WELDING PROCEDURE SPECIFICATION

WPS - 2007-Intx-8-A

REV. NO.: 1

DATE: 4/22/2010

**APPLICABILITY**

WELDING PROCESS: GTAW-A and


SUPPORTING PQR: IC-PQR-02

JOINT: This WPS shall be used in conjunction with the General Welding Standards (GWS) and Welding Fabrication Procedure (WFP) sections and criteria for joint details, repairs, NDE, inspection etc.

Weld Joint Type: Square butt

Class: Full penetration

See GWS 1-06 and WFP's for joint details

Preparation: Machined - Clean with 100% ethyl alcohol

Root Opening: <0.005

Backing: None (in glovebox)

Backgrind root: N/A

Backing Mat.: N/A

Bkgd Method: N/A

GTAW Flux: N/A

Backing Retainer: N/A

FILLER METALS:

Class: N/A and N/A

A No: N/A

SFA Class: N/A

F No: N/A and N/A

Size: N/A

N/A

N/A

N/A

Insert: N/A

Insert Desc: N/A

Weld Metal Thickness Ranges:

AWS Root Pass: 0 thru 0

AWS Balance: 0 thru 0

ASME Root Pass: 0.05 thru 0.1

ASME Balance: 0.05 thru 0.1

BASE MATERIAL

Spec. A-276 SS- Bar

P/S No. 8

Gr No. All

to: P/S No. 8

Gr No. All

to: Spec. A-276 SS- Bar

Grade: All

Grade: All

Qualified Pipe Dia. Range: ≥

AWS: 0 ASME:

Qualified Thickness Range: AWS: 0.000 thru 0.000 ASME: 0.050 thru 0.100

QUALIFIED POSITIONS:

AWS: N/A ASME: All Vert. Prog.: V/Up-Dn

Preheat Min. Temp.: 70 ºF GAS: Shielding: He or

Interpass Max. Temp.: 350 ºF Gas Composition: 100 / / % / / %

Preheat Maintenance: N/A ºF Gas Flow Rate cfm: 10 to 20 to

PWHT: Time @ ºF Temp. N/A Backing Gas/Comp: He* 100 %

Temp. Range: N/A ºF Backing Gas Flow cfm: 0 to 0

to N/A ºF Trailing Gas/Comp: He* 100 %

APPROVAL: Signatures on file at ENG

DATE: 4/22/2010

Monday, June 07, 2010
WELDING CHARACTERISTICS:

<table>
<thead>
<tr>
<th>Current:</th>
<th>DCEN and DCEN</th>
<th>Tungsten Type:</th>
<th>EWTH-2</th>
<th>Transfer Mode:</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranges: Amps</td>
<td>7 to 80</td>
<td>Tungsten Dia.:</td>
<td>0.035</td>
<td>Pulsing Cycle:</td>
<td>60 to 40</td>
</tr>
<tr>
<td>Volts</td>
<td></td>
<td></td>
<td></td>
<td>Background Current:</td>
<td>7</td>
</tr>
<tr>
<td>Fuel Gas:</td>
<td>N/A</td>
<td>Flame:</td>
<td>N/A</td>
<td>Braze temp. °F</td>
<td>N/A to N/A</td>
</tr>
</tbody>
</table>

WELDING TECHNIQUE: For fabrication specific requirements such as fittup, cleaning, grinding, PWHT and inspection criteria refer to Volume 2, Welding Fabrication Procedures

<table>
<thead>
<tr>
<th>Technique:</th>
<th>Automatic part rotated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Pass or Multi Pass:</td>
<td>S</td>
</tr>
<tr>
<td>GMAW Gun Angle °:</td>
<td>0 to 0</td>
</tr>
<tr>
<td>No Pass &gt;1/2&quot;:</td>
<td>GMAW/FCAW Tube to work distance:</td>
</tr>
<tr>
<td>Maximum K/J Heat Input:</td>
<td>N/A</td>
</tr>
<tr>
<td>Travel speed:</td>
<td>6 ipm</td>
</tr>
<tr>
<td>Gas Cup Size:</td>
<td>0.150</td>
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</tbody>
</table>

PROCEDURE QUALIFIED FOR:

| Charpy "V" Notch:       | N/A |
| Nil-Ductil Transition Temperature: | N/A |
| Dynamic Tear:           | N/A |

Comments:
1) Voltage is fixed with arc gap length of 0.055 - 0.075 in rotating welding head.
2) All welding is performed in a Helium atmosphere inside a glove-box.

<table>
<thead>
<tr>
<th>Weld Layer</th>
<th>Manual Process</th>
<th>Filler Metals Size</th>
<th>Amp Range</th>
<th>Volt Range</th>
<th>Travel/ipm</th>
<th>Nozzle Angle</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GTAW-A</td>
<td>N/A</td>
<td>7 to 80</td>
<td>to</td>
<td>0 to 6</td>
<td>0 to 0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>N/A</td>
<td>N/A</td>
<td>0 to 0</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>N/A</td>
<td>N/A</td>
<td>0 to 0</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>N/A</td>
<td>N/A</td>
<td>0 to 0</td>
<td>to</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REM. * Weld layers are representative only - actual number of passes and layer sequence may vary.

ML-1/2 projects or jobs must determine if the supporting documentation for this WPS complies with quality requirements of the project/job. Use of LANL Welding Procedures and Welder Qualifications for non-LANL work shall be at the sole risk and responsibility of the Subcontractor, and the Subcontractor shall indemnify and save LANL and the Government harmless from any and all claims, demands, actions or causes of action, and for any expense or loss by reason of Subcontractor's and their employees possession and use of LANL procedures and qualifications.