

Process Systems International, Inc.
20 Walkup Drive Westborough, MA 01581
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No.: 153-1 Date: 10/28/96
Supporting PQRs: 153-1-H48

Table with 2 columns: BASE METAL (QW-403, QW-405) and JOINT (QW-402). Includes details on P No., thickness range, position, and progression.

Table with 2 columns: PREHEAT (QW-406) and POSTWELD HEAT TREATMENT (QW-407). Includes details on minimum temperature, interpass temp, and stress relief.

Table with 2 columns: Process / type and Process thickness limit. Includes details on GTAW / manual and thickness range.

Table with 2 columns: GAS (QW-408) and Shielding Gas / CFH. Includes details on trailing gas and backing gas.

Table with 2 columns: FILLER METAL (QW-404) and ELECTRICAL (QW-409). Includes details on AWS classification, SFA Spec. No., and welding parameters.

Table with 2 columns: TECHNIQUE (QW-410) and String / weave bead. Includes details on orifice size, contact tube, and oscillation.

- Multiple or Single Pass (per side)... Multiple Passes
(n1) No peening done with this procedure.
(n2) No pass > 1/2 " t.
(3) WELD WIRE SHALL BE CLEANED SPECIAL AND HANDLED WITH POLY GLOVES.
(4) GRINDING WITH ABRASIVE WHEELS IS "NOT ALLOWED".
(n5) WIRE BRUSHING IS "NOT ALLOWED".
(n6) PWHT RAMP UP TO 300 DEG.F. THEN 100 DEG.F/HR TO 1000 DEG.F, HOLD FOR 4 HR.
(n7) PWHT RAMP DOWN FROM 1000F. TO 300F. @100F/HR. THEN COOL TO ROOM TEMP.

WELDING PROCEDURE SPECIFICATION (WPS)

WPS No.: 153-1

Date: 10/28/96 Revis.

JOINT (QW-402)

Single-V groove

Backing : no backing  
 Root Opening: 3/16" max.  
 Groove Angle: 50 degree min.  
 Root Face : 1/8" max.

Single-Bevel groove

Backing : no backing  
 Root Opening: 3/16" max.  
 Groove Angle: 45 degree min.  
 Root Face : 1/8" max.

Single-V groove

Backing : gouged & back welded  
 Root Opening: 1/4" max.  
 Groove Angle: 50 degree min.  
 Root Face : 3/16" max.

Double-Bevel groove

Backing : gouged & back welded  
 Root Opening: 1/4" max.  
 Groove Angle: 45 degree min.  
 Root Face : 3/16" max.

Double-V groove

Backing : gouged & back welded  
 Root Opening: 1/4" max.  
 Groove Angle: 45 degree min.  
 Root Face : 3/16" max.

Single/Double Fillet

Backing :  
 Root Opening: 3/16" max.  
 Weld Size : Required fillet  
 plus root opening

Square groove

Backing : T-joint  
 Root Opening: 1/32" max.

Square groove

Backing : no backing  
 Root Opening: 3/32" max.

WELD JOINT DESCRIPTIONS SHOWN ARE NOT INCLUSIVE OF ALL OF THOSE FOUND ON A JOB. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR DESIGN DRAWING SHALL TAKE PRECEDENCE OVER WELD JOINTS SHOWN IN THIS WPS.

Initial cleaning shall be in strict compliance with special job procedures. Method of back gouging must be accomplished with a carbide burr cutter.

(a) NON-FUSABLE RETAINERS MAY BE USED.

(b) WELD WIRE SHALL BE CLEANED SPECIAL IN ACCORDANCE WITH SPECIFIC JOB PROCEDURES. SEALED IN BAGS AND HANDLED WITH POLY GLOVES AT ALL TIMES.

(c) GRINDING AND WIRE BRUSHING ARE "NOT ALLOWED" ON THE LIGO JOB. DEFECT REMOVAL MUST BE ACCOMPLISHED WITH A CARBIDE BURR CUTTER.

(d) WELDING STARTS & STOPS MUST RAMP GRADUALLY UP & DOWN TO AVOID CRACKING. THE WELDER SHALL PROVIDE A POST (AFTER FLOW) GAS FLOW OF 10 SECONDS.

(e)

We certify that the statements in this record are correct and in accordance with the requirements of Sections IX and VIII of the ASME Code.

