

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

WPS No.: 073-3

Date: 05/29/74 Revision No.: Date: 04/23/96

Supporting PQRs: 073-H9

BASE METAL (QW-403, QW-405) P No. 8 to P No.:8 Thickness range. 0.0625" to 0.7500" Position(s). All positions Progression. Vertical Up notes		JOINT (QW-402) Joint design Groove/Fillet (see pg 2) Backing..... With or without backing Backing Matl Optional Fillet Weld Size All (QW-451.4) notes	
PREHEAT (QW-406) Minimum Temperature. 50 Degrees F. Interpass Temp. Max. 350 Degrees F. Preheat Maintenance. None		POSTWELD HEAT TREATMENT (QW-407) Temperature range None Time range None notes	

Process / type	All pass(es) GTAW / manual	None		
Process thickness limit.	0.0625" to 0.7500"	None		
GAS (QW-408)				
Shielding Gas / CFH.....	100% Argon / 15-25	None	/	-
Trailing Gas / CFH.....	None / -	None	/	-
Backing Gas / CFH.....	100% Argon / 9-30	None	/	-
FILLER METAL (QW-404)				
AWS classification.....	ER308L	None		
SFA Spec. No. & P 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		
Elec./Wire size (in) ...	1/16 3/32 1/8	None	/	-
ELECTRICAL (QW-409)				
Welding amperage range..	70-150 80-180 130-275	-		-
Welding voltage range...	n/r n/r n/r	-		-
Travel speed (ipm).....	Var. Var. Var.	-		-
Max. Heat Input (J/in)..	None	-		-
Tungsten Type/Size.....	EWth-2 / 1/16" - 3/16"	N/A /		
Current & Polarity.....	DCEN (straight)	N/A		
TECHNIQUE (QW-410)				
String / weave bead.....	String & Weave Bead	N/A		
Orifice / gas cup.....	# 5 to # 10	None		
Contact tube to work....	N/A	None		
Oscillation.....	N/A	None		
Mult./Single electrode..	Single Electrode	None		
Other Technique Notes...		N/A		
Multiple or Single Pass (per side)....	Multiple Passes	None		

- (n1) No Pass > 1/2" t
- (n2)
- (n3) WELD WIRE SHALL BE CLEANED SPECIAL AND HANDLED WITH POLY GLOVES.
- (n4) GRINDING WITH ABRASIVE WHEELS IS "NOT ALLOWED".
- (n5) WIRE BRUSHING IS "NOT ALLOWED".
- (n6)
- (n7)

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JOINT (QW-402)

Single-V groove

Backing : no backing
 Root Opening: .125-.1875 max.
 Groove Angle: 50 degree min.
 Root Face : .030-.060 max.

Single-Bevel groove

Backing : no backing
 Root Opening: .125-.1875 max.
 Groove Angle: 45 degree min.
 Root Face : .030-.060 max.

Single-V groove

Backing : gouged & back welded
 Root Opening: .125-.1875 max.
 Groove Angle: 50 degree min.
 Root Face : .030-.060 max.

Double-Bevel groove

Backing : gouged & back welded
 Root Opening: .125-.1875 max.
 Groove Angle: 45 degree min.
 Root Face : .030-.060 max.

Double-V groove

Backing : gouged & back welded
 Root Opening: .125-.1875 max.
 Groove Angle: 45 degree min.
 Root Face : .030-.060 max.

Single/Double Fillet

Backing :
 Root Opening: 1/32" 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 THE JOB. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR DESIGN DRAWING SHALL TAKE PREFERENCE 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: A. Rolas (05/29/74) Weld Specialist

Accepted By: Alan Bradwood (05/29/74) QA Manager:

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

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Date: 05/29/74

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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. Pipe / Tube
 Material Spec. SA-312, Grade TP304L
 To SA-312, Grade TP304L
 P No. 8 Gr. 1 to P No. 8 Gr. 1
 Thickness (in) 0.3750 Dia.(in) 5.5630

note:

HEAT TREATMENT (QW-406, QW-407)

Preheat Temperature: 50 Degrees F.
 Preheat Maintenance: None
 Interpass Temperature: 350 Degrees F.
 PWHT temperature ... : None Degrees F.
 PWHT Holding time(hr): None

POSITION (QW-405)

Position of Joint : 6G - 45 Deg.
 Progression: Vertical Up

note:

All pass(es)
 GTAW / manual

None

Weld Process / type

GAS (QW-408)
 Shielding Gas / CFH..... 100% Argon / 17-20
 Trailing Gas / CFH..... None / -
 Backing Gas / CFH..... 100% Argon / 18

None / -
 None / -
 None / -

FILLER METAL (QW-404)

AWS Classification..... ER308L
 SFA Spec. No. & F No.... SFA#: 5.9 F#: 6
 A No. or Chem. Comp..... 8
 Filler Metal Trade Name. SOLID FILLER METAL
 SAW Flux Trade Name/Type N/A / -
 Weld Deposit 't' (in)... 0.3750
 Elec./Wire Size (in).... 1/16" | - | -
ELECTRICAL (QW-409)
 Amperage USED 110 | - | -
 Voltage USED 14 | - | -
 Travel Speed (ipm)..... 5 | - | -
 Max. Heat Input (J/in).. None
 Tungsten Type & Size.... EWTh-2 / 3/32"
 Current Type/Polarity... DCEN (straight)

None
 SFA#: None F#: -
 None
 None / -
 None
 - | - | -
 - | - | -
 - | - | -
 None
 N/A / -
 N/A

TECHNIQUE (QW-410)

String or Weave Bead.... String & Weave Bead
 Orifice/Gas Cup Size.... # 8
 Contact Tube to Work.... N/A
 Oscillation..... N/A
 Mult./Single Electrodes. Single Electrode
 Other Technique Notes...
 Multiple or Single Pass (per side).... Multiple Passes

N/A
 None
 None
 None
 N/A
 None

- (n1) Peening was not used with this weld test.
- (n2) No pass > 3/16" t.
- (n3)
- (n4)
- (n5)

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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	0.300	0.225	19400	86200	Weld metal
2	0.753	0.302	0.227	20100	88500	Weld metal

GUIDED BEND TEST (QW-160)

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

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: H9 Welder's Name: Anthony J. Rollas ID: Tests conducted by: J.G.Sylvester Assoc.Inc. Laboratory Test No: 5944 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 of Section IX of the ASME Code.

Prepared By: A. Rollas (05/29/74) Weld Specialist

Certified By: Alan R. Beal (05/29/74) QA Manager: