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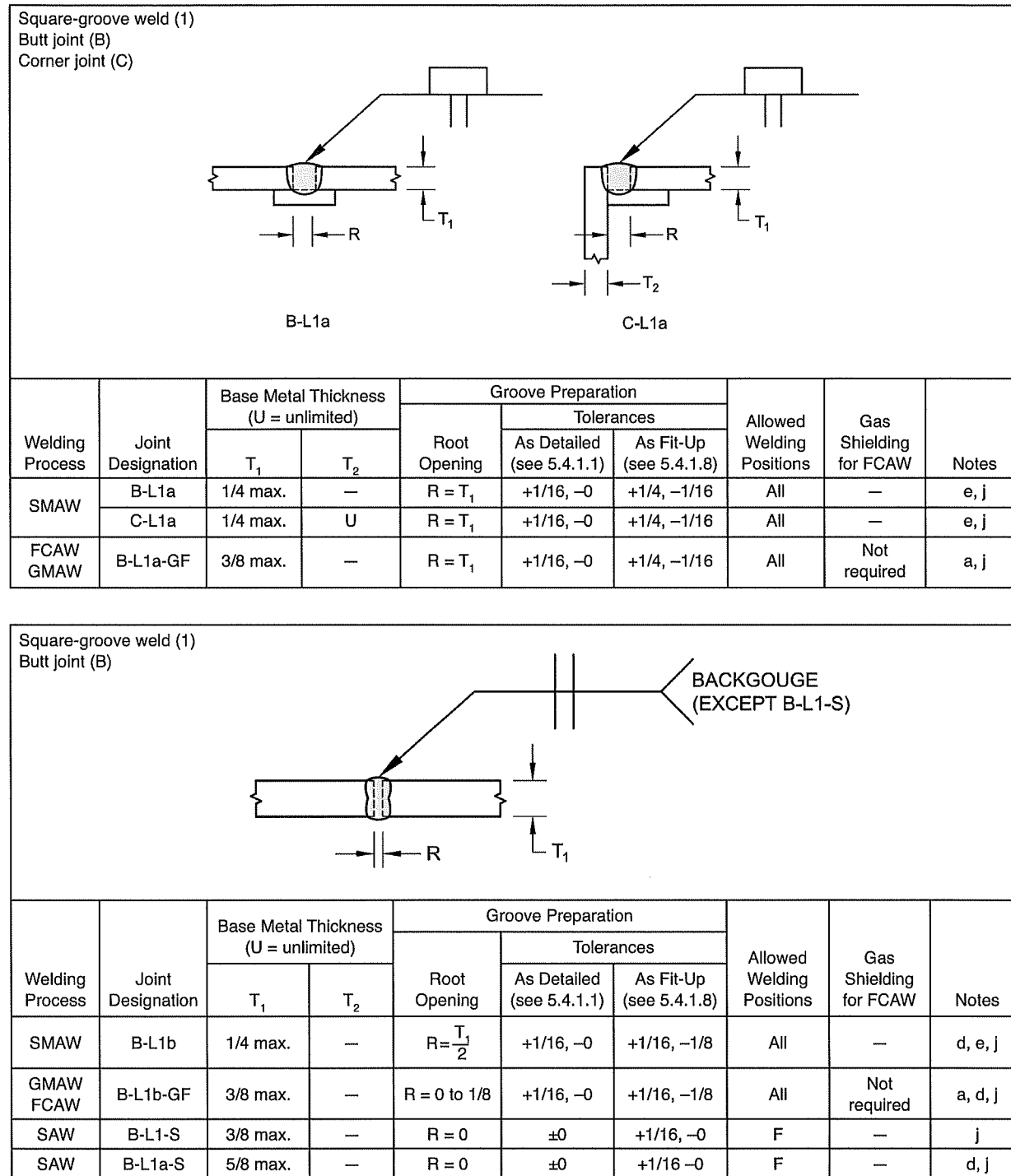


Figure 5.1—Prequalified CJP Groove Welded Joint Details (See 5.4.1) (Dimensions in Inches)

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Square-groove weld (1)
T-joint (T)
Corner joint (C)

The diagram illustrates a square-groove weld T-joint. Two plates, one of thickness T_1 and the other of thickness T_2 , are joined at a right angle. The joint is prepared with a square groove, and the root opening is labeled R . A BACKGOUGE is shown on the right side of the joint, used for measuring the root opening. The diagram also shows the thicknesses T_1 and T_2 of the plates.

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes	
				Root Opening	Tolerances					
		T_1	T_2		As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)				
SMAW	TC-L1b	1/4 max.	U	$R = \frac{T_1}{2}$	+1/16, -0	+1/16, -1/8	All	—	d, e, g	
GMAW FCAW	TC-L1-GF	3/8 max.	U	$R = 0$ to 1/8	+1/16, -0	+1/16, -1/8	All	Not required	a, d, g	
SAW	TC-L1-S	3/8 max.	U	$R = 0$	± 0	+1/16, -0	F	—	d, g	

Single-V-groove weld (2)

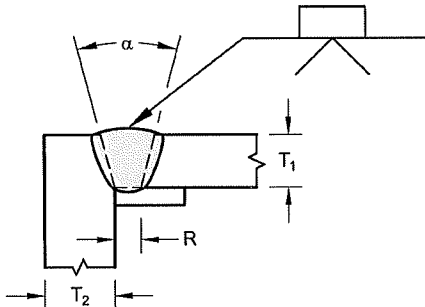
Butt joint (B)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
R = +1/16, -0	+1/4, -1/16
α = +10°, -0°	+10°, -5°

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SMAW	B-U2a	U	—	R = 1/4	α = 45°	All	—	e, j
				R = 3/8	α = 30°	F, V, OH	—	e, j
				R = 1/2	α = 20°	F, V, OH	—	e, j
GMAW FCAW	B-U2a-GF	U	—	R = 3/16	α = 30°	F, V, OH	Required	a, j
				R = 3/8	α = 30°	F, V, OH	Not req.	a, j
				R = 1/4	α = 45°	F, V, OH	Not req.	a, j
SAW	B-L2a-S	2 max.	—	R = 1/4	α = 30°	F	—	j
SAW	B-U2-S	U	—	R = 5/8	α = 20°	F	—	j

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

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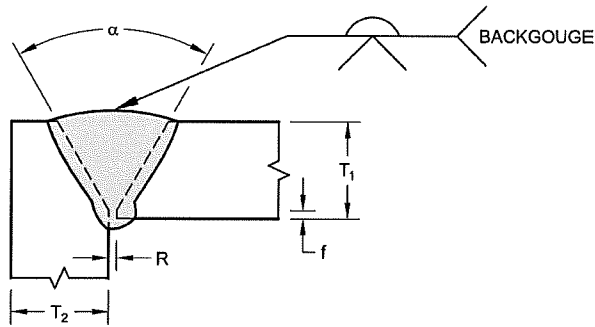
Single-V-groove weld (2) Corner joint (C)				Tolerances				
				As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
				$R = +1/16, -0$	$+1/4, -1/16$			
				$\alpha = +10^{\circ} - 0^{\circ}$	$+10^{\circ}, -5^{\circ}$			
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SMAW	C-U2a	U	U	R = 1/4	$\alpha = 45^{\circ}$	All	—	e, o
				R = 3/8	$\alpha = 30^{\circ}$	F, V, OH	—	e, o
				R = 1/2	$\alpha = 20^{\circ}$	F, V, OH	—	e, o
GMAW FCAW	C-U2a-GF	U	U	R = 3/16	$\alpha = 30^{\circ}$	F, V, OH	Required	a
				R = 3/8	$\alpha = 30^{\circ}$	F, V, OH	Not req.	a, o
				R = 1/4	$\alpha = 45^{\circ}$	F, V, OH	Not req.	a, o
SAW	C-L2a-S	2 max.	U	R = 1/4	$\alpha = 30^{\circ}$	F	—	o
SAW	C-U2-S	U	U	R = 5/8	$\alpha = 20^{\circ}$	F	—	o