Prepared By: Harold Klee ( 10/28/96 ) Weld Specialist

Accepted By: Alan R. Bushbark ( 10/28/96 ) Q.A. Manager:

Process Systems International, Inc.  
 20 Walkup Drive Westborough, MA 01581  
 Procedure Qualification Record (PQR)

PQR No.: 153-1-H48

Date: 10/28/96

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Rev 0

**JOINT DESIGN (QW-402)**  
**WELD JOINT CONFIGURATION**  
 Single-V groove  
 Gas backing was used  
 Groove Angle : 75 Degrees  
 Root Opening : 062-125 Inches  
 Root Face : 030-062 Inches

**BASE METAL (QW-403)**  
 Material form. Plate  
 Material Spec. SA-240, Type 304L  
 To SA-240, Type 304L  
 P No. 8 Gr. 1 to P No. 8 Gr. 1  
 Thickness (in) 0.5000

note:

**HEAT TREATMENT (QW-406, QW-407)**  
 Preheat Temperature: 60 Degrees F.  
 Preheat Maintenance: None  
 Interpass Temperature: 350 Degrees F.  
 PWHT temperature ... : 1000 Degrees F.  
 PWHT Holding time(hr): 4.00  
 note: Stress Relief 1000 Deg.F./-50 F.

**POSITION (QW-405)**  
 Position of Joint : 1G - Flat  
 Progression: N/A  
 note:

Weld Process / type GAS (QW-408)	All pass(es) GTAW / manual			None				
Shielding Gas / CFH.....	100% Argon	/	20-30	None	/ -			
Trailing Gas / CFH.....	None	/	-	None	/ -			
Tacking Gas / CFH.....	100% Argon	/	10-20	None	/ -			
<b>FILLER METAL (QW-404)</b>								
AWS Classification.....	ER308L			None				
SFA Spec. No. & F No....	SFA#:	5.9	F#:	6	SFA#:	None	F#:	-
A No. or Chem. Comp.....	8			None				
Filler Metal Trade Name.	SOLID FILLER METAL			None				
SAW Flux Trade Name/Type	N/A / -			None / -				
Weld Deposit 't' (in)...	0.5000			None				
Elec./Wire Size (in)....	1/16"	3/32"	1/8"	-	-	-	-	
<b>ELECTRICAL (QW-409)</b>								
Amperage USED .....	70-150		80-180		130-275	-	-	
Voltage USED .....	n/r		n/r		n/r	-	-	
Travel Speed (ipm).....	Var.		Var		Var	-	-	
Max. Heat Input (J/in)..	None			None				
Tungsten Type & Size....	EWTh-2 / 3/32"-1/8"			N/A / -				
Current Type/Polarity...	DCEN (straight)			N/A				
<b>TECHNIQUE (QW-410)</b>								
String or Weave Bead....	String & Weave Bead			N/A				
Orifice/Gas Cup Size....	# 8			None				
Contact Tube to Work....	N/A			None				
Oscillation.....	N/A			None				
Mult./Single Electrodes.	Single Electrode			N/A				
Other Technique Notes...				None				
Multiple or Single Pass (per side)....	Multiple Passes							

- (1) Peening was not used with this weld test.
- (2) No pass > 1/2 " t.
- (n3) PWHT Ramp up to 300 Deg.F then 100 Deg.F/Hr to 1000 Deg.F, Hold for 4 Hr.
- (n4) PWHT Ramp down from 1000F. to 300F. @100F/Hr. then cool to room temp.
- (n5)

TENSILE TEST (QW-150)

Specimen No.	Width (in.)	Thick. (in.)	Area (sq.in.)	Ultimate total load (lb)	Ultimate stress (psi)	Type of failure and location
1	0.750	0.515	0.386	35850	92900	Base metal
2	0.750	0.515	0.386	36000	93300	Base metal

GUIDED BEND TEST (QW-160)

Figure No. and Type	Result	Figure No. and Type	Result
QW-462.2 Side bend	No defects	QW-462.2 Side bend	No defects
QW-462.2 Side bend	No defects	QW-462.2 Side bend	No defects

TOUGHNESS TEST (QW-170)

Spec. No.	Notch Location	Notch Type	Test Temp. ( F)	Impact Values (ft-lbs)	Lateral exp.		Drop weight break
					Shear %	Mils	
None							

HARDNESS TEST - No hardness test

Base metal	-1-	-2-	-3-	HAZ	-1-	-2-	-3-	WM	-1	-2-	-3-
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# (Heat Affected Zone=HAZ, Weld Metal=WM) #

Notes:

Stamp: H48 Welder's Name: Kennedy, Dan ID:  
 Tests conducted by: CONAM INSPECTION INC. Laboratory Test No: S06100-861  
 PQR was done & welding of coupon was witnessed by : Process Systems

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 Section IX of the ASME Code.

Prepared By: Harold Klee ( 10/28/96 ) Weld Specialist  
 Certified By: Alan R. Bialkowski ( 10/28/96 ) Q.A. Manager: