

Intermountain Testing Company

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WELDING PROCEDURE SPECIFICATION (WPS) YES X
 PREQUALIFIED X QUALIFIED BY TESTING _____
 OR PROCEDURE QUALIFICATION RECORDS (PQR) YES _____

Company Name Gibbons Erectors
 Welding Process(es) SMAW
 Supporting PQR No. (s) N/A

Identification # GE-97-1
 Revision NEW Date _____ By ITC
 Authorization by J. Ferguson Date 6/2/97
 Type - Manual X Semi-Automatic _____
 Machine _____ Automatic _____

JOINT DESIGN USED

Type: Single * Double Welded *
 Backing: Yes * No *
 Backing Material ALL AWS TABLE 3.1 MATERIALS
 Root Opening * Root Face Dimension *
 Groove Angle * Radius (J-U) *
 Back Gouging: Yes * No * Method ACA or Grind
 *Per Figures in 3.4 and attached details

POSITION

Position of Groove ALL Fillet ALL
 Vertical Progression: Up X Down _____

BASE METAL

Material Spec ALL AWS TABLE 3.1 MATERIALS
 Type or Grade SEE TABLE 3.1
 Thickness: Groove 1/8" & UP Fillet 1/8" & UP
 Diameter (Pipe) OVER 24" DIAMETER

ELECTRICAL CHARACTERISTICS

Transfer Mode (GMAW):
 Short Circuiting _____ Globular _____ Spray _____
 Current: AC _____ DCEP X DCEN _____ Pulsed _____
 Other _____
 Tungsten electrode (GTAW):
 Size _____
 Type _____

FILLER METALS

AWS Specification SFA 5.1, 5.5
 AWS Classification E7018

TECHNIQUE

String or Weave Bead WEAVE OR STRING BEAD
 Multi-pass or Single Pass (per side) Multi or Single
 Number of Electrodes SINGLE
 Electrode Spacing: Longitudinal _____
 Lateral _____
 Angle _____
 Contact Tube to Work Distance _____
 Peening _____
 Interpass Cleaning Wire brush/Grind/Chip

SHIELDING

Flux _____ Gas NONE
 Composition _____
 Electrode-Flux (class) _____ Flow Rate _____
 Gas Cup Size _____

PREHEAT

Preheat Temp Min. PER AWS TABLE 3.2
 Interpass Temp. Min. _____ Max. _____

POSTWELD HEAT TREATMENT

Temp. NONE
 Time NONE

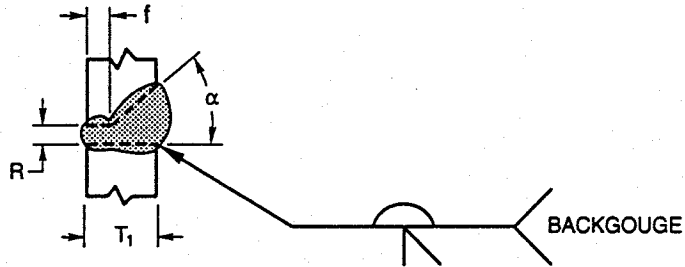
WELDING PROCEDURE

Pass or Weld Layer(s)	Process	Filler Metals		Current		Volts	Travel Speed	Joint Details
		Class	Diam.	Type & Polarity	Amps or Wire Feed Speed			
ALL LAYERS	SMAW	E7018	3/32" - 1/4"	DCEP	90-180	14-26	4-10 IPM	All full & partial penetration groove welds per figure 3.4 and fillets per section 2.4 of AWS D1.1-96.

FULL PENETRATION SINGLE WELDS DEPOSITED FROM ONE SIDE SHALL BE WITH BACKING. DOUBLE WELDS SHALL BE BACKGOUGED PRIOR TO WELDING BACKSIDE.

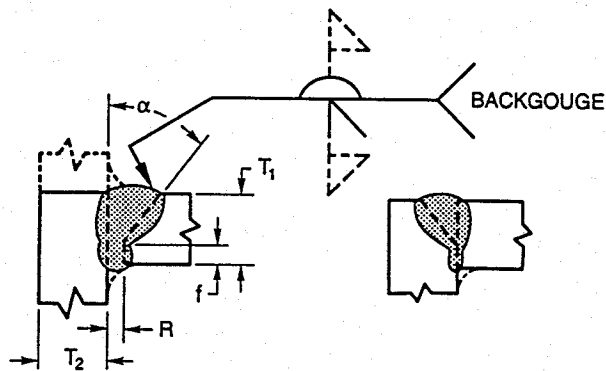
AWS D1.1 PREQUALIFIED JOINT DETAILS (SMAW)

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



Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Permitted Welding Positions	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances			
					As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)		
SMAW	B-U4b	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 All	Br, C, D, N A, Br, C, N