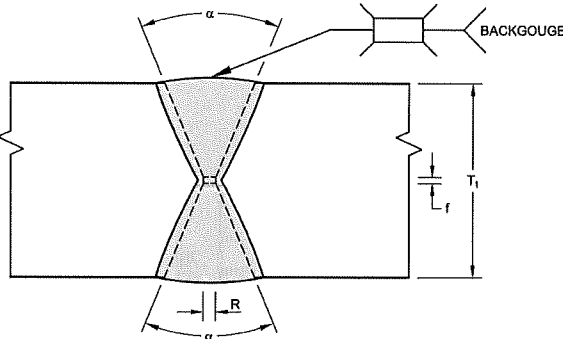
Single-V-groove weld (2)
Butt joint (B)

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes			
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances							
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)						
SMAW	B-U2	U	—	R = 0 to 1/8 f = 0 to 1/8 α = 60°	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	—	d, e, j			
GMAW FCAW	B-U2-GF	U	—	R = 0 to 1/8 f = 0 to 1/8 α = 60°	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	Not required	a, d, j			
SAW	B-L2c-S	Over 1/2 to 1	—	R = 0 f = 1/4 max. α = 60°	R = ±0 f = +0, -f α = +10°, -0°	+1/16, -0 ±1/16 +10°, -5°	F	—	d, j			
		Over 1 to 1-1/2	—	R = 0 f = 1/2 max. α = 60°								
		Over 1-1/2 to 2	—	R = 0 f = 5/8 max. α = 60°								

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

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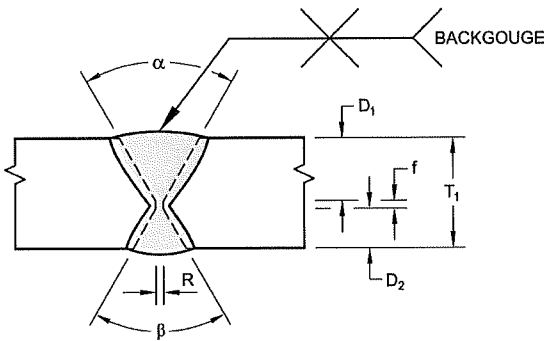
Single-V-groove weld (2) Corner joint (C) 									
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	C-U2	U	U	R = 0 to 1/8 f = 0 to 1/8 $\alpha = 60^\circ$	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	—	d, e, g, j
GMAW FCAW	C-U2-GF	U	U	R = 0 to 1/8 f = 0 to 1/8 $\alpha = 60^\circ$	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	Not required	a, d, g, j
SAW	C-U2b-S	U	U	R = 0 to 1/8 f = 1/4 max. $\alpha = 60^\circ$	± 0 +0, -1/4 +10°, -0°	+1/16, -0 $\pm 1/16$ +10°, -5°	F	—	d, g, j

Double-V-groove weld (3) Butt joint (B) 									
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Root Face	Groove Angle			
SMAW	B-U3a	U Spacer = 1/8 x R	—	R = 1/4	f = 0 to 1/8	$\alpha = 45^\circ$	All	—	d, e, h, j
				R = 3/8	f = 0 to 1/8	$\alpha = 30^\circ$	F, V, OH	—	
				R = 1/2	f = 0 to 1/8	$\alpha = 20^\circ$	F, V, OH	—	
SAW	B-U3a-S	U Spacer = 1/4 x R	—	R = 5/8	f = 0 to 1/4	$\alpha = 20^\circ$	F	—	d, h, j

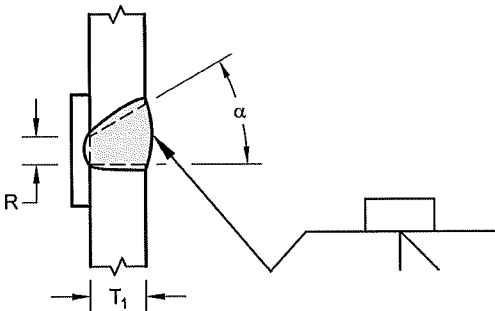
Tolerances			
		As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
R = ± 0			+1/4, -0
f = ± 0			+1/16, -0
$\alpha = +10^\circ, -0^\circ$			+10°, -5°
Spacer	SAW	± 0	+1/16, -0
	SMAW	± 0	+1/8, -0

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

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Double-V-groove weld (3) Butt joint (B) 					For B-U3c-S only		
					T1		D1
					Over	to	1-3/8
					2	2-1/2	
					2-1/2	3	1-3/4
					3	3-5/8	2-1/8
					3-5/8	4	2-3/8
					4	4-3/4	2-3/4
					4-3/4	5-1/2	3-1/4
					5-1/2	6-1/4	3-3/4
For T1 > 6-1/4 or T1 ≤ 2 D1 = 2/3 (T1 - 1/4)							

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T1	T2	Root Opening Root Face Groove Angle	Tolerances				
SMAW	B-U3b	U	—	R = 0 to 1/8 f = 0 to 1/8 α = β = 60°	As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)	All	—	d, e, h, j
GMAW FCAW	B-U3-GF				+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	Not required	a, d, h, j
SAW	B-U3c-S	U	—	R = 0 f = 1/4 min. α = β 60°	+1/16, -0 +1/4, -0 +10°, -0°	+1/16, -0 +1/4, -0 +10°, -5°	F	—	d, h, j
					To find D1 see table above: D2 = T1 - (D1 + f)				

Single-bevel-groove weld (4) Butt joint (B) 					Tolerances	
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
					R = +1/16, -0	+1/4, -1/16
					α = +10°, -0°	+10°, -5°

Welding Process	Joint Designation	Bass Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T1	T2	Root Opening	Groove Angle			
SMAW	B-U4a	U	—	R = 1/4	α = 45°	All	—	c, e, j
				R = 3/8	α = 30°	All	—	c, e, j
GMAW FCAW	B-U4a-GF	U	—	R = 3/16	α = 30°	All	Required	a, c, j
				R = 1/4	α = 45°	All	Not req.	a, c, j
				R = 3/8	α = 30°	F, H	Not req.	a, c, j
SAW	B-U4a-S	U	—	R = 3/8	α = 30°	F	—	c, j
				R = 1/4	α = 45°			

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

See Notes on Page 85

Single-bevel-groove weld (4)
T-joint (T)
Corner joint (C)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
R = +1/16, -0	+1/4, -1/16
α = +10° -0°	+10°, -5°

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SMAW	TC-U4a	U	U	R = 1/4	α = 45°	All	—	e, g, k, o
				R = 3/8	α = 30°	F, V, OH	—	e, g, k, o
GMAW FCAW	TC-U4a-GF	U	U	R = 3/16	α = 30°	All	Required	a, g, k, o
				R = 3/8	α = 30°	F	Not req.	a, g, k, o
				R = 1/4	α = 45°	All	Not req.	a, g, k, o
SAW	TC-U4a-S	U	U	R = 3/8	α = 30°	F	—	g, k, o
				R = 1/4	α = 45°			

Single-bevel-groove weld (4)
Butt joint (B)

The diagram illustrates a single-bevel-groove weld butt joint. It shows two vertical plates of thickness T_1 joined by a weld. The groove angle is α , and the root opening is R . The weld is shown in cross-section and side view. A BACKGOUGE is indicated on the side view.

