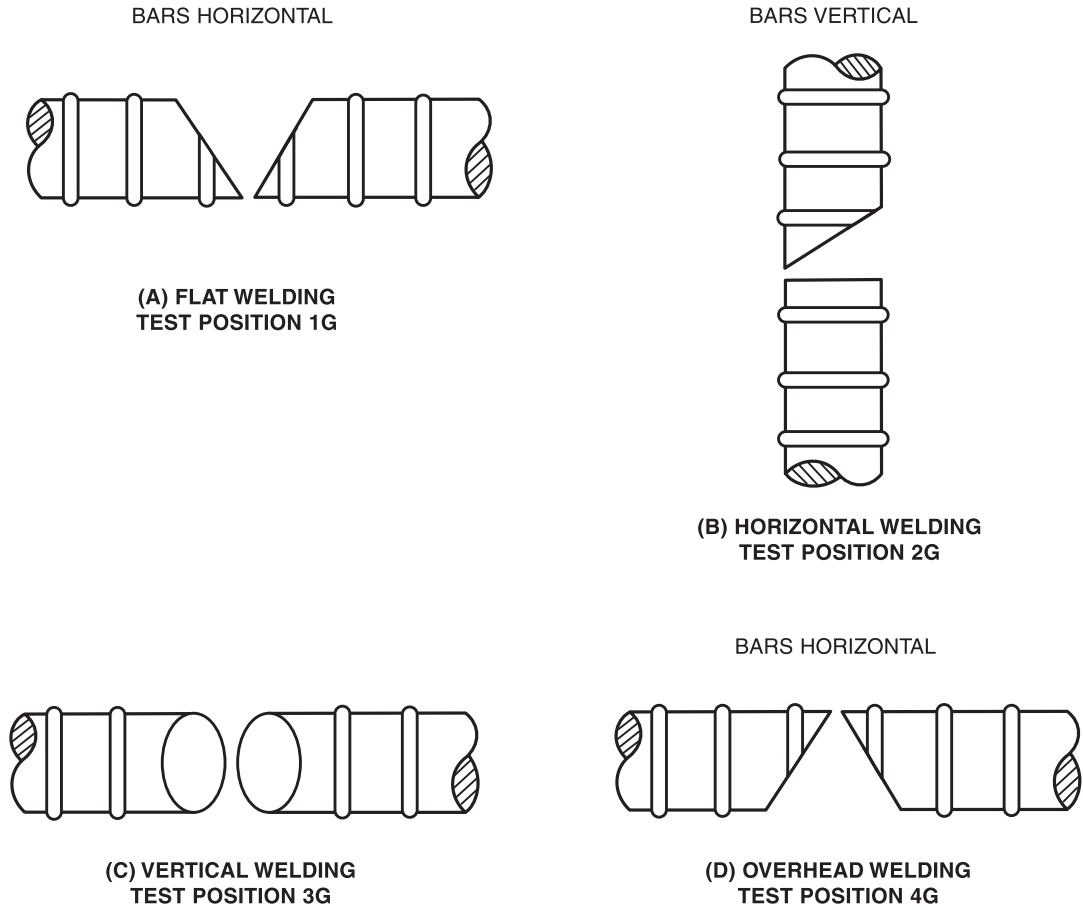


**Table 6.3**  
**Welder Qualification—Number, Types of Test, Production Welds, and Positions Qualified (see 6.3)**

Qualification Test		Number and Type of Tests Required					Production Welding Joint and Position Qualified				
Test Type	Test Assembly	Number of Test Assemblies Required	Radiography (6.3.5.2)	Tension (6.3.5.3.)	Macroetch (6.3.5.4)	Bend Test (6.3.5.9)	Test Position	Direct Butt and T-Joint [Figure 3.1, 3.2, 3.5(D)]	Fillet Joint [Figure 3.5(A), (B), and (C)]	Indirect Butt Joint (Figure 3.3)	Lap Joint (Figure 3.4)
Direct Butt	Figure 6.6(A)	2	2 <sup>a</sup>	1 <sup>b</sup>	1 <sup>b</sup>	—	1G	F	F, H	—	—
							2G	F, H	F, H		
							3G	F, H, V	F, H, V		
							4G	F, OH	F, H, OH		
Indirect Butt	Figure 6.6(B)	2	—	—	2	—	1G	—	F, H	F, H	F, H
							2G	—	F, H	F, H	
							3G	—	F, H, V	F, H, V	F, H, V
							4G	—	F, H, OH	F, OH	F, OH
