



Major Tool and Machine, Inc.
 1458 E. 19th Street, Indianapolis, Indiana, 46218
Procedure Qualification Record (PQR) - Details of Welding Test
 Weldspec for Windows

PQR record number	PQR328.5	Revision 2	WPS record number	WPS328.5-PPPL	Revision 2
Date	12/4/03		Company name	Major Tool and Machine, Inc.	
			Welding standard	ASME Section IX	

BASE METALS (QW-403)

	Product form	Specification (type or grade)	P no.	Grp-no.	Size	Sch.	Thick. (in.)	Dia. (in.)
Welded to:	Plate	SB-443 (1)	43		-	-	.375	-
	Plate	SA-240 (Type 304L)	8	1	-	-	.375	-
and tested:	Without PWHT							
Notes								

JOINTS (QW-402)

Joint design	Double-bevel-groove	<p align="center">60 deg. bevel angle typ.</p>
Backing:	Weld or base metal	
Retainers	None	
Groove angle (deg.)	60	
Root opening (in.)	0	
Root face (in.)	.06	

WELDING PROCESSES

Welding process	GTAW
Type	Manual

FILLER METALS (QW-404)

SFA specification	5.14
AWS classification	ERNiCrMo-3
Filler metal F-number	43
Weld metal A-number	NA
Filler metal nominal composition	See manufacturers data
Filler metal trade name	Inconel 625
Filler metal size (in.)	0.093
Deposited thickness (in.)	0.375
Maximum pass thickness (in.)	<0.375
Weld deposit chemistry	

POSITION (QW-405)

Position of groove	1G
Weld progression	-

PREHEAT (QW-406)

Preheat temperature (°F)	70
Maximum interpass temperature (°F)	350

GAS (QW-408)

Shielding gas: Type	Argon
Flow rate (cfh)	35
Trailing gas: Type	None
Flow rate (cfh)	-
Backing gas: Type	None
Flow rate (cfh)	-

ELECTRICAL (QW-409)

Filler metal size (in.)	0.093
Amperes	139
Volts	13.1
Travel speed (in./min)	7
Maximum heat input (kJ/in.)	
Tungsten size (in.)	.093
Tungsten type	SFA 5.12 EWTh-2
Current/polarity	DCEN
DC pulsing current	Not used

TECHNIQUE (QW-410)

String or weave	Stringer
Orifice/gas cup size	.44
Multi/Single pass per side	Multiple passes
Peening	Not used
Initial/interpass cleaning	Interpass cleaning requirement
Back gouging method	Grinding



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Procedure Qualification Record (PQR) - Test Results (As Welded)
Weldspec for Windows

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TENSILE TESTS (QW-150)

Reduced section

Specimen number	Width (in.)	Thickness (in.)	Area (in ²)	Ultimate total load (lb)	Ultimate unit stress (psi)	Type of failure and location
1	0.757	0.381	0.288	27541	95500	Ductile-Base Metal
2	0.758	0.377	0.286	27273	95400	Ductile-Base Metal

Comments	Both tensile test failures occurred in the 304L base material.
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GUIDED BEND TESTS (QW-160)

Type of test	Acceptance criteria	Result	Comments
2 transverse face bends per QW-161.2 and QW-462.3(a)	QW-163	Acceptable	see - ASME IX - QW-451.1
2 transverse root bends per QW-161.3 and QW-462.3(a)	QW-163	Acceptable	see - ASME IX - QW-451.1
Visual examination	QW-194	Acceptable	
Radiographic Examination	QW-191	Acceptable	

Comments	See Additional information section for other testing performed.
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CERTIFICATION

Welder's name	ID Number	Stamp number	Mechanical testing by	
Clephane, Randy	743		Laboratory test number	Sherry Laboratories
			Test file number	2003080918
			Tests conducted by	Jerry L. Judt

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.

Signature 1 (definable in Tools-Options-Default Settings)

Name	Signature
Michael G. Iverson	
Date	
12/4/2003	



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Procedure Qualification Record (PQR) - Additional information
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1. 625 Inconel base material - heat number 510614L05
 304L base material - heat number 896479

- 2a. Magnetic permeability before welding:
 304L stainless steel base plate before welding = 1.058 - 1.092
 625 Inconel base plate before welding = 1.000 - 1.001

2. Magnetic permeability after welding:
 304L stainless steel base plate = 1.102 - 1.115
 625 Inconel base plate = 1.000 - 1.001
 Heat effected zone = 1.014 - 1.022 (measured on the 625 Inconel side)
 Heat effected zone = 1.080 - 1.105 (measured on the 304L side)

3. NDT performed on test plate:
 - a. Radiography - MQS Inspection W.O. #371-F0004, dated 8/22/2003.
 - b. Visual inspection - MTM NDT #6952.

4. Software error caused PQR test results to print as turned specimen rather than reduced specimen. This was eliminated by resaving the PQR. No revisions have been invoked because all information stayed the same, however, the PQR test results page now show as a reduced specimen when printed rather than a turned specimen. - 11/25/03 - Michael Iverson Welding Engineer/CWI

5. Rev 2 - Per customers comments note 4 should have caused the rev level to change to rev 1. Added Visual and Radiographic Inspection to the Test Results Page, added note 2a which records magnetic permeability of base plates prior to welding. - 12/4/03 - MGI