

WELDING PROCEDURE SPECIFICATION (WPS)

Prequalified as per AWS D1.1 Section 3

Company Name HSSJV
Welding Process(es) SMAW
Supporting PQR No.(s) Prequalified as per AWS D1.1 Sec.3

Prepared By [Signature]
Date 04/02/2017
Approved by [Signature]

JOINT DESIGN USED

Weld Type Refer to attached Joint sketch
Backing As required
Backing Material Same as base metal

WPS No. WPS-015
Revision 0
Date 5-Feb-17
Welding Type Manual

BASE METALS

Material Spec See attached Table 3.1 of AWS D1.1
(A36 or Equivalent)
Type of Grade Refer to AWS D1.1, table 3.1, Group-I & II
Thickness(Groove) 38 mm
Thickness(Fillet) Unlimited

POSITION
Groove All
Fillet All
Progression Uphill

FILLER METAL

AWS Specification A5.1
AWS Classification E7016-E7018

ELECTRICAL CHARACTERISTICS
Transfer Mode(GMAW) -
Current DCRP
Tungsten Electrode N/A
Tingsten Size N/A

SHIELDING

Flux N/A
Electroide-Flux(class) N/A
Gas N/A
Gas Composition N/A
Flow Rate N/A
Gas Cup Size N/A

TECHNIQUE
Beasd String/Weave Both
Pass Single/Multi Both
No of Electrode 1
Contact Tube Distance N/A
Peening N/A
Interpass cleaning Brushing or Grinding

PREHEAT

Preheat Temp. Min. 10°C (Refer to table 3.3 of AWS D1.1)
Interpass Temp. 250°C

POST WELD HEAT TREATMENT
Temperature N/A
Time N/A

Note: When the base metal temperature is below 5°C, both side of the weld preparation shall be preheated to a temperature of approximately 50°C or the preheat temperature prescribed in the WPS whichever is higher.

Weld Layers	Welding Process	Filler Metal		Current			Speed
		Class	Size	Porarity	Amps	Volts	(in/min.)
Root Pass	SMAW	E7016- E7018	2.4-3.2	DCRP	60-120	20-27	4-10
Filler	SMAW	E7016- E7018	3.2-4.0	DCRP	80-170	20-27	4-10

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WPS No. WPS-015
Approved by L.H. Jeon

Table 3.1 (Continued)
Approved Base Metals for Prequalified WPSs (see 3.3)

AWS D1.1/D1.1M:2015

CLAUSE 3. PREQUALIFICATION OF WPSs

Group	Steel Specification Requirements				
	Steel Specification	Minimum Yield Point/Strength		Tensile Range	
		ksi	MPa	ksi	MPa
I	ASTM A36 (>3/4 in [20 mm])	36	250	58-80	400-550
	ASTM A131 Grades AH32, DH32, EH32	48	315	64-85	440-590
	ASTM A131 Grades AH38, DH38, EH38	51	355	71-90	490-620
	ASTM A441	40-50	273-345	60-70	415-485
	ASTM A501 Grade B	50	345	70 min.	485 min.
	ASTM A510 Grade 65	35	240	65-85	450-585
	ASTM A510 Grade 70	38	260	70-90	485-620
	ASTM A529 Grade 50	50	345	70-100	485-690
	ASTM A529 Grade 55	55	380	70-100	485-690
	ASTM A537 Class 1	45-50	310-345	65-80	450-620
II	ASTM A572 Grade 42	42	290	60 min.	415 min.
	ASTM A572 Grade 50	50	345	65 min.	450 min.
	ASTM A572 Grade 55	55	380	70 min.	485 min.
	ASTM A588 ^h (4 in [100 mm] and under)	50	345	70 min.	485 min.
	ASTM A595 Grade A	55	380	65 min.	450 min.
	ASTM A595 Grades B and C	60	410	70 min.	480 min.
	ASTM A600 ^h	45-50	310-340	65 min.	450 min.
	ASTM A618 Grades I, II, III	46-50	315-345	65 min.	450 min.
	ASTM A633 Grade A	42	290	65-85	450-570
	ASTM A633 Grades C, D (2-1/2 in [65 mm] and under)	50	345	70-80	485-620

Table 3.2
Filler Metals for Matching Strength to Table 3.1, Groups I, II, III, and IV Metals—SMAW and SAW (see 3.3)

Base Metal Group	AWS Electrode Specification	SMAW		SAW	
		A5.1, Carbon Steel	A5.5 ^h , Low-Alloy Steel	A5.17, Carbon Steel	A5.25 ^h , Low-Alloy Steel
I	AWS Electrode Classification	E60XX	E70XX-X	F6XX-EXXX	F7XX-EXXX-XX
		E70XX		F6XX-EXXX	F7XX-EXXX-XX
II	AWS Electrode Classification	E7015	E7015-X	F7XX-EXXX	F7XX-EXXX-XX
		E7018	E7018-X	F7XX-EXXX	F7XX-EXXX-XX
		E7018	E7018-X		
III	AWS Electrode Classification	N/A	E8015-X	N/A	F8XX-EXXX-XX
			E8018-X		F8XX-EXXX-XX
			E8018-X		
IV	AWS Electrode Classification	N/A	E9015-X	N/A	F9XX-EXXX-XX
			E9018-X		F9XX-EXXX-XX
			E9018M		

