QW-482 SUGGESTED FORMAT FOR WELDING PROCEDURE SPECIFICATION (WPS)
(See QW-200.1, Section IX, ASME Boiler & Pressure Vessel Code)

Company Name: MH Fab Shop Inc. **By:** Mike Jones
Welding Procedure Spec. No.: GMAW-SAW-01 **Date:** 09-09-08 **Supporting PQR No. (s):** GMAW-SAW-01
WPS Revision No.: Rev. 0 **Rev. Date:** 09-09-08
Welding Process(s): GMAW-SAW **Type(s):** GMAW -semiauto; SAW - Machine
(Automatic, Manual, Machine, or Semi-Auto)

JOINTS (QW-402)

Details

Joint Design: single V groove
Backing: (Yes) ____ **(No)** X
Backing Material: (Type): ____
(Refer to both backing & retainers)

___ Metal ___ Nonfusing Metal
___ Nonmetalic X Other (Gas backing for GMAW)

Use single V groove or detail on referenced drawings or sketches

Note: Root spacing 3/32 in. to 1/8 in.; no retainers

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

(At the option of the Mfgr., Sketches may be attached to illustrate joint design, weld layers, and the bead sequence, e.g. for notch toughness procedures, for multiple process procedures, etc.)

*BASE METALS (QW-403)

P-No. 5A **Group No.** ____ **to P-No.** 5A **Group No.** ____
OR
Specification type and grade ____
to Specification type and grade ____
OR
Chem. Analysis and Mech. Prop. ____
to Chem. Analysis and Mech. Prop. ____

Thickness range:

Base Metal:	**Groove:**	3/16 in. to 1-1/2 in.	**Fillet:**	All
Pipe Dia. Range:	**Groove:**	All	**Fillet:**	All

* FILLER METALS (QW-404)

	GMAW/Root	SAW/Fill & Cap	
Spec. No. (SFA):	5.28	5.23	
AWS No. (Class):	ER90x-B3	F9PO-EB3-B3	
Filler Metal F-No.:	6	6	
Chem. Comp. - A No.:	4	4	
Size of Filler Metals:	0.045 in.	3/32", 1/8", 3/16", 1/4", 3/8"	

Weld Metal Thickness range: **Note: No single pass is to exceed 1/2" in thickness for "t".**

Groove:	t (GMAW) = 0.250 in. max.	t (SAW) = 1.250 in. max	
Fillet:			
Electrode-Flux (Class):			
Flux Trade Name:			
Consumable Insert:			
Other:		No re-crushed slag used	

* Each base metal-filler metal combination should be recorded individually.

QW-482 (Back)

WPS No.: GMAW-SAW-01 **Rev. No.:** 0

POSITIONS (QW-405)

Position(s) of Groove: ALL
Welding Progression: Up X **Down** X
Positions(s) of Fillet: ALL

POSTWELD HEAT TREATMENT (QW-407)

Temperature Range: 1,300–1,400°F (704–760°C)
Time Range: 2 hours min.

PREHEAT (QW-406)

Preheat Temp. Min.: 300°F (149°C)
Interpass Temp. Max.:
Preheat Maint.: None

(Continuous or special heating where applicable should be recorded.)

GAS ((QW-408)

Percent Composition:

	Gas(es)/Mixture	Flow Rate
Shielding: GMAW	100% CO_2	25-35 ft^3/h
Trailing: None		
Backing: GMAW	100% CO_2	35-50 ft^3/h

ELECTRICAL CHARACTERISTICS (QW-409)

GMAW

Current AC or DC: DC **Polarity:** Electrode Positive
Amps Range: 140 to 190 **Volts (Range):** 19 to 21

SAW

Current AC or DC: DC **Polarity:** Electrode Positive
Amps Range: 540 - 550 **Volts:** 27 to 29

Mode of metal Transfer for GMAW Spray
(Spray arc, short circuiting arc, etc.)

Electrode Wire feed speed range

TECHNIQUE (QW-410)

String or Weave Bead:
Orifice or Gas Cup Size:
Initial and Interpass Cleaning (Brushing, Grinding, etc.): Brushing, grinding, sanding, or blasting - Note: Weld prep must be cleaned and prepared at least 1/2" back from weld surfaces
Method of Back Gouging: Grinding or thermal methods allowed
Oscillation:
Contact Tube to Work Distance:
Multiple or Single Pass (per side): GMAW: Single pass; SAW: Multiple pass
Multiple or Single Electrodes: GMAW and SAW: Single electrode
Travel Speed (Range): GMAW: 15 in./min; SAW: 16 in./min
Peening: None allowed
Other: No supplemental filler metal added

