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Australian Standard 1554, Part 1–1980

SAA STRUCTURAL STEEL WELDING CODE

Part 1—WELDING OF STEEL STRUCTURES

STANDARDS ASSOCIATION OF AUSTRALIA
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Association of Consulting Engineers

Australian Chamber of Commerce

Australian Institute of Steel

Australian Welding Institute

Australian Welding Research Association

Aluminium Development Council

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Department of Housing and Construction

Department of Main Roads, N.S.W.

Electricity Supply Association of Australia

Institute of Engineers Australia

Metal Trades Industry Association of Australia

Metropolitan Water Sewerage and Drainage Board, Sydney

National Association of Australia State Road Authorities

Railways of Australia Committee

Snowy Mountains Engineering Corporation

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AUSTRALIAN STANDARD

STRUCTURAL STEEL WELDING

(known as the SAA Structural Steel Welding Code)

Part 1

WELDING OF STEEL STRUCTURES

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PREFACE

This standard was prepared by the Association's Committee on Welding of Structures as both a new edition and an amalgamation of AS 1554, Part 1 — Manual Welding, and Part 2 — Automatic and Semi-automatic Welding. The revision was undertaken because of the requirement of the Australian welding industry for an Australian standard based on and comparable to the American Welding Society Structural Welding Code (AWS D1.1).

The standard provides rules for the welding of a wide range of welded constructions and, while it is expected that its main use will be for statically loaded welds, it applies also to some welds subject to fatigue. It also gives advisory information on the avoidance of brittle fracture. 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. Pre-qualified joint preparations, welding consumables and welding procedures are given in the standard for which no qualification testing is required.

An important difference between this standard and the former Parts 1 and 2 is that, while previously the standard specifically excluded parts and members subject to fatigue loading and hence provided only one category of weld, the new standard, in catering for structures in fatigue situations as well as statically loaded structures, provides two categories of welds with two 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 weld category suited to the severity of the service and nominate this on the drawings; where a structure contains both categories, this will ensure that appropriate levels of supervision and inspection will be applied to the relevant parts of the structure.

Allowable stresses in welds are not covered in the standard and designers are referred to AS 1250, SAA Steel Structures Code, or other relevant design codes or specifications for this purpose, although some aspects of design, not at present covered by AS 1250, are included.

The standard does not apply to the welding of pressure vessels and pressure piping, or railway bridges.

With the amalgamation of the former Parts 1 and 2, the newly prepared standard on arc stud welding is being published as AS 1554, Part 2 — Arc Stud Welding (Steel Studs to Steel).

This standard may require reference to a wide range of standards, details of which are given in Section 1, and to the following:

AS 1065 Method for Ultrasonic Testing of Ferritic Steel Forgings

AS 1101 Graphical Symbols for General Engineering
Part 3 — Symbols for Welding

AS 1163 Welded and Seamless Steel Hollow Sections for General Structural Purposes

AS 1171 Methods for Magnetic Particle Testing of Ferromagnetic Products and Components

AS 1204 Structural Steels — Ordinary Weldable Grades

AS 1205 Structural Steels — Weather-Resistant Weldable Grades

AS 1250 SAA Steel Structures Code

AS 1391 Methods for Tensile Testing of Metals

AS 1405 Low and Intermediate Tensile Strength Carbon Steel Plates of Structural Quality

AS 1448 Carbon and Carbon-manganese Steel Forgings for General Engineering Purposes (Ruling Section Up To and Including 300 mm)

AS 1450 Circular and Non-circular Carbon Steel Tubes for Mechanical and General Engineering Purposes

AS 1538 SAA Cold-formed Steel Structures Code

AS 1548 Steel Plates for Boilers and Unfired Pressure Vessels

AS 1553 Low Carbon Steel Covered Electrodes for Manual Metal-arc Welding

AS 1586 Low Alloy Steel Covered Electrodes for Manual Metal-arc Welding

AS 1588 Filler Rods for Welding

AS 1594 Hot-rolled Unalloyed Low Carbon Steel Sheet and Strip

AS 1595 Cold-rolled Unalloyed Low Carbon Steel Sheet and Strip
Part 1 — Sheet
Part 2 — Strip to Temper Designations

AS 1858 Electrodes and Fluxes for Submerged-arc Welding of Carbon and Low Alloy Steels

AS 2203 Carbon Steel Electrodes, Flux-cored, for Arc Welding*

AS 2205 Methods for the Destructive Testing of Welds in Metal†

AS 2074 Steel Castings for General Engineering Purposes

AS 2085 Magnetic Particle Testing Media

AS 2177 Radiographic Examination of Welded Butt Joints in Metal
Part 1 — Methods of Test
Part 2 — Image Quality Indicators (IQI) and Recommendations for Their Use

AS 2207 Methods for Ultrasonic Testing of Fusion Welded Joints in Steels

* In course of preparation.

