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Structural Welding Code—Steel

American Welding Society

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Structural Welding Code—Steel

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Prepared by
AWS D1 Committee on Structural Welding

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AWS Technical Activities Committee

Approved by
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Abstract

This code covers the welding requirements for any type of welded structure made from the commonly used carbon and low-alloy constructional steels. Sections 1 through 8 constitute a body of rules for the regulation of welding in steel construction. There are twelve mandatory and fifteen nonmandatory annexes in this code. A Commentary of the code is included with the document.

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Foreword

(This Foreword is not a part of AWS D1.1/D1.1M:2002, *Structural Welding Code—Steel*, but is included for information purposes only.)

The first edition of the *Code for Fusion Welding and Gas Cutting in Building Construction* was published by the American Welding Society in 1928. The first bridge welding specification was published separately in 1936. The two documents were consolidated in 1972 in the D1.1 document but were once again separated in 1988 when the joint AASHTO/AWS D1.5, *Bridge Welding Code*, was published to address the specific requirements of State and Federal Transportation Departments. Coincident with this, the D1.1 code changed references of buildings and bridges to statically loaded and dynamically loaded structures, respectively, in order to make the document applicable to a broader range of structural configurations.

Underlined text in the subsections, tables, or figures indicates an editorial or technical change from the 2000 edition. A vertical line in the margin next to a figure drawing indicates a revision from the 2000 edition.

The following is a summary of the most significant technical revisions contained in D1.1/D1.1M:2002:

Section 1—New provisions have been added describing the responsibilities of Contractors, Inspectors, Engineers, Owners, and OEMs (Original Equipment Manufacturers).

Section 2—Parts A, B, and C have been extensively reorganized. Many provisions have been modified or expanded, including new commentary and fatigue design parameters. Annex P has been created in order to facilitate correlating the previous edition's Section 2 provisions with the 2002 edition.

Subsections 3.14 and C3.14—A new provision on PWHT has been added.

Figures 4.7, 4.8, 4.10, and 4.11—Modifications have been made to address CVN testing.

Tables 4.5—Shielding gas flow rate variables have been changed.

Table 4.6—A supplementary essential variable table for WPSs requiring CVN testing has been added.

Table 5.2—Holding times for stress relief have been adjusted.

Subsections 6.26.12 and C6.26.12—Provisions have been added describing UT of CJP groove welds with backing.

Tables 6.2 and 6.3, Note 3—This note has been modified to address UT of backgouged, two-sided CJP groove welds.

Annex III—Modifications have been made to expand the scope of requirements when CVN testing is contractually required.

Annex IX—Changes have been made to address stud welding on decking.

Annex B—Acronyms for the most commonly used terms in the code have been added.

Users should note that, beginning in this edition, the tables and figures for each section will be located at the end of each section.

AWS B4.0, *Standard Methods for Mechanical Testing of Welds*, provides additional details of test specimen preparation and details of test fixture construction.

Commentary. The Commentary is nonmandatory and is intended only to provide insight information into provision rationale.

Mandatory Annexes. These additions to the code are requirements that supplement the text.

Nonmandatory Annexes. These annexes are not requirements but are provided as options that are allowed by the code. Though they are not mandatory, it is essential that all provisions of these annexes be followed when the option to use them is exercised.

Index. As in previous codes, the entries in the Index are referred to by subsection number rather than by page number. This should enable the user of the Index to locate a particular item of interest in minimum time.

Errata. It is the Structural Welding Committee's Policy that all errata should be made available to users of the code. Therefore, in the Society News Section of the AWS *Welding Journal*, any errata (major changes) that have been noted will be published in the July and November issues of the *Welding Journal*.

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

Interpretations. Official interpretations of any of the technical requirements of this standard may be obtained by sending a request, in writing, to the Managing Director, Technical Services, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (see Annex F).

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Structural Welding Code—Steel

1. General Requirements

1.1 Scope

This code contains the requirements for fabricating and erecting welded steel structures. 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 modifies or exempts.

The following is a summary of the code sections:

1. General Requirements. This section contains basic information on the scope and limitations of the code.

2. Design of Welded Connections. This section contains requirements for the design of welded connections composed of tubular, or nontubular, product form members.

3. Prequalification. This section contains the requirements for exempting a WPS (Welding Procedure Specification) from the qualification requirements of this code.

4. Qualification. This section contains the qualification requirements for WPSs and welding personnel (welders, welding operators and tack welders) necessary to perform code work.

5. Fabrication. This section contains the requirements for the preparation, assembly and workmanship of welded steel structures.

6. Inspection. This section contains criteria for the qualifications and responsibilities of inspectors, acceptance criteria for production welds, and standard procedures for performing visual inspection and NDT (nondestructive testing).

7. Stud Welding. This section contains the requirement for the welding of studs to structural steel.

8. Strengthening and Repair of Existing Structures. This section contains basic information pertinent to the welded modification or repair of existing steel structures.

1.2 Limitations

The code is not intended to be used for the following:

(1) Steels with a minimum specified yield strength greater than 100 ksi [690 MPa]

(2) Steels less than 1/8 in. [3 mm] thick. When base metals thinner than 1/8 in. [3 mm] thick are to be welded, the requirements of AWS D1.3 should apply. When used in conjunction with AWS D1.3, conformance with the applicable provisions of this code shall be required.

(3) Pressure vessels or pressure piping

(4) Base metals other than carbon or low-alloy steels. AWS D1.6, *Structural Welding Code—Stainless Steel*, should be used for welding stainless steel structures. Whenever contract documents specify AWS D1.1 for welding stainless steel, the requirements of AWS D1.6 should apply.

1.3 Definitions

The welding terms used in this code shall be interpreted in conformance with the definitions given in the latest edition of AWS A3.0, *Standard Welding Terms and Definitions*, supplemented by Annex B of this code and the following definitions:

1.3.1 Engineer. "Engineer" shall be defined as a duly designated individual who acts for, and in behalf of, the Owner on all matters within the scope of the code.

1.3.2 Contractor. "Contractor" shall be defined as any company, or that individual representing a company, responsible for the fabrication, erection, manufacturing, or welding, in conformance with the provisions of this code.

1.3.3 Inspectors

1.3.3.1 Contractor's Inspector. "Contractor's Inspector" shall be defined as the duly designated person who acts for, and in behalf of, the Contractor on all