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



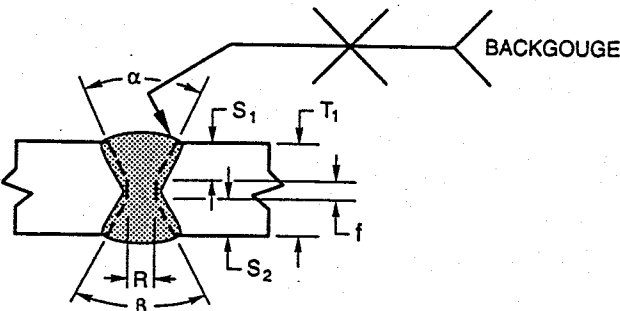
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Permitted Welding Positions	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances			
					As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)		
SMAW	TC-U4b	U	U	R = 0 to 1/8 f = 0 to 1/8 α = 45°	+1/16, -0 +1/16, -0 +10°, -0°	+1/16, -1/8 Not limited 10°, -5°	All All	C, D, J, N, V A, C, J, N, V

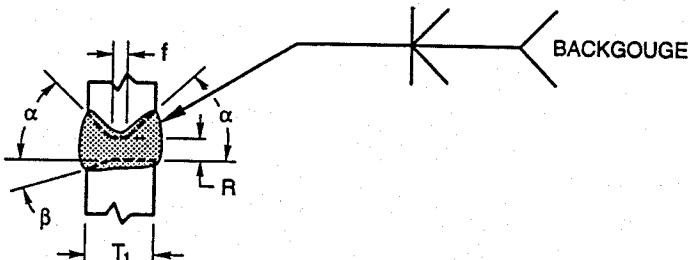
AWS D1.1 PREQUALIFIED JOINT DETAILS (SMAW)

Single-bevel-groove weld (4) T-joint (T) Corner joint (C)				Tolerances			
				As Detailed (see 3.13.1)		As Fit-Up (see 3.13.1)	
				R = +1/16, -0		+1/4, -1/16	
				a = +10°, -0°		+10°, -5°	
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Permitted Welding Positions	Notes
		T ₁	T ₂	Root Opening	Groove Angle		
SMAW	TC-U4a	U	U	R = 1/4	α = 45°	All	D, J, N, V
				R = 3/8	α = 30°		

Single-bevel-groove weld (4) Butt joint (B)				Tolerances			
				As Detailed (see 3.13.1)		As Fit-Up (see 3.13.1)	
				R = +1/16, -0		+1/4, -1/16	
				α = +10°, -0°		+10°, -5°	
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Permitted Welding Positions	Notes
		T ₁	T ₂	Root Opening	Groove Angle		
SMAW	B-U4a	U	—	R = 1/4	α = 45°	All	Br, D, N
				R = 3/8	α = 30°		

AWS D1.1 PREQUALIFIED JOINT DETAILS (SMAW)

Double-V-groove weld (3) Butt joint (B)								
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Permitted Welding Positions	Notes
		T_1	T_2	Root Opening Root Face Groove Angle	Tolerances			
				$R = 0 \text{ to } 1/8$ $f = 0 \text{ to } 1/8$ $\alpha = \beta = 60^\circ$	$+1/16, -0$ $+1/16, -0$ $+10^\circ, -0^\circ$	$+1/16, -1/8$ Not limited $+10^\circ, -5^\circ$	All	C, D, M, N
SMAW	B-U3b	U	—				All	A, C, M, N

Double-bevel-groove weld (5) Butt joint (B)								
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Permitted Welding Positions	Notes
		T_1	T_2	Root Opening Root Face Groove Angle	Tolerances			
				$R = 0 \text{ to } 1/8$ $f = 0 \text{ to } 1/8$ $\alpha = 45^\circ$ $\beta = 0^\circ \text{ to } 15^\circ$	$+1/16, -0$ $+1/16, -0$ $\alpha + \beta +10^\circ$ -0°	$+1/16, -1/8$ Not limited $\alpha + \beta +10^\circ$ -5°	All	Br, C, D, M, N
SMAW	B-U5a	U	—				All	Br, C, D, M, N

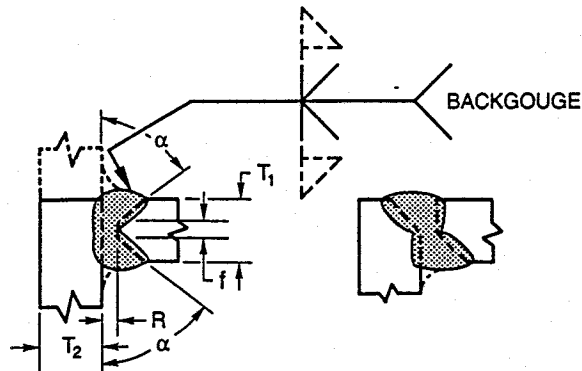
AWS D1.1 PREQUALIFIED JOINT DETAILS (SMAW)

Single-V-groove weld (2) Butt joint (B)									
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Permitted Welding Positions		Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances				
					As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)			
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		C, D, N

