AS 1554.1—1991

Australian Standard®

Structural steel welding (known as the SAA Structural Steel Welding Code)

Part 1: Welding of steel structures

STANDARDS AUSTRALIA

This Australian Standard was prepared by Committee WD/3, Welding of Structures. It was approved on behalf of the Council of Standards Australia on 8 January 1991 and published on 15 April 1991.

The following interests are represented on Committee WD/3:

Association of Consulting Engineers, Australia

Australian Chamber of Commerce

Australian Institute of Steel Construction

AUSTROADS

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Electricity Supply Association of Australia

Institution of Engineers, Australia

Metal Trades Industry Association of Australia

Railways of Australia Committee

Steel Reinforcement Institute of Australia

University of Sydney

Welding Technology Institute of Australia

This Standard was issued in draft form for comment as DR 89156.

STANDARDS AUSTRALIA

Amendment No. 1
to
AS 1554.1—1991
Structural steel welding (known as the SAA Structural Steel Welding Code)
Part 1: Welding of steel structures

REVISED TEXT

The 1991 edition of AS 1554.1 is amended as follows; the amendments should be inserted in the appropriate place.

SUMMARY: This Amendment applies to Clauses 2.1, 3.1.2, 3.2.5 and 4.5.1.1, and Tables 4.4(B), 4.4(C), 4.5.1(A), 4.5.1(B), 4.5.2 and 5.3.4, and Appendices A and D.

Published on 14 September 1992.

AMDT No. 1 SEPT. 1992

Page 7 Clause 2.1

Item (c), *delete* 'AS 3679' and *substitute* 'AS 3679.1, AS 3679.2'.

AMDT No. 1 SEPT. 1992

Page 8 Clause 3.1.2

1 In title, *delete* '**Permissible**' and *substitute* '**Design**'.

2 Line 2, *delete* 'permissible'.

AMDT No. 1 SEPT. 1992

Page 9 Clause 3.2.5

Line 2, after 'AS 1250' insert 'and AS 4100'.

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Page 27 Table 4.4(B)

In the Figure for joint identification B-P 6, C-P 6, transpose notations 't' and 'D'.

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Page 29 Table 4.4(C)

Row 1, Column 3, *delete* 'Clause 5.2.4' and *substitute* 'Clause 5.2.3'.

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Page 34 Clause 4.5.1.1

1 Item (b), line 1, *delete* the words 'Column 4' and *substitute* 'Columns 4 and 5'.

2 Item (c), *delete* the words 'Column 5' and *substitute* 'Column 6'.

3 Item (d), line 3, *delete* the words 'Columns 5, 6 and 7' and *substitute* 'Columns 7, 8 and 9'.

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Page 34 Table 4.5.1(A)

At the end of the Table, *add* 2 new rows for steel types 7A and 7B as follows:

7A	E48XX	0 and 1	W50XY	W50X	W50X	1YM, 1YSM, 1YS	1YT	1YTM
7B	E48XX	2	W502Y	W502X.X	W502	2YM, 2YSM, 2YS	2YT	2YTM

ISBN 0 7262 7751 7

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Page 35 Table 4.5.1(B)

Delete all existing Table and *substitute* the following:

Steel type	Specification and grade numbers of parent metal								
	AS 1163	AS 3678/AS 3679.2	AS 3679.1	AS 1450	AS 1548	AS 1594	AS 1595	AS 2074	AS 2624
1	C250	200 250 300	250	C200 H200 C250 H250	7-430R 7-430N 7-430T 7-430A 7-460R 7-460N 7-460T 7-460A	Hd1 Hd2 Hd3 Hd4 Hd200 Hd250 Hd300 Hd300/1	All grades	C2 C3 C4-1	S264
2	C250 L0	—	250 L0	—	7-430R L0 7-460R L0	—	—	—	S264 L0
3	—	250 L15 300 L15	250 L15	—	7-430N L20 7-430T L20 7-430A L20 7-460N L20 7-460T L20 7-460A L20	—	—	—	—
4	C350	350 WR350/1 400	WR350/1 WR350/2 350	C350 H350	5-490N 5-490A 7-490R 7-490N 7-490T 7-490A	Hd350 Hd400 HW350	—	C1 C4-2 L1A	—
5	C350 L0	WR350/1 L0	WR350/1 L0 WR350/2 L0 350 L0	—	—	XF300 XF400 XF500	—	—	S365 L0
6	—	350 L15 400 L15	WR350/2 L15 350 L15	—	5-490N L20 5-490T L20 5-490A L20 7-490N L20 7-490T L20 7-490A L20	—	—	—	—
7A	C450	—	—	—	—	—	—	—	—
7B	C450 L0	—	—	—	—	—	—	—	—

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Page 36 Table 4.5.2

At the end of the Table *add* 2 new rows for steel types 7A and 7B as follows:

