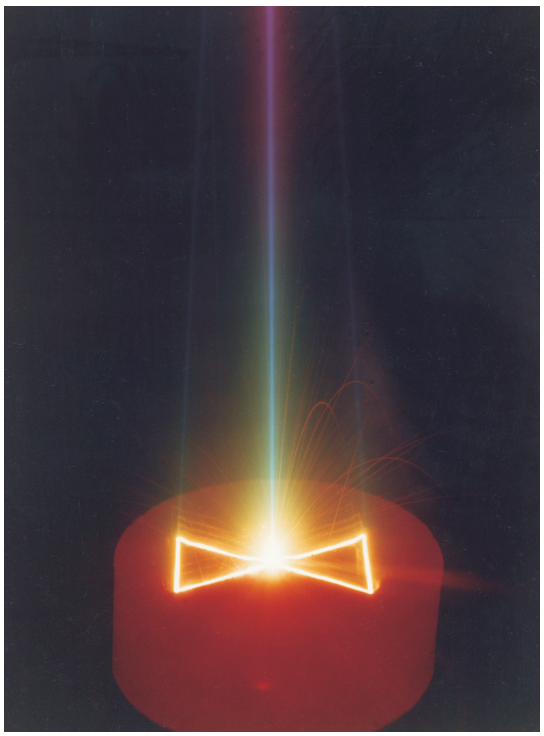
AWS C7.1M/C7.1:2004
An American National Standard

Recommended Practices for Electron Beam Welding



American Welding Society

Approved American National Standard
ANSI

Key Words—Electron beam welding, high thermal conductivity materials, high-power density welding, recommended practices, refractory materials, thick-section welding, keyhole mode welding, deep-penetration welding, heavy-section welding

AWS C7.1M/C7.1:2004
An American National Standard

Approved by
American National Standards Institute
December 11, 2003

Recommended Practices for Electron Beam Welding

Supersedes AWS C7.1:1999

Prepared by
AWS C7 Committee on High Energy Beam Welding and Cutting

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This document presents recommended practices for electron beam welding. It is intended to cover common applications of the process. Processes definitions, safe practices, general process requirements, and inspection criteria are provided.

American Welding Society
550 N.W. LeJeune Road, Miami, Florida 33126

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Recommended Practices for Electron Beam Welding

1. Scope

These recommended practices present descriptions of electron beam welding equipment and procedures for welding a wide range of metals and thicknesses. The appropriate terms, definitions, and safety considerations are presented in detail. Information is included on designing for electron beam welding (EBW), welding dissimilar metals and thicknesses, fixturing, specifications, and operator training and qualifications.

Highly technical and detailed descriptions of metallurgy and the physics of the EBW process, though important to the engineer and scientist, were considered beyond the scope of this publication. Related processes such as EB cutting, EB heat-treating, and EB curing, though similar in nature and procedure, were also considered beyond the scope of this document and are not included.

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

2. Reference Documents

2.1 Introduction. This section presents a listing of the standards at the time this document was prepared, associated with the EBW process.

This listing was compiled by reviewing standards issued by government and national organizations associated with industry. The majority of the standards address the aerospace industry and were established or adopted by either the government (military) or the Society of Automotive Engineers (SAE). Only those standards written and published in the United States have been included in this text.

2.2 Document List. The following list is divided into several groups based on the issuing organization of the standards. A convenient cross-reference chart specific to Electron Beam welding is shown in Figure 1, to aid the reader in determining which standards are of interest.

2.2.1 American Society for Testing and Materials

(1) ASTM E 1742, *Practice for Radiographic Examination*.

2.2.2 Society of Automotive Engineers, Standards and Specifications

(1) ARP-1317A, *Electron Beam Welding*;

(2) ARP-1333, *Nondestructive Testing of Electron Beam Welded Joints in Titanium-Based Alloys*;

(3) AMS-2680B, *Electron Beam Welding for Fatigue Critical Applications*; and

(4) AMS-2681A, *Electron Beam Welding*.

2.2.3 Aerospace Industries Association of America, Standards and Specifications

(1) NAS 976, Electron Beam Welding Machine—High Vacuum.

2.2.4 American Society of Mechanical Engineers, Standards and Specifications

(1) *Section IX, Boiler and Pressure Vessel Code.*

2.2.5 American Welding Society, Standards and Specifications

(1) AWS A3.0, *Standard Welding Terms and Definitions*;

(2) AWS B2.1, *Specification for Welding Procedure and Performance Qualification;*

(3) AWS C7.3, *Process Specification for Electron Beam Welding*; and

(4) AWS D17.1, *Specification for Fusion Welding for Aerospace Application*.

Copies of the documents mentioned above can be obtained from the following addresses:

(1) American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428

(2) Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096

(3) American Society of Mechanical Engineers (ASME), 3 Park Avenue, New York, NY 10016-5990