(Continued)

Table 3.3
Prequalified Minimum Preheat and Interpass Temperature (see 3.5)

Category	Steel Specification	Welding Process	Thickness of Thickest Part at Point of Welding		Minimum Preheat and Interpass Temperature	
			in	mm	°F	°C
A	ASTM A36	SMAW with other than low-hydrogen electrodes	1/8 to 3/4 incl.	3 to 20 incl.	32 ^a	0 ^b
	ASTM A53 Grade B					
	ASTM A108 Grade B					
	ASTM A131 Grades A, B, CS, D, DS, E					
	ASTM A138 Grade B					
	ASTM A381 Grade Y35					
	ASTM A500 Grade A					
	ASTM A500 Grade B					
	ASTM A500 Grade C					
	ASTM A501 Grade A					
	ASTM A516 Grades I & II					
	ASTM A524 Grade 65					
	ASTM A573 Grade 36					
	ASTM A709 Grade 30					
	ASTM A1000 SS Grade 33 Type 1					
ASTM A1011 SS	Grade 40 Type 1					
	Grade 30					
	Grade 33					
	Grade 36 Type 1					
	Grade 40					
ASTM A1018 SS	Grade 30					
	Grade 33					
	Grade 36					
	Grade 39					
	Grade 40					
API 5L Grade B						
ABS	Grade X42					
	Grades A, B, D, CS, DS Grade E					

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Company Name HSSJV
Welding Process(es) SAW
Supporting PQR No.(s) Prequalified as per AWS D1.1 Sec.3

WPS No. WPS-015
Approved by [Signature]

Double-V groove weld (1)
Butt joint (B)

Tolerances	
As Detailed (see 3.13.1)	As Fabric (see 3.13.1)
R = 0	+0.4, -0
F = 0	+1.0, -0
α = ±0.5°	+0.5°, -0.5°

Welding Process	Joint Designation	Base Metal Thickness (t = unlimited)		Groove Preparation		Allowed Welding Positions	Can Shielding be FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SAW	B-0	U	Spacer = 10 x 8	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0 1 x 1.0	Groove Angle: α = 0° α = 30° α = 20°	3D	—	4, 5, 6
SAW	B-0	U	Spacer = 1.0 x 0	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0	Groove Angle: α = 0°	F	—	4, 5, 6

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

E₁ + E₂ MUST NOT EXCEED $\frac{R}{2}$
ALL DIMENSIONS IN mm

Welding Process	Joint Designation	Base Metal Thickness (t = unlimited)		Groove Preparation		Allowed Welding Positions	Can Shielding be FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SAW	B-0	U	6mm	Root Opening: 0 to 1.0 0 to 1.0	Groove Angle: α = 0°	3D	—	4, 5, 6

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

Welding Process	Joint Designation	Base Metal Thickness (t = unlimited)		Groove Preparation		Allowed Welding Positions	Can Shielding be FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0 1 x 1.0	Groove Angle: α = 0° α = 30° α = 20°	3D	—	4, 5, 6
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0	Groove Angle: α = 0°	F	—	4, 5, 6

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

Welding Process	Joint Designation	Base Metal Thickness (t = unlimited)		Groove Preparation		Allowed Welding Positions	Can Shielding be FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0 1 x 1.0	Groove Angle: α = 0° α = 30° α = 20°	3D	—	4, 5, 6
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0	Groove Angle: α = 0°	F	—	4, 5, 6

Single-bevel-groove weld (3)
Butt joint (B)

Welding Process	Joint Designation	Base Metal Thickness (t = unlimited)		Groove Preparation		Allowed Welding Positions	Can Shielding be FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0 1 x 1.0	Groove Angle: α = 0° α = 30° α = 20°	3D	—	4, 5, 6
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0	Groove Angle: α = 0°	F	—	4, 5, 6

Single-bevel-groove weld (3)
Butt joint (B)

Welding Process	Joint Designation	Base Metal Thickness (t = unlimited)		Groove Preparation		Allowed Welding Positions	Can Shielding be FCAW	Notes
		T ₁	T ₂	Root Opening	Groove Angle			
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0 1 x 1.0	Groove Angle: α = 0° α = 30° α = 20°	3D	—	4, 5, 6
SAW	B-0	U	—	Root Opening: 1 x 0 to 1.0 1 x 0 to 1.0	Groove Angle: α = 0°	F	—	4, 5, 6