7A	500	NR	NR	NR	NR
7B	500	47	26	40	0

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Page 45 Table 5.3.4

Delete the existing row for Standard AS 1163 and *substitute* the following:

AS 1163	C250, C250 L0 C350, C350 L0 C450, C450 L0	1 3 3

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Page 46 Table 5.3.4

1 Column 1, row 1, *delete* 'AS 3678' and *substitute* 'AS 3678 and AS 3679.2'.

2 Column 1, row 2, *delete* 'AS 3679' and *substitute* 'AS 3679.1'.

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Page 59 Appendix A

Delete '3679 Hot-rolled structural steel bars and sections', and *substitute*:

3679 Structural steel
3679.1 Part 1: Hot-rolled bars and sections
3679.2 Part 2: Welded sections

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Page 62 Paragraph D4.2

Delete existing paragraph and *substitute*:

D4.2 Limitations Table D1 shall only be used without modification for members and components which comply with the fabrication and erection provisions of AS 4100, and with the provisions of this Standard.

Table D1 may be used without modification for welded members and connection components which are not subject to more than 1.0% outer bend fibre strain during fabrication. Members and components subject to greater outer bend fibre strains shall be assessed using the provisions of Paragraph D4.3.

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Page 63 Table D1

Delete existing Table and *substitute*:

TABLE D1

PERMISSIBLE SERVICE TEMPERATURES ACCORDING TO STEEL TYPE AND THICKNESS

Steel type (see Table 4.5.1(B))	Permissible service temperatures (°C)													
	Thickness (mm)													
	0	5	10	20	30	40	50							
1	−20		−10			0								+10
2	−30		−20		−10					0				
3	−40		−30		−20				−10					
4	−10					0								+10
5	−30		−20		−10				0					
6	−40		−30		−20				−10					
7A	−10					0								+10
7B	−30		−20		−10				0					

NOTE: Table D1 applies for—

(a) elements of a member of connection component subject to tensile stress; and

(b) plates and sections, the flange thickness being used for the latter.

Australian Standard®

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Part 1: Welding of steel structures

First published as AS CA8—1933.
Second edition 1939.
AS CA8 partly superseded by SAA Int. 352—1952.
Revised and redesignated as AS CA8, Part 1—1965 superseding SAA Int. 352—1952.
AS CA8, Part II first published—1972.
AS CA8, Parts I and II revised and redesignated as AS 1554, Parts 1 and 2—1974.
AS 1554, Parts 1 and 2 revised and redesignated as AS 1554, Part 1—1980.
Second edition—1985.
Third edition—1991.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY NSW
ISBN 0 7262 6779 1

PREFACE

This edition of this Standard was prepared by the Standards Australia Committee on Welding of Structures to supersede AS 1554.1—1985.

This edition is technically equivalent to the 1985 edition, but incorporates the following changes:

(a) The scope has been expanded to provide for steel structures complying with AS 4100, *Steel Structures*, in addition to AS 1250, *SAA Steel Structures Code.*

(b) Requirements for safety precautions have been added (Clause 1.7).

(c) The requirements for plug and slot welds (Clause 3.6) have been revised to align with the latest edition of AWS D1.1, *Structural Welding Code—Steel.*

(d) The prequalified welding consumables have been extended to cover those for gas metal-arc welding to AS 2717.1.

(e) Tables 4.5.1(B), 4.5.1(C) and 5.3.4 have been updated to reflect changes in new and revised Standards for steels.

(f) The equipment requirements for ultrasonic examination (Clause 6.4.2) have been revised.

(g) Table 6.3 has been revised to lower the permissible level of internal defects for SP category welds.

(h) Appendix D has been revised to align with AS 4100.

(i) Editorial changes and adjustments, including the following:

  (i) Update of referenced Standards.

  (ii) Alignment with current Standards Australia policy.

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. 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 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 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.

Strength capacity of welds is not covered in the Standard and designers are referred to AS 1250, AS 4100, or other relevant design codes or specifications for this purpose.

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

CONTENTS

STANDARDS AUSTRALIA

Australian Standard
Structural steel welding

Part 1: Welding of steel structures

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).

(f) Electrogas welding (EGW).

NOTE: Arc stud welding is dealt with in AS 1554.2.

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

The Standard applies specifically to the welding of steelwork in structures complying with AS 1250 or AS 4100. 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 or AS 4100, as limited by (ii) below, or the directly equivalent fatigue provisions of other application Standards.

Welded joints complying with the above requirements are those which—

(i) are not subject to fatigue conditions; or

(ii) are 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, or F of AS 1250, or weld categories lower than or equal to detail category 112 of AS 4100; or

(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; or does not exceed the stress range permitted for detail category 112 of AS 4100.

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

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

(A) Oxy-acetylene welding (OAW).

(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 or permissible stresses in welds, nor the production, rectification, or 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.