

Engineering Procedure

SAEP-1107

29 October, 2003

Welding Test Supplement S07 for GTAW,
Carbon, Low Alloy and Stainless Steel Pipe

Document Responsibility: Inspection Department

Saudi Aramco DeskTop Standards

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Previous Issue: 30 April, 2000 Next Planned Update: 1 November, 2008

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1 Scope

This welder performance qualification Test Supplement shall govern the testing of welders with the Gas Tungsten Arc Welding (GTAW) process, welding progression vertical up, for welding carbon, low alloy and stainless steel pipe.

2 Applicable Documents

The requirements contained in the following documents apply to the extent specified in this procedure.

2.1 Saudi Aramco References

Saudi Aramco Engineering Procedures

<u>SAEP-321</u>	<i>Performance Qualification Testing and Certification of Saudi Aramco Welders</i>
<u>SAEP-1101</u>	<i>Welding Test Supplement S01 for SMAW, Carbon and Low Alloy Steel Pipe</i>
<u>SAEP-1103</u>	<i>Welding Test Supplement S03 for SMAW, Stainless Steel, Single Sided</i>
<u>SAEP-1104</u>	<i>Welding Test Supplement S04 for SMAW, Stainless Steel/Nickel, Backing</i>

2.2 Industry Code(s) and Standard(s)

American Society of Mechanical Engineers

<i>ASME SEC IX</i>	<i>Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators</i>
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3 Instructions

Conduct the Performance qualification testing of welders following the requirements of [SAEP-321](#) as supplemented by the subsequent instructions.

3.1 Applications

Piping	Yes
Pipelines	Yes
Pressure Vessels	No
Tanks	No

Structural	No
Dissimilar Metals	Yes *
* See restrictions in paragraph 3.9	
3.7	Testing and Inspection Requirements
Time Limit of Test	Two (2) hours maximum
Radiography	100% (ASME QW-191)
Visual Inspection	See paragraph 6.1.3 of SAEP-321
3.8	Qualification Limits
Material Form	Plate or pipe
Joint Type	Groove welds with and without backing, and fillet welds
Base Material	Carbon steels (P1), low alloy steels (P3, P4, P5, P9, P11), stainless steels (P8) only to themselves, and carbon & low alloy steels to each other.
Process	GTAW
Filler Metal (Root/Fill/Cap):	
Carbon Steel	ERXXS-X (A5.18)
Low Alloy Steel	ERXX(X)S-X(X) (A5.28)
Stainless Steel	ERXXX (A5.9)
Gas Backing	Inert gas backing is required when welding P5 materials (and materials with greater P-Numbers) to themselves or to each other
Base Metal Thickness	0.436" maximum
Diameter Range	1" NPS and greater with no restrictions. For the occasional job requiring welding of butt joints less than one inch (1") diameter, the welder shall weld a 2G and 5G test coupon on the smallest job size diameter tubing. The welding shall be witnessed by the OIU inspector and the weld radiographed. Both test coupons shall meet the acceptance criteria of paragraph 3.7 of this Test Supplement. Acceptance shall qualify the welder to weld tubing

diameters between one inch (1") and the diameter tested, and shall remain in effect as long as the welder welds tubing in the diameter range continuously and up until one month afterwards.

Positions	All
Vertical Progression	Uphill

3.9 Restrictions

Dissimilar Metal Welds (between ferritic steels and austenitic stainless steels made with ER309 GTAW filler metals only) are permitted for:

- (1) Structural welding applications where welds are not in contact with service fluid and the design temperature is less than 300°C, and
- (2) The welding of stainless steel name plates to pressure vessel shells.

Revision Summary

29 October, 2003	Minor revision to convert the text statements into a form layout (ASME SEC IX format). Revised the "Next Planned Update".
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WELDING PROCEDURE SPECIFICATION (WPS)

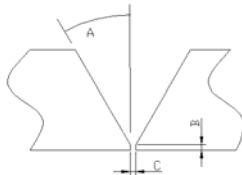
WPS S07

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Procedure Qualification Record (PQR): <u>None</u>	Welding Process: <u>GTAW, manual</u>
Scope: <u>For welder qualification only</u>	Prior Qualification Requirements: <u>S01 & S03 or (S04)</u>

BASE MATERIAL (QW-403)	POST WELD HEAT TREATMENT (QW-407)
Test coupon type: <u>Pipe</u>	Temperature: <u>None</u>
Material Spec, type or Grade: <u>Carbon Steel</u>	Time: _____
Diameter of test coupon: <u>2" NPS</u>	Other: _____
Thickness of test coupon: <u>0.218"</u>	
To Material spec. type or grade: <u>Carbon Steel</u>	
Tack Welds: <u>Three (3) made by the welder and incorporated into the root pass</u>	
FILLER METALS (QW-404)	GAS (QW-408)
Weld Metal Analysis Number: <u>8</u>	Gas: <u>Argon</u>
Filler Metal F No.: <u>6</u>	Composite: _____
AWS specification: <u>A 5.9</u>	Flow (CFH): <u>10-20</u>
AWS Classification: <u>See Below</u>	Backing: <u>Argon</u>
Electrode: <u>EWTh-2 (2.4mm)</u>	Trailing: _____
POSITION (QW-405)	TECHNIQUE
Position of Groove: <u>2G & 5G</u>	String or weave: <u>Stringer or Weave</u>
Weld Progression: <u>Uphill</u>	Oscillation: _____
PREHEAT (QW 406)	Multiple or Single pass per side: <u>Multiple</u>
Preheat Temperature: <u>10°C</u>	Single or multiple electrode: <u>Single</u>
Interpass temperature: <u>177°C</u>	Other: _____
Other: _____	



Joint Design: Single Vee

A = 30° +/- 2.5°
B = 1.6 +/- 0.8mm
C = 3.2 +/- 0.8mm

		WELDING PROCEDURE SPECIFICATION (WPS)				WPS S07 Rev. 0 Page 2 of 2	
WELD LAYER	PROCESS	FILLER METAL		CURRENT		VOLTAGE	TRAVEL SPEED (cm/min)
		Class	Dia. (mm)	Polarity	Amps.		
Root	GTAW	ER308L/309L/316L	2.4	DCEN	80-140	10-12	3.8-8.9
Hot	GTAW	ER308L/309L/316L	2.4	DCEN	70-100	10-12	3.8-10.2
Fill	GTAW	ER308L/309L/316L	2.4	DCEN	90-160	10-12	3.8-14
Cap	GTAW	ER308L/309L/316L	2.4	DCEN	90-160	10-12	5.0-15.2