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

Structural Welding Code—Stainless Steel

American Welding Society

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An American National Standard

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American National Standards Institute
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Structural Welding Code—
Stainless Steel

2nd Edition

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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.

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Foreword

This foreword is not part of AWS D1.6/D1.6M:2007, *Structural Welding Code—Stainless Steel*, but is included for informational purposes only.

This is the second edition of the AWS D1.6, *Structural Welding Code—Stainless Steel*; the first edition was published in 1999. This code is the product of a pool of experts arriving at a consensus position, in keeping with the American National Standard Institute's requirements.

This code covers the requirements for welding stainless steel components other than pressure vessels or pressure piping. For many years, fabrications involving stainless steel welding have used AWS D1.1/D1.1M, *Structural Welding Code—Steel*, to provide the requirements for quality construction. However, as the AWS D1.1 document is written for the carbon and low alloy steels commonly encountered in structural fabrication, it does not explicitly address the unique requirements of the stainless steels. The AWS Structural Welding Committee thus recognized the industry need for an AWS D1.1 analogue designed for the welding of stainless steel wrought and cast shapes and plates.

The most noticeable feature of D1.6 is the allowance of prequalified Welding Procedure Specifications (WPSs) for the austenitic stainless steels. This exemption from qualification testing is based on considerable experience with the most widely used stainless steels.

Underlined text in the subclauses, tables, or figures indicates an editorial or technical change from the 1999 edition. A vertical line in the margin next to a figure indicates a revision from the 1999 edition. Changes to Clause 2 are not indicated in the chapter since the substantial reorganization of Clause 2 makes it too difficult to identify technical changes.

The following is a summary of the most significant technical revisions contained in D1.6/D1.6M:2007:

Clause 1 was reorganized to add elements found within AWS D1.1/D1.1M.

Terms specific to this code were added in 1.3 for clarity.

Responsibilities of parties involved in structural welding were clarified in 1.4.

Clause 2 was rewritten to bring its design requirements into closer accord with AWS D1.1/D1.1M.

The fatigue provisions in Clause 2 were revised.

Provisions for fillet welds and plug and slot welds were added to Table 2.1 and 2.2.

The provisions for fillet welds and plug and slot welds in holes and slots in Clause 2 were revised.

A comprehensive suggested filler metal chart for various combinations of stainless steels and other ferrous base metals was added as an annex.

New commentary for Clause 2 was added.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS D1 Committee on Structural Welding, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

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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.