

**Drafting and Design Presentation Standards  
Volume 3: Structural Drafting Standards**

**Chapter 6: Welding**

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## Chapter 6 - Amendments

### Revision Register

Issue/Rev No.	Reference Section	Description of Revision	Authorised by	Date
1	-	First Issue	Manager (Structural Drafting)	April 2011
2	-	Document name change	Manager (Structural Drafting)	November 2011
	6.8	Weld preparation details amended in Figures 6.8-7 and 6.8-8		
3	6.6	Direct butt splice and anchorage splice welds for reinforcing bar – Welding consumables updated	Team Leader (Structural Drafting)	March 2017
	6.7	Welding Hollow Sections added.		
	6.8.5	Intermittent or Stitch Welds section removed		
	6.10	Australian Standards – updated to match current publications		

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## **6 Welding**

### **6.1 Glossary of terms**

For a complete glossary of terms refer Chapter 1 - *Introduction*.

### **6.2 Figures and examples shown in this volume**

The figures and examples shown in this volume are for presentation purposes only, and may contain some details that are now superseded. These details have been included for ease of reference, to illustrate typical solutions, and to show the required standard of drafting presentation. The details are not to be used without an engineering check and certification by a Structural RPEQ to confirm that the details are appropriate for the specific project.

### **6.3 Notes format**

For general welding notes refer Chapter 5 – *Notes*. Show only the welding notes applicable to the details on the Standard Drawing.

### **6.4 Welding of stainless steel**

Welds shall be Category 2B in accordance with AS/NZS 1554.6 *Structural Steel Welding* Part 6: Welding Stainless Steels for Structural Purposes.

### **6.5 Welding Splice of reinforcing bar**

#### **Design details**

The welded splice for a reinforcing bar shall be a flare-v-butt weld in accordance with AS 1554.3 *Structural Steel Welding*.

The diameter of the smallest bar is the controlling factor for the size of the weld.

The minimum throat thickness ( $D$ ) shall not be less than  $0.25 \times$  smallest bar diameter. The minimum width of the weld ( $W$ ) shall not be less than  $0.45 \times$  smallest bar diameter.

Welds are not permitted on a bent portion of a bar. Welds shall be kept clear of any bent portion of a bar by a minimum distance of twice the diameter of the bar being bent.

#### **Weld tables for welded splice**

The following tables show welding requirements for nominated bar diameters. Refer Table 6.5-1 - Welded Lap Lengths - One Side of Bar Welded, Table 6.5-2 - Welded Lap Lengths - Both Sides of Bar Welded, and Figure 6.5-3 - Welded Splice. The preferred splice is a weld on both sides of the bar.

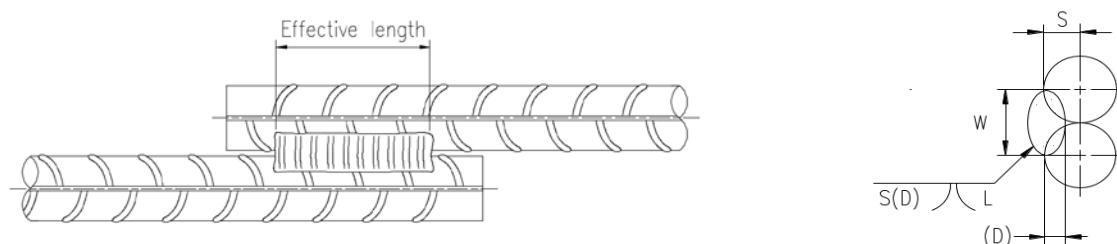
**Table 6.5-1 - Welded Lap Lengths - One Side of Bar Welded**

Bar Diameter	S (mm)	D (mm)	W (mm)	Welding Consumable	Weld Length (mm) (SP Category Weld)
R10	5	3	6	G49X to AS/NZS ISO 4341-B or T49X to AS/NZS ISO 17632-B	100
N12	6	3	6		110
N16	8	4	7		150
N20	10	5	9		180
N24	12	6	11		220
N28	14	7	13		260
N32	16	8	15		290
N36	18	9	16		330

**Table 6.5-2 - Welded Lap Lengths - Both Sides of Bar Welded**

Bar Diameter	S (mm)	D (mm)	W (mm)	Welding Consumable	Weld Length (mm) (SP Category Weld)
R10	5	3	6	G49X to AS/NZS ISO 14341-B or T49X to AS/NZS ISO 17632-B	50
N12	6	3	6		60
N16	8	4	7		80
N20	10	5	9		100
N24	12	6	11		120
N28	14	7	13		140
N32	16	8	15		160
N36	18	9	16		180

