

AWS D18.1:1999
An American National Standard



Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications



American Welding Society



Key Words— Visual examination acceptance criteria, food processing equipment, qualification, sanitary application, stainless steel tubing

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Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications

Prepared by
AWS D18 Committee on Welding in Sanitary Applications

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This specification provides the requirements for welds in tubing systems in dairy and other food processing plants. The document addresses qualifications, fabrication, extent of visual examination, acceptance criteria, and documentation requirements.



American Welding Society

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Foreword

[This Foreword is not a part of AWS D18.1:1999, *Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications*, but is included for information purposes only.]

The formation of the D18 Committee was approved in October and November 1995 by the AWS Technical Activities Committee and the Board of Directors respectively. The Committee was formed to respond to the request of the 3-A Sanitary Standards Committee for help in preparing welding standards for use in the manufacture and construction of dairy and food product processing plants. The 3-A Sanitary Standards Committees develop and promulgate sanitary design standards for dairy and food processing, packaging and handling equipment and systems. Several members of the D18 Committee are active members of 3-A, and the Committee has maintained liaison with 3-A.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, D18 Committee on Welding in Sanitary Applications, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

Official interpretations of any of the technical requirements of this standard may be obtained by sending a request, in writing following the guidelines in Annex A of this document, to the Managing Director, Technical Services, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126. A formal reply will be issued after it has been reviewed by the appropriate personnel following established procedures.

Table of Contents

	Page No.
<i>Personnel</i>	iii
<i>Foreword</i>	v
<i>List of Figures</i>	vii
1. Scope	1
2. References and Definitions	1
2.1 References.....	1
2.2 Definitions.....	1
3. Qualification	2
3.1 Procedure Qualification	2
3.2 Performance Qualification	3
4. Fabrication.....	4
4.1 Material Preparation	4
4.2 Preconstruction Weld Samples (PWS).....	5
5. Visual Examination Requirements	5
5.1 Extent of Examination	5
5.2 Visual Examination Acceptance Criteria.....	5
6. Documentation	7
<i>Annex A—Guidelines for Preparation of Technical Inquiries for AWS Technical Committees</i>	9

List of Figures

Figure	Page No.
1 Examples of Maximum Allowable Discontinuities	6
2 Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube	7

Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications

1. Scope

This specification covers the requirements for gas tungsten arc welding (GTAW) of austenitic stainless steel tube and pipe 1/4 in. (6 mm) diameter and larger in the fabrication and construction of new sanitary (hygienic) processing systems. Sanitary processing systems are intended to include those systems handling products for human and animal consumption. Such products include dairy, meat, poultry, vegetable, beverage, and other products consumed by humans and animals. This specification addresses welding qualification and visual examination requirements prior to postweld conditioning.

This specification is intended for new construction, however the requirements may also be applied to maintenance of food processing equipment. This specification does not address requirements designed to prevent corrosion damage during service.

This specification does not address the health and safety of manufacturer or contractor personnel performing the fabrication or construction of food processing equipment. Users should refer to federal, state, and local regulations as well as other safety standards such as ANSI/ASC Z49.1, *Safety in Welding, Cutting, and Allied Processes*.

2. References and Definitions

2.1 References. The following documents are incorporated into this specification by reference.

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

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

(3) ANSI/AWS B4.0, *Standard Methods for Mechanical Testing of Welds*.

(4) ANSI/ASC Z49.1, *Safety in Welding, Cutting, and Allied Processes*.

(5) ANSI/ASME B 46.1, *Surface Texture*.