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T_1	T_2	Root Opening Root Face Groove Angle	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	B-U4b	U	—	$R = 0 \text{ to } 1/8$ $f = 0 \text{ to } 1/8$ $\alpha = 45^\circ$	$+1/16, -0$	$+1/16, -1/8$	All	—	c, d, e, j
GMAW FCAW	B-U4b-GF	U	—		$+1/16, -0$ $+10^\circ, -0^\circ$	Not limited $10^\circ, -5^\circ$	All	Not required	a, c, d, j
SAW	B-U4b-S	U	—	$R = 0$ $f = 1/4 \text{ max.}$ $\alpha = 60^\circ$	± 0 $+0, -1/8$ $+10^\circ, -0^\circ$	$+1/4, -0$ $\pm 1/16$ $10^\circ, -5^\circ$	F	—	c, d, j

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

See Notes on Page 85

Single-bevel-groove weld (4)
T-joint (T)
Corner joint (C)

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes			
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances							
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)						
SMAW	TC-U4b	U	U	R = 0 to 1/8 f = 0 to 1/8 α = 45°	+1/16, -0	+1/16, -1/8	All	—	d, e, g, j, k			
GMAW FCAW	TC-U4b-GF	U	U		+1/16, -0 +10°, -0°	Not limited +10°, -5°	All	Not required	a, d, g, j, k			
SAW	TC-U4b-S	U	U	R = 0 f = 1/4 max. α = 60°	±0 +0, -1/8 +10°, -0°	+1/4, -0 ±1/16 +10°, -5°	F	—	d, g, j, k			

Double-bevel-groove weld (5)
 Butt joint (B)
 T-joint (T)
 Corner joint (C)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
$R = \pm 0$	$+1/4, -0$
$f = +1/16, -0$	$\pm 1/16$
$\alpha = +10^{\circ}, -0^{\circ}$	$+10^{\circ}, -5^{\circ}$
Spacer	$+1/16, -0$ $+1/8, -0$

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Root Face	Groove Angle			
SMAW	B-U5b	U	—	R = 1/4	f = 0 to 1/8	α = 45°	All	—	c, d, e, h, j
		Spacer = 1/8 × R	—						
	TC-U5a	U	U	R = 1/4	f = 0 to 1/8	α = 45°	All	—	d, e, g, h, j, k
		Spacer = 1/4 × R	U	R = 3/8	f = 0 to 1/8	α = 30°	F, OH	—	d, e, g, h, j, k

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

See Notes on Page 85

Double-bevel-groove weld (5)
Butt joint (B)

The diagram illustrates a double-bevel-groove butt joint. Two plates, each of thickness T_1 and T_2 , are joined at a root. The joint features a V-groove with a root opening R and a root face f . The groove angle is denoted by α , and the bevel angle is β . A BACKGOUGE is indicated on the right side of the joint.

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	B-U5a	U	—	R = 0 to 1/8 f = 0 to 1/8 $\alpha = 45^\circ$ $\beta = 0^\circ$ to 15°	+1/16, -0 +1/16, -0 $\alpha + \beta = +10^\circ, -0^\circ$	+1/16, -1/8 Not limited $\alpha + \beta = +10^\circ, -5^\circ$	All	—	c, d, e, h, j
GMAW FCAW	B-U5-GF	U	—	R = 0 to 1/8 f = 0 to 1/8 $\alpha = 45^\circ$ $\beta = 0^\circ$ to 15°	+1/16, -0 +1/16, -0 $\alpha + \beta = +10^\circ, -0^\circ$	+1/16, -1/8 Not limited $\alpha + \beta = +10^\circ, -5^\circ$	All	Not required	a, c, d, h, j

Double-bevel-groove weld (5)
T-joint (T)
Corner joint (C)

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes			
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances							
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)						
SMAW	TC-U5b	U	U	R = 0 to 1/8 f = 0 to 1/8 α = 45°	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited +10°, -5°	All	—	d, e, g, h, j, k			
GMAW FCAW	TC-U5-GF	U	U				All	Not required	a, d, g, h, j, k			
SAW	TC-U5-S	U	U	R = 0 f = 1/4 max. α = 60°	±0 +0, -3/16 +10°, -0°	+1/16, -0 ±1/16 +10°, -5°	F	—	d, g, h, j, k			

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

See Notes on Page 85

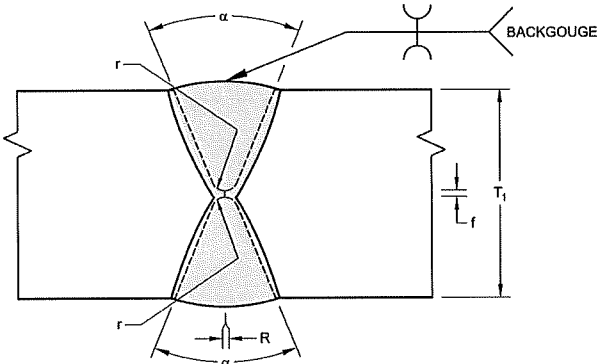
Single-U-groove weld (6)

Butt joint (B)

Corner joint (C)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
$R = +1/16, -0$	$+1/16, -1/8$
$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$
$f = \pm 1/16$	Not Limited
$r = +1/8, -0$	$+1/8, -0$

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U6	U	—	R = 0 to 1/8	$\alpha = 45^\circ$	f = 1/8	r = 1/4	All	—	d, e, j
				R = 0 to 1/8	$\alpha = 20^\circ$	f = 1/8	r = 1/4	F, OH	—	d, e, j
	C-U6	U	U	R = 0 to 1/8	$\alpha = 45^\circ$	f = 1/8	r = 1/4	All	—	d, e, g, j
				R = 0 to 1/8	$\alpha = 20^\circ$	f = 1/8	r = 1/4	F, OH	—	d, e, g, j
GMAW FCAW	B-U6-GF	U	—	R = 0 to 1/8	$\alpha = 20^\circ$	f = 1/8	r = 1/4	All	Not req.	a, d, j
	C-U6-GF	U	U	R = 0 to 1/8	$\alpha = 20^\circ$	f = 1/8	r = 1/4	All	Not req.	a, d, g, j

Double-U-groove weld (7) Butt joint (B)				<table><tr><th colspan="2">Tolerances</th></tr><tr><th>As Detailed (see 5.4.1.1)</th><th>As Fit-Up (see 5.4.1.8)</th></tr><tr><th colspan="2">For B-U7 and B-U7-GF</th></tr><tr><td>R = +1/16, -0</td><td>+1/16, -1/8</td></tr><tr><td>α = +10°, -0°</td><td>+10°, -5°</td></tr><tr><td>f = +1/16, -0</td><td>Not Limited</td></tr><tr><td>r = +1/4, -0</td><td>±1/16</td></tr><tr><th colspan="2">For B-U7-S</th></tr><tr><td>R = +0</td><td>+1/16, -0</td></tr><tr><td>α = +10°, -0°</td><td>+10°, -5°</td></tr><tr><td>f = +0, -1/4</td><td>±1/16</td></tr><tr><td>r = +1/4, -0</td><td>±1/16</td></tr></table>		Tolerances		As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)	For B-U7 and B-U7-GF		R = +1/16, -0	+1/16, -1/8	α = +10°, -0°	+10°, -5°	f = +1/16, -0	Not Limited	r = +1/4, -0	±1/16	For B-U7-S		R = +0	+1/16, -0	α = +10°, -0°	+10°, -5°	f = +0, -1/4	±1/16	r = +1/4, -0	±1/16
Tolerances																													
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)																												
For B-U7 and B-U7-GF																													
R = +1/16, -0	+1/16, -1/8																												
α = +10°, -0°	+10°, -5°																												
f = +1/16, -0	Not Limited																												
r = +1/4, -0	±1/16																												
For B-U7-S																													
R = +0	+1/16, -0																												
α = +10°, -0°	+10°, -5°																												
f = +0, -1/4	±1/16																												
r = +1/4, -0	±1/16																												

