

Welding Inspection Handbook



American Welding Society[®]

Welding Inspection Handbook

**Fourth Edition
2015**

**Prepared by the
AWS B1C Standing Task Group on Welding Inspection Handbook**

**Under the Direction of the
AWS Technical Activities Committee**

**Approved by the
AWS Board of Directors**



American Welding Society®

ISBN: 978-0-87171-855-6

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THE WELDING INSPECTION HANDBOOK is a collective effort of many volunteer technical specialists to provide information to assist welding inspectors and supervisors in the technology and application of visual and nondestructive examination.

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Foreword

The inspection of welds and welded assemblies requires knowledge of many factors of welding quality control. This includes dimensional inspection, nondestructive examination methods, welding processes, welding metallurgy, destructive testing, and the qualification of welding procedures and personnel. It also includes the examination and test requirements of codes, criteria, and specifications; the acceptance standards to be employed; and an understanding of drawings, and welding and nondestructive examination symbols. Knowledge about discontinuities that may be associated with different welding processes, and the ability to evaluate the difference between discontinuities and rejectable defects, is also an important element of welding inspection.

This fourth edition of the *Welding Inspection Handbook* has been prepared by the AWS B1C Welding Inspection Handbook Task Group. The objective is to provide a reliable source of useful reference information. This is particularly relevant for the technically trained individual who may not be directly involved with inspection but whose position requires knowledge about welding inspection. This book also is intended for the inspector who needs a general refresher in the basic requirements of weld inspection. This fourth edition supersedes the AWS *Welding Inspection Handbook* bearing the same title, and includes changes to numerous clauses to provide clarification, correct inconsistencies, and updates representative of current industry practices.

Underlined text in the clauses and subclauses indicates a change from the 2000 edition. A vertical line in the margin indicates a revision from the 2000 edition.

Additional books on the subjects covered in each chapter may be found in good technical libraries. The many specifications and codes that have been used as examples may also be consulted for more detailed information.

This book is an instructive reference. Codes or specifications applicable to any particular weldment always take precedence over the generalized material contained herein. The text of this book has, of necessity, been written in general terms and cannot include all the conditions applicable to a specific instance. Thus, examples given are general and are used only for the purpose of illustration.

Every effort has been made to present this material in convenient form so that the book can be used as a training text for inspectors, engineers, and welders. Although the information generally relates to the arc welding processes, most of it applies to any weldment—fabricated by any joining process—for which the inspection methods described herein may be required.

For the inspection of brazed assemblies, refer to *The Brazing Handbook* published by the American Welding Society. For the inspection of resistance welded assemblies, refer to AWS/SAE D8.7, *Recommended Practices for Automotive Weld Quality—Resistance Spot Welding*, also published by the American Welding Society.

Information on nondestructive examination methods is available in AWS B1.10M/B1.10, *Guide for Nondestructive Examination of Welds*, and in AWS B1.11M/B1.11, *Guide for the Visual Examination of Welds*.

Comments and inquiries concerning this publication are welcome. They should be sent to the Managing Director, Technical Services Division, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

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Chapter 1

Scope and Application

1.1 Scope

The scope of this handbook includes testing and examination methods that apply to a majority of metallic and nonmetallic weldments used in construction. The extent of inspections should be clearly defined in contract documents or on drawings that refer to a particular weldment (unless otherwise defined in applicable codes or specifications). Furthermore, acceptance criteria should be clearly understood and agreed upon by both the supplier and the purchaser before any production welding begins. Acceptance criteria for weld discontinuities are specifically excluded from this handbook.

It is the responsibility of those charged with the administration and supervision of inspection to make certain that the principles and methods to be used are properly understood and applied uniformly. This responsibility may include the qualification and certification of inspectors where such certification is required by codes, specifications, job contracts, civil law, or company policies.

The following documents address the qualification of welding inspection and nondestructive examination personnel:¹

- (1) AWS QC1, *Standard for AWS Certification of Welding Inspectors*
- (2) AWS B5.1, *Specification for the Qualification of Welding Inspectors*
- (3) ANSI/ASNT CP-189, *ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel*
- (4) ASNT Recommended Practice SNT-TC-1A, *Personnel Qualification and Certification in Nondestructive Testing*
- (5) ASTM 1316, *Standard Terminology for Nondestructive Testing*
- (6) ISO 9712, *Nondestructive Testing—Qualification and Certification of NDT personnel*

Even when a particular qualification for certification program is not mandatory, every welding inspector should be aware of the ethical criteria for welding inspectors contained in documents such as AWS QC1.

1.2 Application

The information in this handbook pertains to the general duties and responsibilities of welding inspectors and is intended as a reference to help their performance. This book provides specific information about methods of weldment inspection; however, much of the information will also generally apply to the examination of nonwelded components, such as base metal inspection prior

1. See Chapter 17 for addresses of standards writing organizations.