# Welding Procedure Specification

**WPS:** 5000-xxxx-HY80/HSLA100-IX  
**CODE:** ASME IX  
**REV. NO.:** 1  
**DATE:** 7/3/2012  
**APPLICABILITY**

## Joint
- **Type:** Butt/Fillet  
- **Class:** Full & Partial Penetration & Fillets

## Weld Preparation
- **Root Opening:** N/A  
- **Backgrind Root:** When required  
- **Backgrind Method:** Gouge, Chip, Grind  
- **GTAW Flux:** N/A  
- **GTAW Flux Retainer:** N/A

## Filler Metals
- **Class:** Mill-100S-1 and N/A  
- **Insert:** N/A  
- **Insert Type:** N/A  
- **Flux:** Mill800-H  
- **Filler Material Note:**
  - **Type:** N/A  
  - **Size:** N/A

## Base Material
- **Spec.:** HY80 or HSLA100  
- **Grade:** N/A  
- **Qualified Pipe Dia. Range:** >=  
- **Qualified Thickness Range:**
  - **AWS:** 0 thru 0  
  - **ASME:** 0.1875 thru 8

## Qualified Positions
- **AWS:** N/A  
- **ASME:** 1G  
- **Vert. Prog.:** N/A

## Welding Characteristics
- **Current:** DCEN  
- **Ranges:** Amps: 200  
- **Volts:** 18  
- **Fuel Gas:** N/A  
- **Flame:** N/A  
- **Welding Technique:** Machine

## Welding Technique
- For fabrication specific requirements such as fitup, cleaning, grinding, PWHT and inspection criteria, refer to Volume 2, Welding Fabrication Procedures.

## Supporting PQR
- **SUPPORTING PQR:** 5000-HY80/HSLA100

## Welding Procedure Details
- **WELD PROCESS:** SAW  
- **CODE:** ASME IX  
- **OTHER:**
- **SUPPORTING PQR:** 5000-HY80/HSLA100  
- **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:** Butt/Fillet  
- **Class:** Full & Partial Penetration & Fillets
- **Preparation:** Thermal or Mechanical  
- **Backing:** Metal  
- **Backgrind Root:** When required  
- **Backgrind Mat.:** Metal  
- **GTAW Flux:** N/A  
- **GTAW Flux Retainer:** N/A

## Welding Characteristic Ranges
- **Interpass Max. Temp.:** 400 °F  
- **Preheat Maintenance:** 200 °F  
- **PWHT: Time @ °F Temp.:** N/A

## Welding Process Parameters
- **GAS:** Shielding: N/A or N/A
- **Gas Composition:** N/A / N/A / N/A %
- **Gas Flow Rate cfm:** 0 to 0
- **Back Gas Flow cfm:** 0 to 0
- **Back Gas Flow Comp.:** N/A %
- **Trailing Gas Flow cfm:** 0 to 0

## Welding Equipment Specifications
- **Background Current:** N/A
- **Transfer Mode:** N/A  
- **Pulsing Cycle:** N/A to N/A
- **Background Current:** N/A
- **Background Current:** N/A
- **Braze Temp °F:** N/A to N/A

## Welding Technique Details
- **Cleaning Method:** Chip/grind/file/wire brush
Single or Multi Pass: Multi
Stringer or Weave Bead (S/W): S or N/A
Oscillation: N/A
GMAW Gun Angle: 0° to 0°
Forehand or Backhand for GMAW: N/A
No Pass > 1/2": N/A
GMAW/FC AW Tube to Work Distance (in): N/A
Maximum K/J Heat Input: 62000 KJ/in
Travel Speed: N/A
Gas Cup Size: N/A

PROCEDURE QUALIFIED FOR:
Charpy "V" Notch: Yes
Nil-Ductile Transition Temperature: No
Dynamic Tear: Yes

Comments:
Note 1.) Welds are qualified with DT of weld material @-40° F of 614 ft-lbs. Westmoreland Report #2-64863
Note 2.) Welds are qualified with Charpy of weld material @-90° F of 68 ft-lbs. Sherry Labs Report #B12051281

Weld Layer Manual Process Filler Metals Size Amp Range Volt Range Travel/ipm Nozzle Angle Other
1 SAW Mill-100S-1 .045 200 to 240 18 to 22 2.3 to 3.0 0 to 0
2 N/A 1/16 345 to 390 24 to 28 8 to 12
3 N/A 3/32 340 to 600 26 to 34 9 to 12
4 N/A 1/8 350 to 600 26 to 34 9 to 12

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 the reason of Subcontractor's and their employees possession and use of LANL procedures and qualifications.

APPROVAL: Signatures on file at ES-DE
DATE: 7/11/2012