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U7	U	—	R = 0 to 1/8	α = 45°	f = 1/8	r = 1/4	All	—	d, e, h, j
				R = 0 to 1/8	α = 20°	f = 1/8	r = 1/4	F, OH	—	d, e, h, j
GMAW FCAW	B-U7-GF	U	—	R = 0 to 1/8	α = 20°	f = 1/8	r = 1/4	All	Not required	a, d, j, h
SAW	B-U7-S	U	—	R = 0	α = 20°	f = 1/4 max.	r = 1/4	F	—	d, h, j

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

See Notes on Page 85

Single-J-groove weld (8)
Butt joint (B)

The diagram illustrates a Single-J-groove weld (B) in a butt joint. It shows two plates of thickness T_1 and T_2 being joined. The root opening is R , the groove angle is α , the root face is f , and the bevel radius is r . A BACKGOUGE is shown on the reverse side of the joint.

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
B-U8 and B-U8-GF	
$R = +1/16, -0$	$+1/16, -1/8$
$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$
$f = +1/8, -0$	Not Limited
$r = +1/4, -0$	$\pm 1/16$
B-U8-S	
$R = \pm 0$	$+1/4, -0$
$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$
$f = +0, -1/8$	$\pm 1/16$
$r = +1/4, -0$	$\pm 1/16$

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T_1	T_2	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U8	U	—	$R = 0 \text{ to } 1/8$	$\alpha = 45^\circ$	$f = 1/8$	$r = 3/8$	All	—	c, d, e, j
GMAW FCAW	B-U8-GF	U	—	$R = 0 \text{ to } 1/8$	$\alpha = 30^\circ$	$f = 1/8$	$r = 3/8$	All	Not req.	a, c, d, j
SAW	B-U8-S	U	—	$R = 0$	$\alpha = 45^\circ$	$f = 1/4 \text{ max.}$	$r = 3/8$	F	—	c, d, j

Single-J-groove weld (8)
T-joint (T)
Corner joint (C)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
TC-U8a and TC-U8a-GF	
R = +1/16, -0	+1/16, -1/8
α = +10°, -0°	+10°, -5°
f = +1/16, -0	Not Limited
r = +1/4, -0	±1/16
TC-U8a-S	
R = ±0	+1/4, -0
α = +10°, -0°	+10°, -5°
f = +0, -1/8	±1/16
r = +1/4, -0	+1/16

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	TC-U8a	U	U	R = 0 to 1/8	α = 45°	f = 1/8	r = 3/8	All	—	d, e, g, j, k
				R = 0 to 1/8	α = 30°	f = 1/8	r = 3/8	F, OH	—	d, e, g, j, k
GMAW FCAW	TC-U8a-GF	U	U	R = 0 to 1/8	α = 30°	f = 1/8	r = 3/8	All	Not required	a, d, g, j, k
SAW	TC-U8a-S	U	U	R = 0	α = 45°	f = 1/4 max.	r = 3/8	F	—	d, g, j, k

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

See Notes on Page 85

Double-J-groove weld (9)
Butt joint (B)

The diagram illustrates a Double-J-groove butt joint (B) between two plates. Key dimensions and features include:

- T_1 and T_2 : Total thicknesses of the two plates.
- D_1 and D_2 : Groove depths on each side.
- f : Groove face width.
- α : Groove angle.
- R : Root radius.
- r : Bevel radius.
- A BACKGOUGE is shown on the right side, used to measure the root opening.

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
$R = +1/16, -0$	$+1/16, -1/8$
$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$
$f = +1/16, -0$	Not Limited
$r = 1/8, -0$	$\pm 1/16$

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T_1	T_2	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U9	U	—	$R = 0$ to $1/8$	$\alpha = 45^\circ$	$f = 1/8$	$r = 3/8$	All	—	c, d, e, h, j
GMAW FCAW	B-U9-GF	U	—	$R = 0$ to $1/8$	$\alpha = 30^\circ$	$f = 1/8$	$r = 3/8$	All	Not required	a, c, d, h, j

Double-J-groove weld (9)
 T-joint (T)
 Corner joint (C)

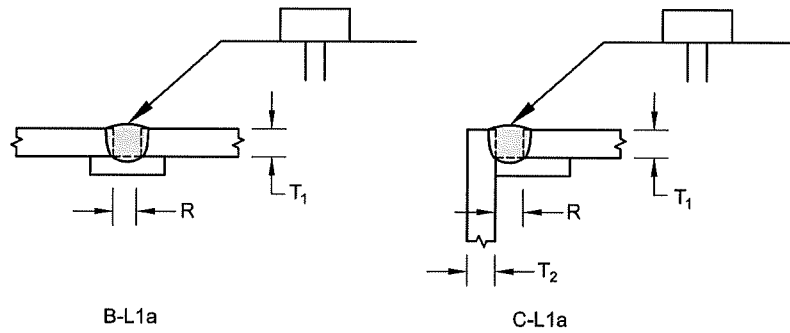
Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
R = +1/16, -0	+1/16, -1/8
α = +10°, -0°	+10°, -5°
f = +1/16, -0	Not Limited
r = 1/8, -0	±1/16

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	TC-U9a	U	U	R = 0 to 1/8	α = 45°	f = 1/8	r = 3/8	All	—	d, e, g, h, j, k
				R = 0 to 1/8	α = 30°	f = 1/8	r = 3/8	F, OH	—	d, e, g, h, k
GMAW FCAW	TC-U9a-GF	U	U	R = 0 to 1/8	α = 30°	f = 1/8	r = 3/8	All	Not required	a, d, g, h, j, k

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Inches)

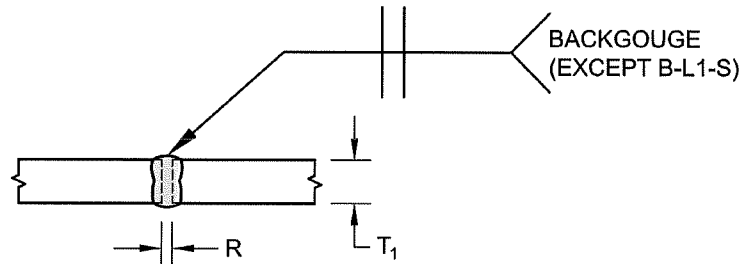
See Notes on Page 85

Square-groove weld (1)
Butt joint (B)
Corner joint (C)



Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	B-L1a	6 max.	—	R = T ₁	+2, −0	+6, −2	All	—	e, j
	C-L1a	6 max.	U	R = T ₁	+2, −0	+6, −2	All	—	e, j
FCAW GMAW	B-L1a-GF	10 max.	—	R = T ₁	+2, −0	+6, −2	All	Not required	a, j

Square-groove weld (1)
Butt joint (B)



Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	B-L1b	6 max.	—	$R = \frac{T_1}{2}$	+2, −0	+2, −3	All	—	d, e, j
GMAW FCAW	B-L1b-GF	10 max.	—	R = 0 to 3	+2, −0	+2, −3	All	Not required	a, d, j
SAW	B-L1-S	10 max.	—	R = 0	±0	+2, −0	F	—	j
SAW	B-L1a-S	16 max.	—	R = 0	±0	+2, −0	F	—	d, j

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Square-groove weld (1)
T-joint (T)
Corner joint (C)

The diagram illustrates a square-groove weld joint. It shows two plates, one vertical and one horizontal, meeting at a T-joint. The vertical plate has a thickness labeled T₂. The horizontal plate has a thickness labeled T₁. The joint is prepared with a square groove. The radius of the groove is labeled R. A BACKGOUGE is shown on the right side of the joint, used to maintain the groove depth. The diagram also shows a corner joint (C) where the two plates meet at a 90-degree angle.

