

AWS D1.3/D1.3M:2008
An American National Standard



Structural Welding Code— Sheet Steel



American Welding Society



second printing, November 2008



**AWS D1.3/D1.3M:2008
An American National Standard**

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Structural Welding Code— Sheet Steel

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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 associated with welding sheet steel having a minimum specified yield point no greater than 80 ksi [550 MPa]. The code requirements cover any welded joint made from the commonly used structural quality low-carbon hot rolled and cold rolled sheet and strip steel with or without zinc coating (galvanized). Clause 1 includes general provisions, Clause 2 design, Clause 3 prequalification, Clause 4 qualification, Clause 5 fabrication, Clause 6 inspection, and Clause 7 stud welding.



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Dedication

The D1 Committee on Structural Welding dedicates this edition of AWS D1.3/D1.3M, *Structural Welding Code—Sheet Steel*, to R. D. “Rollie” Block, past chair and vice chair of the D1H Subcommittee on Sheet Steel. The subcommittee is gratefully indebted to Mr. Block’s tireless efforts, devotion, and enthusiasm in making this revision of D1.3 possible. The members of D1 and D1H extend a warm “Thank you, Rollie!” in his memory.

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Foreword

This foreword is not part of AWS D1.3/D1.3M:2008, *Structural Welding Code—Sheet Steel*, but is included for informational purposes only.

When the first edition of AWS D1.3, *Specification for Welding Sheet Steel in Structures*, was developed and issued in the 1978, it was anticipated that changes would be needed in the specification as further research was conducted on sheet steel welded joints. After users' experience with the specification and development of new sheet steel applications, it was revised in 1981, 1989, 1998, and 2008. Also, in the 1981 edition, the title of the standard was changed to AWS D1.3, *Structural Welding Code—Sheet Steel*, to conform with the uniform titles now being given to standards developed by the AWS D1 Committee on Structural Welding. The many changes in this document reflect both experience in using the code and the results of research, principally by the American Iron and Steel Institute's Subcommittee on Sheet Steel.

One of the primary objectives of this code is to define the allowable capacities used in sheet steel applications in which transfer of calculated load occurs. The foremost examples of such applications are steel decks, panels, storage racks, and stud and joist framing members. It is a concurrent objective of this code to impose workmanship, technique, and qualification requirements so as to effect consistently sound execution of welding of joints in these categories.

Certain shielded metal arc, gas metal arc, gas tungsten, gas metal arc, and flux cored arc welding procedure specifications (WPSs) when used with certain types of joints, have been tested by users and have a history of satisfaction performance. These WPSs are designated as prequalified, may be employed without further evidence, and include most of those that are commonly used. However, the purpose of defining prequalified WPSs is not to preclude the use of other WPSs as they are qualified.

Then other processes, WPSs, or joints are proposed, they are subject to the applicable provisions of this code and shall be qualified by tests. The obligation is placed on the contractor to prepare WPSs and qualify them before production use.

All WPSs (prequalified and qualified) must include the classification of the filler metal, its size, and for each type of weld, its melting rate or other suitable means of current control indicative of the melting rate, as applicable. The requirements for the qualification of welders and welding operators are also given. Welder qualification test requires each welder prove their ability to produce satisfactory weld using these prequalified or qualified WPSs.

Although this code is essentially directed at those joints that are used to transfer loads, the quality of welds where strength is not a governing consideration should meet quality standards that will maintain the integrity of the supporting structure. The allowable capacity provisions of Clause 2 could be disregarded when the welds are not used in a load-carrying capacity.

Underlined text in the subclauses, tables, or figures indicates an editorial or technical change from the 1998 edition. A vertical line in the margin next to a figure or table indicates a revision from the 1998 edition.

The following is a summary of the most significant technical revisions contained in D1.3/D1.3M:2008:

- (1) Addition of a new normative annex listing requirements when welding D1.3 sheet steels to other D1.1 steel product forms.
- (2) New Commentary for Clauses 2, 4, 5, and Annex A.
- (3) Extensive revisions in Tables 1.2, 4.1, and 4.2.
- (4) Addition of new essential variables within Table 4.3.
- (5) Addition of Tables 1.1, 3.1, and A.1.
- (6) Revisions throughout Figures 2.7, 3.1, 3.2, 3.3, 4.1, and C-2.1.

