Los Alamos NATIONAL LABORATORY

WELDING PROCEDURE SPECIFICATION

WPS: 9000-TW4300-8A **REV. NO.:** 0 **DATE:** 8/14/2025 ****APPLICABILITY****
WELDING PROCESS: STUD **CODE:** AWS D1.6 **and** ASME IX **OTHER:** None
SUPPORTING PQR: 9000-TW4300-8A-.375

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: Stud **Class:** Drawn Arc Stud
See GWS 1-06 and WFP's for joint details. **Preparation:** Grind or wire brush
Root Opening: N/A **Backing:** N/A
Backgrind Root: N/A **Backing Mat.:** N/A
Bkgrd Method: N/A **GTAW Flux:** N/A **Backing Retainer:** N/A

FILLER METALS: **Class:** SS 3xx-Stud **and** SS 3xx-Stud
A No: 8 **SFA Class:** N/A **and** N/A **F No:** N/A **and** N/A **Size:** 3/8"
Insert: N/A **Insert Type:** N/A **Weld Metal Thickness Ranges:**
Flux: **Type:** N/A **Size:** N/A **AWS Root Pass:** N/A **thru** N/A
Filler Material Note: Stud with 3/8" dia. base **AWS Balance:** 0 **thru** 0
ASME Root Pass: N/A **thru** N/A
ASME Balance: 0 **thru** 0

BASE MATERIAL:

	P No: 8	**Gr No.:** 1	**to P No.:** 8	**Gr No.:** 1
Spec.: SS- 3xx-x Stud	**Grade:** All	**to Spec.:** A-240 SS- Plate sheet & strip		**Grade:** All
Qualified Pipe Dia. Range: >=	**AWS:** 4	**ASME:** 4		
Qualified Thickness Range:	**AWS:** 0.125 **thru** 5	**ASME:** 0.125 **thru** 5		

QUALIFIED POSITIONS: **AWS:** 1S, 2S, 4S **ASME:** 1S, 2S, 4S **Vert. Prog.:** N/A

Preheat Min. Temp.:	50	**GAS: Shielding:** N/A	**or**	N/A
Interpass Max. Temp.:	350 **°F**	**Gas Composition:** 0 / 0 / 0 %		0 / 0 / 0 %
Preheat Maintenance:	N/A **°F**	**Gas Flow Rate cfh:** 0 **to** 0		0 **to** 0
PWHT: Time @ °F Temp.:	N/A	**Backing Gas/Comp:** N/A		0 **%**
Temperature Range:	N/A **°F to** N/A **°F**	**Backing Gas Flow cfh:** 0 **to** 0		
		Trailing Gas/Comp: N/A		0 **%**

WELDING CHARACTERISTICS:

Current: DCEN **and** DCEN	**Tungsten Type:** N/A	**Transfer Mode:** Drawn Arc	
Ranges: **Amps:** 558	**Tungsten Dia.:** N/A **to** N/A	**Pulsing Cycle:** 0 **to** 0	
Volts:		**Background Current:** 0	
Fuel Gas: N/A	**Flame:** N/A	**Braze Temp °F:** N/A **to** N/A	

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

Technique:	Automatic	**Cleaning Method:** Abrasive cloth/SS wire brush/file		
Single or Multi Pass:	N/A	**Stringer or Weave Bead (S/W):** N/A **or** N/A		**Oscillation:** N/A
GMAW Gun Angle:		**Forehand or Backhand for GMAW:** N/A		
No Pass > 1/2":	N/A	**GMAW/FCAW Tube to Work Distance (in):** N/A		
Maximum K/J Heat Input: N/A **KJ/in**		**Travel Speed:** N/A		**Gas Cup Size:** N/A

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

Comments: Optimal Settings for 1S & 2S: Arc Timing 0.35 sec, 600 Amps, Lift 1/8" Plunge 0.182 (slightly less than 3/16"). Optimal Setting for 4S: Same as other positions except Arc Timing is 0.33 sec & 630 amps.
Ranges of Other Essential Variables to Automatic Drawn Arc Stud Welding: Ceramic Ferrule shall be used, Arc Timing Range: 0.29 sec. to 0.36 sec., Lift Range: 3/32" to 5/32", Tru-Weld Model TW 4300 stud gun shall be used. Note: this equipment doesn't allow adjustments to output Voltage nor is Voltage an essential variable for this process.

Weld Layer	Manual Process	Filler Metals	Size	Amp Range	Volt Range	Travel/ipm	Nozzle Angle	Other
1	STUD	SS 3xx-Stud	3/8"	558 **to** 676		0 **to** 0		
2		SS 3xx-Stud						
3		SS 3xx-Stud						
4		SS 3xx-Stud						

REM. * Weld layers are representative only - actual number pf 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 posession and use of LANL procedures and qualifications.

APPROVAL: Signatures on file at ES-DE **DATE:** 8/14/2025