**Figure 6.5-3 - Welded Splice**



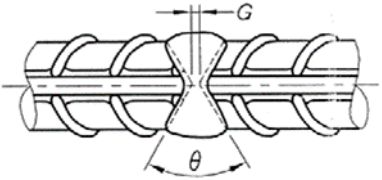
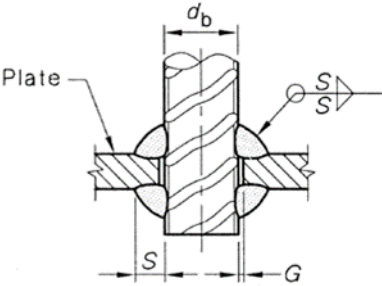
The following conditions apply:

- all welds to be SP Category (note to be shown on drawings)
- weld width "W" not shown on drawing
- 4 mm minimum throat thickness

- Minimum weld length on both sides of the bar shall be in accordance with AS 1554.3 *Structural Steel Welding Part 3: Welding of Reinforcing Steel*, Table 3.2.

### 6.6 Direct butt splice and anchorage splice welds for reinforcing bar

The preferred welding consumables for direct butt splice welds and anchorage splice welds for reinforcing bar are shown below:

Weld Type	Detail	Consumable
Direct Butt Splice	<p>Double-V butt splice</p>  <p>NOTE: Wherever possible, horizontal bars should be welded in the flat position.</p>	G55X or G62X to AS/NZS ISO 14341-B, or T55X or T62X to AS/NZS ISO 17632-B
Anchorage Splice	<p>Double-side external fillet weld</p> 	G55X or G62X to AS/NZS ISO 14341-B, or T55X or T62X to AS/NZS ISO 17632-B

The following conditions apply:

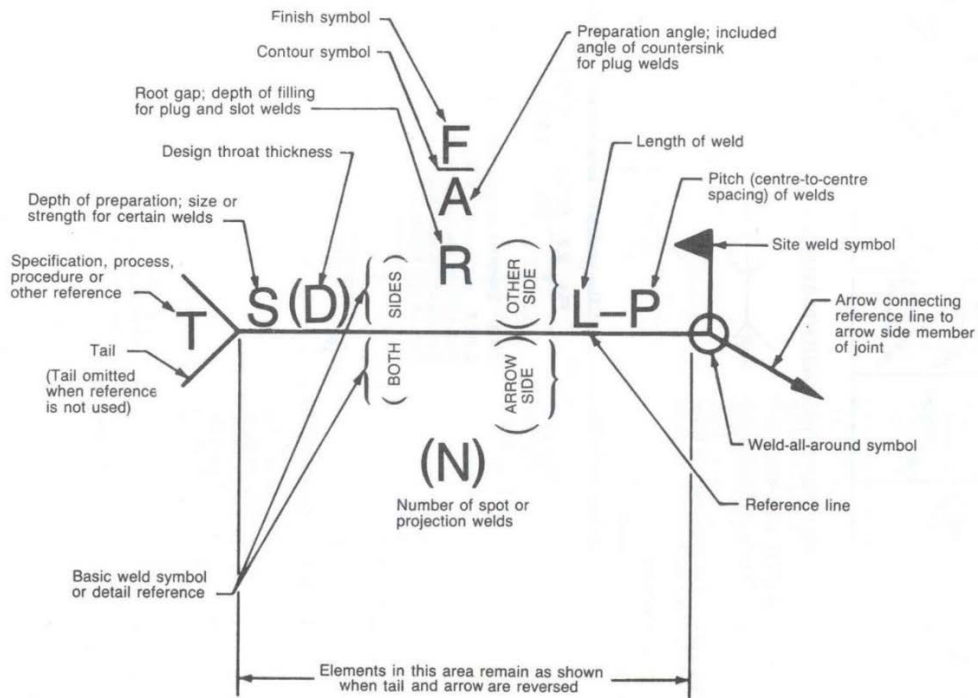
- All welds to be SP Category (note to be shown on drawings)
- The Design Engineer shall nominate all the weld sizes, but the minimum throat thickness for anchorage splice welds shall be 4 mm.

### 6.7 Welding symbols

Welding symbols on drawings are to conform to AS 1101.3 *Graphical Symbols for General Engineering Part 3: Welding and Non-destructive Examination*.

The standard location of elements of a welding symbol is shown in Figure 6.7-1 - Standard Location of Elements of a Welding Symbol.

**Figure 6.7-1 - Standard Location of Elements of a Welding Symbol**



**6.8 Presentation details**

The following is a basic cross section of commonly detailed welding symbols that may be encountered on drawings.

