AS/NZS 1554.7:2006

Australian/New Zealand Standard™

Structural steel welding

Part 7: Welding of sheet steel structures

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee WD-003, Welding of Structures. It was approved on behalf of the Council of Standards Australia on 7 September 2006 and on behalf of the Council of Standards New Zealand on 15 September 2006.
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Australian Industry Group
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee WD-003, Welding of Structures.

The objective of this Standard is to provide rules for the welding of a wide range of light gauge steel constructions designed in accordance with the requirements of AS/NZS 4600, although this Standard has been specifically prepared for steel structures, it may be usefully applied to machine frames and other types of steel constructions.

Given the historical links between the requirements of AS/NZS 4600, *Cold-formed steel structures* and the American Welding Society's AWS D1.3, *Structural Welding Code—Sheet Steel*, this Standard takes cognizance of the requirements and practices associated with AWS D1.3, and the similar requirements contained within AS/NZS 1554.1, *Structural steel welding* Part 1: *Welding of steel structures,* for category GP quality welds.

The Standard requires that weld preparations, welding consumables and welding procedures be qualified before commencement of welding. Prequalified joint preparations, welding consumables and welding procedures are also given in the Standard.

The Standard caters specifically for statically loaded structures and, similarly to AS/NZS 4600, does not consider brittle fracture requirements. Under circumstances where brittle fracture is considered likely, the user is instead referred to AS/NZS 1554.1. Whilst AS/NZS 4600 now caters for dynamic loading conditions, both AS/NZS 4600 and this Standard also refer the user to the more appropriate requirements of AS/NZS 1554.1 Category SP, or for high levels of dynamic loading (fatigue), to AS/NZS 1554.5, *Structural steel welding* Part 5: *Welding of steel structures subject to high levels of fatigue loading*. This will ensure that appropriate levels of supervision and inspection will be applied to the relevant parts of the structure.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the arc welding of steel structures made up of combinations of steel plate, sheet or sections, including pipe, hollow sections and built-up sections (collectively referred to herein as sheet steels) up to 4.8 mm in thickness by the following processes:

(a) Manual metal-arc welding (MMAW).

(b) Submerged arc welding (SAW).

(c) Gas metal-arc welding (GMAW or MIG), including pulsed mode.

(d) Gas tungsten-arc welding (GTAW or TIG).

(e) Flux-cored arc welding (FCAW).

The Standard is limited to the welding of steel parent material with a specified minimum yield strength not exceeding 550 MPa.

1.2 APPLICATION

The Standard applies to the welding of steelwork in structures complying with AS/NZS 4600. The following limitations apply:

(a) For other than fatigue conditions, where welded joints are governed by dynamic loading conditions, all welding shall comply with AS/NZS 1554.1 category SP.

(b) For welded joints subject to fatigue conditions (i.e., weld categories higher than detail category 118 of AS/NZS 4600), welding shall comply with AS/NZS 1554.5.

Consistent with AS/NZ 4600, brittle fracture provisions have not been included in this Standard. For service temperatures colder than –10°C (see Appendix B), the brittle fracture provisions of AS/NZS 1554.1 for materials and welding consumables shall apply.

In addition to the abovementioned structures, the Standard applies to the welding of steelwork in applications other than structural.

Provided approval has been obtained from the Principal, the Standard may be applied to the welding of sheet steels up to 4.8 mm thickness in structures designed in accordance with AS 4100 and NZS 3404.1, where category GP is specified. The welding of sheet steels thicker than 4.8 mm, shall comply with the requirements of AS/NZS 1554.1.

When stud welding through the flat portion of decking or roofing onto supporting structural members, the weld procedure shall comply with the requirements of AS/NZS 1554.2.

1.3 EXCLUSIONS

The Standard does not apply to the welding of structures by the following processes:

(a) Oxyacetylene welding (OAW).

(b) Friction welding (FW).

(c) Thermit welding (TW).

(d) Resistance welding (RW).

(e) Electroslag (including consumable guide) welding (ESW).

(f) Electrogas welding (EGW).

NOTE: Resistance welds in structures complying with AS/NZS 4600 should be made in accordance with AWS C1.1 or AWS C1.3, as appropriate.

The Standard does not apply to the welding of pressure vessels and pressure piping.

The Standard does not cover the design of welded connections or permissible stresses in welds, nor the production, rectification or repair of castings.

1.4 INNOVATION

Any alternative materials, welding processes, consumables, methods of construction or testing that give equivalent results to those specified, but do not comply with the specific requirements of this Standard or are not mentioned in it, are not necessarily prohibited.

The Joint Standards Australia/Standards New Zealand Committee on welding of structures can act in an advisory capacity concerning equivalent suitability, but specific approval remains the prerogative of the inspecting authority.

1.5 REFERENCED DOCUMENTS

The documents referred to in this Standard are listed in Appendix A.

