

Engineering Procedure

SAEP-1101

29 October, 2003

Welding Test Supplement S01 for SMAW,
Carbon and Low Alloy Steel Pipe, Uphill

Document Responsibility: Inspection Department

Saudi Aramco DeskTop Standards

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

Revised paragraphs are indicated in the right margin

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1 Scope

This welder performance qualification Test Supplement shall govern the testing of welders with the Shielded Metal Arc Welding (SMAW) process, welding progression vertical up, for welding carbon and low alloy 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

[SAEP-321](#)

*Performance Qualification Testing and
Certification of Saudi Aramco Welders*

[SAEP-1112](#)

*Welding Test Supplement S12 for SMAW, Carbon
Steel, Small Diameter*

2.2 Industry Code(s) and Standard(s)

American Society of Mechanical Engineers

ASME SEC IX

*Qualification Standard for Welding and Brazing
Procedures, Welders, Brazers, and Welding
and Brazing Operators*

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	Yes *
Tanks	Yes *
Structural	Yes *
Dissimilar Metals	Yes *

* See restrictions in paragraph 3.9.

3.7 Testing and Inspection Requirements

Time Limit of Test	Four (4) 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 steel (P1) and low alloy steels (P3, P4, P5, P9, P11) to themselves and each other
Process	SMAW
Filler Metal:	
Root	EXX10/11 (A5.1, A5.5)
Fill/Cap	EXX15/16/18 (A5.1, A5.5)
Base Metal Thickness	Unlimited
Diameter Range	2.5" NPS and greater
Positions	All
Vertical Progression	Uphill

3.9 Restrictions

(A) Piping, Pipelines, Pressure Vessels, Tanks and Structures

The root pass of double sided welds welded in the vertical position can be welded using the downhill or uphill progression (with E6010 or E7018 electrodes) provided the backside of the root is back gouged or ground to sound metal prior to welding the second side.

(B) Small Bore Piping

This certification does not qualify a welder to weld small bore carbon steel piping with the SMAW welding process. To weld small bore carbon steel piping (less than 2.5" NPS) entirely with the SMAW welding process a welder must be qualified in accordance with [SAEP-](#)

[1112](#), Test Supplement 12. Refer to Section 3.9 of that Supplement for mandatory application restrictions.

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".



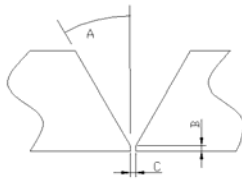
WELDING PROCEDURE SPECIFICATION (WPS)

WPS S01
Rev. 0

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Procedure Qualification Record (PQR): <u>None</u>	Welding Process: <u>SMAW, manual</u>
Scope: <u>For welder qualification only</u>	Prior Qualification Requirement: <u>None</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>8" NPS</u>	Other: _____
Thickness of test coupon: <u>0.812"</u>	
To Material spec. type or grade: <u>Carbon Steel</u>	
Tack Welds: <u>For (4) made by the welder and incorporated into the root pass</u>	
FILLER METALS (QW-404)	GAS (QW-408)
Weld Metal Analysis Number: <u>1</u>	Gas Composite Flow (CFH)
Filler Metal F No.: <u>E6010 - F3 & E7018 - F4</u>	Shielding <u>None</u>
AWS specification: <u>E6010 & E7018 - SFA 5.1</u>	Backing <u>None</u>
AWS Classification: <u>E6010 & E7018</u>	Trailing _____
POSITION (QW-405)	TECHNIQUE
Position of Groove: <u>6G</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>50°C</u>	Single or multiple electrode: <u>Single</u>
Interpass temperature: <u>315°C</u>	Other: _____
Other: _____	



Joint Design: Single Vee

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

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		WELDING PROCEDURE SPECIFICATION (WPS)				WPS S01 Rev. 0 Page 2 of 2	
WELD LAYER	PROCESS	FILLER METAL		CURRENT		VOLTAGE	TRAVEL SPEED (cm/min)
		Class	Dia. (mm)	Polarity	Amps.		
Root	SMAW	E6010	3.2	DCEP	80-140	19-25	3.8-8.9
Hot	SMAW	E7018	2.4	DCEP	70-100	19-25	3.8-10.2
Fill	SMAW	E7018/E8018-C1	3.2	DCEP	90-160	22-28	3.8-14
Cap	SMAW	E7018/E8018-C1	3.2	DCEP	90-160	22-28	5.0-15.2