† In course of preparation as revision of AS B301.

AS 2214 SAA Structural Steel Welding Supervisors Certification Code

AS Z5 Glossary of Metal Welding Terms and Definitions

BS 4105 Liquid Carbon Dioxide, Industrial

BS 4365 Industrial Argon

BS .... Rules for the Derivation of Acceptance Levels for Defects in Fusion Welded Joints (Draft BS 75/77081)

SAA MA1 — Manual on Steel Structures
MA1.8 — Fabrication

Australian Welding Research Association Publications:

Technical Note 1 — The Weldability of Steels

Technical Note 3 — Care of Manual-arc Welding Steel Electrodes

Technical Note 5 — Flame Cutting of Steels

Technical Note 6 — Control of Lamellar Tearing

In addition to the above standards, a wide range of Australian standards on safety in industry is available and users of this standard should refer to the appropriate safety standards for welding.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
STRUCTURAL STEEL WELDING

PART 1 — WELDING OF STEEL STRUCTURES

SECTION 1. SCOPE AND GENERAL CONSIDERATIONS

1.1 SCOPE. This standard prescribes 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 arc 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 welding processes:

(a) Manual metal-arc.
(b) Submerged arc.
(c) Gas metal arc including MIG.
(d) Flux cored arc.
(e) Electroslag (including consumable guide).
(f) Electrogas.

NOTE: Arc stud welding is dealt with in AS 1554, Part 2.

The standard is limited to the welding of steel parent material with a specified minimum yield strength not exceeding 450 MPa.

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

(i) Oxy fuel gas welding.
(ii) Gas tungsten arc welding
(iii) Resistance welding
(iv) Friction welding
(v) Thermit welding.

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

1.2 APPLICATION. The standard applies specifically to the welding of steelwork in structures complying with AS 1250. 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 (b) below, or the directly equivalent fatigue provisions of other application standards.

Welded joints complying with the above requirements are those which —

(a) are not subject to fatigue conditions; or
(b) are subject to fatigue conditions, and —
    (i) the stress range in the welded joint complies with the permissible stress range of stress categories C, D, E, F, or G of AS 1250; or
    (ii) the stress range in the welded joint is not more than 80 percent of the permissible stress range of stress categories A and B of AS 1250.

SEE AMENDMENT Corrigenda 1981

In addition to the abovementioned structures the standard applies to the welding of cranes and hoists complying with AS 1448, the welding of road and pedestrian bridges, and the welding of steelwork in applications other than structural.

SEE AMENDMENT Corrigenda 1981

1.3 WELD CATEGORIES.

1.3.1 General. The standard provides two categories of welds based on the type of application (see Clause 6.1) which in turn necessitates two levels of quality assurance, i.e. two levels of inspection and acceptance of weld imperfections, suitable for different weld applications and service conditions.

1.3.2 Categories. The two weld categories shall be designated as follows:

(a) GP (general purpose).
(b) SP (special purpose).

Category GP should generally be selected where the weld is essentially statically loaded and is not stressed above 50 percent of the maximum permissible stress given in the relevant clause of AS 1250, or where the welding application is other than structural.

Category SP should generally be selected where a statically loaded weld is stressed above 50 percent of the maximum permissible stress or where the weld is subject to dynamic loading within the limits specified in Clause 1.2. (See Appendix A.)

1.4 BASIC WELDING REQUIREMENTS. The basis of this standard is that a weld shall —

(a) be deposited in accordance with a qualified welding procedure;
(b) be deposited by a welder suitably qualified to carry out such a procedure; and
(c) comply with all the appropriate requirements of the standard.

For certain conditions prescribed herein, the welding procedure is deemed to be prequalified and does not require qualification testing (see Clause 4.3).