Australian/New Zealand Standard™

Structural steel welding

Part 3: Welding of reinforcing steel





AS/NZS 1554.3:2008

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 26 February 2008 and on behalf of the Council of Standards New Zealand on 11 April 2008. This Standard was published on 19 May 2008.

The following are represented on Committee WD-003:

Australian Chamber of Commerce and Industry Australian Industry Group AUSTROADS Bureau of Steel Manufacturers of Australia Electricity Supply Association of Australia Institution of Engineers Australia New Zealand Heavy Engineering Research Association New Zealand Non-destructive Testing Association Steel Reinforcement Institute of Australia University of Sydney Welding Technology Institute of Australia

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Australian/New Zealand Standard™

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This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee WD-003, Welding of Structures, to supersede AS/NZS 1554.3—2002, *Structural steel welding*, Part 3: *Welding of reinforcing steel*.

The objective of this Standard is to provide a code for the welding of reinforcing steel.

This edition takes cognizance of the ISO Standards for the welding of reinforcing steels, ISO 17660-1, *Welding—Welding of reinforcing steel*, Part 1: *Load-bearing welded joints* and ISO 17660-2, *Welding—Welding of reinforcing steel*, Part 2: *Non load-bearing welded joints* and, where deemed relevant by the Committee, appropriate requirements have been incorporated or adopted with modification. Changes associated with Australia and New Zealand adopting the ISO welding consumable Standards have also been included in this edition, as have changes to maintain consistency with other parts of the AS/NZS 1554 series of Standards.

The differences with the 2002 edition of AS/NZS 1554.3 are as follow:

- (a) Clarification of general requirements: Clause 1.7 and 1.9.3.
- (b) New Zealand specific requests: Clauses 2.1, 8.3 and Table 8.3.
- (c) Provision for the welding of stainless reinforcing steels: Clause 2.1.
- (d) Changes to welding consumable classification Standards: Clauses 2.3.1, 2.3.3, and Tables 3.2, 4.5(A), 4.5(B), 4.9(A), 4.9(C).
- (e) Clarification of requirements for the welding of non-loadbearing welding joints including provision for Cross-joints: Clause 3.3, 4.10.2.1, 7.3.4, and Table 7.2(B).
- (f) Changes associated with ISO 17660 1 and ISO 17660 2: Clauses 1.4.15.1, 3.3, 4.4.3, 4.10.1, 4.11.6, 7 (all), 8.5 and Tables 4.5(A), 4.10.2, 4.11.6, 7.2(A), 7.2(B) and 9.2 and Table F3, Appendix F.
- (g) Clarification of test acceptance requirements: Clauses 8.3, 8.4 and 8.5.
- (h) Inspection requirements: Clauses 10.2 and 10.3.2.
- (i) Correction of errors and other amendments: Clause 9.5, Tables 4.10.2 and Table F4, Appendix F.

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.

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

CONTENTS

Page

SECTIO	N 1 SCOPE AND GENERAL	
1.1	SCOPE	5
1.2	INNOVATION	5
1.3	REFERENCED DOCUMENTS	5
1.4	DEFINITIONS	5
1.5	WELD CATEGORY	7
1.6	WELDING OF REINFORCING STEEL	7
1.7	BASIC WELDING REQUIREMENTS	
1.8	JOINING REINFORCING STEEL TO STRUCTURES	
1.9	SAFETY PRECAUTIONS	
SECTIO	N 2 MATERIALS OF CONSTRUCTION	
21	PARENT MATERIAL	9
2.2	BACKING MATERIAL	9
2.3	WELDING CONSUMABLES.	9
SECTIO	N 3 DETAILS OF FUSION-WELDED CONNECTIONS	
3 1	GENERAL	11
3.1	LOADBEARING WEI DED IOINTS	
3.2	NON LOADBEARING WELDED JOINTS	1/
5.5	NON-LOADBEAKING WELDED JOINTS	
SECTIO	N 4 QUALIFICATION OF WELDING PROCEDURES AND WELDING	
PERSON	NNEL FOR FUSION WELDING	
4.1	QUALIFICATION OF WELDING PROCEDURE	17
4.2	METHODS FOR QUALIFICATION OF WELDING PROCEDURE	17
4.3	PREQUALIFIED WELDING PROCEDURES	17
4.4	PREQUALIFIED JOINT PREPARATIONS	
4.5	QUALIFICATION OF WELDING CONSUMABLES	
4.6	EXTENSION OF QUALIFICATION	
4.7	COMBINATION OF PROCESSES	
4.8	RECORDS OF TESTS	
4.9	REQUALIFICATION OF FUSION WELDING PROCEDURES	
4.10	QUALIFICATION OF WELDING PERSONNEL	
4.11	WORKMANSHIP	
SECTIO	N 5 FLASH BUTT WELDING	
5.1	GENERAL	
5.2	SIZES	
5.3	BAR PREPARATION	
5.4	ALIGNMENT	
5.5	CLEANLINESS	
5.6	WORKMANSHIP	
5.7	EQUIPMENT	
5.8	QUALIFICATION OF WELDING PROCEDURE	
5.9	PRODUCTION CONTROL TESTS	
5.10	DEFECTIVE WELDS	