T-Joint Complete Penetration	Figure 6.6(C)	2	—	—	2	—	1G	F	F, H	—	—
							2G	F, H	F, H		
							3G	F, H, V	F, H, V		
							4G	F, OH	F, H, OH		
Fillet Weld	Figure 6.6(D)	2	—	—	—	2	1F (Rotated)	—	F	—	—
							2F	—	F, H		
							2F (Rotated)	—	F, H		
							4F	—	F, H, OH		
							5F	—	All		

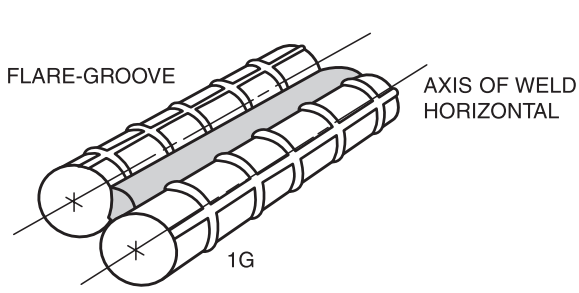
<sup>a</sup> Radiography not permitted for welds made by GMAW short circuiting transfer.

<sup>b</sup> Required for welds made by GMAW using short circuiting transfer. Tension and macroetch tests may be used in lieu of radiography for all other welding processes, at the Contractor's option.

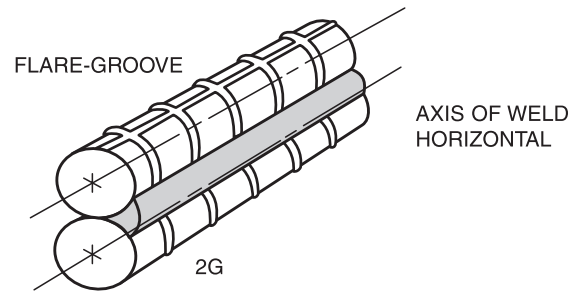


Note: See Figure 6.3 for definition of positions for groove welds.

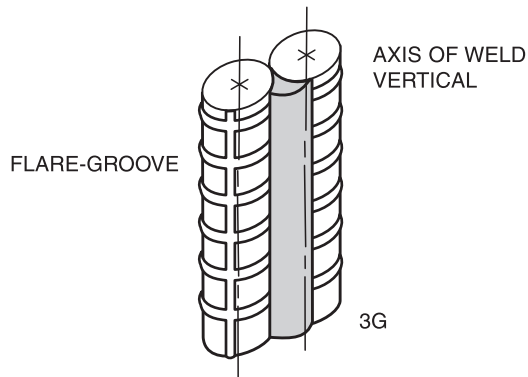
**Figure 6.1—Direct Butt Joint Test Positions for Groove Welds (see 6.2.3)**



