

An American National Standard



Process Specification for Electron Beam Welding



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An American National Standard

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Process Specification for Electron Beam Welding

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Prepared by the
American Welding Society (AWS) C7 Committee on High-Energy Beam Welding and Cutting

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification on electron beam welding discusses applicable specifications, safety, requirements, fabrication, quality examination, equipment calibration and maintenance, approval of work, and delivery of work.



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Foreword

This Foreword is not part of AWS C7.3:2016, *Process Specification for Electron Beam Welding*, but is included for information purposes only.

The commercial application of Electron Beam Welding (EBW) was first introduced in the late 1950s and subsequently gained rapid and widespread acceptance by the industrial community. It is estimated that there are over 1000 electron beam welding machines presently in use in the United States and a significantly greater number than that in use throughout the rest of the world (primarily in other industrialized countries such as the former Soviet Union countries, Japan, Germany, and Great Britain). Industries employing electron beam welding include aerospace, automotive, nuclear, electronic, consumer product, medical, and job shop. In order to support this widespread use of electron beam welding, a uniform guide to preparation of weld process specifications and operator qualification is needed. This document is intended to provide electron beam welding users worldwide with a uniform set of guidelines for the qualification of electron beam welding procedures and operators.

The information in this document was compiled by the American Welding Society's C7B Subcommittee on Electron Beam Welding and Cutting by collecting information from various manufacturers and users of electron beam equipment. The information has, therefore, been carefully reviewed by a number of experts in the field of electron beam welding and should provide a helpful guide.

This is the second edition of the C7.3 specification. A vertical line in the margin or underlined text in clauses, tables, or figures indicates an editorial or technical change from 1999.

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Process Specification for Electron Beam Welding

1. General Requirements

1.1 Scope. This specification addresses processing and quality control requirements for electron beam welding. Processing includes both high- and low-voltage welding equipment and high and medium vacuum variations.

1.1.1 Materials. This specification covers all major engineering metals and alloys.

1.1.2 Qualification Categories. There are three categories to which welds may be qualified: Class A, B, or C.

1.1.2.1 Class A: Critical Applications. Critical weldments include those where a failure of any portion would cause loss of system, loss of major component, loss of control, unintentional release of critical stores (such as fuel or cargo), or endangerment of personnel.

1.1.2.2 Class B: Semicritical Applications. Semicritical weldments include those where a failure would reduce the overall efficiency of the system but loss of the system or endangerment of personnel would not be experienced.

1.1.2.3 Class C: Noncritical Applications. Noncritical weldments include those where a failure would not affect the efficiency of the system or endanger personnel.

1.2 Units of Measure. 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 issues and concerns are addressed in this standard, although health issues and concerns are beyond the scope of this standard. 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 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.