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes			
		T ₁	T ₂	Root Opening	Tolerances							
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)						
SMAW	TC-L1b	6 max.	U	$R = \frac{T_1}{2}$	+2, -0	+2, -3	All	—	d, e, g			
GMAW FCAW	TC-L1-GF	10 max.	U	R = 0 to 3	+2, -0	+2, -3	All	Not required	a, d, g			
SAW	TC-L1-S	10 max.	U	R = 0	±0	+2, -0	F	—	d, g			

Single-V-groove weld (2)
Butt joint (B)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
R = +2, -0	+6, -2
α = +10°, -0°	+10°, -5°

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SMAW	B-U2a	U	—	R = 6	α = 45°	All	—	e, j
				R = 10	α = 30°	F, V, OH	—	e, j
				R = 12	α = 20°	F, V, OH	—	e, j
GMAW FCAW	B-U2a-GF	U	—	R = 5	α = 30°	F, V, OH	Required	a, j
				R = 10	α = 30°	F, V, OH	Not req.	a, j
				R = 6	α = 45°	F, V, OH	Not req.	a, j
SAW	B-L2a-S	50 max.	—	R = 6	α = 30°	F	—	j
SAW	B-U2-S	U	—	R = 16	α = 20°	F	—	j

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Single-V-groove weld (2)
Corner joint (C)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
R = +2, -0	+6, -2
α = +10°, -0°	+10°, -5°

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SMAW	C-U2a	U	U	R = 6	α = 45°	All	—	e, o
				R = 10	α = 30°	F, V, OH	—	e, o
				R = 12	α = 20°	F, V, OH	—	e, o
GMAW FCAW	C-U2a-GF	U	U	R = 5	α = 30°	F, V, OH	Required	a
				R = 10	α = 30°	F, V, OH	Not req.	a, o
				R = 6	α = 45°	F, V, OH	Not req.	a, o
SAW	C-L2a-S	50 max.	U	R = 6	α = 30°	F	—	o
SAW	C-U2-S	U	U	R = 16	α = 20°	F	—	o

Single-V-groove weld (2)
Butt joint (B)

The diagram illustrates a single-V-groove butt joint. Two plates of thickness T_1 and T_2 are joined. The groove angle is α . The root opening is R . The face width is f . A backgouge is shown on the opposite side of the joint.

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes			
		T_1	T_2	Root Opening Root Face Groove Angle	Tolerances							
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)						
SMAW	B-U2	U	—	$R = 0$ to 3 $f = 0$ to 3 $\alpha = 60^\circ$	$+2, -0$ $+2, -0$ $+10^\circ, -0^\circ$	$+2, -3$ Not limited $+10^\circ, -5^\circ$	All	—	d, e, j			
GMAW FCAW	B-U2-GF	U	—	$R = 0$ to 3 $f = 0$ to 3 $\alpha = 60^\circ$	$+2, -0$ $+2, -0$ $+10^\circ, -0^\circ$	$+2, -3$ Not limited $+10^\circ, -5^\circ$	All	Not required	a, d, j			
SAW	B-L2c-S	Over 12 to 25	—	$R = 0$ $f = 6$ max. $\alpha = 60^\circ$	$R = \pm 0$ $f = +0, -f$ $\alpha = +10^\circ, -0^\circ$	$+2, -0$ ± 2 $+10^\circ, -5^\circ$	F	—	d, j			
		Over 25 to 38	—	$R = 0$ $f = 12$ max. $\alpha = 60^\circ$								
		Over 38 to 50	—	$R = 0$ $f = 16$ max. $\alpha = 60^\circ$								

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Single-V-groove weld (2)
Corner Joint (C)

The diagram illustrates a single-V-groove weld corner joint. Two plates, one of thickness T_1 and the other of thickness T_2 , are joined at a corner. The groove is defined by a root opening R and a root face f . The groove angle is denoted by α . A BACKGOUGE is shown on the opposite side of the joint, used for non-destructive testing.

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T_1	T_2	Root Opening Root Face Groove Angle	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	C-U2	U	U	$R = 0 \text{ to } 3$ $f = 0 \text{ to } 3$ $\alpha = 60^\circ$	$+2, -0$ $+2, -0$ $+10^\circ, -0^\circ$	$+2, -3$ Not limited $+10^\circ, -5^\circ$	All	—	d, e, g, j
GMAW FCAW	C-U2-GF	U	U	$R = 0 \text{ to } 3$ $f = 0 \text{ to } 3$ $\alpha = 60^\circ$	$+2, -0$ $+2, -0$ $+10^\circ, -0^\circ$	$+2, -3$ Not limited $+10^\circ, -5^\circ$	All	Not required	a, d, g, j
SAW	C-U2b-S	U	U	$R = 0 \text{ to } 3$ $f = 6 \text{ max.}$ $\alpha = 60^\circ$	± 0 $+0, -6$ $+10^\circ, -0^\circ$	$+2, -0$ ± 2 $+10^\circ, -5^\circ$	F	—	d, g, j

Double-V-groove weld (3)
Butt joint (B)

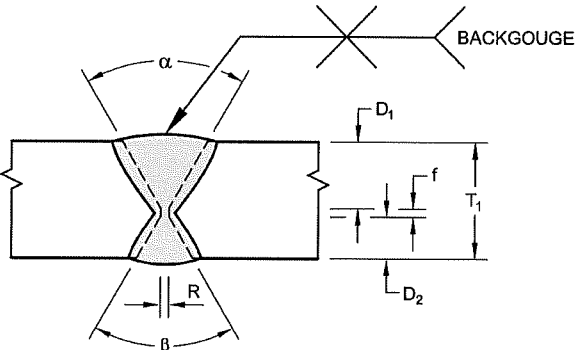
The diagram illustrates a double-V-groove butt joint. Two plates, each with a thickness T_1 , are joined at a root opening R . The groove angle is denoted by α . The root face is f . A BACKGOUGE is shown on the opposite side of the joint.

		Tolerances	
		As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
		$R = \pm 0$	$+6, -0$
		$f = \pm 0$	$+2, -0$
		$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$
Spacer	SAW	± 0	$+2, -0$
	SMAW	± 0	$+3, -0$

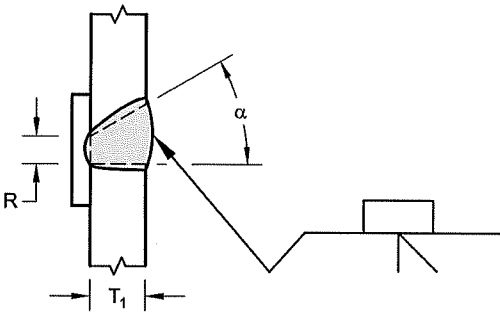
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T_1	T_2	Root Opening	Root Face	Groove Angle			
SMAW	B-U3a	U Spacer = $3 \times R$	—	$R = 6$	$f = 0$ to 3	$\alpha = 45^\circ$	All	—	d, e, h, j
				$R = 10$	$f = 0$ to 3	$\alpha = 30^\circ$	F, V, OH	—	
				$R = 12$	$f = 0$ to 3	$\alpha = 20^\circ$	F, V, OH	—	
SAW	B-U3a-S	U Spacer = $6 \times R$	—	$R = 16$	$f = 0$ to 6	$\alpha = 20^\circ$	F	—	d, h, j

**Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)**

See Notes on Page 85

Double-V-groove weld (3) Butt joint (B)		For B-U3c-S only		
		T_1		D_1
		Over	to	35
		50	60	
		60	80	45
		80	90	55
		90	100	60
		100	120	70
		120	140	80
		140	160	95
		For $T_1 > 160$ or $T_1 \leq 50$ $D_1 = 2/3(T_1 - 6)$		

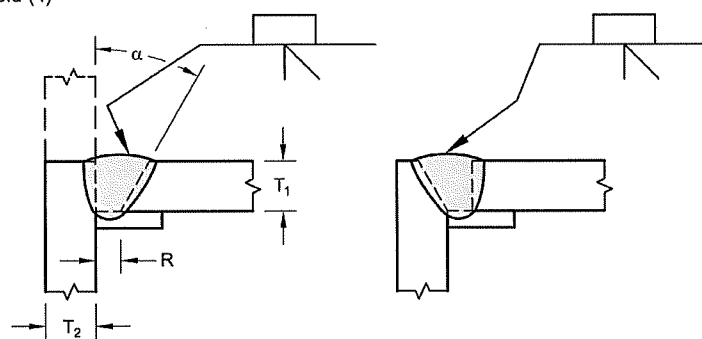
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	B-U3b	U	—	R = 0 to 3 f = 0 to 3 α = β = 60°	+2, -0 +2, -0 +10°, -0°	+2, -3 Not limited +10°, -5°	All	—	d, e, h, j
GMAW FCAW	B-U3-GF			All	Not required	a, d, h, j			
SAW	B-U3c-S	U	—	R = 0 f = 6 min. α = β = 60°	+2, -0 +6, -0 +10°, -0°	+2, -0 +6, -0 +10°, -5°	F	—	d, h, j
				To find D ₁ see table above: D ₂ = T ₁ - (D ₁ + f)					

Single-bevel-groove weld (4) Butt joint (B)		Tolerances	
		As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
		R = +2, -0	+6, -2
		$\alpha = +10^\circ, -0^\circ$	+10°, -5°

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T_1	T_2	Root Opening	Groove Angle			
SMAW	B-U4a	U	—	R = 6	$\alpha = 45^\circ$	All	—	c, e, j
				R = 10	$\alpha = 30^\circ$	All	—	c, e, j
GMAW FCAW	B-U4a-GF	U	—	R = 5	$\alpha = 30^\circ$	All	Required	a, c, j
				R = 6	$\alpha = 45^\circ$	All	Not req.	a, c, j
				R = 10	$\alpha = 30^\circ$	F, H	Not req.	a, c, j
SAW	B-U4a-S	U	—	R = 10	$\alpha = 30^\circ$	F	—	c, j
				R = 6	$\alpha = 45^\circ$			

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Single-bevel-groove weld (4) T-joint (T) Corner joint (C)				<table><tr><th colspan="2">Tolerances</th></tr><tr><th>As Detailed (see 5.4.1.1)</th><th>As Fit-Up (see 5.4.1.8)</th></tr><tr><td>R = +2, -0</td><td>+6, -2</td></tr><tr><td>$\alpha = +10^\circ, -0^\circ$</td><td>$+10^\circ, -5^\circ$</td></tr></table>		Tolerances		As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)	R = +2, -0	+6, -2	$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$
Tolerances													
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)												
R = +2, -0	+6, -2												
$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$												
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Allowed Welding Positions	Gas Shielding for FCAW	Notes					
		T ₁	T ₂	Root Opening	Groove Angle								
SMAW	TC-U4a	U	U	R = 6	$\alpha = 45^\circ$	All	—	e, g, k, o					
				R = 10	$\alpha = 30^\circ$	F, V, OH	—	e, g, k, o					
GMAW FCAW	TC-U4a-GF	U	U	R = 5	$\alpha = 30^\circ$	All	Required	a, g, k, o					
				R = 10	$\alpha = 30^\circ$	F	Not req.	a, g, k, o					
				R = 6	$\alpha = 45^\circ$	All	Not req.	a, g, k, o					
SAW	TC-U4a-S	U	U	R = 10	$\alpha = 30^\circ$	F	—	g, k, o					
				R = 6	$\alpha = 45^\circ$								

Single-bevel-groove weld (4)
Butt joint (B)

The diagram illustrates a single-bevel-groove weld for a butt joint. Two vertical plates, each with a thickness labeled T_1 , are joined at a 90-degree angle. The groove angle is labeled α . The root opening is labeled R . The distance from the groove to the edge is labeled f . A BACKGOUGE is shown on the right side of the joint.

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes			
		T_1	T_2	Root Opening	Tolerances							
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)						
SMAW	B-U4b	U	—	R = 0 to 3 f = 0 to 3 $\alpha = 45^\circ$	+2, -0 +2, -0 +10°, -0°	+2, -3 Not limited 10°, -5°	All	—	c, d, e, j			
GMAW FCAW	B-U4b-GF	U	—				All	Not required	a, c, d, j			
SAW	B-U4b-S	U	—	R = 0 f = 6 max. $\alpha = 60^\circ$	± 0 +0, -3 +10°, -0°	+6, -0 ± 2 10°, -5°	F	—	c, d, j			

