

Engineering Procedure

SAEP-1102

29 October, 2003

Welding Test Supplement S02 for SMAW,
Carbon and Low Alloy Steel Pipe, Downhill

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 down, for welding carbon and low alloy steel pipe.

2 Applicable Documents

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

2.1 Saudi Aramco Reference(s)

Saudi Aramco Engineering Procedure

[SAEP-321](#)

*Performance Qualification Testing and
Certification of Saudi Aramco Welders*

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	Not applicable
Pipelines	Yes *
Pressure Vessels	Not applicable
Tanks	Yes *
Structural	Yes *
Dissimilar Metals	No

* 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 (see restrictions in 3.9), and fillet welds
Base Material	Carbon steel (P1)
Process	SMAW
Filler Metal:	
Root/Fill/Cap	EXX10/11 (A5.1, A5.5)
Base Metal Thickness	Unlimited
Diameter Range	2.5" NPS and greater
Positions	All
Vertical Progression	Downhill

3.9 Restrictions

(A) Pipelines

Welding is restricted to:

- (1) Circumferential full penetration butt joints, and
- (2) Fillet welds ($\frac{1}{4}$ " max) between nonpressure parts (structural attachments) and pressure parts.

(B) Tanks and Structural

Welding is restricted to:

- (1) Full penetration welds from three-sixteenths inch ($\frac{3}{16}$ ") to three-eighths inch ($\frac{3}{8}$ ") thick welded from both sides (second side arc gouged or ground to sound metal), and

- (2) Fillet welds ($\frac{1}{4}$ " maximum size) between structural members, and nonpressure parts (structural attachments) to pressure parts.

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".



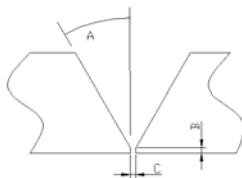
WELDING PROCEDURE SPECIFICATION (WPS)

WPS S02
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) Test coupon type: <u>Pipe</u> Material Spec, type or Grade: <u>Carbon Steel</u> Diameter of test coupon: <u>8" NPS</u> Thickness of test coupon: <u>0.812"</u> To Material spec. type or grade: <u>Carbon Steel</u> Tack Welds: <u>Four (4) made by the welder and incorporated into the root pass</u>	POST WELD HEAT TREATMENT (QW-407) Temperature: <u>None</u> Time: _____ Other: _____																
FILLER METALS (QW-404) Weld Metal Analysis Number: <u>1</u> Filler Metal F No.: <u>E6010 - F3 & E7018 - F4</u> AWS specification: <u>E6010 & E7018 - SFA 5.1</u> AWS Classification: <u>E6010 & E7018</u>	GAS (QW-408) <table border="1"> <thead> <tr> <th></th> <th>Gas</th> <th>Composite</th> <th>Flow (CFH)</th> </tr> </thead> <tbody> <tr> <td>Shielding</td> <td>NONE</td> <td></td> <td></td> </tr> <tr> <td>Backing</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Trailing</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Gas	Composite	Flow (CFH)	Shielding	NONE			Backing				Trailing			
	Gas	Composite	Flow (CFH)														
Shielding	NONE																
Backing																	
Trailing																	
POSITION (QW-405) Position of Groove: <u>6G</u> Weld Progression: <u>Downhill</u>	TECHNIQUE String or weave: <u>Stringer or Weave</u> Oscillation: _____ Multiple or Single pass per side: <u>Multiple</u> Single or multiple electrode: <u>Single</u> Other: _____																
PREHEAT (QW 406) Preheat Temperature: <u>50°C</u> Interpass temperature: <u>315°C</u> Other: _____																	



Joint Design: Single Vee

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

		WELDING PROCEDURE SPECIFICATION (WPS)				WPS S02 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/E7010	3.2/4.0	DCEP	80-140	19-25	3.8-8.9
Hot	SMAW	E6010/E7010	3.2/4.0	DCEP	70-100	19-25	3.8-10.2
Fill	SMAW	E6010/E7010	3.2/4.0	DCEP	90-160	22-28	3.8-14
Cap	SMAW	E6010/E7010	3.2/4.0	DCEP	90-160	22-28	5.0-15.2