Weld Layer(s)	Process	Class	Filler Metal Dia.	Filler Metal Type Polar.	Current Amp Range	Current Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire, Technique, Torch Angle, etc.)
ALL	GMAW	ER90S-B3	As required	DC - RP	140 to 190	19 - 21	15 in./min	
ALL	SAW	F9PO-EB3-B3	As required	DC - RP	540 to 560	27 - 29	16 in./min	

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QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORDS (PQR)
(See QW-200.2, Section IX, ASME Boiler and Pressure vessel Code)
Record Actual Conditions Used to Weld Test Coupon

Company Name: MH Fab Shop Inc.
Procedure Qualification Record No.: GMAW-SAW-01, Rev. 0 **Date:** 09-09-08
WPS No.: GMAW-SAW-01 Rev. 0
Welding Process(s): GMAW-SAW
Types (Manual, Automatic, Semi-Auto.): Semi Auto / Machine

JOINTS (QW-402)

No single pass exceeded 1/2" in thickness.

Groove Design of Test Coupon
(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.)

BASE METALS (QW-403)
Material Spec.: SA-335
Type or Grade: Grade P22
P-No.: P-No. 5A **to P-No.:** P-No. 5A
Thickness of Test Coupon: 5/8 in.
Diameter of Test Coupon: 6 in.
Other:

FILLER METALS (QW-404)
SFA Specification: 5.28/5.23
AWS Classification: ER90S-B3/F9PO-EB3-B3
Filler Metal F No.: F-No. 6/F-No. 6
Weld metal Analysis No.: A-No. 4
Size of Filler Metal: GMAW 1/8 in. SAW 3/8 in.
Other: No supplemental filler metal added
Weld Metal Thickness: GMAW 0.125 in.
SAW 0.500 in.
Note: No single pass was greater than 1/2" "t".

POSITION (QW-405)
Position of Groove: 1G
Weld Progression (Uphill, Downhill): N/A
Other:

PREHEAT (QW-406)
Preheat Temp.: 300°F (with Tempil Stick of 300°F)
Interpass temp.:
Other:

POSTWELD HEAT TREATMENT (QW-407)
Temperature: 1350°F
Time: 1-1/2 hours
Other:

GAS (QW-408)

	Gas(es)/Mixture	Flow Rate
Shielding: GMAW	75% Ar-25% CO_2	25-35 ft^3/h
Trailing: None		
Backing: None		

ELECTRICAL CHARACTERISTICS (QW-409)
Current:
Polarity: DC Reverse
Amps.: GMAW 190 A/ SAW 550 A
Volts: GMAW 20 V/ SAW 30 V
Tungsten Electrode Size:
Other: short circuiting transfer not used

TECHNIQUE (QW-410)
Travel Speed: as required
String or Weave Bead: string
Oscillation:
Multipass or Single Pass (per side): multipass
Single or Multiple Electrodes: single
Other:

QW-483 (Back)

PQR No.: GMAW-SAW-01 Rev. 0

Tensile Test (QW-150)

Specimen No.	Width	Thickness	Area	Ultimate Total Load Lb.	Ultimate Unit Stress psi	Type of Failure & Location
1	0.765	0.626	0.479	34,721	72,486	*Base Metal
2	0.758	0.625	0.474	31,475	66,403	*Base Metal

* Specimens 1 & 2 broke in the base metal outside the weld or fusion zone.

Guided Bend Tests (QW-160)

Type and Figure No.	Result
Side Bend per QW-462.2	3/32" open discontinuity in the heat affected zone
Side Bend per QW-462.2	No open discontinuity.
Side Bend per QW-462.2	5/32" open discontinuity in the weld metal on the corner of the specimen, with no sign of internal discontinuity.
Side Bend per QW-462.2	No open discontinuity.

Toughness Tests (QW-170)

Specimen No.	Notch Location	Specimen Size	Test Temp.	Impact Values			Drop Weight Break (Y/N)
				Ft. Lbs.	% Shear	Mils	

Comments: _____

Fillet Weld Test (QW-180)

Result --- Satisfactory: Yes: _____ No: _____ Penetration Into Parent Metal: Yes: _____ No: _____

Macro --- Results: _____

Other Tests

Type of Test: _____

Deposit Analysis: _____

Other: _____

Welder's Name: Mike Heat Clock No.: 99 Stamp No.: X

Tests conducted by: MH Testing Inc. Laboratory Test No.: 10-04-04

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.

Manufacturer: MH Fab Shop, Inc.

Date: 10-04-04 By: Mike Heat