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**An American National Standard**



# **Guide for the Visual Inspection of Welds**



**American Welding Society**



**Key Words**—Visual inspection, visual examination,  
surface conditions, instruments,  
equipment, records, discontinuities,  
nondestructive examination

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# **Guide for the Visual Examination of Welds**

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Prepared by  
AWS Committee on Methods of Inspection

Under the Direction of  
AWS Technical Activities Committee

Approved by  
AWS Board of Directors

## **Abstract**

This guide contains information to assist in the visual examination of welds. Included are sections on prerequisites, fundamentals, surface conditions, and equipment. Sketches and full-color photographs illustrate weld discontinuities commonly found in welds.



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# Foreword

(This Foreword is not a part of AWS B1.11:2000, *Guide for the Visual Examination of Welds*, but is included for information purposes only.)

Visual examination (VT), as used in this guide, is a nondestructive method whereby a weldment, the related base metal, and particular phases of welding may be evaluated in accordance with applicable requirements. All visual examination methods require the use of eyesight to evaluate the conditions which are present; hence, the term *visual* examination.

The use of gauges and other tools is supplemental to the main method, and these are treated only as adjuncts to visual examination of weldments.

*The Guide for the Visual Examination of Welds* has been prepared by the AWS Committee on Methods of Inspection to serve as a simple tutorial source of basic information concerning visual examination of welds. It is not the intent of this document to present the *only* approved methods for conducting visual examination. Some typical standards are listed in this document. It is intended that the material presented be useful to engineers, designers, educators, inspectors, and other welding personnel who need knowledge about basic visual examination attributes, which would be essential, or desirable, for a particular process. Included in this guide are fundamental prerequisites for performing visual examination, steps in performing visual examination at various stages of welding, and also typical examples of visual examination, discontinuities and conditions, equipment supplements and aids, records, and other reference sources which may be helpful. Terminology used throughout this guide has been established in AWS A3.0, *Standard Welding Terms and Definitions*.

This guide is intended as an instructive reference. The codes or specifications applicable to any particular weldment always take precedence over the generalized material contained herein, should any conflict arise between the two. The text has been written in general terms and does not include all the conditions applicable to a specific instance. Examples given are general and are used only for the purpose of illustration.

This material can be used as a training text for inspectors. Although the information generally relates to the arc welding processes, most of it applies to weldments fabricated by other fusion welding processes, for which these methods may be required.

For the examination of resistance welded assemblies, refer to AWS C1.1, *Recommended Practices for Resistance Welding*, AWS C1.3, *Recommended Practices for Resistance Welding Coated Low Carbon Steels*, and AWS D8.7, *Recommended Practices for Automotive Weld Quality—Resistance Spot Welding*, published by the American Welding Society.

For the examination of brazed assemblies, refer to the *Brazing Handbook*, also published by the American Welding Society.

For those who need more detailed information than this guide provides, bibliographies or complete books on the subjects covered in each chapter may be found in good technical libraries. The many specifications and codes that are listed, and have been used as illustrative examples, may also be consulted for more detailed information.

Basic information on other nondestructive examination methods is contained in AWS B1.10, *Guide for Nondestructive Examination of Welds*, and in the AWS book, *Welding Inspection*.

Comments and inquiries concerning this standard are welcome. They should be sent to the Secretary, B1 Committee on Methods of Inspection, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

# Table of Contents

	Page No.
<i>Personnel</i> .....	<i>iii</i>
<i>Foreword</i> .....	<i>v</i>
<i>List of Figures</i> .....	<i>vii</i>
1. General .....	1
1.1 Application.....	1
1.2 Scope.....	1
1.3 Safety and Health.....	1
1.4 References.....	1
2. Prerequisites .....	2
2.1 General.....	2
2.2 Visual Acuity.....	2
2.3 Equipment.....	2
2.4 Experience and Training .....	2
2.5 Procedures.....	2
2.6 Certification Programs .....	2
2.7 Safety .....	2
3. Fundamentals of Visual Examination.....	2
3.1 General.....	2
3.2 Prior to Welding .....	3
3.3 During Welding.....	3
3.4 After Welding.....	4
4. Weld Surface Conditions .....	4
4.1 General.....	4
4.2 Porosity .....	4
4.3 Incomplete Fusion.....	6
4.4 Incomplete Joint Penetration.....	6
4.5 Undercut.....	8
4.6 Underfill .....	8
4.7 Overlap.....	11
4.8 Lamination .....	11
4.9 Seams and Laps.....	12
4.10 Cracks.....	12
4.11 Slag Inclusions .....	15
4.12 Excessive Reinforcement .....	16
4.13 Convexity and Concavity .....	16
4.14 Arc Strikes.....	16
4.15 Spatter .....	16
4.16 Melt-Through.....	16
4.17 Weld Size .....	17
4.18 Surface Oxidation.....	17
5. Examination Equipment .....	17
5.1 Introduction .....	17
5.2 Calibration and Handling of Examination Equipment.....	18

