

AWS D1.6/D1.6M:2007
An American National Standard



Structural Welding Code— Stainless Steel



American Welding Society



AWS D1.6/D1.6M:2007
An American National Standard

Approved by the
American National Standards Institute
January 4, 2007

Structural Welding Code— Stainless Steel

2nd Edition

Supersedes AWS D1.6:1999

Prepared by the
American Welding Society (AWS) D1 Committee on Structural Welding

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This code covers the requirements for welding stainless steel structural assemblies.



American Welding Society

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Structural Welding Code—Stainless Steel

1. General Provisions

1.1 Scope

This code covers welding requirements applicable to stainless steel structures and weldments subject to design stress. It shall be used in conjunction with any complementary code or specification for the design or construction of stainless steel structures and weldments. When this code is stipulated in contract documents, conformance with all provisions of the code shall be required, except for those provisions that the Engineer (see 1.4.1) or contract documents specifically modify or exempt. This code is not intended to be used for pressure vessels or pressure piping.

1.2 Base Metals

1.2.1 The base metals to be welded under this code shall be stainless steels with the following chemical composition limits:

- (1) Carbon (C) content equal to or less than 0.5%
- (2) Chromium (Cr) content equal to or greater than 10.5%
- (3) Iron (Fe) content exceeding the content of any other single element
- (4) Any combination of the types in 1.2.2 or with weldable carbon steels or low alloy steels. Free machining steels and steels with intentional additions of sulfur (S), selenium (Se), or lead (Pb) shall not be welded.

1.2.2 Stainless steel base metals may include any of the following types:

- (1) Austenitic
- (2) Ferritic
- (3) Martensitic
- (4) Precipitation Hardening (austenitic, semi-austenitic, and martensitic)

(5) Duplex

1.2.3 Base metals may be used in assemblies, the parts of which may be composed of:

- (1) The same grade of stainless steel,
- (2) Different grades of stainless steels belonging to the same type as listed above,
- (3) Different types of stainless steels,
- (4) Any combination of the types in 1.2.2 or with weldable carbon steels or low alloy steels. See Annex F for suggested filler metals for various combinations of stainless steels and other ferrous base metals.

1.2.4 The stainless steel base metals may be in any of the following forms:

- (1) Sheet—cold rolled
- (2) Sheet, plate—hot rolled
- (3) Shapes
- (4) Tubular products
- (5) Clad materials
- (6) Castings
- (7) Forgings

1.2.5 Stainless steels are generally defined by American Iron and Steel Institute (AISI) Numbers, Unified Numbering System (UNS), and by American Society for Testing and Materials (ASTM) Specifications for product form, chemical composition, and mechanical properties. Newer proprietary steels may not be covered by standards and shall be identified by chemical composition or other suitable means which clearly define the steel.

1.2.6 Specified Base Metal. The contract documents shall designate the specifications and grades of base metal to be used. The provisions of this code are not intended to apply to welding base metals thinner than 1/16 in. [1.5 mm] or 16 gage.

1.2.7 Service Temperature Limits. The contract documents shall specify service temperature limits for the weldment.

1.2.8 Base Metal Prequalification. Austenitic stainless steels whose filler metals normally produce a small amount of ferrite (see Table 3.2 for prequalified limits) shall be considered prequalified, provided they are welded with filler metals in accordance with Table 3.3 and the WPSs used conform to all the applicable requirements of this code. All other stainless steels or combinations, and WPSs which are not prequalified, shall be qualified in conformance to this code. Suggested filler metals to weld a number of stainless steels are shown in Annex F.

1.2.9 Use of Unlisted Base Metals. When a stainless steel other than one of those listed in Table 3.2 is proposed for welded construction under this code, WPSs shall be established by qualification in accordance with the requirements of Clause 4, except as permitted in 1.2.9.1. The contractor shall have the responsibility for establishing the WPS by qualification.

1.2.9.1 An unlisted base metal which has the same chemical composition and strength as a listed steel may be welded with a prequalified or qualified WPS for the listed steel.

1.2.9.2 The Engineer may prescribe additional weldability testing of the unlisted steel. The responsibility for determining weldability is assigned to the party who either specifies a material not listed in Table 3.2, except as permitted by 1.2.9.1, or who proposes the use of a substitute material not listed in Table 3.2.

1.3 Terms and Definitions

The welding terms used in this code shall be interpreted in conformance with the definitions given in AWS A3.0:2001, *Standard Welding Terms and Definitions*, supplemented by Annex L of this code. Definitions, which follow, shall also apply:

1.3.1 Authority Having Jurisdiction. The organization, political subdivision, office or individual charged with the administration and enforcement of this standard.

1.3.2 Drawings. Plans, design and detail drawings, and erection plans.

1.3.3 Engineer. The duly designated individual who acts for, and in behalf of, the Owner on all matters within the scope of the code.

1.3.4 Contractor. Any company, or that individual representing a company, responsible for the fabrication, erection, manufacturing, or welding, in conformance with the provisions of this code.

1.3.5 Inspectors

1.3.5.1 Contractor's Inspector. The duly designated person who acts for, and in behalf of, the Contractor on all inspection and quality matters within the scope of the code and of the contract documents.

1.3.5.2 Verification Inspector. The duly designated person who acts for, and in behalf of, the Owner or Engineer on all inspection and quality matters specified by the Engineer.

1.3.5.3 Inspector. When the term "Inspector" is used without further qualification as the specific Inspector category described above, it applies equally to the Contractor's Inspector and the Verification Inspector within the limits of responsibility described in 6.1.2.

1.3.6 OEM (Original Equipment Manufacturer). That single Contractor that assumes some or all of the responsibilities assigned by this code to the Engineer.

1.3.7 Owner. The individual or company that exercises legal ownership of the product or structural assembly produced under this code.

1.3.8 Code Terms "Shall," "Should," and "May." "Shall," "should," and "may" have the following significance:

1.3.8.1 Shall. Code provisions that use "shall" are mandatory unless specifically modified in contract documents by the Engineer.

1.3.8.2 Should. The word "should" is used to recommend practices that are considered beneficial, but are not requirements.

1.3.8.3 May. The word "may" in a provision allows the use of optional procedures or practices that can be used as an alternative or supplement to code requirements. Those optional procedures that require the Engineer's approval shall either be specified in the contract documents, or require the Engineer's approval. The Contractor may use any option without the Engineer's approval when the code does not specify that the Engineer's approval shall be required.

1.4 Responsibilities

1.4.1 Engineer's Responsibilities. The Engineer shall be responsible for the development of the contract documents that govern products or structural assemblies produced under this code. The Engineer may add to, delete from, or otherwise modify, the requirements of this code to meet the particular requirements of a specific structure. If alternate requirements are proposed by other parties such as the Contractor, the Engineer may approve