

**Welding Procedure Specification**

WPS: GTA-S25A22B  
Rev.: A  
26-June-2021

WPS:	GTA-S25A22B Rev. A		
Supporting PQR(s):	GTA-S25A22B-125-O		
Process:	Gas Tungsten Arc Welding	Transfer Mode:	NA
Type:	Manual <input checked="" type="checkbox"/>	Semi Automatic	Automatic

**Scope:** This WPS is to be used when welding non-heat treatable aluminum alloy using the manual GTAW process.

The welder shall read and understand the information and limitations of this WPS. The welder shall have access to this WPS at all times while this WPS is being used.

This WPS meets the requirements of the following welding/fabrication standard:  
NAVSEA S9074-AR-GIB-010/278

For the following Service Classifications as defined in the fabrication document:

Machinery Class M	Yes	Pressure Vessels and Tanks Class A	Yes	Pressure Pipe Class P	Yes	Steam Turbines Class T	No
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Prepared By: Albert J. Moore Jr. Date: 26-June-2021

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_

Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

Customer's Review: \_\_\_\_\_ Date: \_\_\_\_\_

Representing: \_\_\_\_\_

**Base Metals**

Specification: Non-heat treatable aluminum alloy - Refer to NAVSEA S9074-AR-GIB-010/278 Table 1 for a complete listing of approved material specifications

Alloy: Refer to Table 1 in NAVSEA S9074-AR-GIB-010/278

S Number: S22 and S25 (H-1 temper only)

Thickness Range:	Grooves:	CJP:	Pipe	Plate
	(weld deposit thickness)	PJP:	0.058 to ¼-inch	1/8 to ¼-inch
	Filletts (other than sockets):		0.058 to unlimited	1/8 to ¼-inch
	Sockets:		3/16-in. min. wall	Unlimited

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Specification	Filler Metal <sup>1</sup> Classification	Group Number
AWS A5.10	Refer to Table 1	A-22B
Diameter: 3/32-inch max.		

Shielding Gas	
Shielding Gas: SG-A (argon)	Percent Mix: 100% Argon
Flow Rate: 22.5 cfh min.	Specification: AWS A5.32
Preflow: 2 sec. min.	Post flow: 5 sec. typical
Gas Nozzle: #4 to #12	
Root Purge: Not required	Flow Rate: 5 to 25 cfh
Optional - Argon	

Electrical Characteristics		
Machine Type:	Constant Current: X	Constant Voltage: NA
Current: AC	Polarity: NA	Pulsing: None
Frequency: 160-180 Hz		Balance: 80-90%
Tungsten Specification: AWS A5.12		Classification: EWTh-1 or -2
Diameter: 3/32 to 1/8-in.		
Voltage: 9 to 16	Amperage: 100 to 200 amps.	
Torch: Speedway SW320 or equivalent		Cooling: Liquid cooled

Preheat / Interpass / PWHT		
Preheat: 60°F min.		Interpass: 150°F max.
PWHT: None	Temperature: NA	Time: NA

Technique	
Position:	Grooves – Flat: inclination 0°-15° rotation 150°-210° Fillets – Flat: inclination 0°-15° rotation 150°-210°
Progression:	Forehand
Travel Speed:	2 to 5 ipm
Number of Electrodes:	Single
Single or Multiple Passes:	Either
Stringer or Weave:	Either, but stringers are preferable. Weaves are limited to 2X tungsten diameter.
Pressure Boundaries:	All pressure boundaries, consisting of either grooves or fillets, shall be welded with at least 2 layers.

<sup>1</sup> Autogenous welds are not permitted. This applies to tack welds as well as the production weld.

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**Cleaning:** Prior to Welding: Joint and adjacent surfaces within 1 inch of joint shall be free of oxides. Paint, oils, grease, or other hydrocarbons within 4 inches of the weld joint shall be removed.

Sheared or machined surfaces of groove welds shall be draw filed. Surfaces (OD & ID) should be wire brushed with a stainless steel brush and flushed or wiped with 90% isopropyl alcohol and allowed to completely evaporate before welding.

Post Welding: Wire brush all completed welds.

**Back Gouging:** Rotate files are the preferred method of backgouging. All complete joint penetration double sided groove welds shall be back gouged to sound metal before welding the second side.

**Peening:** None

**Weld Marking:** As directed in the work order or on drawing.

**Inspection:** Welds are to be visually inspected by the welder before requesting QC inspection. Visual acceptance criteria shall be as per MIL-STD-2035A for the applicable Service Class indicated by the approved drawing.

The extent of the required inspection performed by QC shall be as per NAVSEA-S9074-AR-GIB-010/278, Table VIII, IX, or X for the applicable Service Class indicated by the approved drawing.

**Joint Details:** This WPS can be used to weld any joint listed in MIL-STD-22D (or as approved by the customer) with the following limitations/exceptions:

Complete joint penetration groove welds made from one side are limited to 1/8-inch maximum thickness.

Complete joint penetration groove welds made with backing or double sided (when the second side is back gouged to sound metal) are permitted.

The following joint details are not approved:

- Fillets on coated surfaces (paint, etc.),
- Tube to tube sheet,
- Internal tube to header,
- Cladding for corrosion or abrasion resistance
- Joints with preplaced filler metal inserts

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<b>Table 1 - Recommended Matching Filler Metal Group</b>						
<b>Base Metal Alloy</b>		<b>S22</b>		<b>S25</b>		
		<b>5052</b>	<b>5454</b>	<b>5083</b>	<b>5086</b>	<b>5456</b>
<b>S22</b>	<b>5052</b>	R5356	R5356	R5356	R5356	R5356
	<b>5454</b>	R5356	R5554/R5356	R5356	R5356	R5554
<b>S25</b>	<b>5083</b>	R5356	R5356	R5556	R5356	R5556
	<b>5086</b>	R5356	R5356	R5356	R5356	R5356
	<b>5456</b>	R5356	R5554	R5556	R5356	R5556

*The preferred filler metal alloy is listed first with the alternative filler metals listed second.*

*When specified by the customer, the filler metal classification shall be as specified by the approved drawing or traveler.*

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