

**AWS D1.1/D1.1M:2025**  
**An American National Standard**



# **Structural Welding Code— Steel**



**AWS D1.1/D1.1M:2025**  
**An American National Standard**

**Approved by the**  
**American National Standards Institute**  
**March 19, 2025**

# **Structural Welding Code—Steel**

**25th Edition**

**Revises AWS D1.1/D1.1M:2020**

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 welding requirements for any type of welded structure made from the commonly used carbon and low-alloy constructional steels. Clauses 1 through 11 constitute a body of rules for the regulation of welding in steel construction. There are eight normative and eleven informative annexes in this code. A Commentary of the code is included with the document.



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## Foreword

This foreword is not part of AWS D1.1/D1.1M:2025, *Structural Welding Code—Steel*, but is included for informational 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 and called Code 1 Part A. It was revised in 1930 and 1937 under the same title. It was revised again in 1941 and given the designation D1.0. D1.0 was revised again in 1946, 1963, 1966, and 1969. The 1963 edition published an amended version in 1965, and the 1966 edition published an amended version in 1967. The code was combined with D2.0, *Specifications for Welding Highway and Railway Bridges*, in 1972, given the designation D1.1, and retitled *AWS Structural Welding Code*. D1.1 was revised again in 1975, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2015, and 2020. A second printing of *AWS D1.1/D1.1M:2010, 2015, and 2020* were published in 2011, 2016, and 2022, respectively. From 1972 to 1988, the D1.1 code covered the welding of both buildings and bridges.

In 1988, AWS published its first edition of AASHTO/AWS D1.5M/D1.5, *Bridge Welding Code*; 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 applications. After the publishing of the 2010 edition, it was decided that the *AWS Structural Welding Code—Steel* would be published on a five year revision cycle instead of a two year revision cycle. This was done in order to sync the publication cycle of *AWS Structural Welding Code—Steel* with the publication cycles of the *ANSI/AISC 360, Specification for Structural Steel Buildings* and the *International Building Code*. This 2025 edition is the 25<sup>th</sup> edition of D1.1.

**Changes in Code Requirements**, underlined text in the clauses, subclauses, tables, figures, or forms indicates a change from the 2020 edition. A vertical line in the margin of a table or figure also indicates a change from the 2015 edition.

The following is a summary of the most significant technical changes contained in *AWS D1.1/D1.1M:2025*:

<b>Summary of Changes</b>	
<b>Clause/Table/Figure/Annex</b>	<b>Modification</b>
General	AWS A5.36 filler metal classifications and properties have been removed throughout the standard.
Clause 2—Normative References	The normative references were amended.
Clause 3—Terms and Definitions	New terms and definitions were added.
Clause 4—Design of Welded Connections	Clarified base metal and filler metal strength requirements, added provisions for matching filler metals, added provisions for toughness, added a new subclause 4.7 on Load and Resistance Factor Design (LRFD), added a new Table 4.3 for available strength of welded joints, and added a new Figure 4.7, clarifying the maximum specified fillet weld size along edges.
Clause 5—Prequalification of WPSs	Revised subclause 5.6.1 on matching and undermatching filler metal strength, converted Table 5.1 on prequalified WPS requirements from the previous edition into 4 separate tables, added Group V metals to Table 5.7 on filler metals for matching strengths, and replaced the joint details in Figures 5.1 and 5.2 with new drawings.
Clause 6—Qualification	Qualification for preheat and interpass temperatures were revised, acceptance criteria for macroetch testing was updated, and the WPS qualification tables were changed.
Clause 7—Fabrication	Text was introduced, clarifying production welding requirements and preheat and interpass temperatures, and new weld tab exemptions were listed.

(Continued)

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## Summary of Changes (Continued)

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Clause/Table/Figure/Annex	Modification
Clause 8—Inspection	Additional provisions for Magnetic Particle Testing (MT) and Penetrant Testing (PT) were added, language was included to clarify the certification of personnel performing nondestructive testing (NDT), and the acceptance criteria for visual inspection was updated.
Clause 9—Stud Welding	New provisions for type D studs were added.
Clause 10—Tubular Structures	Revised the requirements for tubular connections and clarified the requirements for T-, Y-, and K- connection procedures.
Annex M	It was presented as Annex N in the previous edition.
Annex N	It was presented as Annex O in the previous edition.
Annex O	It was presented as Annex P in the previous edition.
Annex P	It was presented as Annex Q in the previous edition.
Annex R	It was presented as Annex S in the previous edition and new reference documents were listed.
Annex Q	It was presented as Annex R in the previous edition.
Annex S	New annex that addresses the addition of base materials to AWS D1.1/D1.1M.

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

**Normative Annexes.** These annexes address specific subjects in the code and their requirements are mandatory requirements that supplement the code provisions.

**Informative Annexes.** These annexes are not code requirements but are provided to clarify code provisions by showing examples, providing information, or suggesting alternative good practices.

**Index.** As in previous codes, the entries in the Index are referred to by subclause 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, any significant errata will be published in the Society News Section of the *Welding Journal* and posted on the AWS web site at: <http://www.aws.org/standards/page/errata>.

**Suggestions.** Your comments for improving AWS D1.1/D1.1M:2025, *Structural Welding Code—Steel* are welcome. Submit comments to the Secretary of the D1Q Subcommittee, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

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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 1.5.1) or contract documents specifically modifies or exempts.

The following is a summary of the code clauses:

- 1. General Requirements.** This clause contains basic information on the scope and limitations of the code, key definitions, and the major responsibilities of the parties involved with steel fabrication.
- 2. Normative References.** This clause contains a list of reference documents that assist the user in implementation of this code or are required for implementation.
- 3. Terms and Definitions.** This clause contains terms and definitions as they relate to this code.
- 4. Design of Welded Connections.** This clause contains requirements for the design of welded connections composed of tubular, or nontubular, product form members.
- 5. Prequalification of WPSs.** This clause contains the requirements for exempting a Welding Procedure Specification (WPS) from the WPS qualification requirements of this code.
- 6. Qualification.** This clause contains the requirements for WPS qualification and the performance qualification tests required to be passed by all welding personnel (welders, welding operators, and tack welders).
- 7. Fabrication.** This clause contains general fabrication and erection requirements applicable to welded steel structures governed by this code, including the requirements for base metals, welding consumables, welding technique, welded details, material preparation and assembly, workmanship, weld repair, and other requirements.
- 8. Inspection.** This clause contains criteria for the qualifications and responsibilities of inspectors, acceptance criteria for production welds, and standard procedures for performing visual inspection and nondestructive testing (NDT).
- 9. Stud Welding.** This clause contains the requirements for the welding of studs to structural steel.
- 10. Tubular Structures.** This clause contains exclusive tubular requirements. Additionally, the requirements of all other clauses apply to tubulars, unless specifically noted otherwise.
- 11. Strengthening and Repair of Existing Structures.** This clause contains basic information pertinent to the welded modification or repair of existing steel structures.

### 1.2 Standard Units of Measurement

This standard makes use of both U.S. Customary Units and the International System of Units (SI). The latter are shown within brackets ([ ]) or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore, each system must be used independently.