

	FIRST PROCESS	SECOND PROCESS
Welding Process (es):	Shielded Metal Arc Welding (SMAW)	
Type (s):	Manual	
FILLER METALS (QW-404)		
AWS Classification	E7018	
Electrode-Flux Class (SAW)		
SFA Specification	SFA 5.1	
Filler Metal F-No.	4	
Weld Metal Analysis A-No.	1	
Size of Filler Metals mm (in)	5/32 to 3/16 in.	
Filler Metal Product Form	Iron powder low hydrogen	
Max. Weld Pass Thickness mm (in)	3/16 in.	
Deposited Weld Metal Thickness mm (in)	90 mm (3.54 in.)	
Weld Deposit Chemistry	N/A	
Flux Trade Name and Flux Type (SAW)	N/A	
Other information: This is a DEMO PQR from www.WPSAmerica.com		
POSITION (QW-405)		
Position of Groove	1G	
Welding Progression		
PREHEAT (QW-406)		
Preheat Temperature °C (°F)	150 °C	
Interpass Temperature °C (°F)	150 °C	
GAS (QW-408)		
Shielding Gas Type (Mixture)	N/A	
Flow Rate lt/min. (CFH)	-	
Trailing Gas Type (Mixture)	N/A	
Flow Rate lt/min. (CFH)	-	
Gas Backing (Mixture)	N/A	
Flow Rate lt/min. (CFH)	-	
ELECTRICAL CHARACTERISTICS (QW-409)		
Following data may also shown on Table in Sheet 1 of 4		
Current/ Polarity	DCEP	
Amps (Range)	160 to 250	
Volts (Range)	24 to 26	
Wire Feed Speed (Range) mm/min (in/min)	N/A	
Travel Speed (Range) mm/min (in/min)	5 to 10 (in./min)	
Mode of Metal Transfer for GMAW (FCAW)	N/A	
Tungsten Electrode Size mm (in)	-	
Tungsten Type	N/A	
TECHNIQUE (QW-410)		
String or Weave Bead	String and Weave Bead	
Multiple or Single Electrodes	Single	
Multiple or Single Pass (per side)	Multiple	
Orifice or Gas Cup Size	N/A	
Contact Tube to Work Distance mm (in)	N/A	
Initial and Interpass Cleaning	Brushing and Grinding	
Method of Back Gouging	Grinding	
Oscillation	Not Required	
Peening	Not Required	
Other information: Clean each layer before start welding new passes/layers		
POSTWELD HEAT TREATMENT (QW-407)		
Holding Temperature Range °C (°F): 600 to 620 °C	Holding Time Range: 1 Hour per in.	
Heating Rate °C/hr (°F/hr): 120 °C/hr	Method: Furnace	
Cooling Rate °C/hr (°F/hr): 120 °C/hr	Method: Open Air	

Heat Treatment (ASME Code's Guideline):

PREHEAT TABLE:

ASME Section VIII-Division 1: Preheating from Appendix R

- (a) 175 °F (80 °C) for material which has both a specified maximum carbon content in excess of 0.30% and a thickness at the joint in excess of 1 in. (25 mm);
- (b) 50 °F (10 °C) for all other materials of P-No. 1 group.

POSTWELD HEAT TREATMENT TABLE:

ASME Section VIII-Division 1: Requirements for PWHT of Table UCS-56

Min. Holding Temperature: 1,100 °F (595 °C)

Min. Holding Time for Weld Thickness (Nominal):

Up to 2 in. (50 mm): 1 hr/in. (2 min/mm), 15 min Min.

Over 2 in. (50 mm): 2 hr plus 15 min for each additional inch over 2 in. (50 mm)

Heating and Cooling rate: Max. 400 °F (220 °C) per hr divided by the maximum thickness of material in inches at the weld, but no more than 400 F (220 °C)/hr: Min. 100 F (55 °C)/hr

For Mandatory & Non-Mandatory thickness conditions of PWHT, See Note (2) of Table UCS-56

For PWHT at lower temperatures for longer periods of time, See Note (1) of Table UCS-56

PQR Qualified Range (ASME IX Guideline):

Qualified Positions (Groove, Fillet): All Positions for Plate or Pipe. Unless specifically required otherwise by the welding variables (QW-250), a qualification in any position qualifies the procedure for all positions. The welding process and electrodes must be suitable for all positions permitted by the WPS (ASME Section IX, QW-203). (For impact test application, there are some restrictions for welding in vertical-uphill progression position; See ASME Section IX, QW-405.2)

Qualified Thicknesses (Groove, Fillet): 3/16 in. (5 mm) Min., (8 in.) (200 mm) Max. (Plate or Pipe)

[When testing longitudinal-bend tests only: 2T Max.]

