

# CAN/CSA-S16-14 – Design of Steel Structures Welding Requirements

This document provides an overview of the requirements of *CAN/CSA-S16-14 –Design of Steel Structures* with respect to welding. It is designed to provide guidance for individuals and organizations involved in the design, fabrication, and erection of steel structures in Canada.

This document is only for general guidance purposes; reference to the full text of CSA S16 should be made. For further information, please contact the CWB at 1-800-844-6790 or [info@cwbgroup.org](mailto:info@cwbgroup.org).

## **Introduction**

Welding is a key joining method used in the fabrication of steel structures. To ensure welds of the highest quality and the safety of both the users of buildings and the general public, CSA Standard S16 provides specific requirements around the design of steel structures and welded fabrication and erection of steel structures, with awareness that buildings are occupied by people.

## **Welded Fabrication**

CSA S16 provides the following requirements:

### **24.1 Arc welding**

*Arc welded joints shall be designed in accordance with*

*(a) Clause 13.13 for factored resistance of welds under static loading with matching electrode (see CSA W59 for locations and conditions where non-matching is permissible); and*

*(b) Clause 26 for resistance to fatigue loading, with matching electrode (see CSA W59 for locations and conditions where non-matching is permissible).*

*For all other aspects of welding, the requirements of CSA W59 shall be followed.*

### **24.2 Resistance welding**

*The resistance of resistance-welded joints shall be in accordance with CSA W55.3. Quality assurance and weld process control procedures shall be as specified in CSA W55.3.*

### **24.3 Fabricator and erector qualification**

*Fabricators and erectors responsible for welding structures fabricated or erected under this Standard shall be certified by the Canadian Welding Bureau to the requirements of CSA W47.1 (Division 1 or Division 2), CSA W55.3, or both, as applicable. Part of the work may be sublet to a Division 3 fabricator or erector; however, the Division 1 or Division 2 fabricator or erector shall retain responsibility for the sublet work.*

CSA Standard W47.1 provides requirements for the qualification of welders and welding operators, welding procedures and welding supervisory and engineering personnel. A company certified to CSA W47.1 Division 1 requires having full time engineer(s) and a company certified to Division 2 requires having retained part time engineer(s).

CSA Standard W55.3 provides requirements for the qualification of welding operators, welding procedures and welding supervisory and engineering personnel. A company certified to CSA W55.3 Division 1 requires having full time engineer(s) and a company certified to Division 2 requires having retained part time engineer(s). All companies certified to CSA W55.3 require to have in place a quality system for resistance welding.

CSA Standard W59 provides guidance on weld design, fabrication techniques, inspection and other key considerations around welding for steel. CSA Standard W59 requires that contractors performing work under this standard be certified under the requirements of CSA Standard W47.1 unless the Engineer of record approves the contractor for the work to be undertaken.

An organization meeting the requirements of CSA Standard W47.1 and / or CSA Standard W55.3 will have qualified welders, operators, accepted welding procedures and accepted supervisory/engineering personnel. All elements of the welding operation will be independently verified by the Canadian Welding Bureau on an on-going basis.

Please note that there are no domestic or international equivalents to CSA Standard W47.1 and / or CSA Standard W55.3. Other national systems, such as that of the American Welding Society (AWS) do not include key concepts such as independent and on-going verification and welding supervisors/engineers. The CWB strongly cautions the reader around accepting substitutions; doing so may contravene the intent of CSA S16 and place public safety at risk.

For a listing of all organizations that currently meet the requirements of CSA Standard W47.1 and CSA Standard W55.3 please see [www.cwbgroup.org](http://www.cwbgroup.org).

## **Welding Inspection**

### **30.5.1 Extent of examination**

#### **30.5.1.1 General**

*The fabricator or erector shall visually inspect all welds. Non-destructive examination of welds (other than visual) shall be completed by the fabricator or erector when specified by the owner. Third party welding inspection (visual and/or non-destructive) shall be performed when required by the owner.*

#### **30.5.2.2 Competency of all personnel performing non-destructive testing (not including visual inspection)**

*Competency of all personnel performing non-destructive testing, other than visual, shall be in accordance with CAN/CGSB-48.9712/ISO9712.*

#### **30.5.2.3 Competency for third-party personnel performing non-destructive testing (visual inspection only)**

*The competency of third-party visual inspection personnel shall meet the requirements of CSA W178.2 or AWS QC1. AWS inspectors shall have evidence of an eye exam showing 20/20 vision corrected or uncorrected within the last 2 years.*

#### **30.5.2.5 Non-destructive testing personnel**

*Non-destructive testing personnel referenced in Clause 30.5.2.2 and 30.5.2.3 shall meet the requirements of Level 2 or 3 of CSA W178.2, AWS QC1 or CAN/CGSB-48.9712/ISO9712 as applicable. Level 1 personnel (or a CAWI under AWS QC1) may only perform the applicable tasks under the direct supervision of a Level 2 or 3 personnel.*

**Note:** *For personnel certified under AWS QC1, a CWI or SCWI is equivalent to an inspector certified to Level II of CSA W178.2.*

### **30.5.3 Acceptance criteria**

*The fabricator or erector shall ensure that all welds under their responsibility comply with the CSA W59. When third-party welding inspection is required by the owner, such verification shall be completed by the fabricator or erector prior to the third-party inspection.*

*Unless otherwise specified, the acceptance criteria for all welds shall be in accordance with CSA W59.*

CSA Standard W59 requires that all welds be visually inspected. In addition, when required by contract weld inspection must be completed by certified welding inspectors or a welding inspection organization following the requirements of CSA Standard W178.2 or CSA Standard W178.1 respectively. It also requires that CSA Standard W59 be followed for the acceptance criteria for all welds. It should be noted that CSA Standard W178.2 has individual "product categories" that inspectors may qualify to, including one for CSA Standard W59.

For a listing of all organizations and individuals who currently meet the requirements of CSA Standard W178.1 and CSA Standard W178.2, please see [www.cwbgroup.org](http://www.cwbgroup.org).

## **Welding Consumables**

### **5.1.8 Welding electrodes**

*Welding electrodes shall meet the requirements of CSA W48, as applicable.*

CSA Standard W48 provides requirements for the classification and certification of welding consumables by itself or in conjunction with gas mixtures or fluxes as applicable. Welding consumables certified by the CWB have undergone through periodically testing and acceptance of quality management system of the manufactures.

For a listing of all consumables who currently meet the requirements of CSA Standard W48 please see [www.cwbgroup.org](http://www.cwbgroup.org).