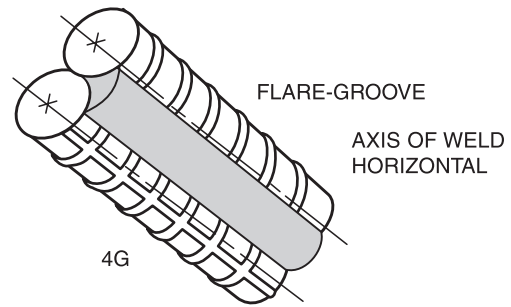
(A) TEST POSITION : FLAT



(B) TEST POSITION : HORIZONTAL



(C) TEST POSITION : VERTICAL

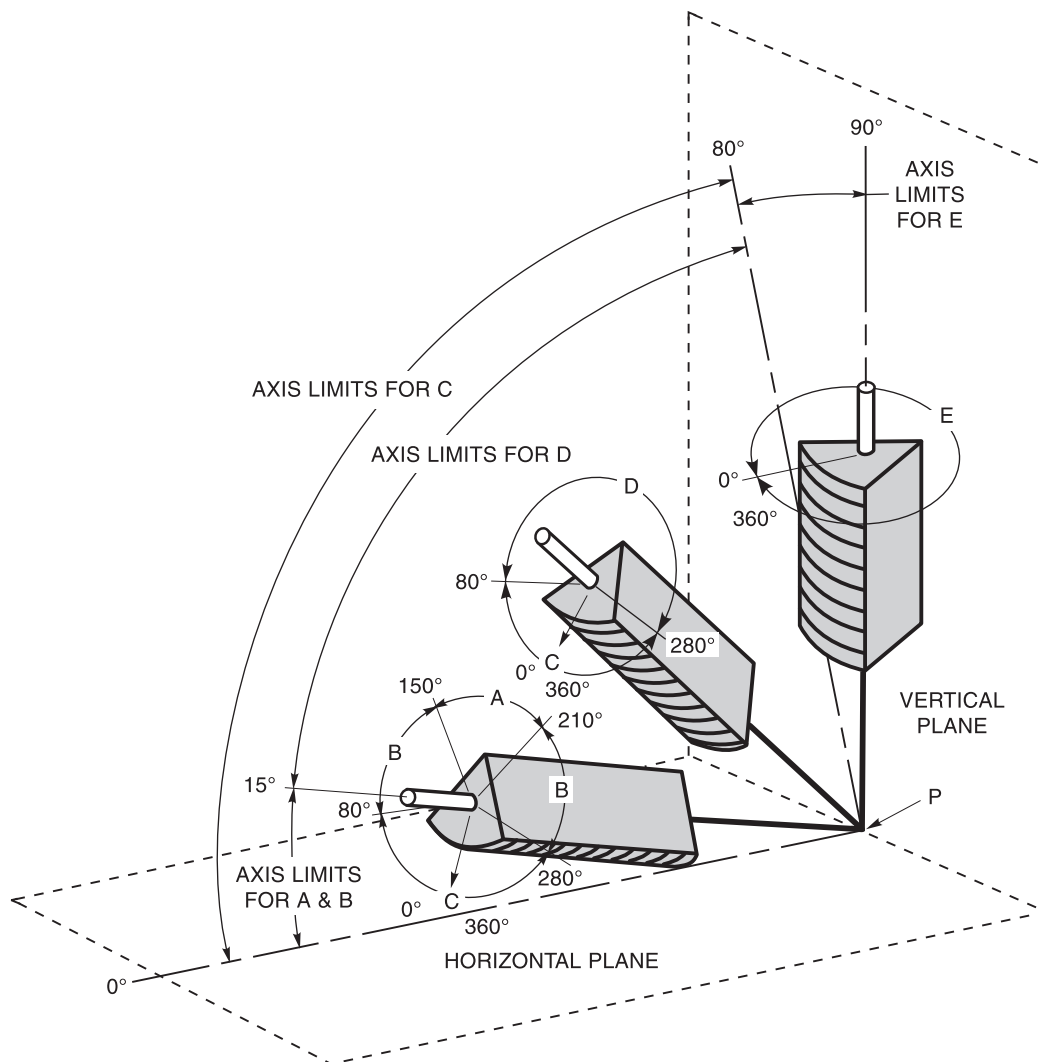


(D) TEST POSITION : OVERHEAD

Note: See Figures 6.3 and 6.4 for definitions of positions for flare-groove and fillet welds.