1.6 DEFINITIONS

For the purpose of this Standard, the definitions given in AS 2812 and those below apply.

1.6.1 Fabricator

The person or organization responsible for the welding of the structure during fabrication or erection.

1.6.2 Inspecting authority

The authority having statutory powers to control the design and erection of buildings or structures.

NOTE: Where the structure is not subject to statutory jurisdiction, the principal is deemed to be the inspecting authority.

1.6.3 Inspector

A person employed by or acceptable to the inspecting authority or principal for the purpose of inspecting welding in accordance with this Standard.

1.6.4 May

Indicates the existence of an option.

1.6.5 Principal

The purchaser or owner of the structure being fabricated or erected, or a nominated representative.

NOTE: The nominated representative should be suitably qualified to deal with the technical issues of this Standard.

1.6.6 Shall

Indicates that a statement is mandatory.

1.6.7 Should

Indicates a recommendation.

1.7 SYMBOLS

For the purpose of this Standard the symbols given in AS 1101.3 apply.

1.8 BASIC WELDING REQUIREMENTS

The basis of this Standard is that a weld shall—

(a) be made in accordance with a qualified welding procedure;

(b) be carried out by a welder suitably qualified to carry out such a procedure;

(c) be carried out under the supervision of a welding supervisor who is employed by or contracted to the fabricator; and

(d) comply with the appropriate requirements of this Standard.

For some conditions prescribed herein, the welding procedure is deemed to be prequalified and may not require full qualification testing (see Clause 4.3 and Table 4.7.1).

NOTE: Fabricators may find it useful to refer to AS/NZS ISO 3834 and its parts where fabrication activities require the approval of the principal or the inspecting authority, or where the fabrication of large, complex or critical structures is being undertaken.

1.9 SAFETY

1.9.1 Safety equipment and procedures

Welding shall be carried out in accordance with the relevant requirements of AS 1470, AS 1674.1, AS 1674.2, AS 2865, AS/NZS 1336, AS/NZS 1337 and AS/NZS 1338.1.

1.9.2 Welding equipment

Welding plant and equipment shall comply with the relevant sections of appropriate regulations, and AS 2799, AS/NZS 1995, and AS 60974.1.

1.9.3 Other hazards

The fabricator shall identify and manage any other risks and hazards from welding that are not covered by Clauses 1.9.1 and 1.9.2. In particular, due consideration shall be given to the control and dispersal of emitted fumes, especially when welding through paints, primers and other surface coatings.

NOTES:

1 Guidance on the management of risk is given in AS/NZS 4360.

2 Further guidance on safety precautions is given in WTIA Technical Notes 7 and 22.

SECTION 2 MATERIALS OF CONSTRUCTION

2.1 PARENT MATERIAL

The parent material to be welded shall—

(a) be of a grade with a specified minimum yield strength not exceeding 550 MPa; and

(b) comply with AS 1163, AS 1397, AS 1450, AS 1548, AS/NZS 1594, AS/NZS 1595, AS/NZS 3678, AS/NZS 3679.1, AS/NZS 3679.2, and NZS 3415, as appropriate.

NOTE: Any steel type from any Standard above may be welded to any other steel type from any Standard above, provided the requirements of this Standard are met for each of the steels.

With the exception of quenched and tempered steels, parent materials not identified to a Standard nominated in Item (b) above may be used provided one of the following requirements are met:

(i) Testing of the material to determine compliance with any of the grade types in the Standards nominated in Item (b) above has been carried out to the satisfaction of the principal.

(ii) A comparison of supplied test certificates with the requirements of any of the grade types in the Standards nominated in Item (b) above has been performed to the satisfaction of the principal.

NOTES:

1 For high-strength quenched and tempered steels, see AS/NZS 1554.4.

2 Steels relying on a strength increase from cold work may incur a loss of strength in the heat-affected zone of the weld.

3 For steels subject to design service temperatures colder that −10°C, reference should be made to the brittle fracture provisions of AS/NZS 1554.1. Impact tests (not normally a requirement of this Standard) in addition to those prescribed by the Standards in Item (b) above may be required to establish compliance with AS/NZS 1554.1.

2.2 BACKING MATERIAL

The weldability of permanently attached steel backing material shall be not less than that of the parent material.

Temporary backing material of any type may be used for welds, provided the finished weld complies with the requirements of this Standard.

2.3 WELDING CONSUMABLES

2.3.1 Electrodes and filler wires

Electrodes for manual metal-arc welding shall comply with AS/NZS 1553.1, AS/NZS 4857 or ISO 2560, as applicable (see Clause 4.6.1).

Electrodes or filler wires for processes other than manual metal-arc welding shall comply with AS 1858.1, AS/NZS 1167.2, AS/NZS 2717.1, AS/NZS ISO 17632 or ISO 636, as applicable (see Clause 4.6.1).

Electrodes that do not comply with the above Standards may be used, provided that they are qualified in accordance with the requirements of Clause 4.6.2.