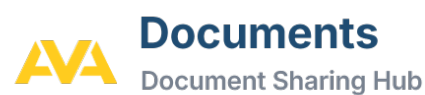


Australian/New Zealand Standard™

Structural steel

Part 2: Welded I sections



AS/NZS 3679.2:2016

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Austroads
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Business New Zealand
New Zealand Heavy Engineering Research Association
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Australian/New Zealand Standard™

Structural steel

Part 2: Welded I sections

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD-023, Structural Steel to supersede AS/NZS 3679.2:2010.

The objective of this Standard is to specify requirements for manufacturers and suppliers of welded I sections for general structural and engineering functions. These functions include the possibility of such welded I sections being subjected to dynamic and other special loads.

This edition includes the following major changes from the previous edition:

- (a) Requirements for type testing and minimum production testing and inspections have been included in the normative Appendix on product conformity.
- (b) Test certificates with the listed minimum requirements are required to be available for all products produced to this Standard.
- (c) Labelling requirements have been added to enable products compliant with this Standard to be traceable back to their corresponding test certificate.
- (d) Definitions, clause numbering and layout across the four steel-product Standards AS/NZS 1163, AS/NZS 3678, AS/NZS 3679.1 and AS/NZS 3679.2 are consistent wherever practicable.

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.

A statement expressed in mandatory term in a note to a table is deemed to be a requirement of this Standard.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard

Structural steel

Part 2: Welded I sections

1 SCOPE

This Standard specifies requirements for the production and supply of welded I sections for general structural and engineering purposes.

This Standard is intended for general structural and engineering applications. All grades specified in this Standard are suitable for—

- (a) welding in accordance with AS/NZS 1554, parts 1, 2, 5 and 7; and
- (b) fastening as specified in, AS 3990, AS 4100, AS/NZS 4600, AS 5100.6 and NZS 3404.

This Standard does not cover the following:

- (i) Structural steel—Hot-rolled bars and sections.
- (ii) Built-up I sections fabricated in accordance with AS 3990, AS 4100 or NZS 3404.1.

Requirements for product conformity to this Standard is specified in Appendix B.

NOTE: Guidelines for purchasers on requirements that should be specified by the purchaser and those that should or may be agreed on at the time of enquiry and order are given in Appendix A.

2 NORMATIVE REFERENCES

The following normative documents are referenced in this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS	
1391	Metallic materials—Tensile testing at ambient temperature
2706	Numerical values—Rounding and interpretation of limiting values
3990	Mechanical equipment—Steelwork
4100	Steel structures
5100	Bridge design
5100.6	Part 6: Steel and composite construction
AS/NZS	
1365	Tolerances for flat-rolled steel products
1554	Structural steel welding
1554.1	Part 1: Welding of steel structures
1554.2	Part 2: Stud welding (steel studs to steel)
1554.5	Part 5: Welding of steel structures subject to high levels of fatigue loading
1554.7	Part 7: Welding of sheet steel structures
3678	Structural steel—Hot-rolled plates, floor plates and slabs
4600	Cold-formed steel structures

NZS
3404 Steel Structures Standard
3404.1 Part 1: Materials, fabrication, and construction
WTIA
Technical Note 5 Flame cutting of steels

3 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

3.1 Automatic welding

Mechanized welding with equipment that performs the complete welding operation without adjustment of the controls by a welding operator.

3.2 Can

To denote a capability or possibility that is available or that might occur.

3.3 Crack

Narrow line of fracture on the surface.

3.4 Defects

Surface discontinuities, including cracks, laps and seams, with a depth or area, or both, greater than a specified limiting value.

3.5 Factory production control

Operational techniques and all measures necessary to regulate and maintain the conformity of the product to the requirements of the relevant product standard.

3.6 Imperfections

Surface discontinuities, other than cracks, laps and seams, with a depth or area, or both, less than or equal to a specified limiting value.

3.7 Inspection

Judgement by competent personnel to determine acceptability against requirements.

3.8 Lap

Overlapping material partially connected with the base material.

3.9 Longitudinal direction

Direction parallel to the longitudinal weld seam.

3.10 Manufacturer

The business operating the plant producing the finished welded sections.

3.11 May

Indicates the existence of an option.

3.12 Mechanized welding

Welding with equipment that performs the welding operation under present conditions and constant observation and control of a welding operator.

3.13 Plate

Hot-rolled product supplied flat, with width greater than or equal to 900 mm and nominal thickness greater than or equal to 4.50 mm.

3.14 Purchaser

Organization or person who is a recipient from a supplier, of a steel product manufactured to this Standard.

3.15 Seams

Caused when surface discontinuities in the semi-finished product are elongated and extended during rolling.