2.2 Definitions. Welding terms used in this specification are defined in ANSI/AWS A3.0, *Standard Welding Terms and Definitions*. Other terms not defined in A3.0 are defined in the following.

contractor. Includes contractors, subcontractors, fabricators, erectors, or other organizations that fabricate weldments that are intended to meet the requirements of this specification.

dress. Oxides remaining on the flame, arc, and other cut surfaces of the base metals.

essential variable. A variable in which a change beyond that described in 3.1.5 is considered to affect the mechanical properties of the weldment, and shall require requalification of the Welding Procedure Specification (WPS).

gas tungsten arc welding (GTAW). An arc welding process that uses an arc between a tungsten electrode (nonconsumable) and the weld pool. The process is used with shielding gas and without the application of pressure. Nonstandard terms for GTAW are TIG and Heliarc® welding.

nonessential variable. A variable in which a change, as described in 3.1.5 may be made in the WPS without requalification.

nonproduct contact surface. An exposed surface other than a product contact surface.

Owner. Organization that will operate the sanitary (hygienic) processing system, or the organization's authorized representative.

pit. A surface imperfection the depth of which exceeds 25% of the smallest surface dimension, and whose length does not exceed three (3) times its width.

product contact surface. Any surface that is exposed to the product or any surface from which materials may drain, drop, or be drawn into the product.

sanitary (hygienic) applications. Those applications where the metal surface condition is such that it can be cleaned to meet the requirements of food products.

termination. Completion point of a weld pass. Other terms commonly used are tail off, slope down, sign off and feather out.

verification test (procedure). A sample weldment intended to confirm that a WPS revision to a verification variable meets the requirements of 5.2.

verification test (performance). A sample weldment intended to confirm the welder's or welding operator's ability to meet the requirements of 5.2.

verification variable. A variable in which a change as described in 3.1.5 may prevent the weld from meeting 5.2. Such a change may be made only after successfully completing a verification test.

3. Qualification

3.1 Procedure Qualification

3.1.1 A written qualified Welding Procedure Specification (WPS) shall be followed for each weld in sanitary applications. The welding procedure specification may be in any convenient format provided all the welding variables of 3.1.5 are recorded.

3.1.2 The welding variables required to be addressed for each procedure shall be those specified in 3.1.5.

3.1.3 The evaluation of procedure qualification test weldments shall be as listed in 3.1.3.1 through 3.1.3.4. The actual welding variables used during the qualification tests shall be recorded in addition to the results of the destructive and visual examination. The welding procedure qualification record may be in any convenient format provided all the welding variables of 3.1.5 and the results of all tests are recorded.

3.1.3.1 Procedure qualification shall be by standard test weldment as required in ANSI/AWS B2.1, *Specification for Welding Procedure and Performance Qualification*, except that the essential, nonessential, and verification variables of 3.1.5 apply.

3.1.3.2 Procedure qualification test weldments shall be visually examined on all surfaces.

3.1.3.3 The destructive test sample preparation shall be as required in ANSI/AWS B2.1, Annex B, except that bend specimens shall not be machined flat. The maximum radius at the edge of the bend specimens is 1/16 in. (1.6 mm).

3.1.3.4 If any test fails, the procedure fails, and a new welding procedure qualification test shall be conducted.

3.1.4 Acceptance Criteria of Procedure Qualification Test Welds

3.1.4.1 Visual examination may be conducted with or without magnification. The results of visual examination shall meet the acceptance criteria of 5.2.

3.1.4.2 After visual examination, two transverse tensile specimens, two root-end, and two face-bend specimens shall be tested in accordance with ANSI/AWS B4.0, *Standard Methods for Mechanical Testing of Welds*.

3.1.4.3 Each tensile test specimen shall have a tensile strength not less than the following:

- (1) The specified minimum tensile strength of the base metal, or of the weaker of the two base metals if metals of different minimum tensile strength are used; or
- (2) The specified minimum tensile strength of the weld metal when the referencing document provides for the use of weld metal having a lower tensile strength than the base metal; or
- (3) If the specimen breaks in the base metal outside of the weld or weld interface, the test shall be accepted, provided the strength is not more than 5% below the specified minimum tensile strength of the base metal; or
- (4) If the base metal has no specified minimum tensile strength, then failure in the base metal shall be acceptable.