Examples have been provided on the following pages that cover most fillet weld and butt weld joints.

**Figure 6.8-1 - Basic Elements of a Weld Symbol**

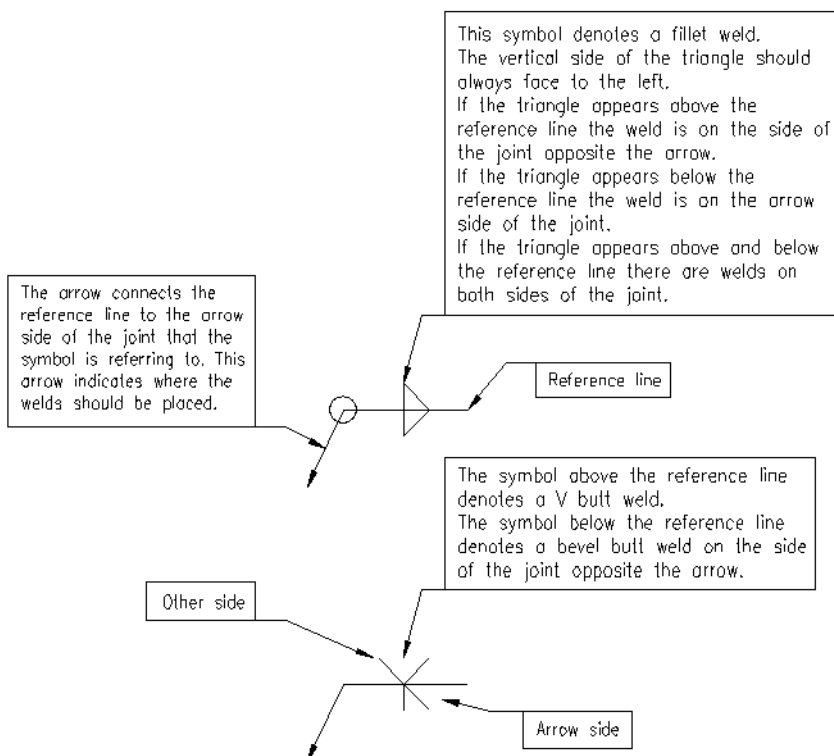
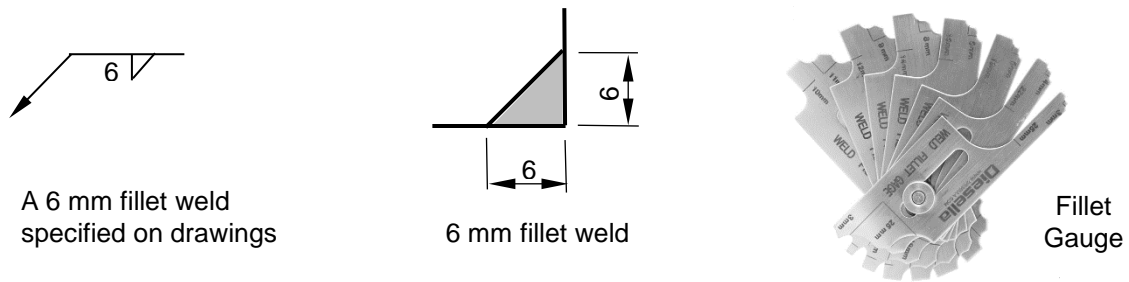




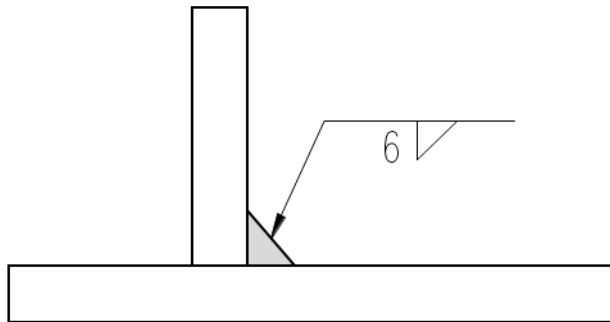
Figure 6.8-2 - Determining Size of a Fillet Weld shows how the size of a fillet weld is determined. Accurate measurement of fillet welds requires the use of a weld fillet gauge.