[For impact test application, except ESW process: Min. Qualified Thickness is 5/8 in. (16 mm); This variable does not apply when a WPS is qualified with a PWHT above the upper transformation temperature or when an austenitic material is solution annealed after welding. ASME IX, QW-403.6]

[For ferrous base metals other than P-No. 7, 8 and 45 (when test coupon receives a PWHT above the upper transformation temperature): 1.1T Max. ASME IX, QW-407.4]

[For any weld pass greater than 1/2 in. (13 mm) thick: 1.1T Max. (Except GTAW process). ASME IX, QW-403.9]

T: Thickness of Test Plate or Pipe Wall in PQR (ASME Section IX, Table QW-451.1)

Qualified Diameters (Groove, Fillet): All Nominal Pipe (Tube) Sizes, within Qualified Thicknesses in PQR

WPS Base Metal P-Number Allowed by PQR: Any metals of the same P-No. 1 tested in PQR (ASME Section IX, QW-424)

Qualified WPS Filler Metal Allowed by PQR: Only Filler Metal categories with the same F-number and same A-number tested in PQR. Any electrode diameter sizes can be used in WPS, as it is not an essential variable for the most process and conditions. For Non-impacted test applications only, filler metal classification within an SFA specification, with the same F-number and the same A-number and the same minimum tensile strength and the same nominal chemical composition can be used in WPS. (ASME Section IX, QW-250)

Qualified Weld Metal Deposit (Groove, Fillet): 2t Max. when t is less than 3/4 in. (19 mm) (Plate or Pipe)

Qualified Weld Metal Deposit (Groove, Fillet): 8 in. (200 mm) Max. when t is equal or larger than 3/4 in. (19 mm)

[For GMAW-Short Circuit Arc, when t is less than 1/2 in. (13 mm): 1.1t Max.]

[When testing longitudinal-bend tests only: 2t Max.]

t: Thickness of Weld Metal Deposit in PQR, Plate or Pipe Wall (ASME Section IX, Table QW-451.1)

TENSILE TEST (QW-150)

Specimen No.	Width mm (in)	Thickness mm (in)	Area mm x mm (in x in)	Ultimate Total Load, Kg (lb)	Ultimate Unit Stress, MPa (psi)	Type of Failure and Location
TA1	25.1	30	753	36212 Kg	471 (MPa)	Ductile out Weld
TA2	25.1	30	753	36712 Kg	477 (Mpa)	Ductile out Weld
TM1	25	30	750	35712 Kg	466 (MPa)	Ductile out Weld
TM2	25.1	30	753	35612 Kg	463 (MPa)	Ductile out Weld
TB1	25	30	750	36412 Kg	475 (MPa)	Ductile out Weld
TB2	25	29.8	745	36312 Kg	478 (MPa)	Ductile out Weld

GUIDED-BEND TESTS (QW-160)

Type and Figure No.	Results	Remarks
QW 462.2 PL1	Satisfactory	Ductile
QW 462.2 PL2	Satisfactory	Ductile
QW 462.2 PL3	Satisfactory	Ductile
QW 462.2 PL4	Satisfactory	Ductile

TOUGHNESS TESTS (QW-170)

Specimen No.	Notch Location	Specimen Size mm x mm (in x in)	Test Temperature °C (°F)	Impact Values	Lateral Exp.		Drop Weight Break: Yes/ No
				Joule J (ft-lb)	% Shear	mm/mm	
TVA1	in weld	10 X 10	0 °C	78			
TVA2	in weld	10 X 10	0 °C	39			
TVA3	in weld	10 X 10	0 °C	83			
TVB1	in weld	10 X 10	0 °C	73			
TVB2	in weld	10 X 10	0 °C	78			
TVB3	in weld	10 X 10	0 °C	73			

Comments (Notch type, etc.): Charpy V Notch, 2 mm

Other Tests (Notes):

No further tests are required.

Radiographic-ultrasonic examination:

RT report no: 1230-RT Result: O.K.
UT report no: 2310-UT Result: O.K.

FILLET-WELD TEST RESULTS (QW-180)

Result-Satisfactory:
Penetration into Parent Metal:
Macro-Results: N/A

Welder's name: Joe Smith
Name of Laboratory: Quality Weld Lab, Inc.

Clock No.: 123-12-1234 Stamp No.: JS-02

Tests conducted by: WPSAmerica.com Laboratory Tests Number: TN-46547

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Additional Notes: This is a DEMO-PQR prepared with WPSAmerica.com online welding software.

Manufacturer or Contractor's Welding Engineer:

Name: Jim Clark
Signature: J.C.
Title: Welding Engineer
Date: 12, 12, 2005

Authorized by:

Name: John Smith
Signature: J.S.
Title: QA Manager
Date: 12,12, 2005