3.1.4.4 Bend specimens shall be bent in one of the guided bend test fixtures shown in ANSI/AWS B4.0. For transverse specimens, the weld metal and heat-affected zone shall be completely within the bent portion of the specimen after bending. Bend test specimens shall be examined at a minimum of 10X magnification. Bend specimens shall have no openings greater than 1/16 in. (1.6 mm) or 1/2 T, whichever is less, where T equals the base metal thickness qualified.

3.1.5 Welding Variables. This matrix lists the welding variables required to be addressed on both the welding procedure qualification record and welding procedure specification. The types of welding variables found in this matrix are essential (E), nonessential (N), and verification (V) variables, as defined in 2.2.

A change in an essential variable beyond that allowed in 3.1.5 requires requalification of the WPS. A change in a verification variable beyond that allowed in 3.1.5 requires successful completion of a Verification Test. A change in a nonessential variable may be made without requalification of the WPS.

	GTAW (Manual)	GTAW (Mechanized or Automatic)
3.1.5.1 Joint Design		
(1) Any change in groove type.	E	E
(2) An increase in the root opening beyond that used in the qualification test.	E	E
3.1.5.2 Base Metal		
(1) A change in the base metal thickness range exceeding 1/2T to 2T where T equals the thickness qualified.	E	E
3.1.5.3 Filler Metals		
(1) Addition or deletion of filler metal. ¹	E	E
(2) A change in filler metal A-Number. ²	E	E
(3) A change in filler metal diameter.	N	N
3.1.5.4 Shielding Gas		
(1) A change in the welding head (torch) or backing (purge) gas from a single gas to any other gas or gas mixture, or a change from one gas mixture to any other gas mixture or to a single gas.	E	E
(2) The addition or deletion of a trailing gas.	N	N
(3) A change in the torch shielding gas flow rate greater than $\pm 25\%$ from that qualified.	V	V
(4) A change in the backing (purge) gas flow rate greater than $\pm 10\%$ from that qualified.	V	V
(5) The addition or deletion of a backing (purge) gas.	E	E

	GTAW (Manual)	GTAW (Mechanized or Automatic)
3.1.5.5 Electrical Characteristics		
(1) The addition or deletion of pulsing current.	E	E
(2) Any change in pulsing parameters from that qualified.	V	V
(3) A change in current type or polarity.	E	E
(4) A change in the current range greater than $\pm 10\%$ from that qualified.	V	V
(5) A change in tungsten type.	N	N
(6) A change in tungsten size.	V	V
3.1.5.6 Other Variables		
(1) A change in the welding process.	E	E
(2) A change in the cup or nozzle size.	N	N
(3) A change from a collet body to a gas lens or vice-versa.	N	N
(4) A change in the cleaning method.	N	N
(5) A change in the type of welding (manual, semiautomatic, mechanized or automatic).	V	V
(6) A change exceeding $\pm 10\%$ in travel speed for mechanized or automatic welding.	N/A	V

Notes:

1. Filler metal shall not be used except in field-fabricated fitting and only with the approval of the owner.
2. A-Number defines the weld metal chemical composition. See ANSI/AWS B2.1, *Specification for Welding Procedure and Performance Qualification*.

3.2 Performance Qualification

3.2.1 Performance qualification shall be by standard test in accordance with ANSI/AWS B2.1. The welder/welding operator performance qualification shall be documented and may be in any convenient format provided all the welding variables of 3.2.8 and the results of all tests are recorded.

3.2.2 Visual examination of standard test weldments shall meet the acceptance criteria of 5.2.1 and 5.2.3.

3.2.3 Bend specimens shall be bent in one of the guided bend test fixtures shown in ANSI/AWS B4.0. For transverse specimens, the weld metal and heat-affected zone shall be completely within the bent portion of the specimen after bending. Bend test specimens shall be examined at a minimum of 10X magnification. Bend specimens shall have no openings greater than 1/16 in. (1.6 mm) or 1/2 T, whichever is less, where T equals the base metal thickness qualified.