(7) New equation for SMAW melting rate.

(8) Deletion of Clause 7 Stud Welding.

(9) Weld/base-metal fusion restriction added in weld acceptance criteria.

(10) WPS temperature qualification changed from 60°F [16°C] or higher to 100°F [38°C] or lower.

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

Errata. It is the policy of the AWS D1 Committee on Structural Welding that all errata should be made available to users of this code. Therefore, in the Society News Section of the AWS *Welding Journal*, and errata (major editorial changes) that have been noted will be published in the July and November issues of the *Welding Journal* and posted on the AWS web site.

Suggestions. 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.

Errata

The following Errata have been identified and incorporated into the current reprint of this document.

Page 25—Subclause 4.6.1.1—incorrect reference—correct reference from “3.2” to “Clause 3.”

Page 26—Subclause 4.6.2.1—incorrect reference—correct reference from “3.3” to “Clause 3.”

Page 26—Subclause 4.6.3.1—incorrect reference—correct reference from “3.4” to “Clause 3.”

Pages 51–84—Headers—correct page headers from “AWS D1.3/D1.3M:2007” to “AWS D1.3/D1.3M:2008.”

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Structural Welding Code—Sheet Steel

1. General Provisions

1.1 Scope

This code contains the requirements for arc welding of structural sheet/strip steels, including cold formed members, hereafter collectively referred to as “sheet steel,” which are equal to or less than 3/16 in (0.188 in) [4.8 mm] in nominal thickness. When this code is stipulated in contract documents, conformance with all its provisions shall be required, except for those provisions that the Engineer or contract documents specifically modifies or exempts.

When used in conjunction with AWS D1.1, conformance with the applicable provisions of Annex A of AWS D1.3 shall apply (see also Table 1.1). Two weld types unique to sheet steel, arc spot, and arc seam are included in this code.

1.1.1 Applicable Materials. This code is applicable to the welding of structural sheet steels to other structural sheet steels or to supporting structural steel members.

1.1.2 General Stipulations. The fundamental premise of the code is to provide general stipulations applicable to any situation. Acceptance criteria for production welds different from those specified in the code shall be permitted for a particular application, provided they are suitably documented by the proposer and approved by the Engineer. These alternate acceptance criteria shall be based upon evaluation of suitability for service using past experience, experimental evidence, or engineering analysis considering material type, service load effects, and environmental factors.

1.1.3 Approval. All references to the need for approval shall be interpreted to mean approval by the Engineer, defined as the duly designated person who acts for and in behalf of the owner on all matters within the scope of this code. Deviations from code requirements shall require the Engineer’s approval.

1.2 Sheet Steel Base Metal

1.2.1 Specified Base Metals. Sheet steel base metals to be welded under this code shall conform to the requirements of the latest edition of one of the specifications listed in Table 1.2, or any sheet steel qualified in conformance with 1.2.2. Any combination of these steels may be welded together. These steels may also be welded to any of the steels listed in the latest edition of AWS D1.1, *Structural Welding Code—Steel*.

1.2.2 Other Base Metals. When a steel other than those covered in 1.2.1 is approved under the provisions of the project or product specification, and such a steel is proposed for welded construction, the weldability of the steel and the WPS for welding it shall be established by qualification in conformance with the requirements of Clause 4 and such other requirements as prescribed by the Engineer.

1.2.3 Minimum Yield Point. The provisions of this code are intended for use with sheet steel having a minimum specified yield point equal to or less than 80 ksi [550 MPa].

1.3 Welding Processes

1.3.1 Approved Processes. This code provides for welding with the shielded metal arc welding (SMAW), gas metal arc welding (GMAW), flux cored arc welding (FCAW), gas tungsten arc welding (GTAW), or submerged arc welding (SAW) welding processes. (*NOTE: Any variation of gas metal arc welding (GMAW), including short-circuiting transfer, is acceptable.*)

1.3.2 Stud Welding. When stud welding through the flat portion of sheet steel decking or roofing onto other product forms, the WPS, the studs, and the quality control requirements shall conform with the applicable provisions in the AWS D1.1 code.