**Figure 6.8-2 - Determining Size of a Fillet Weld**



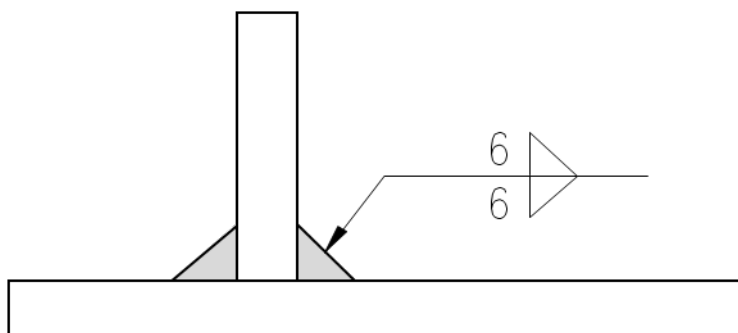
**Figure 6.8-3 - Weld on Arrow Side of Joint**

The following sketch shows a 6 mm fillet weld is needed on the side of the joint that the arrow is pointing.

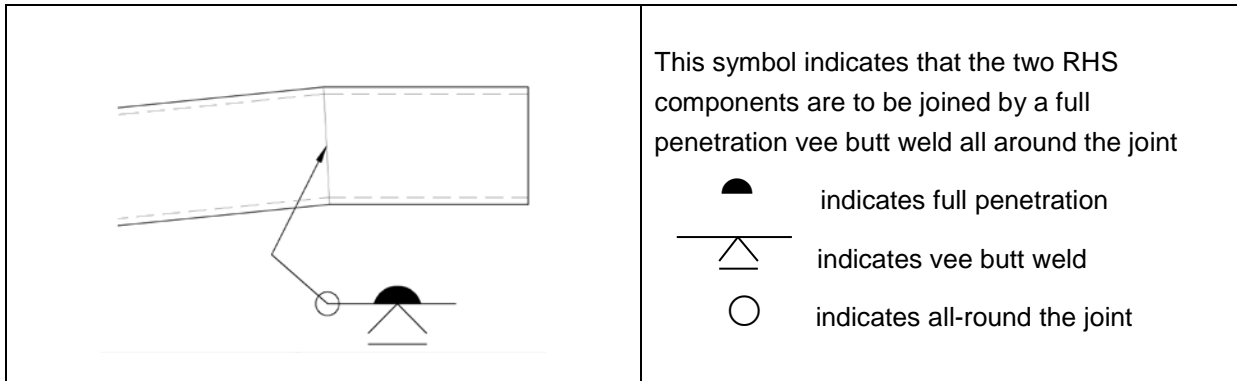


**Figure 6.8-4 - Weld on Both Sides of Joint**

The following sketch shows a 6 mm fillet weld is needed on both sides of the joint.