3.2.4 As an alternate to 3.2.3, radiography may be performed for evaluation of performance qualification test welds. The radiographic procedure shall be as listed in ANSI/AWS B2.1, Annex E. For acceptance, the weld shall have no discontinuities exceeding 1/16 in. (1.6 mm) or 1/2 T, whichever is less. Oxide islands shall not be considered relevant indications for this test.

3.2.5 The performance qualification shall remain in effect indefinitely unless the welder or welding operator is not engaged in the process qualified for a period exceeding six (6) months or there is a specific reason to question the ability of the welder or welding operator.

3.2.6 Documentation should be maintained that shows the qualified welder or welding operator has welded in the six (6) month period listed in 3.2.5.

3.2.7 Verification performance test welds may be required by the Owner or Owner's Authorized Representative at any time during the duration of the contract (see 2.2).

A welder or welding operator who fails the verification performance test may be retested using (1) or (2) below.

(1) If a verification performance retest is permitted without further training or practice, it shall consist of two consecutive verification performance test weldments for each position failed. Both verification performance test weldments shall be acceptable for the welder or welding operator to qualify. If either verification performance test weldment does not meet the requirements of 4.2.2, the welder or welding operator shall be retested in accordance with 3.2.1.

(2) Provided that the welder or welding operator has had further training or practice, one verification performance test weld for each position failed is permitted. If the verification performance test weldment does not meet the requirements of 4.2.2, the welder or welding operator shall be retested in accordance with 3.2.1.

3.2.8 Performance Qualification Variables

3.2.8.1 Qualification with one WPS will also qualify for welding with any other WPS within the limits given in the following performance qualification variables.

3.2.8.2 Welders. A change in any variable listed below from that which was used in a welder's qualification test will require requalification of that welder.

- (1) A change in the welding process
- (2) A change from manual to semiautomatic or vice versa
- (3) The deletion of backing (welding from both sides is considered welding with backing)
- (4) The addition or deletion of filler metal
- (5) The addition or deletion of consumable inserts
- (6) A change in base metal except as permitted in ANSI/AWS B2.1
- (7) A change in current type or polarity
- (8) The addition or deletion of pulsing current
- (9) A change in the position from that qualified except as permitted in ANSI/AWS B2.1
- (10) A change in the vertical progression from uphill to downhill or vice versa
- (11) A change in the thickness or diameter from that tested except as permitted in ANSI/AWS B2.1

3.2.8.3 Welding Operators. A change in any variable listed below from that which was used in a welding operator's qualification test will require requalification of that welding operator.

- (1) A change in the welding process
- (2) A change from direct visual to remote visual control or vice versa
- (3) A change in position except as permitted in ANSI/AWS B2.1
- (4) The addition or deletion of filler metal
- (5) The addition or deletion of consumable inserts
- (6) A change in the base metal except as permitted in AWS B2.1
- (7) A change from automatic to mechanized welding or vice versa

4. Fabrication

4.1 Material Preparation. Tubular products for use in applications may be cut by any method that produces an edge that meets the criteria of 4.1.1.

4.1.1 Material Preparation. Edges shall be cut square. All visible heat tint, cutting flash, burrs, and dross shall be removed. Tube edges shall not be beveled deeper than 10% of the tube wall thickness.

4.1.2 Joint Fit Up. Butt joints should fit tight and be square around the tube circumference except as permitted by the WPS.

4.1.3 Filler Metal. Filler metals shall not be used except for field-fabricated fittings, and then only with the Owner's permission.

4.1.4 Field-Fabricated Fittings. If a field-fabricated fitting meets the visual examination requirements of 5.2 in the as-welded condition then the fitting may be used without additional conditioning. If the requirements of 5.2 are not met in the as-welded condition then the product contact surface of field-fabricated fittings shall be conditioned to exhibit a maximum Ra of 32 micro inch (0.8 micron) when measured according to ANSI/ASME B 46.1, *Surface Texture*.