SECTIC	N 6 FLAME PRESSURE WELDING	
6.1	GENERAL	33
6.2	SIZES	33
6.3	BAR PREPARATION	33
6.4	ALIGNMENT	33
6.5	CLEANLINESS	33
6.6	WORKMANSHIP	33
6.7	OUALIFICATION OF WELDING PROCEDURE	33
6.8	PRODUCTION CONTROL TESTS	34
6.9	DEFECTIVE WELDS	34
SECTIC	N 7 OUALIEICATION OF WELDING DROCEDURE DV TESTING	
SECTIC 7 1	OENED AL	25
/.1	UENEKAL	33
1.2		35
/.3		36
7.4	RETESTS	37
SECTIC	N 8 TESTS	
8.1	PRODUCTION CONTROL TEST	38
8.2	MACRO TEST	38
8.3	TENSILE TEST	38
8.4	BEND TEST	38
8.5	SHEAR TEST	38
SECTIC	NO OUALITY OF WELDS	
	CATECODY OF WELDS	20
9.1	METHODS OF INSPECTION AND DEDMISSIDE ELEVELS OF	39
9.2	METHODS OF INSPECTION AND PERMISSIBLE LEVELS OF	20
0.2	IMPERFECTIONS	39
9.3	MAGNETIC PARTICLE EXAMINATION	39
9.4	LIQUID PENETRANT EXAMINATION	39
9.5	WELD DEFECTS	39
9.6	INSPECTION AFTER WELD REPAIR	39
SECTIC	N 10 INSPECTION	
10.1	GENERAL	41
10.2	QUALIFICATIONS OF INSPECTORS	41
10.3	INSPECTION OF WORK	41
APPENI		42
A	KEFEKENCED DOCUMENTS	43
В	TACK WELD SUITABLE FOR LOCATIONAL PURPOSES	46
С	LOCATIONAL TACK WELDS—TEST METHODS	10
-	AND PERFORMANCE REQUIREMENTS	48
D	TYPICAL WELDING PROCEDURE SHEET	
_	SUITABLE FOR USE AS A PQR OR A WPS	51
E	MATTERS FOR APPROVAL BETWEEN THE FABRICATOR AND THE	
	PRINCIPAL	52
F	WELDED JOINT AND PROCESS IDENTIFICATION	53
G	WELD PROCEDURE FOR CHANGES TO THE WELDING CONSUMABLE	
	CLASSIFCATION SYSTEM	71

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Australian/New Zealand Standard Structural steel welding

Part 3: Welding of reinforcing steel

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the welding of reinforcing steel used in concrete structures that are designed and constructed in accordance with AS 3600 or NZS 3101.1, as well as other Standards that may be appropriate, by the following processes:

- (a) Manual metal-arc welding (MMAW).
- (b) Gas metal-arc welding (GMAW).
- (c) Flux-cored arc welding (FCAW).
- (d) Flash butt welding.
- (e) Flame-pressure welding or other processes approved by the principal.

