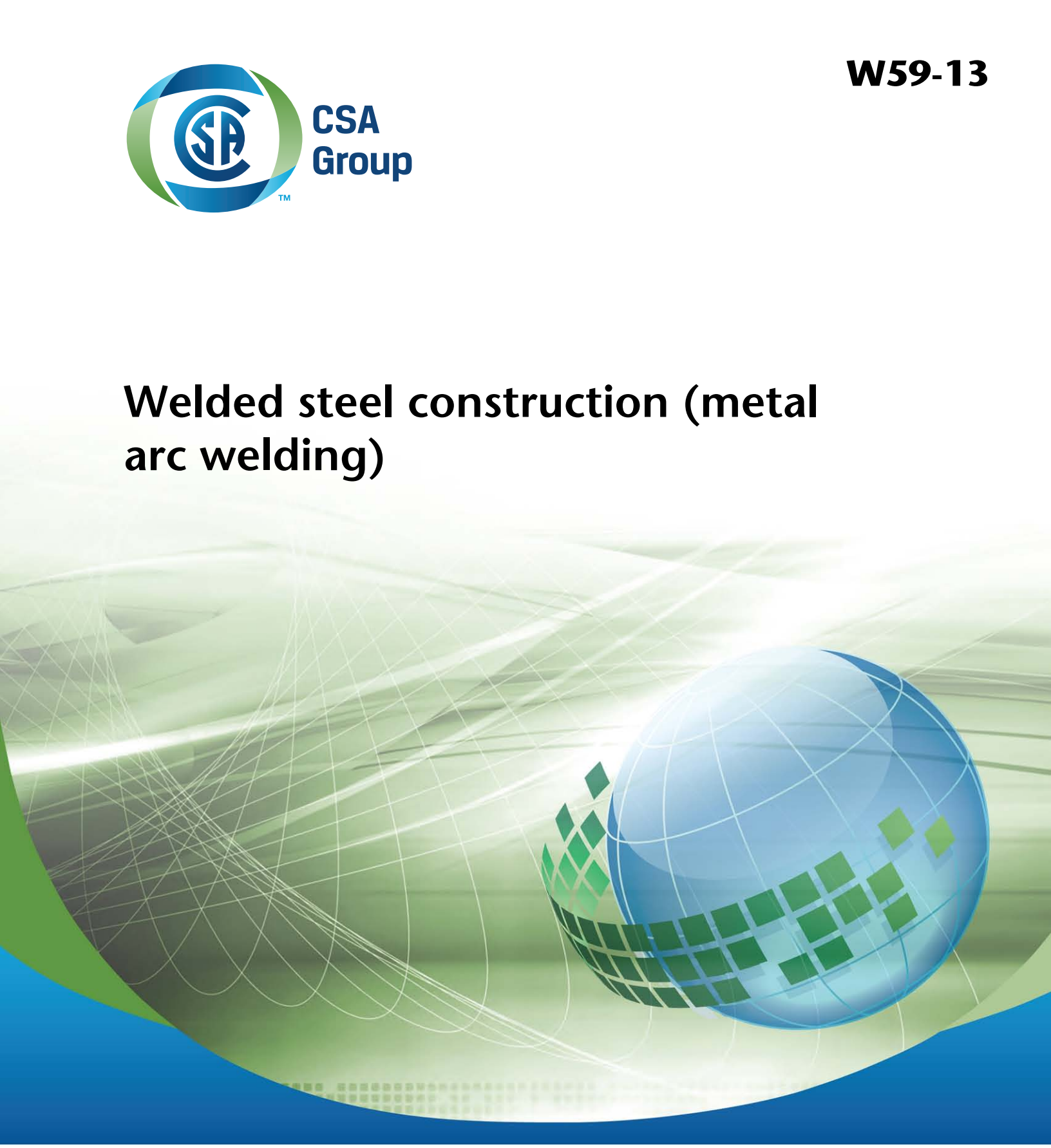
CSA Group

W59-13

Welded steel construction (metal arc welding)



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Preface

This is the ninth edition of CSA W59, *Welded steel construction (metal arc welding)*. It supersedes the previous editions published in 2003, 1989, 1984, 1982, 1977, 1970, 1946, and 1940.

The following is a brief description of some of the most significant changes to the current edition of CSA W59:

- The Scope now acknowledges that provisions gas tungsten arc welding are now included in the Standard.
- Clause 3 has been revised to add requirements for the welding of prequalified joints with multiple welding processes. Clause 3 also acknowledges that joints welded by either gas tungsten arc or pulsed gas metal arc welding processes can now be deemed as prequalified. Several steels have been added to the prequalified list.
- In Clause 4, references to allowable stress design for welds have been deleted from the main body of the standard and moved to a non-mandatory annex (see Annex S).
- Clause 5 has been updated to include reference to gas tungsten arc welding and clarification on the requirements related to hydrogen designators. The section on stud welding has been reworked and moved to Clause 6.
- Clause 6 now contains requirements for stud welding; these requirements were previously in Clause 5.5.6.
- Clause 7 has been reworked to provide clarity on roles and responsibilities for welding inspection.
- In Clause 8, allowances for the use of alternative ultrasonic methods and alternative radiation imaging systems have been added.
- In Clause 10, all the figures have been reviewed for consistency. A major inclusion is the prequalified joint geometries for the gas tungsten arc welding process and the pulsed gas metal arc welding process.
- Clause 11, for statically loaded structures, has been changed in two ways. The first change is to remove the allowable stress design (ASD) design provisions from this Clause (see Annex S). The second change is to make the design provisions for fillet weld connections consistent with CSA S16-09. The changes to fillet weld design are as follows: the base metal check is no longer required; and there is now a method for designing joints combining longitudinal and transverse fillet welds (or any weld orientation in between). The materials tables have also been updated to reflect additional materials in use.
- In Clause 12, for cyclically loaded structures, the changes are similar to those made in Clause 11; ASD design provisions have been deleted (see Annex S) and design provisions for the ultimate strength of fillet welds have been made consistent with CSA S16-09. The materials tables have also been updated to reflect additional materials in use.

As CSA W59 contains no commentary, various non-mandatory annexes have been included to generate a better understanding of certain aspects of welded steel construction. The annexes of the previous edition of W59 have generally been reviewed for clarity:

- Annex N has been revised to include additional information on the relationship between voltage and wire feed speed
- Annex P has been updated to alternative preheat determination methodologies.
- Annex R has been updated to add reference to Ultrasonic Impact Technology as a possible method of fatigue life enhancement.
- Annex S has been added to reference design provisions for allowable stress design from the previous edition of CSA W59.
- Annex T has been added to provide a description and intended use of electrodes for gas metal arc welding in consideration of the classification system of CAN/CSA-ISO 14341.
- **Annex U** has been added to provide welding requirements for fixed steel offshore structures previously contained in CSA S473, which has been withdrawn following the adoption of ISO 19902 as a National Standard of Canada (CAN/CSA-Z19902). The provisions of this Annex supersede the provisions for the welding of offshore structures contained in CSA S473.

- Annex V has been added to provide a comparison chart for previous electrode classifications used in the CSA W48 series of standards.

This Standard was prepared by the Technical Committee on Welding of Bridges, Buildings, and Machinery and the Offshore Welding Task Group, under the jurisdiction of the Strategic Steering Committee on Construction and Civil Infrastructure, and has been formally approved by the Technical Committee.

Notes:

(1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*

(2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*

(3) *This Standard was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*

(4) *To submit a request for interpretation of this Standard, please send the following information to* ***inquiries@csagroup.org*** *and include "Request for interpretation" in the subject line:*
(a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;
(b) provide an explanation of circumstances surrounding the actual field condition; and
(c) where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.
Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization *and are available on the* Current Standards Activities *page at* ***standardsactivities.csa.ca****.*

(5) *This Standard is subject to review five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to* ***inquiries@csagroup.org*** *and include "Proposal for change" in the subject line:*
(a) Standard designation (number);
(b) relevant clause, table, and/or figure number;
(c) wording of the proposed change; and
(d) rationale for the change.

W59-13
Welded steel construction (metal arc welding)

1 Scope

1.1
This Standard covers welding requirements for carbon and low-alloy welded steel construction, with the exception of those types listed in Clause 1.2.

Requirements that are essentially common to all such structures are covered in Clauses 3 to 10, while provisions applying specifically to statically-loaded structures and to cyclically-loaded structures are included in Clauses 11 and 12, respectively.

1.2
This Standard is not intended to apply to pressure vessels or to structures governed by special codes such as those of the American Petroleum Institute, the American Society of Mechanical Engineers, or the American Water Works Association.

1.3
This Standard includes provisions for the following:
(a) shielded metal arc welding (SMAW);
(b) submerged arc welding (SAW);
(c) gas metal arc welding (GMAW);
(d) gas tungsten arc welding (GTAW);
(e) flux-cored arc welding (FCAW);
(f) metal-cored arc welding (MCAW);
(g) electroslag welding (ESW);
(h) electrogas welding (EGW); and
(i) stud welding (SW) processes.

1.4
The provisions of this Standard are not intended for use with steels having a specified minimum yield strength over 700 MPa (100 000 psi).

1.5
This Standard applies to the welding of base metals 3 mm (1/8 in) and thicker. In cases where base metals less than 3 mm (1/8 in) thick are to be welded to base metals 3 mm (1/8 in) and thicker, the requirements of AWS D1.3/AWS D1.3M and this Standard apply. In the case of any conflict between AWS D1.3/AWS D1.3M and this Standard, the requirements of this Standard govern.

Note: *In cases where base metals less than* 3 mm *(*1/8 in*) thick are to be welded to base metals less than* 3 mm *(*1/8 in*), the requirements of AWS D1.3/AWS D1.3M may be appropriate.*

1.6
This Standard does not address safety problems associated with welding and welding practices.

Note: *CSA W117.2 addresses safety in welding, cutting, and allied processes, and should be followed in addition to any applicable workplace health and safety legislation in effect. It is the responsibility of the user of this Standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.*