3.16 Sections

Welded I sections produced by automatic welding processes from three individual plate components with trimmed edges and dimensions (see Appendix D).

3.17 Shall

Indicates that a statement is mandatory.

3.18 Should

Indicates a recommendation.

3.19 Supplier

An organization or person that provides steel products manufactured to this Standard.

3.20 Testing

Mechanical tests, undertaken by an accredited laboratory as required by this Standard.

3.21 Test piece

Piece prepared for testing, made from a test specimen by a mechanical operation.

3.22 Test sample

Portion of material or product, or a group of items selected from a batch or group by a sampling procedure.

3.23 Test specimen

Portion or a single item taken from the test sample for the purpose of eventually applying a particular test.

3.24 Thermal cutting

Parting or shaping of materials by the application of heat with or without a gas stream.

3.25 Trimmed edge

Edge produced by the removal of material by thermal or mechanical cutting.

3.26 Type testing

Testing performed to prove that the material is capable of conforming to the requirements of this Standard.

3.27 Unit

Length of a welded section.

3.28 Welding procedure

Detailed methods and practices involved in the making of a weld or in the production of a welded component or assembly.

3.29 Welding process

Particular method of welding involving the application of certain metallurgical, electrical, physical, chemical or mechanical principles.

4 DESIGNATION

All grades shall be designated in the format shown in the following examples:

<i>Examples</i>	AS/NZS 3679.2-300
	AS/NZS 3679.2-400
	AS/NZS 3679.2-300L15
	AS/NZS 3679.2-400L15

where

AS/NZS 3679.2	= number of this Standard
300 and 400	= nominal minimum yield stress of the steel, in MPa
L	= guaranteed impact properties of the material (when applicable)
15	= low temperature impact test at 15°C (when applicable)

5 MANUFACTURING PROCESS

5.1 Steel feed

Welded I sections shall be manufactured from hot-rolled structural steel plates complying with AS/NZS 3678.

All plates shall be free of scale or other defects that would prevent proper welding during manufacture of welded I sections. The acceptability of surface defects and method of repair shall be in accordance with AS/NZS 3678.

5.2 Plate cutting or preparation

Plates shall be stripped to size using either thermal or mechanical cutting processes to produce an edge condition that ensures the welds comply with AS/NZS 1554.1, Category SP.

The procedure used shall produce cut edges equal to the quality resulting from thermal cutting.

Edges, not incorporated in welds, shall have a surface finish of Class 3 or better. Edges, incorporated in welds, shall have a surface finish of Class 2 or better as defined in WTIA, Technical Note 5.

NOTE: WTIA, Technical Note 5 gives guidance on cutting procedures together with replicas of cut surfaces.

5.3 Welding

5.3.1 General

Welding shall be in accordance with AS/NZS 1554.1, including the documentation of all welding or repair procedures.

The weld quality shall be Category SP throughout.

5.3.2 Welding consumables

Welding consumables used in the manufacture of welded I sections shall be in accordance with AS/NZS 1554.1.

5.3.3 Fillet welds

Web-to-flange joints shall be made with welds produced by an automatic welding procedure. The size of the fillet welds shall be sufficient to develop the specified minimum tensile strength requirements given in Table 1, and shall be tested in accordance with Clause 10.

Web-to-flange welds may be complete or incomplete penetration joints, depending on the web thickness or the welding procedure.

NOTES:

- 1 For automatic welding, the equipment may or may not perform the loading and unloading of the work.
- 2 Additional welding or strengthening may be undertaken by the purchaser, if necessary.
- 3 The availability of welded I sections with complete penetration joints is subject to negotiation between manufacturer and purchaser.

TABLE 1

TENSILE TEST REQUIREMENTS FOR WELDED WEB-TO-FLANGE TEST

Grade to AS/NZS 3678	Specified minimum tensile strength MPa	Nominal thickness of web mm	Minimum test load per unit flange/web length kN/mm
300 and 300L15	430	10	4.30
		12	5.16
		16 and greater	6.88
400 and 400L15	480	10	4.80
		12	5.76
		16 and greater	7.68

NOTE: For web plate thicknesses greater than 16 mm, the web-to-flange weld is to develop the specified minimum tensile strength of a 16 mm thick web only (see Clause 10.2).

5.3.4 Butt welds

Butt welds in flange or web components are permitted if the required length of the member is greater than the available rolled length of the component. The joints shall be complete-penetration butt welds, ground flush in the longitudinal direction of the section and subject to 100% ultrasonic testing. Butt joints in any component shall be completed before the component is welded to another component of the member.

5.4 Welding used in the repair of production welding

Weld repair of defects in production welding shall result in the penetration and joint properties equivalent to those produced by automatic welding. Welding shall be in accordance with AS/NZS 1554.1, Category SP. The repair weld shall be ground to make it flush with the original production weld.