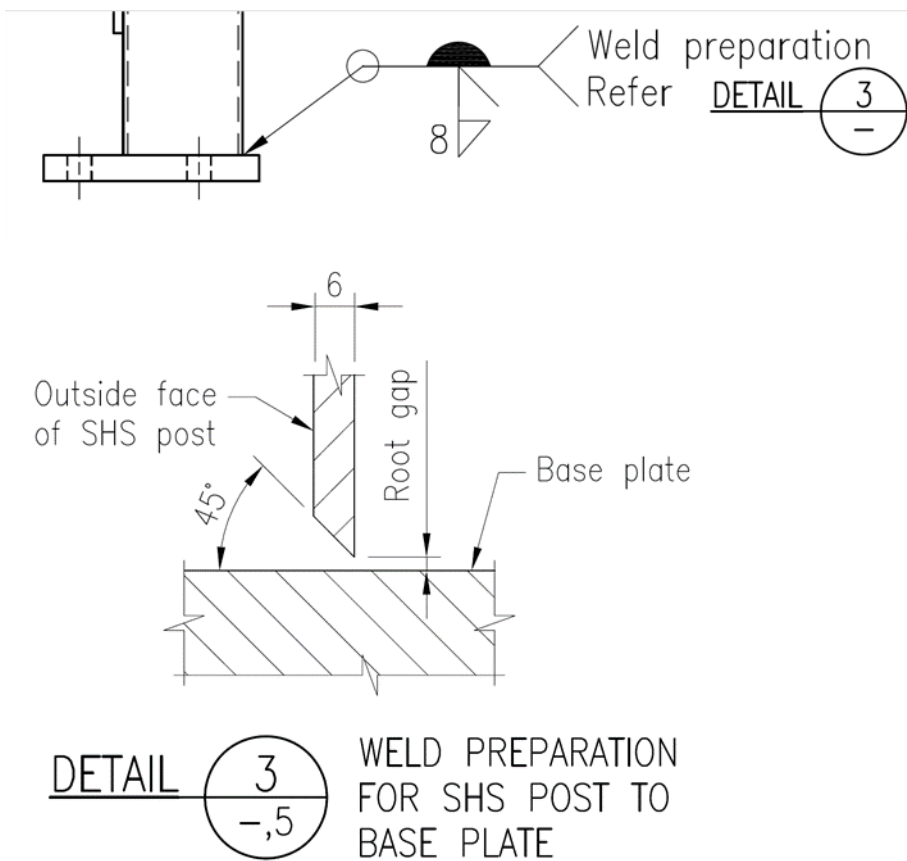
**Figure 6.8-5 - Butt Weld**



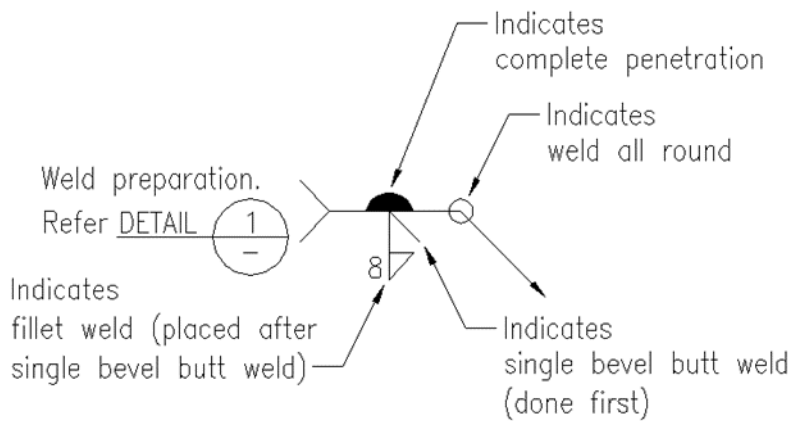
The weld shown in Figure 6.8-6 - Bridge Traffic Barrier Post to Base Plate is a critical structural weld and its conformance to specification is vital to the performance of bridge traffic barrier posts under load. This is a complete penetration butt weld (compound butt weld placed first followed by a fillet weld). Refer Figure 6.8-8 - Combination Butt and Fillet Welds for description.

The weld shown in Figure 6.8-8 - Bridge Traffic Barrier Post to Anchor Plate describes the welds to connect the bridge traffic barrier posts and anchor plates.

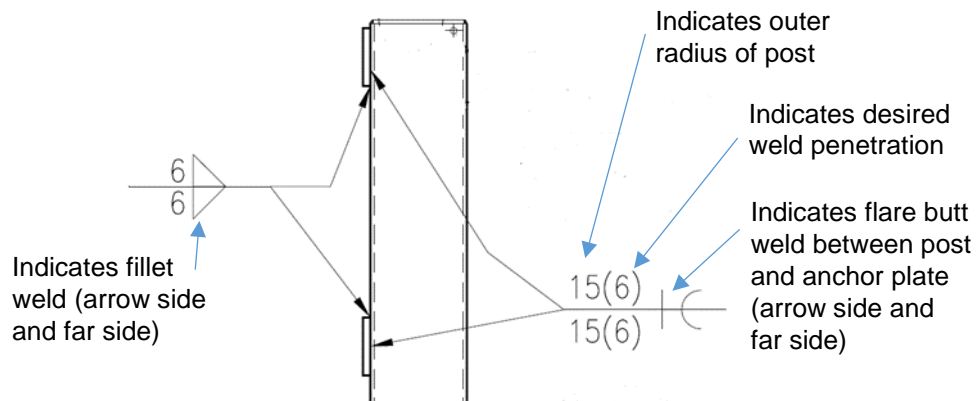
**Figure 6.8-6 - Bridge Traffic Barrier Post to Base Plate**



**Figure 6.8-7 - Combination Butt and Fillet Welds**



**Figure 6.8-8 - Bridge Traffic Barrier Post to Anchor Plate**



## References

Drafters should be familiar with the following Australian Standards:

- AS 1101.3-2005 *Graphical Symbols for General Engineering Part 3: Welding and Non-destructive Examination*
- AS/NZS 1554.1-Amdt 1 2015 *Structural Steel Welding Part 1: Welding of Steel Structures*
- AS/NZS 1554.3-2014 *Structural Steel Welding Part 3: Welding of Reinforcing Steel*
- AS/NZS 1554.6-2012 *Structural Steel Welding Part 6: Welding Stainless Steels for Structural Purposes*
- AS/NZS 1665-2004 *Welding of Aluminium Structures*
- AS/NZS 4855-2007 *Welding Consumables – Covered Electrodes for Manual Metal Arc Welding of Non-alloy and Fine Grain Steels – Classification*