4.1.5 Tack Welds. Tack welds shall not be full penetration and shall not exhibit visible internal oxidation.

4.2 Preconstruction Weld Samples (PWS)

4.2.1 Prior to any field welding on a project, each welder or welding operator shall prepare three verification tests. Each verification test weld shall be visually examined on all surfaces.

4.2.2 All surfaces shall meet the requirements of 5.2.1 and the inside surface shall meet the requirements of 5.2.3.

4.2.3 Each PWS shall be permanently marked with the welder or welding operator's identification, and the PWSs shall be distributed to the welder or welding operator, the welding supervisor, and the Owner's Representative.

4.2.4 Additional workmanship samples may be required during the life of the project by agreement between the Owner and the Contractor.

5. Visual Examination Requirements

The requirements of this section apply to welds prior to postweld conditioning.

5.1 Extent of Examination

5.1.1 Welders and welding operators shall examine each weld they make. The start, termination, and width of the weld shall be consistent with that of their PWS. Supervisors shall examine a representative sample of each welder's and welding operator's production using that welder's or welding operator's PWS to verify that the work is satisfactory. The Owner's Representative should monitor both the welding production and the welding supervisor's examination practices.

5.1.2 Outside surfaces of all welds shall be visually examined by the contractor. Welds that do not meet the requirements of 5.2.1 and 5.2.2 shall be examined inter-

nally. Internal examination of weld surfaces shall be performed with a borescope or other device acceptable to the Owner, and the weld surface shall meet the requirements of 5.2.3. Alternatively, the internal weld quality may be verified by a procedure agreed upon by the Owner and the contractor.

5.1.3 Product contact surfaces of internal welds, such as elbows and ferrules, that can be visually examined without special tools shall be visually examined. The internal weld surfaces shall meet the requirements of 5.2.1 and 5.2.3.

5.1.4 Welds fabricated with the addition of filler metal shall be visually examined on all product contact surfaces. The product contact surface of such welds shall meet the requirements of 5.2.1 and 5.2.3.

5.2 Visual Examination Acceptance Criteria. The examination of the outside (non product surface) weld can provide an indication of the quality of the inside (product contact surface) weld.

5.2.1 Visual Examination Acceptance Criteria for All Welds

5.2.1.1 Welds shall be full penetration.

5.2.1.2 Welds shall not contain cracks, undercut, crevices, pits or embedded or protruding material.

5.2.1.3 Offset or misalignment shall not exceed 10% of the wall thickness as illustrated in Figure 1A.

5.2.2 Visual Examination Acceptance Criteria for Non-Product Contact Surfaces

5.2.2.1 Maximum allowable concavity shall be 0.006 in. (0.15 mm) as illustrated in Figure 1B.

5.2.2.2 Maximum allowable convexity shall be 0.012 in. (0.3 mm) as illustrated in Figure 1C.

5.2.2.3 Manual welds shall have a minimum weld face width of 2T where T is the tube wall thickness as illustrated in Figure 1D.

5.2.2.4 The weld face should be uniform in width. The minimum face width of each weld shall be at least 75% of the maximum face width as illustrated in Figure 1E.