6 CHEMICAL COMPOSITION

The chemical composition of the steel feed shall comply with the requirements of AS/NZS 3678.

7 MANUFACTURING TOLERANCES

7.1 General

Variations from nominal dimensions of a welded I section shall not exceed the appropriate limits given in Table 2 for straightness and Table 3 for length. Appendix E provides methods of measurement for camber and sweep.

7.2 Cross-sectional dimensions

Figure 1 illustrates and specifies permissible variations in cross-sectional dimensions of welded beams. Figure 2 shows permissible variations in cross-sectional dimensions for welded columns.

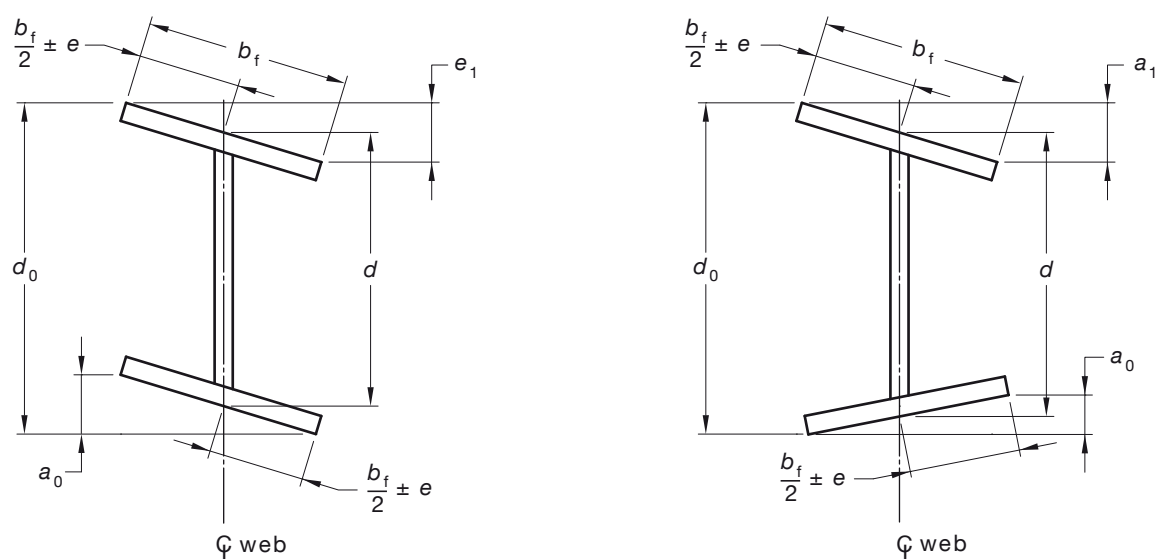
TABLE 2
PERMISSIBLE VARIATIONS IN STRAIGHTNESS
FOR WELDED I SECTIONS

Nominal size	Sweep or camber
Sections with a flange width (b_f) approximately equal to the depth (d):	millimetres
(a) Lengths of 14 m and less	$\frac{\text{Length}}{1000}$ but not more than 10 mm
(b) Lengths greater than 14 m	$10 \text{ mm} + \frac{\text{Length} - 14000}{1000}$
All other sections	$\frac{\text{Length}}{1000}$

NOTE: Owing to the extreme variation in the elastic flexibility of welded sections about the y axis, difficulty may be experienced in obtaining reproducible sweep measurements. Measuring of sweep shall be in accordance with Appendix E.

TABLE 3
PERMISSIBLE VARIATIONS IN
LENGTH FOR WELDED I SECTIONS

Specified length	Permissible variation from specified length, mm	
	Under	Over
All lengths	Nil	+50



NOTES:

- 1 Dimensions d_0 , d , a_1 and a_0 are measured parallel with the centre-line of the web. Dimensions b_f and $b_f/2 \pm e$ are measured parallel with the plane of the flange.
- 2 Dimension d is measured at the centre-line of the web.

1		2	3	4	5	6
Designation		Permissible variation of depth	Permissible variation of flange width	Permissible out-of-square on each flange	Permissible total out-of-square	Permissible web off-centre
Depth	kg/m	(d) mm	(b _f) mm	(a ₁ or a ₀) mm	(a ₁ + a ₀) mm	(e) mm
1200 WB	455 423 392 342 317 278 249	±4.0	+6.0 to −5.0	±5.0	±8.0	±5.0
1000 WB	322 296 258 215					
900 WB	282 257 218 175					
800 WB	192 168 146 122					
700 WB	173 150 130 115					

FIGURE 1 PERMISSIBLE VARIATIONS IN CROSS-SECTIONAL DIMENSIONS FOR WELDED BEAMS