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

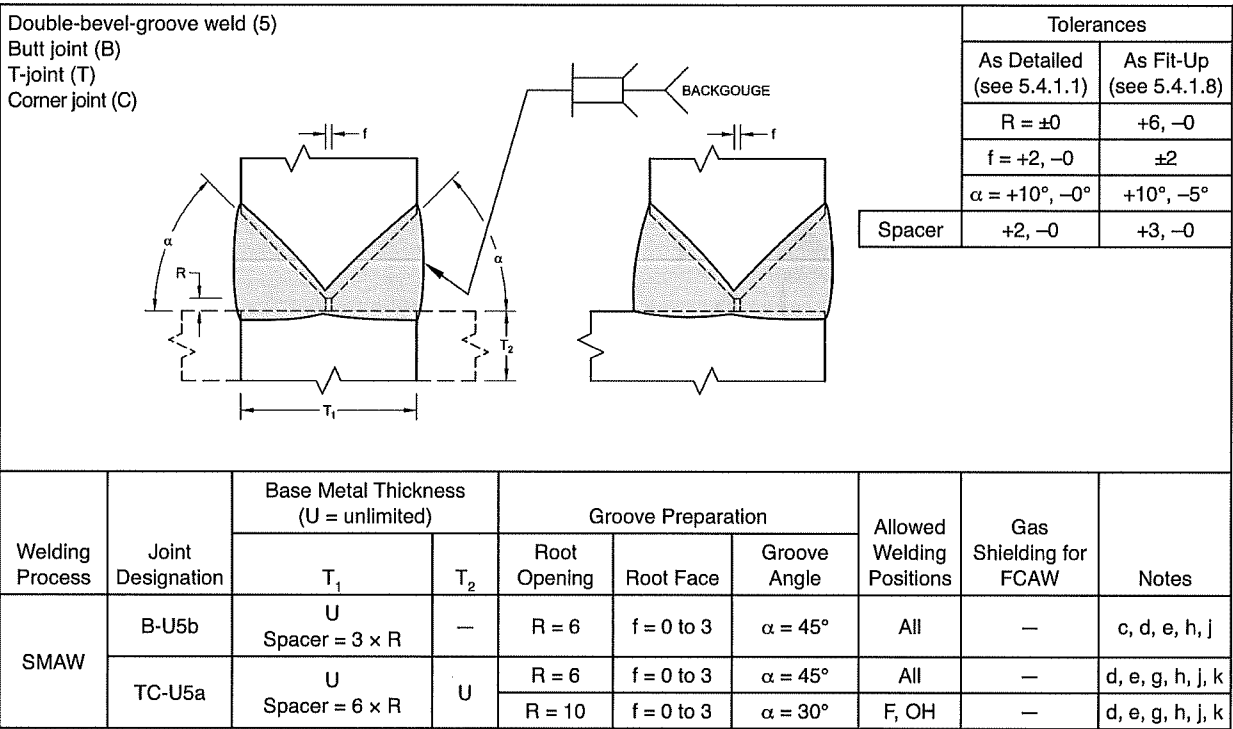
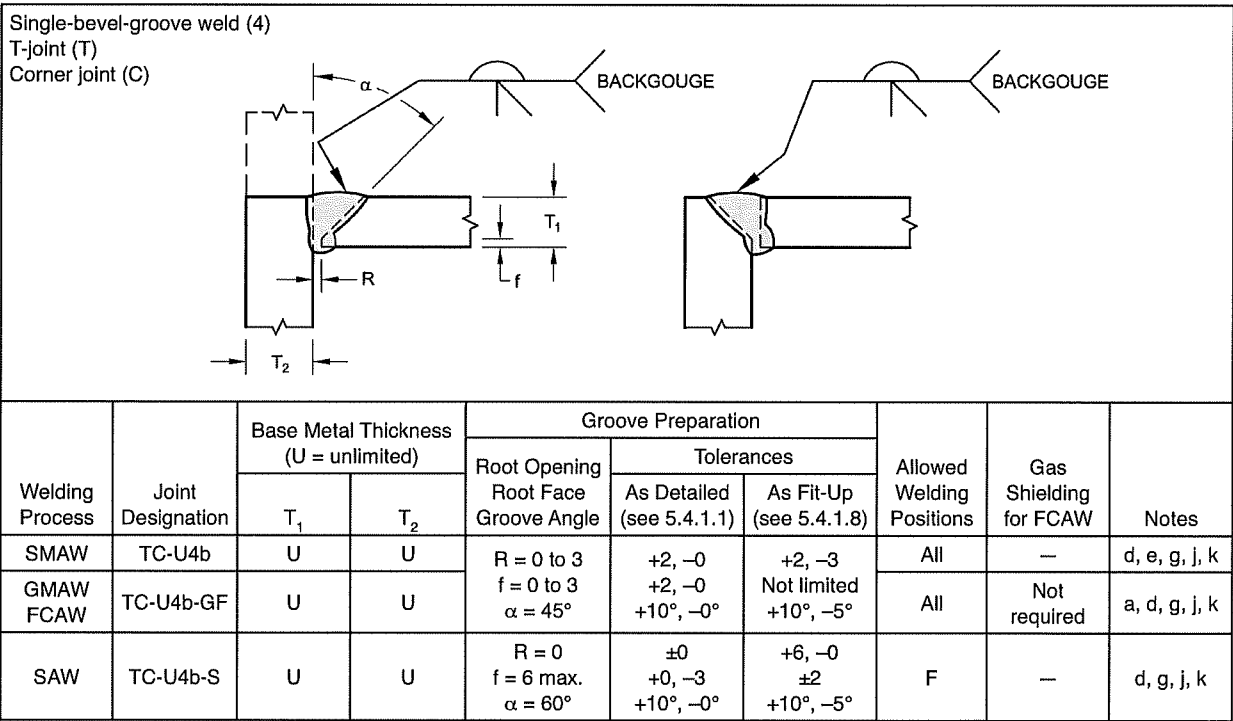
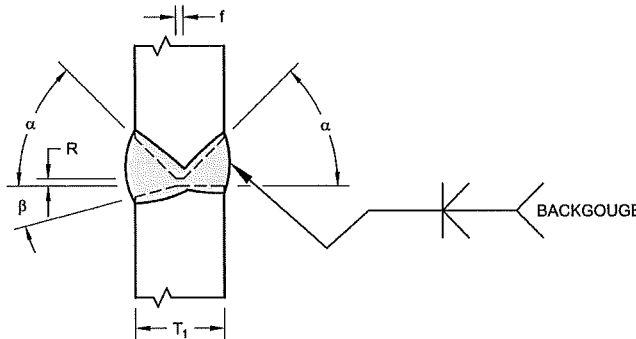


Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Double-bevel-groove weld (5) Butt joint (B)									
									
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	B-U5a	U	—	R = 0 to 3 f = 0 to 3 $\alpha = 45^\circ$ $\beta = 0^\circ$ to 15°	+2, -0 +2, -0 $\alpha + \beta = +10^\circ, -0^\circ$	+2, -3 Not limited $\alpha + \beta = +10^\circ, -5^\circ$	All	—	c, d, e, h, j
GMAW FCAW	B-U5-GF	U	—	R = 0 to 3 f = 0 to 3 $\alpha = 45^\circ$ $\beta = 0^\circ$ to 15°	+2, -0 +2, -0 $\alpha + \beta = +10^\circ, -0^\circ$	+2, -3 Not limited $\alpha + \beta = +10^\circ, -5^\circ$	All	Not required	a, c, d, h, j

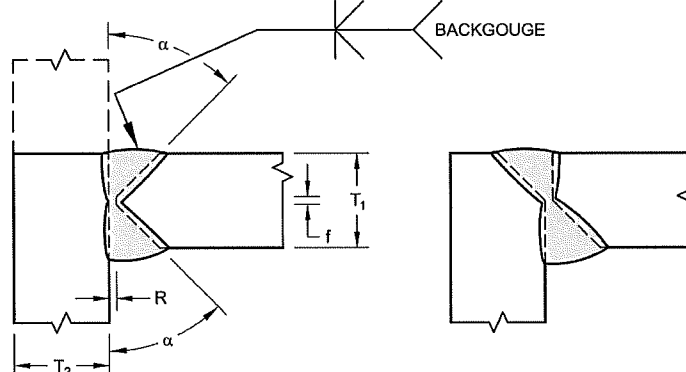
Double-bevel-groove weld (5) T-joint (T) Corner joint (C)									
									
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances				
					As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)			
SMAW	TC-U5b	U	U	R = 0 to 3 f = 0 to 3 $\alpha = 45^\circ$	+2, -0 +2, -0 $\alpha + \beta = +10^\circ, -0^\circ$	+2, -3 Not limited $\alpha + \beta = +10^\circ, -5^\circ$	All	—	d, e, g, h, j, k
GMAW FCAW	TC-U5-GF	U	U	R = 0 to 3 f = 0 to 3 $\alpha = 45^\circ$	+2, -0 +2, -0 $\alpha + \beta = +10^\circ, -0^\circ$	+2, -3 Not limited $\alpha + \beta = +10^\circ, -5^\circ$	All	Not required	a, d, g, h, j, k
SAW	TC-U5-S	U	U	R = 0 f = 6 max. $\alpha = 60^\circ$	± 0 +0, -5 $\alpha + \beta = +10^\circ, -0^\circ$	+2, -0 ± 2 $\alpha + \beta = +10^\circ, -5^\circ$	F	—	d, g, h, j, k

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Single-U-groove weld (6)
Butt joint (B)
Corner joint (C)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
$R = +2, -0$	$+2, -3$
$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$
$f = \pm 2$	Not Limited
$r = +3, -0$	$+3, -0$