5.2.2.5 The start, termination, and width of the weld shall be consistent with the welder's PWS.

5.2.3 Visual Examination Acceptance Criteria for Product Contact Surfaces

5.2.3.1 Maximum allowable convexity shall be 0.012 in. (0.3 mm) as illustrated in Figure 1F.

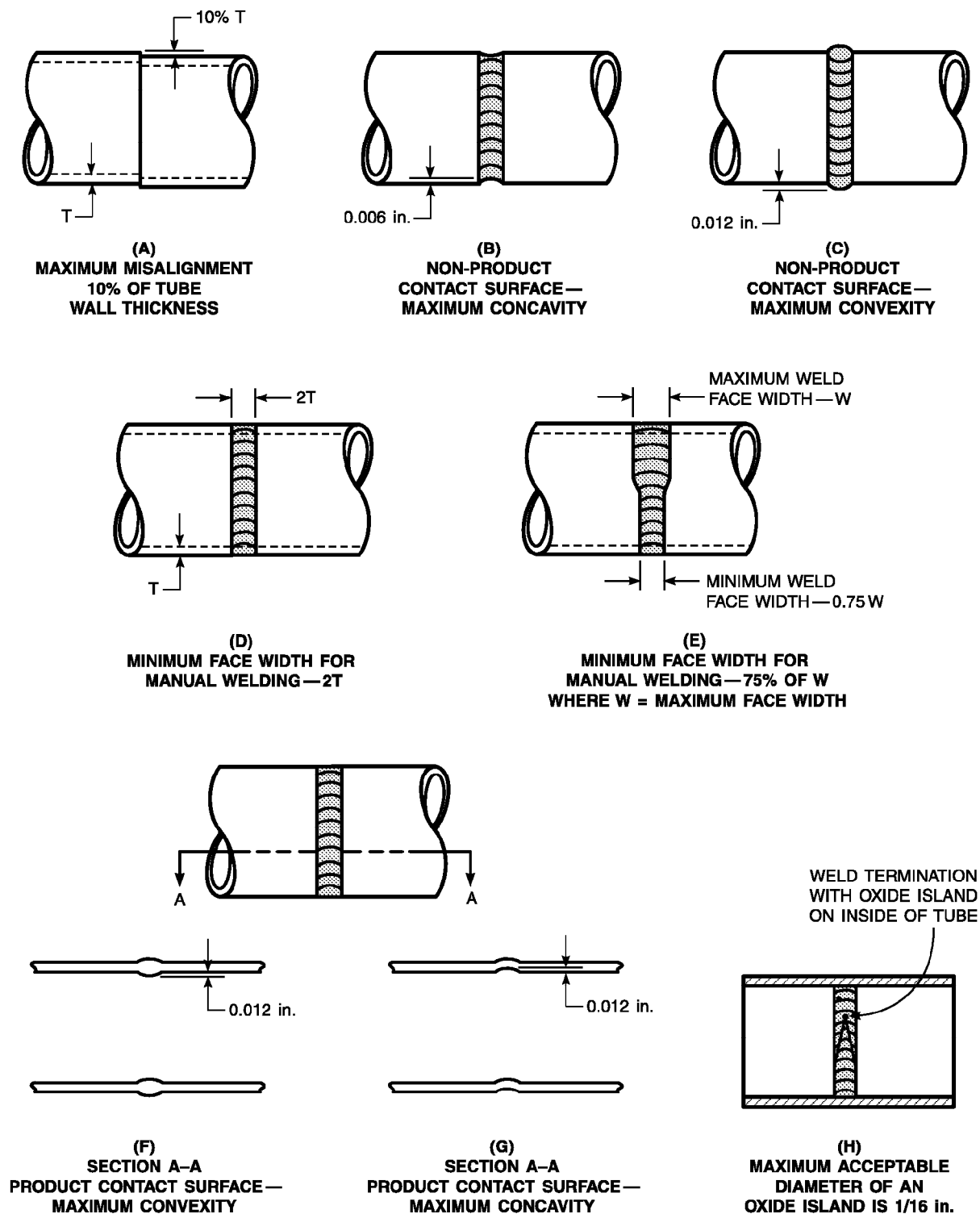


Figure 1—Examples of Maximum Allowable Discontinuities

5.2.3.2 Maximum allowable concavity shall be 0.012 in. (0.3 mm) as illustrated in Figure 1G.

5.2.3.3 The weld surface shall not contain excessive oxidation. Oxidation indicated by a discoloration greater than a straw or light blue as shown in Figure 2, Example 5, or higher, is unacceptable in the as-welded condition.

