

Fermilab *Fermi National Accelerator Laboratory*
 Technical Division-Machine Shop

Procedure Qualification Record No. *Fermi PQR Ti-6* Date *4/10/2009*
 Revision: 0 Date: Remarks:

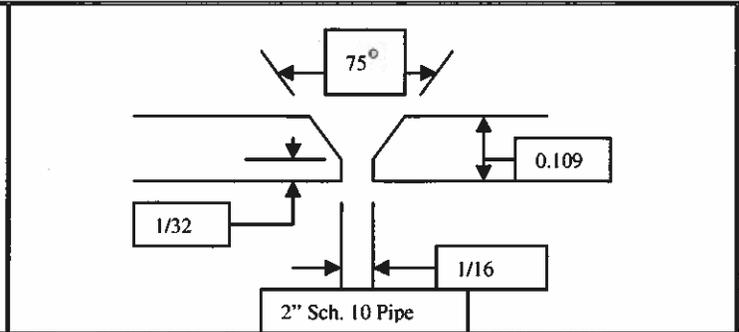
Welding Process/Weld Type: *GTAW/Manual* Supporting WPS: *Fermi WPS Ti-6*

Joints (QW-402)

Details:

Weld Type: *Single V Groove Weld*
Backing: *Open Butt, Gas Backing Only*
Root Opening: *0.0625"*
Root Face: *0.031"*

2" x Schedule 10 Pipe
Manual Weld out of chamber



Base Metals (QW-403)
Material Spec., Type or Grade
ASME SB-861, Grade 2 to ASME SB-861, Grade 2
P-No. *51* to **P-No.** *51*
Thickness of Coupon (in.) *0.109 inches*
Diameter of Test Coupon (in.) *2.375 inches*

Post Weld Heat Treatment (QW-407)
Type: *No PWHT performed*
Temperature: *None*
Time: *None*

Filler Metals (QW-404)
SFA Specification: *5.16*
AWS Classification: *ERTi-2*
Filler Metal F-No.: *51*
Weld Metal Analysis A-No.: *N/A*
Size of Filler Metal (in.): *1/16 diameter*
Weld Deposit "t"(in.): *0.109 inches*
Filler Metal Product Form: *Solid/Bare Wire*

Gas (QW-408)

	Gas	Percent Mixture%	Flow Rate
Shielding:	<i>Argon</i>	<i>>99.995%</i>	<i>@ 30 CFH</i>
Trailing:		<i>None</i>	
Backing:	<i>Argon</i>	<i>>99.995%</i>	<i>@ 7 CFH</i>

Other: *Oversized gas lens and cup 1.375 in. dia.*

Positions (QW-405)
Position of Joint: *6G*
Weld progression: *Upward*
Coupon welded out of chamber

Electrical Characteristics (QW-409)
Current/Polarity: *DCEN (Straight)*
Amps: *65-95* **Volts:** *6-14*
Tungsten Type & Size: *EWCe-2 3/32 diameter*
Other: *Non-Pulsing Current*

Preheat (QW-406)
Preheat Temperature: *Ambient 66°F*
Interpass Temperature: *350° F Maximum*

Technique (QW-410)
Travel (ipm): *As Required* **Oscillation:** *None*
String/Weave Bead: *Stringer & Weave*
Multiple/Single Pass (per side) *Multiple one side*
Multiple/Single Electrode: *Single Electrode*
Nozzle/Gas Cup Size *1 3/8" dia. gas lens with clear Pyrex cup*

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Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (Squared in.)	Ultimate Total Load (lbs.)	Ultimate Stress (PSI)	Failure Type Location
001	0.5050	0.1060	0.0535	0.42	67,100	Weld
002	0.5040	0.0900	0.0454	0.36	73,700	Weld

Guided Bend Test (QW-160)

Figure Number & Type	Result	Figure Number Type	Result
003: Face Bend	Acceptable	005: Root Bend	Acceptable
004: Face Bend	Acceptable	006: Root Bend	Acceptable

Mechanical Test Conducted by: Bodycote Testing Group Ref. # G090430

Visual Examination: Acceptable **X-ray per ASME Section IX, QW-191.2.2** Acceptable

Radiograph Tests conducted by: Alloyweld Inspection Company, Inc. **Test ID#:** 174820

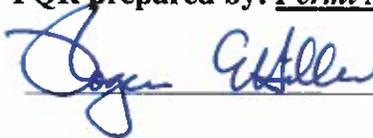
Welder's Name: Daniel J. Watkins **ID #** 03991N **Weld Stamp #** 24

Welding of coupon Verified by: Michael P. Reynolds ID# 03993N

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.

PQR prepared by: Fermi National Accelerator Laboratory

Authorized Representative



ID#

00362N