**Figure 6.2—Indirect Butt Joint Test Positions for Flare-Groove Welds or Fillet Welds (see 6.2.3)**

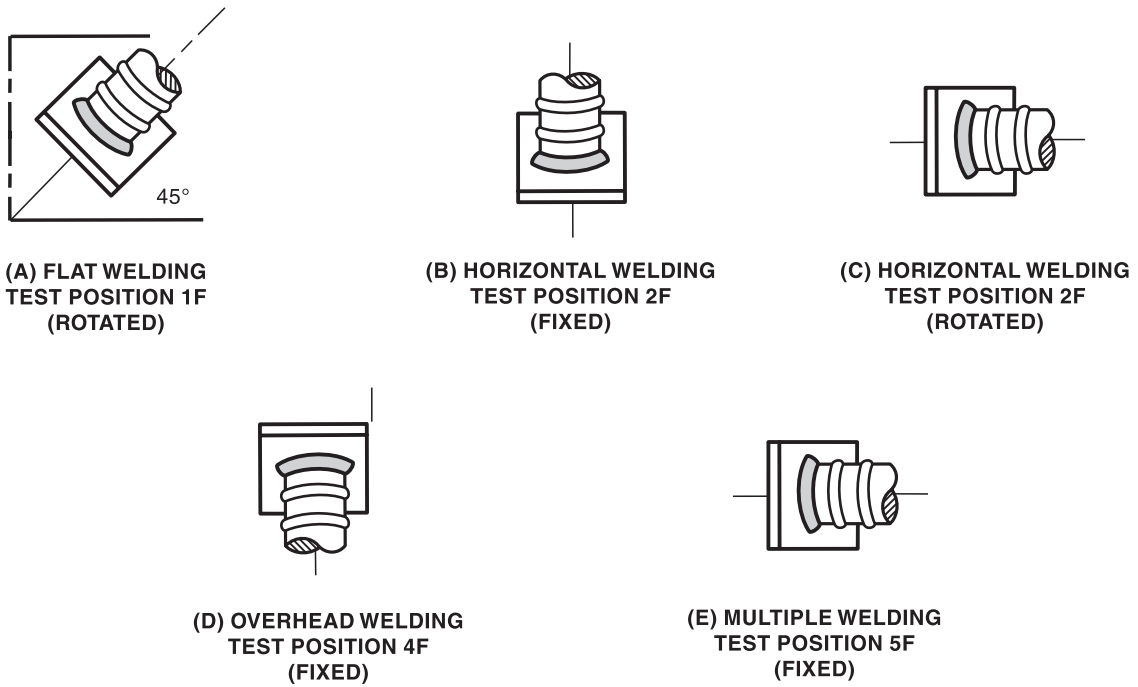
Tabulation of Positions of Groove Welds			
Position	Diagram Reference	Inclination of Axis	Rotation of Face
Flat	A	0° to 15°	150° to 210°
Horizontal	B	0° to 15°	80° to 150° 210° to 280°
Overhead	C	0° to 80°	0° to 80° 280° to 360°
Vertical	D	15° to 80°	80° to 280°
	E	80° to 90°	0° to 360°



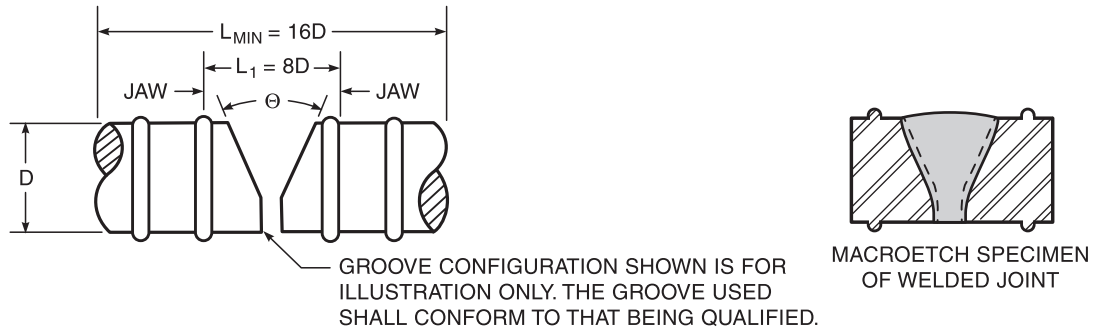
Notes:

1. The horizontal reference plane is always taken to lie below the weld under consideration.
2. The inclination of axis is measured from the horizontal reference plane toward the vertical reference plane.
3. The angle of rotation of the face is determined by a line perpendicular to the theoretical face of the weld which passes through the axis of the weld. The reference position (0°) of rotation of the face invariably points in the direction opposite to that in which the axis angle increases. When looking at point P, the angle of rotation of the face of the weld is measured in a clockwise direction from the reference position (0°).

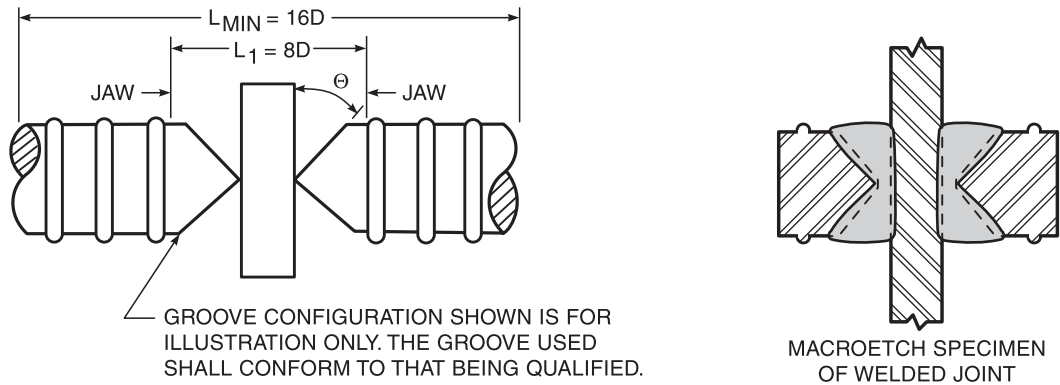
**Figure 6.3—Positions of Groove Welds (see 6.2.3)**