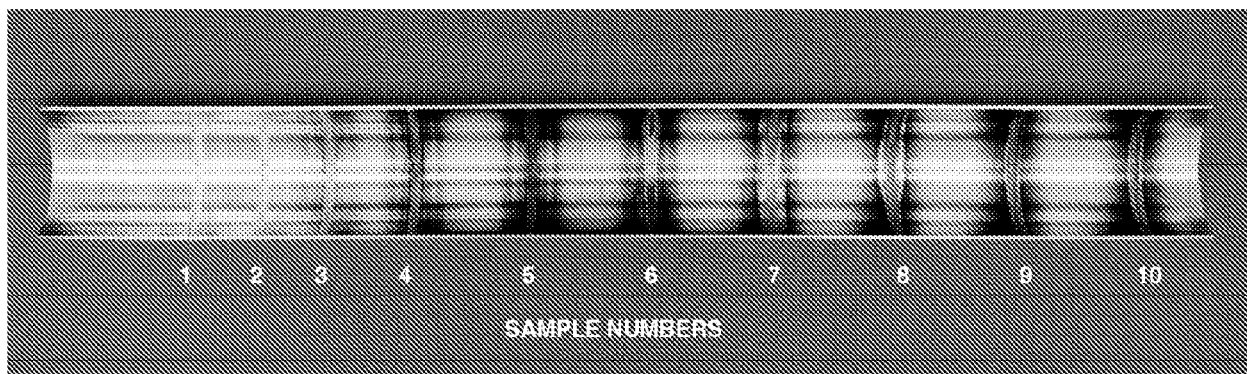
5.2.3.4 Oxide islands greater than 1/16 in. (1.6 mm) diameter, as illustrated in Figure 1H, shall be unacceptable. No more than four (4) oxide islands shall be present in any weld. Oxide islands less than 1/64 in. (0.4 mm) shall be disregarded.

6. Documentation

6.1 The Contractor shall maintain copies of Procedure Qualification Records, Verification Test Records, and Welding Procedure Specifications for each type of joint welded on the project.

6.2 The Contractor shall maintain copies of Performance Qualification Test Records and preconstruction weld samples for the life of the project.

6.3 The Manufacturer or Contractor should prepare, certify, and deliver a document to the Owner that states that all welds meet all of the requirements of this specification.



Notes:

- The tube sample was prepared by making ten autogenous welds on the outside diameter of a 2 in. (50.8 mm) 316L stainless steel tube. Welds on 304L tubing showed no significant difference in heat tint from 316L. The welds were full penetration welds. The torch shielding gas was 95% argon, 5% hydrogen [99.998 with <2 parts per million (ppm) of oxygen, moisture, and hydrocarbons] to assure full penetration welds. The hydrogen addition to the torch shielding gas is considered to have no effect on the HAZ heat-tint oxide on the inside surface. To provide varying amounts of oxygen in the backing gas a compressed cylinder of medical grade air was added to 99.998% minimum pure argon (<2 ppm of oxygen, moisture, and hydrocarbons) and the oxygen was measured with a calibrated commercial oxygen indicator. The amount of oxygen in ppm in the backing gas was measured to be as follows:

No. 1—10	No. 3—50	No. 5—200	No. 7—1000	No. 9—12 500
No. 2—25	No. 4—100	No. 6—500	No. 8—5000	No. 10—25 000

- The illustration should be used as a reference to identify the degree of heat-tint oxide by number and not to specify oxygen limits in the backing gas. The acceptable degree of heat tint can vary with different service environments. It should be considered along with the economics involved obtaining very low levels of heat tint when specifying acceptable heat tint level welds.

The amount and visual appearance of heat-tint oxide can be influenced by factors other than oxygen, such as:

- High levels of moisture in the backing gas will increase the degree of heat-tint.
- Contaminates such as hydrocarbons, moisture, and some types of particulate on the surface prior to welding can influence heat-tint oxide levels.
- Hydrogen gas in the argon backing gas can significantly reduce the amount of heat-tint oxide.
- The metal surface finish can have a varying affect on the visual appearance of heat tint.