The Standard applies specifically to the welding of reinforcing steels complying with AS/NZS 4671, but other steels may be used as provided for in Clause 2.1. It also applies to the welding of steel connection devices, inserts, anchors and anchor details, including prefabricated assemblies required in reinforced and precast concrete constructions.

NOTE: Further information is given in WTIA Technical Note 11.

1.2 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 requirement 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.

1.3 REFERENCED DOCUMENTS

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

1.4 DEFINITIONS

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

1.4.1 Approved

Except as may be otherwise stated, approved by the principal or the designer as appropriate.

1.4.2 Designer

The person, persons or organization responsible for the design of a structure.

1.4.3 Fabricator

The person, persons or organization responsible for executing work.

1.4.4 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.

1.4.5 Inspector

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

1.4.6 Loadbearing welded joints

See Clause 1.4.15.1.

1.4.7 May

Indicates the existence of an option.

1.4.8 Non-loadbearing welded joints

See Clause 1.4.15.2.

1.4.9 Principal

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

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

1.4.10 Reinforcing steel

Material complying with AS/NZS 4671 or material otherwise approved in accordance with Clause 2.1.

1.4.11 Shall

Indicates that a statement is mandatory.

1.4.12 Should

Indicates a recommendation.

1.4.13 Tack welds

See Clause 1.4.15.2.

1.4.14 Types of splice

1.4.14.1 Transverse end plate splice

A joint between a bar and a baseplate, which is for anchoring purposes.

1.4.14.2 Direct butt splice

A splice between two bars of reinforcing steel, with approximately collinear axes, with complete penetration and fusion of weld metal and base metal throughout the depth of the splice, the bars having been joined by a butt weld made from both sides, or from one side with permanent or temporary backing.

1.4.14.3 *Double-lap splice*

A joint consisting of two welds, deposited in the two grooves formed between two overlapping parallel bars in contact.

1.4.14.4 *Indirect butt splice*

A splice between two reinforcing steel bars, whose axes are approximately collinear, with the bars welded to either a single or double common splice member by either single or double-lap splices, the cross-section of the bars where they butt together remaining unwelded.

NOTE: The splice member may be a plate, an angle, a bar or other-shaped component.

1.4.14.5 *Single-lap splice*

A joint consisting of a single weld, deposited in a groove formed between two overlapping parallel bars in contact.

1.4.15 Welded joints

1.4.15.1 Loadbearing welded joints

Welded joints for the transmission of specified loads between reinforcing steel bars or between a reinforcing steel bar and another type of steel.

1.4.15.2 Non-loadbearing welded joints (tack welds)

Welded joints for which the strength is not taken into account during the design of the reinforced concrete structure.

NOTE: Normally, the purpose of non-loadbearing welded joints is to keep reinforcing components in their correct position during fabrication, transport and concreting. Such welds are often referred to as tack welds.

1.5 WELD CATEGORY

Weld quality requirements of this Standard have equivalent requirements to weld Category SP (structural purpose) as specified in AS/NZS 1554.1.

1.6 WELDING OF REINFORCING STEEL

1.6.1 Approval

Reinforcing steel shall not be welded, unless it is shown on the drawings, or in other appropriate documents, or is otherwise approved in accordance with Appendix E.

1.6.2 Limitations

The following limitations on welding, bending and rebending apply:

- (a) Tack welds that are not shown on drawings, but required to maintain reinforcing steel in its correct position, shall comply with the requirements of Clause 3.3.
- (b) Bending shall only be permitted on portions of the bar containing tack welds or direct butt splice welds. The limits on bending diameters and angles shall be as specified in Clause 7.3.3.
- (c) Rebending shall not be permitted on any welded part of a bar.

NOTES:

- 1 Bends should be made prior to welding and, for all welds other than tack welds, the distance from the weld to the start of the bend should be not less than twice the size of the bar being bent (that is, $2d_b$, where d_b is as shown in Figure 3.1.3). Where the design requires a loadbearing weld within a previously bent portion of a bar, a special test piece (see Clause 4.2(c)) replicating the proposed weld conditions should be subjected to suitable qualification tests as agreed between the principal and the fabricator.
- 2 Tack welds in bent sections of bars are permitted, subject to the requirements of Clause 3.3.