**Figure 6.4—Positions of Fillet Welds (see 6.2.3)**

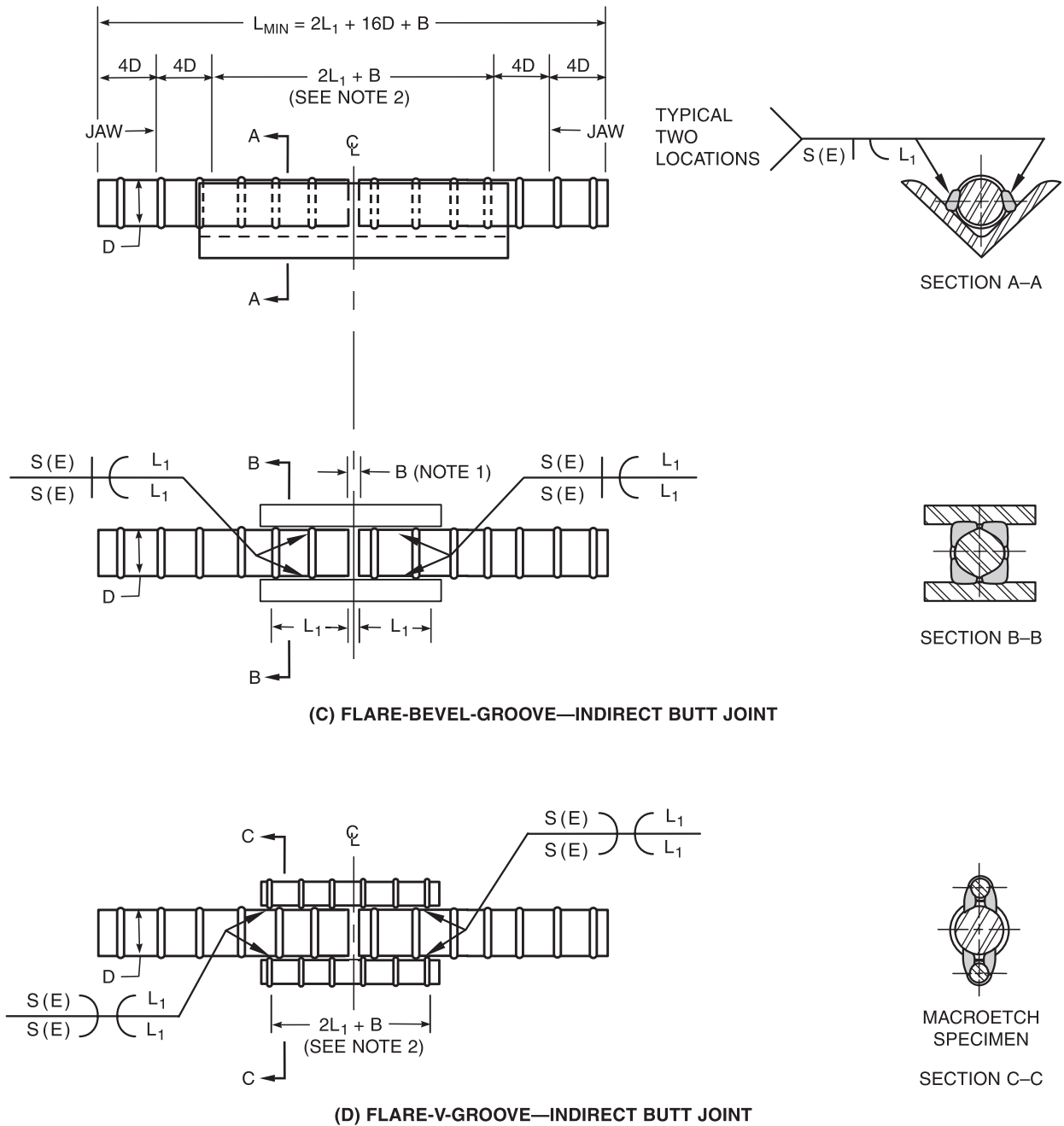


**(A) COMPLETE JOINT PENETRATION GROOVE WELD—  
DIRECT BUTT JOINT**



**(B) ALTERNATE COMPLETE JOINT PENETRATION  
GROOVE WELD—T-JOINT**

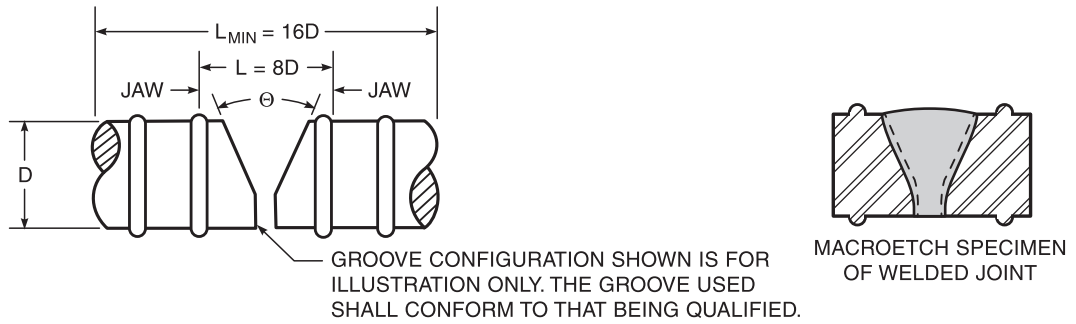
**Figure 6.5—Full Section Tension Test Specimens  
for WPS Qualification Tests (see 6.2.4.2)**



