WELDING PROCEDURE
SPECIFICATION


WELDING PROCESS: GTAW-A and GTAW-A

ASME: X  AWS:  OTHER:


**APPLICABILITY**

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.

JOINT: See GWS 1-06 and WFP’s for joint details

Weld Joint Type: Square butt  Full penetration

Root Opening: 0"

Preparation: Machined

Backing: Gas

Backgrind root: N/A

Backing Mat.: N/A

Bkgrd Method: N/A

GTAW Flux: N/A

Backing Retainer: N/A

FILLER METALS:

A No: N/A  SFA Class: N/A

F No: N/A

Insert: N/A

Insert Desc.: N/A

Flux: Type: N/A  Size: N/A

Flux Type: N/A

Filler Metal Note: See note in comments section.

Weld Metal Thickness Ranges:

AWS Root Pass: 0 thru 0

ASME Root Pass: 0.00 thru 0.000

ASME Balance: 0.02 thru 0.180

BASE MATERIAL

Spec. A-213/249 SS- Pipe & tube  Grade: All

Qualified Pipe Dia. Range: ≥ 0 ASME: 0.125

Qualified Thickness Range: AWS: 0.000 thru 0.000

ASME: 0.020 thru 0.180

QUALIFIED POSITIONS:

AWS: N/A

ASME: All

Vert. Prog.: Up/Dn

Preheat Min. Temp.: 70 °F

GAS: Shielding: Argon* or

Interpass Max. Temp.: 350 °F

Gas Composition: 100 / / % / / %

Preheat Maintenance: N/A °F

Gas Flow Rate cfh: 10 to 20

PWHT: Time @ °F Temp. N/A

Backing Gas/Comp: Argon**

Temp. Range: 0 °F to 0 °F

Backing Gas Flow cfh: 5 to 10

Trailing Gas/Comp: N/A

0 %

APPROVAL: Signatures on file at ENG

DATE: 4/28/2009
WPS NO: 2010-xxxx-8-A

WELDING CHARACTERISTICS:

<table>
<thead>
<tr>
<th>Current</th>
<th>DCEN and DCEN</th>
<th>Tungsten Type: EWTh-2</th>
<th>Transfer Mode: N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranges:</td>
<td>21 to 0</td>
<td>Tungsten Dia.: 0.04</td>
<td>Pulsing Cycle: 22 to 46</td>
</tr>
<tr>
<td>Volts</td>
<td>7 to</td>
<td>Background Current: N/A</td>
<td></td>
</tr>
<tr>
<td>Fuel Gas</td>
<td>N/A</td>
<td>Flame: N/A</td>
<td>Braze temp. °F 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

| Technique | Cleaning Method | Single Pass or Multi Pass | Stringer or Weave bead (S/W) | Oscillation | GMAW Gun Angle °: | Forehand or Backhand for GMAW (F/B): | GMAW/FCAW Tube to work distance: | Maximum K/J Heat Input | Travel speed | Gas Cup Size: N/A |
|-----------|----------------|---------------------------|-----------------------------|-------------|------------------|-------------------------------------|--------------------------------|-----------------|-------------|----------------|--------|
| Automatic | SS Wool/Abrasive cloth | S | S or | N/A | 0 to 0 | N/A | N/A |

PROCEDURE QUALIFIED FOR:

<table>
<thead>
<tr>
<th>Charpy &quot;V&quot; Notch</th>
<th>Nil-Ductil Transition Temperature</th>
<th>Dynamic Tear</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weld Layer</th>
<th>Manual Process</th>
<th>Filler Metals</th>
<th>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>---</td>
<td>21 to 46</td>
<td>7 to 8.2</td>
<td>15 to 17</td>
<td>0 to 0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GTAW-A</td>
<td>N/A</td>
<td>---</td>
<td>21 to 46</td>
<td>7 to 8.2</td>
<td>15 to 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GTAW-A</td>
<td>N/A</td>
<td>---</td>
<td>0 to 0</td>
<td>0 to 0</td>
<td>15 to 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GTAW-A</td>
<td>N/A</td>
<td>---</td>
<td>0 to 0</td>
<td>0 to 0</td>
<td>15 to 17</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.