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AS 1554.4—1989

Australian Standard®

SAA Structural Steel Welding Code

Part 4: Welding of high strength quenched and tempered steels

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The following interests are represented on Committee WD/3:

Association of Consulting Engineers, Australia
Australian Chamber of Commerce
Australian Institute of Steel Construction
Bureau of Steel Manufacturers of Australia
Confederation of Australian Industry
Departement of Defence
Electricity Supply Association of Australia
Institution of Engineers, Australia
Metal Trades Industry Association of Australia
National Association of Australia State Road Authorities
Railways of Australia Committee
Steel Reinforcement Promotion Group
University of Sydney
Welding Technology Institute of Australia

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Australian Standard®

Structural steel welding

Part 4: Welding of high strength quenched and tempered steels (known as the SAA Structural Steel Welding Code)

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PREFACE

This Standard was prepared by the Standards Australia Committee on Welding of Structures.

The Standard provides rules for the welding of a wide range of welded constructions using high strength quenched and tempered steel parent material and, while it is expected that its main use will be for statically loaded welds, it applies also to some welds subject to fatigue. The Standard has been specifically prepared for steel structures, but may be usefully applied to machine frames and other types of steel constructions.

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, in catering for structures subject to fatigue conditions as well as statically loaded structures, provides three categories of welds with three differing levels of weld quality assurance associated with the different types of service to which the welds are subjected. The intention is that the designer should select the category suited to the severity of the service and nominate this on the drawings; where a structure contains more than one category, this will ensure that appropriate levels of supervision and inspection will be applied to the relevant parts of the structure.

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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard specifies materials of construction, weld preparations and weld qualities, qualification of welding procedures and welding personnel, and fabrication and inspection requirements for welds related to the fusion welding of steelwork in structures made up of combinations of steel plate, sheet, or sections, including hollow sections and built-up sections, or castings and forgings, by the following processes:

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

(b) Submerged arc welding (SAW).

(c) Gas metal-arc welding (GMAW).

(d) Flux cored arc welding (FCAW).

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

(f) Electrogas welding (EGW) (see Note).

NOTE: These processes may not be suitable for welding quenched and tempered steels (see AWRA Technical Note 15).

The Standard is limited to the welding of quenched and tempered steel parent material complying with Clause 2.1.

The Standard applies specifically to the welding of steelwork in structures complying with appropriate Standards (see Note below). Where the proportions of welded joints in these structures are governed by dynamic loading conditions, the Standard applies only to those welded joints which comply with the fatigue provisions of AS 1250, as limited by (i) below, or the directly equivalent fatigue provisions of other application Standards.

Where the operating temperature is lower than −10°C, special consideration should be given to brittle fracture.

The Standard applies to welded joints which are—

(i) not subject to fatigue conditions; or

(ii) subject to fatigue conditions, and—

(A) the stress range in the welded joint complies with the permissible stress range of stress categories C,D,E, and F of AS 1250;

(B) the stress range in the welded joint is not more than 80 percent of the permissible stress range of stress category B of AS 1250 (category SP weld, see Clause 1.5.2); or

(C) the stress range in the welded joint is greater than 80 percent, but does not exceed the fatigue stress allowed in AS 1250 for stress category B (category FP weld, see Clause 1.5.2).

In addition to the abovementioned structures, the Standard applies to the welding of cranes, hoists, earth-moving equipments and other dynamically loaded structures, the welding of road and pedestrian bridges, and the welding of steelwork in applications other than structural.

NOTE: Complementary codes which facilitate design in and fabrication of high strength quenched and tempered steels include the following:

(i) American Institute of Steel Construction Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

(ii) American Association of State Highway and Transportation Officals, Standard Specifications for Highway Bridges.

(iii) American Railway Engineering Association Specifications for Steel Railway Bridges.

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

(a) Oxy fuel gas welding (GW).

(b) Gas tungsten arc welding (GTAW).

(c) Resistance welding (RW).

(d) Friction welding (FW).

(e) Thermit welding (TW).

It also does not apply to the welding of pressure vessels and pressure piping or railway bridges.

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

1.2 INNOVATION. Any novel materials, welding processes or consumables, or methods of construction which do not comply with a specific requirement of this Standard, or are not mentioned in it, but which give equivalent results to those specified, are not necessarily prohibited. The Standards Australia Committee on Welding of Structures can act in an advisory capacity concerning equivalent suitability, but specific approval remains the prerogative of the Inspecting Authority.

1.3 REFERENCED DOCUMENTS. A list with titles of documents referred to in this Standard is given in Appendix E.

1.4 DEFINITIONS. For the purpose of this Standard, the definitions given in AS 1101.3 and AS 2812 and those below apply.

1.4.1 Shall—indicates that a statement is mandatory.

1.4.2 Should—indicates a recommendation.

1.4.3 Fabricator—the person or organization responsible for the welding of the structure during fabrication or erection.