	<b>Page No.</b>
5.3 Linear Measuring Devices .....	19
5.4 Temperature Measuring Devices.....	19
5.5 Weld Gauges .....	21
5.6 Fiberscopes and Borescopes .....	24
5.7 Ferrite Gauges .....	24
5.8 Light Source .....	24
5.9 Ammeters .....	27
6. Records.....	27
<i>Annex A—List of Standards Commonly Used in the Welding Industry .....</i>	<i>29</i>
<i>Annex B—Supplementary Reading Material .....</i>	<i>31</i>
<i>Annex C—Guidelines for Preparation of Technical Inquiries for AWS Technical Committees .....</i>	<i>33</i>
<i>AWS Document List .....</i>	<i>35</i>

# List of Figures

Figure		Page No.
1	Scattered Porosity .....	5
2	Surface Appearance of Piping Porosity .....	5
3	Aligned Porosity with Crack.....	6
4	Elongated Porosity .....	6
5	Various Locations of Incomplete Fusion .....	7
6	Incomplete Fusion.....	7
7	Incomplete Fusion at the Groove Face.....	7
8	Incomplete Fusion Between Weld Beads.....	8
9	Incomplete Fusion Between the Weld and Base Metal.....	8
10	Incomplete Joint Penetration.....	8
11	Incomplete Joint Penetration with Consumable Insert .....	9
12	Incomplete Joint Penetration.....	9
13	Examples of Undercut.....	9
14	Undercut at Fillet Weld Toe .....	10
15	Underfill .....	10
16	Underfill Using Flux Cored Arc Welding in Steel.....	10
17	Overlap.....	11
18	Overlap.....	11
19	Laminations.....	11
20	Types of Cracks.....	12
21	Longitudinal vs. Transverse Cracks .....	13
22	Longitudinal Crack and Linear Porosity .....	13
23	Transverse Cracks .....	14
24	Throat Crack .....	14
25	Crater Crack .....	15
26	Longitudinal Cracks Propagating from Crater Crack .....	15
27	Toe Cracks.....	15
28	Toe Cracks.....	16
29	Underbead Cracks .....	16
30	Slag Inclusion.....	17
31	Weld Reinforcement.....	17
32	Convex Fillet Weld.....	18
33	Convexity .....	18
34	Concave Fillet Weld .....	19
35	Spatter .....	19
36	Melt-Through.....	20
37	Surface Oxidation (Sugaring) in a Stainless Steel Gas Tungsten Arc Weld .....	21
38	Temperature-Sensitive Crayon.....	21
39	Surface Contact Thermometer .....	22
40	Pyrometer .....	22
41	Evaluating a Convex Fillet Weld.....	23
42	Evaluating a Concave Fillet Weld .....	23
43	A Multipurpose Gauge.....	24
44	A Taper Gauge .....	25
45	Hi-Lo Mismatch Gauge .....	25
46	A Fiberscope in Use .....	26
47	Ferrite Indicator (Ferritescope) .....	26
48	Tong Test Ammeter .....	27



# Guide for the Visual Examination of Welds

## 1. General

**1.1 Application.** Information contained in this guide applies to the general duties and responsibilities of visual inspectors of weldments and is useful to them in carrying out their duties and responsibilities defined in particular codes or specifications. This document is primarily intended for those who are responsible for the final acceptance of weldments. However all welders, supervisors, technicians, and engineers who are required to routinely inspect work performed by them or under their authority will benefit from the use of this document. This document will provide general guidelines for the visual examination of weldments.

The inspector should be knowledgeable concerning each of the principles and methods of examination required on a particular weldment. It is the responsibility of those charged with the administration and supervision of inspection to make certain that the principles and methods set forth are properly understood and uniformly applied. This responsibility also includes the qualification and certification of inspectors, where such certification is required by codes, specifications, or civil laws. AWS QC1, *Standard for AWS Certification of Welding Inspectors*, indicates the importance AWS assigns to visual examination.

Contract documents should specify the requirements for visual examination. In the absence of such requirements, the manufacturer should be requested to establish, in writing, the extent and the methods of examination to be required.

Acceptance standards should be clearly understood by both the manufacturer and the buyer before any welding is started. This is not only to make more effective use of the examination methods but to prevent disagreement over whether a weldment is satisfactory and in accordance with the contract specifications.

**1.2 Scope.** This guide includes an outline of the fundamental prerequisites for personnel performing visual examination of welds. Such prerequisites include physical limitations or capabilities, as well as technical knowledge, training, experience, judgment, and certification.

This guide essentially provides an introduction to visual examination of welding. These examinations fall into three categories based on the time they are performed, as follows: (1) prior to welding, (2) during welding, and (3) after welding. An extensive treatment is provided on weld surface conditions, including reference to frequently used terminologies associated with *preferred* and *non-preferred* conditions. Visual examination may be performed by different people or organizations. Personnel performing welding examination include welders, welding supervisors, the contractor's welding inspector, the purchaser's examiner, or the regulatory inspector. For the purpose of simplicity, these individuals referred to as visual inspectors in the remainder of this standard in that they perform visual inspection. Fabrication documents, contract specifications, and regulatory agencies may specify who performs final inspections.

Also provided is a review of visual examination equipment aids routinely used, such as gauges and lighting equipment. Formal documentation of visual examination results is contained in Section 6, Records. Finally, the guide suggests additional reading or references, that may provide more detailed requirements for specific visual examination applications.

**1.3 Safety and Health.** This technical document does not address all welding and health hazards. Pertinent information can be found in ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, and other safety-related documents including federal, state, and local regulations.

**1.4 References.** The following documents are cited in this document. Copies may be obtained from the American Welding Society.