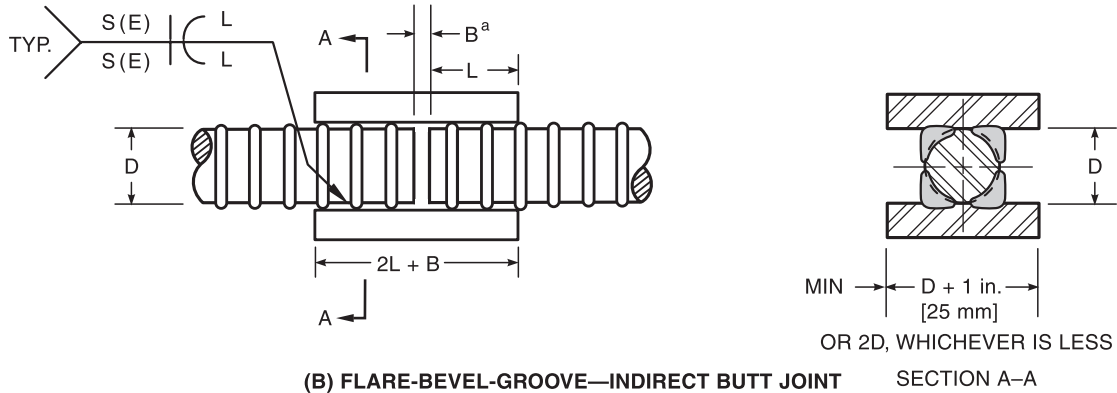
Notes:

1. B = Separation between ends of bars, maximum B = 3/4 in. [19 mm].
  2.  $L_1 = \frac{5.23 F_u (D)}{F_{xx}(n)}$  with  $F_u$  = Minimum specified tensile strength of the bar (for bars of unequal  $F_u$ , use lesser of the two).  
 $F_{xx}$  = Minimum specified tensile strength of weld metal.  
 D = Diameter of solid bar.  
 n = Number of connecting flare-bevel-groove welds between one bar and two plates (or one angle).
- (See 6.2.4.3)

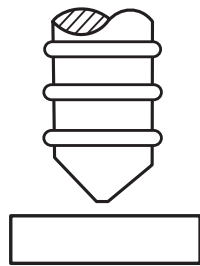
**Figure 6.5 (Continued)—Full Section Tension Test Specimens  
for WPS Qualification Tests (see 6.2.4.2)**



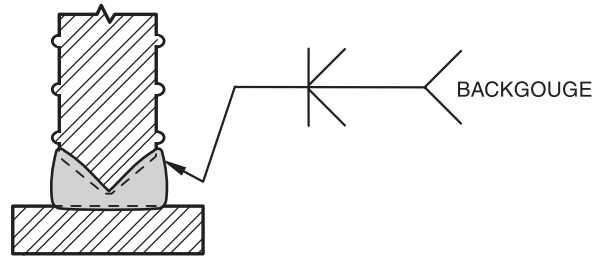
(A) COMPLETE JOINT PENETRATION GROOVE WELD—DIRECT BUTT JOINT



(B) FLARE-BEVEL-GROOVE—INDIRECT BUTT JOINT

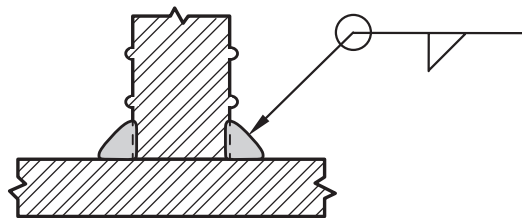


T-JOINT



MACROETCH SPECIMEN OF WELDED JOINT

(C) COMPLETE JOINT PENETRATION GROOVE WELD—T-JOINT



MACROETCH SPECIMEN

(D) FILLET WELD BAR TO PLATE

<sup>a</sup>B = Separation between ends of bars. Maximum: B = 3/4 in. [19 mm].

Notes:

1. For Bars No. 9 [29] or larger, use single-V or single-bevel-groove welds ( $\theta = 45^\circ$ ).
2. For Bars No. 8 [25] or smaller, use single-V with split pipe backing, [ $\theta = 60^\circ$ , as in Figure 3.2(C)].

**Figure 6.6—Full Section Tension Test and Macroetch Test Specimens for Welder Qualification Tests (see 6.3.3.3)**