

# On-Site Structural Welding

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This document provides information for duty holders (e.g. employers and persons who manage or control workplaces) about risks associated with on-site structural welding and how to control these risks.

## Background

WorkSafe has identified serious safety issues related to the performance and management of on-site structural welding which may result in catastrophic structural collapse and cause serious and/or fatal injuries to workers (and other persons) in the vicinity. For example:

- poor quality structural welds;
- an absence of documentation to verify the qualifications or competency of persons performing structural welding works;
- incomplete welding specifications in the structural engineering documentation;
- insufficient or lack of necessary welding procedures for welders; and
- failure to have welds inspected and signed-off by a suitably competent person (e.g. welding inspector) before a structural engineer approves the removal of the temporary structural supports, or the welds are grouted over.

Situations where these deficiencies have been identified include:

- welding of stitch / fish / connection plates on pre-cast concrete panels;
- welding of structural steel members to cast in plates (e.g. awnings to a precast panel); and
- on-site welding of structural steel members.

**Note:** Welds required to resist structural loads or restrain structural elements temporarily are still 'structural welds' and need to be managed accordingly. For example, precast panel stitch plates and associated welds designed as temporary restraints to enable the removal of panel bracing prior to casting and curing of concrete floor slabs.

## Controlling the risks

Relevant duty holders (generally the builder) should ensure that both temporary and permanent works are constructed in accordance with the structural engineer's or designer's specifications.

In practice, the specifications typically require compliance with Australian Standards AS4100: *Steel structures* and/or AS/NZS1554: *Structural steel welding* in order to meet requirements under the National Construction Code/Building Code of Australia. These standards specify a quality assurance system to ensure the integrity of the structural welding (including on-site welding).

Ensure the system of work associated with on-site structural welding includes the following key aspects of a welding quality assurance system:

1. provision of a **welding specification** with the structural design;
2. development of a **welding procedure** by a qualified person and that this is communicated to the welder(s);
3. verification of the **qualifications and/or competency** of the welder(s) engaged;
4. oversight of the welding works by a qualified **welding supervisor**; and
5. sign-off of completed welds by a qualified **welding inspector** as complying with the design.

Further information regarding each of these items, including details of acceptable qualifications, is provided in AS1554.1:2014 '*Structural steel welding, Part 1: Welding of structural steel*'.

Where compliance with AS4100 and/or AS/NZS 1554 is not specified in the structural engineer's or designer's specifications, an alternative and equivalent quality assurance system to ensure the integrity of the structural welding should be followed and documented.

Where site conditions or fabrication errors do not allow for the original design to be followed, an alternative structural solution should be designed and documented by a structural engineer before rectification works are undertaken.

## Examples of unacceptable work practices

The following are examples of deficient structural welds and associated design alterations observed by WorkSafe. Duty holders should ensure that persons undertaking welding work, inspection and certification do so in accordance with the relevant Australian Standards to ensure the welds are appropriate and safe.



### Further information

- Occupational Health & Safety Act 2004
- Contact WorkSafe Victoria Advisory Service on 1800 136 089 or go to [worksafe.vic.gov.au](http://worksafe.vic.gov.au).

### WorkSafe publications

- Industry Standard: Precast and tilt-up concrete for buildings
- Industry Standard: Safe erection of structural steel for buildings
- Information About: Precast and tilt-up concrete construction

### Other publications

- Australian Standard AS3850:2015 Part 1 & 2 - Prefabricated concrete elements
- Australian Standard AS4100:1998 - Steel Structures
- Australian Standard AS/NZS 1554.1:2014 - Structural steel welding, Part 1: Welding of Steel Structures
- National Construction Code 2016 (incorporating the Building Code of Australia)

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