Single-V-groove weld (2) Butt joint (B)																	
							<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">Tolerances</th> </tr> <tr> <th style="width: 50%;">As Detailed (see 3.13.1)</th> <th style="width: 50%;">As Fit-Up (see 3.13.1)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">R = +1/16, -0</td> <td style="text-align: center;">+1/4, -1/16</td> </tr> <tr> <td style="text-align: center;">α = +10°, -0°</td> <td style="text-align: center;">+10°, -5°</td> </tr> </tbody> </table>			Tolerances		As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)	R = +1/16, -0	+1/4, -1/16	α = +10°, -0°	+10°, -5°
Tolerances																	
As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)																
R = +1/16, -0	+1/4, -1/16																
α = +10°, -0°	+10°, -5°																
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Permitted Welding Positions		Notes									
		T ₁	T ₂	Root Opening	Groove Angle												
SMAW	B-U2a	U	—	R = 1/4 R = 3/8 R = 1/2	α = 45° α = 30° α = 20°	All F, V, OH F, V, OH		D, N D, N D, N									

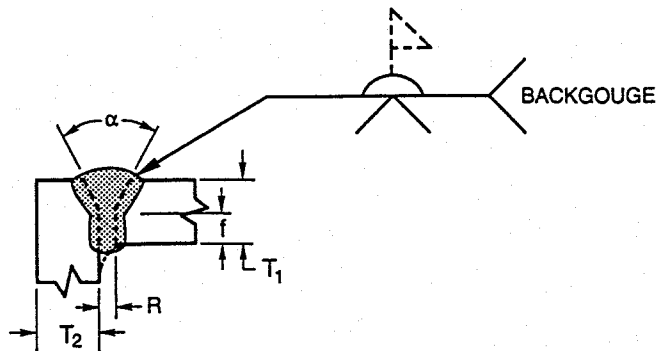
AWS D1.1 PREQUALIFIED JOINT DETAILS (SMAW)

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



Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Permitted Welding Positions	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances			
					As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)		
SMAW	TC-U5b	U	U	R = 0 to 1/8 f = 0 to 1/8 α = 45°	+1/16, -0	+1/16, -1/8	All	C, D, J, M, N, V
					+1/16, -0	Not limited		All

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



Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation			Permitted Welding Positions	Notes
		T ₁	T ₂	Root Opening Root Face Groove Angle	Tolerances			
					As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)		
SMAW	C-U2	U	U	R = 0 to 1/8 f = 0 to 1/8 α = 60°	+1/16, -0	+1/16, -1/8	All	C, D, J, N
					+1/16, -0	Not limited		

AWS D1.1 PREQUALIFIED JOINT DETAILS (SMAW)

Single-V-groove weld (2) Corner joint (C)				Tolerances			
				As Detailed (see 3.13.1)	As Fit-Up (see 3.13.1)		
		$R = +1/16, -0$	$+1/4, -1/16$				
		$\alpha = +10^\circ, -0^\circ$	$+10^\circ, -5^\circ$				
Welding Process	Joint Designation	Base Metal Thickness (U = unlimited)		Groove Preparation		Permitted Welding Positions	Notes
		T ₁	T ₂	Root Opening	Groove Angle		
SMAW	C-U2a	U	U	R = 1/4	$\alpha = 45^\circ$	All	D, N
				R = 3/8	$\alpha = 30^\circ$	F, V, OH	D, N
				R = 1/2	$\alpha = 20^\circ$	F, V, OH	D, N

Notes:

- A: Not prequalified for gas metal arc welding using short circuiting transfer nor GTAW. Refer to Annex A.
- B: Joint is welded from one side only.
- Br: Cyclic load application limits these joints to the horizontal welding position (see 2.27.5).
- C: Backgouge root to sound metal before welding second side.
- D: SMAW detailed joints may be used for prequalified GMAW (except GMAW-S) and FCAW.
- E: Minimum weld size (E) as shown in Table 3.4. S as specified on drawings.
- J: If fillet welds are used in statically loaded structures to reinforce groove welds in corner and T-joints, these shall be equal to 1/4 T₁, but need not exceed 3/8 in. Groove welds in corner and T-joints of cyclically loaded structures shall be reinforced with fillet welds equal to 1/4 T₁, but not more than 3/8 in.
- M: Double-groove welds may have grooves of unequal depth, but the depth of the shallower groove shall be no less than one-fourth of the thickness of the thinner part joined.
- Mp: Double-groove welds may have grooves of unequal depth, provided these conform to the limitations of Note E. Also the weld size (E) applies individually to each groove.
- N: The orientation of the two members in the joints may vary from 135° to 180° for butt joints, or 45° to 135° for corner joints, or 45° to 90° for T-joints.
- V: For corner joints, the outside groove preparation may be in either or both members, provided the basic groove configuration is not changed and adequate edge distance is maintained to support the welding operations without excessive edge melting.
- Z: Weld size (E) is based on joints welded flush.