Figure 2—Weld Discoloration Levels on Inside of Austenitic Stainless Steel Tube

Annex A

Guidelines for Preparation of Technical Inquiries for AWS Technical Committees

(Nonmandatory Information)

[This Annex is not a part of AWS D18.1:1999, *Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications*, but is included for information purposes only.]

A1. Introduction

The AWS Board of Directors has adopted a policy whereby all official interpretations of AWS standards will be handled in a formal manner. Under that policy, all interpretations are made by the committee that is responsible for the standard. Official communication concerning an interpretation is through the AWS staff member who works submitted in writing. Such requests will be handled as expeditiously as possible but due to the complexity of the work and the procedures that must be followed, some interpretations may require considerable time.

A2. Procedure

All inquiries must be directed to:

Managing Director, Technical Services
American Welding Society
550 N.W. LeJeune Road
Miami, FL 33126

All inquiries must contain the name, address, and affiliation of the inquirer, and they must provide enough information for the committee to fully understand the point of concern in the inquiry. Where that point is not clearly defined, the inquiry will be returned for clarification. For efficient handling, all inquiries should be typewritten and should also be in the format used here.

A2.1 Scope. Each inquiry must address one single provision of the Standard, unless the point of the inquiry

involves two or more interrelated provisions. That provision must be identified in the Scope of the inquiry, along with the edition of the Standard that contains the provisions or that the Inquirer is addressing.

A2.2 Purpose of the Inquiry. The purpose of the inquiry must be stated in this portion of the inquiry. The purpose can be either to obtain an interpretation of a Standard requirement, or to request the revision of a particular provision in the Standard.

A2.3 Content of the Inquiry. The inquiry should be concise, yet complete, to enable the committee to quickly and fully understand the point of the inquiry. Sketches should be used when appropriate and all paragraphs, figures, and tables (or the Annex), which bear on the inquiry must be cited. If the point of the inquiry is to obtain a revision of the Standard, the inquiry must provide technical justification for that revision.

A2.4 Proposed Reply. The inquirer should, as a proposed reply, state an interpretation of the provision that is the point of the inquiry, or the wording for a proposed revision, if that is what inquirer seeks.

A3. Interpretation of Provision of the Standard

Interpretations of provisions of the Standard are made by the relevant AWS Technical Committee. The secretary

of the committee refers all inquiries to the chairman of the particular subcommittee that has jurisdiction over the portion of the Standard addressed by the inquiry. The subcommittee reviews the inquiry and the proposed reply to determine what the response to the inquiry should be. Following the subcommittee's development of the response, the inquiry and the response are presented to the entire committee for review and approval. Upon approval by the committee, the interpretation will be an official interpretation of the Society, and the secretary will transmit the response to the inquirer and to the *Welding Journal* for publication.

A4. Publication of Interpretations

All official interpretations will appear in the *Welding Journal*.

A5. Telephone Inquiries

Telephone inquiries to AWS Headquarters concerning AWS Standards should be limited to questions of a general nature or to matters directly related to the use of the

Standard. The Board of Directors' Policy requires that all AWS Staff members respond to a telephone request for an official interpretation of any AWS Standard with the information that such an interpretation can be obtained only through a written request. The Headquarters Staff can not provide consulting services. The staff can, however, refer a caller to any of those consultants whose names are on file at AWS Headquarters.

A6. The AWS Technical Committee

The activities of AWS Technical Committees in regard to interpretations are limited strictly to the interpretation of provisions of standards prepared by the Committee or to consideration of revisions to existing provisions on the basis of new data or technology. Neither the committee nor the Staff is in a position to offer interpretive or consulting services on: (1) specific engineering problems, or (2) requirements of Standards applied to fabrications outside the scope of the document or points not specifically covered by the Standard. In such cases, the inquirer should seek assistance from a competent engineer experienced in the particular field of interest.