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U6	U	—	R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 6	All	—	d, e, j
				R = 0 to 3	$\alpha = 20^\circ$	f = 3	r = 6	F, OH	—	d, e, j
	C-U6	U	U	R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 6	All	—	d, e, g, j
				R = 0 to 3	$\alpha = 20^\circ$	f = 3	r = 6	F, OH	—	d, e, g, j
GMAW	B-U6-GF	U	—	R = 0 to 3	$\alpha = 20^\circ$	f = 3	r = 6	All	Not req.	a, d, j
FCAW	C-U6-GF	U	U	R = 0 to 3	$\alpha = 20^\circ$	f = 3	r = 6	All	Not req.	a, d, g, j

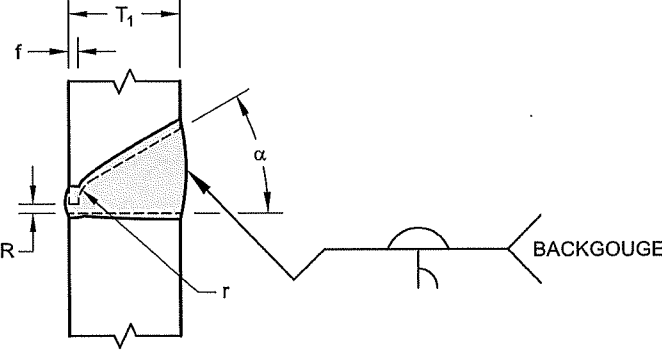
Double-U-groove weld (7)
Butt joint (B)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
For B-U7 and B-U7-GF	
R = +2, -0	+2, -3
$\alpha = +10^\circ, -0^\circ$	+10°, -5°
f = $\pm 2, -0$	Not Limited
r = +6, -0	± 2
For B-U7-S	
R = +0	+2, -0
$\alpha = +10^\circ, -0^\circ$	+10°, -5°
f = +0, -6	± 2
r = +6, -0	± 2

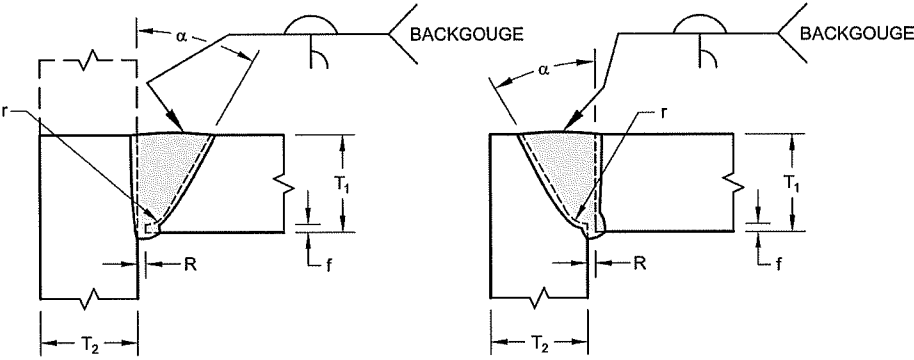
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U7	U	—	R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 6	All	—	d, e, h, j
				R = 0 to 3	$\alpha = 20^\circ$	f = 3	r = 6	F, OH	—	d, e, h, j
GMAW FCAW	B-U7-GF	U	—	R = 0 to 3	$\alpha = 20^\circ$	f = 3	r = 6	All	Not required	a, d, j, h
SAW	B-U7-S	U	—	R = 0	$\alpha = 20^\circ$	f = 6 max.	r = 6	F	—	d, h, j

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Single-J-groove weld (8) Butt joint (B)				Tolerances	
				As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
				B-U8 and B-U8-GF	
				R = +2, -0	+2, -3
				$\alpha = +10^\circ, -0^\circ$	+10°, -5°
				f = +3, -0	Not Limited
				r = +6, -0	±1/16
				B-U8-S	
				R = ±0	+3, -0
				$\alpha = +10^\circ, -0^\circ$	+10°, -5°
				f = +0, -3	±2
				r = +6, -0	±2

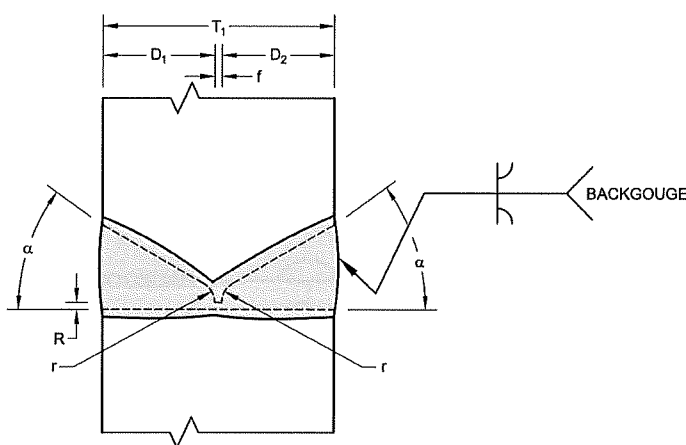
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U8	U	—	R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 10	All	—	c, d, e, j
GMAW FCAW	B-U8-GF	U	—	R = 0 to 3	$\alpha = 30^\circ$	f = 3	r = 10	All	Not req.	a, c, d, j
SAW	B-U8-S	U	—	R = 0	$\alpha = 45^\circ$	f = 6 max.	r = 10	F	—	c, d, j

Single-J-groove weld (8) T-joint (T) Corner joint (C)				Tolerances	
				As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
				TC-U8a and TC-U8a-GF	
				R = +2, -0	+2, -3
				$\alpha = +10^\circ, -0^\circ$	+10°, -5°
				f = +2, -0	Not Limited
				r = +6, -0	±1/16
				TC-U8a-S	
				R = ±0	+6, -0
				$\alpha = +10^\circ, -0^\circ$	+10°, -5°
				f = +0, -3	±2
				r = +6, -0	±2

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	TC-U8a	U	U	R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 10	All	—	d, e, g, j, k
				R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 10	F, OH	—	d, e, g, j, k
GMAW FCAW	TC-U8a-GF	U	U	R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 10	All	Not required	a, d, g, j, k
SAW	TC-U8a-S	U	U	R = 0	$\alpha = 45^\circ$	f = 6 max.	r = 10	F	—	d, g, j, k

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)

See Notes on Page 85

Double-J-groove weld (9) Butt joint (B)								Tolerances	
								As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
								R = +2, -0	+2, -3
								$\alpha = +10^\circ, -0^\circ$	+10°, -5°
								f = +2, -0	Not Limited
								r = +3, -0	±2

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	B-U9	U	—	R = 0 to 3	$\alpha = 45^\circ$	f = 3	r = 10	All	—	c, d, e, h, j
GMAW FCAW	B-U9-GF	U	—	R = 0 to 3	$\alpha = 30^\circ$	f = 3	r = 10	All	Not required	a, c, d, h, j

Double-J-groove weld (9)
T-joint (T)
Corner joint (C)

Tolerances	
As Detailed (see 5.4.1.1)	As Fit-Up (see 5.4.1.8)
R = +2, -0	+2, -3
α = +10°, -0°	+10°, -5°
f = +2, -0	Not Limited
r = 3, -0	±2

Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation				Allowed Welding Positions	Gas Shielding for FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle	Root Face	Bevel Radius			
SMAW	TC-U9a	U	U	R = 0 to 3	α = 45°	f = 3	r = 10	All	—	d, e, g, h, j, k
				R = 0 to 3	α = 30°	f = 3	r = 10	F, OH	—	d, e, g, h, j, k
GMAW FCAW	TC-U9a-GF	U	U	R = 0 to 3	α = 30°	f = 3	r = 10	All	Not required	a, d, g, h, j, k

Figure 5.1 (Continued)—Prequalified CJP Groove Welded Joint Details (See 5.4.1)
(Dimensions in Millimeters)