



National Aeronautics and
Space Administration

John C. Stennis Space Center
Stennis Space Center, MS
39529-6000

SSTD-8070-0040-WELD
Rev. A
SEPTEMBER 2019

COMPLIANCE IS MANDATORY

John C. Stennis Space Center ASME WELD PROCEDURE FOR CARBON STEEL PIPE (SMAW)

Original signed by:

Approved by:

C. Brennan Sanders
NASA SSC Center Operations
Facilities Engineering
Test Complex Support

9-24-19
Date

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Todd Mannion
NASA SSC Center Operations Directorate
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9-25-19
Date

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NASA SSC Engineering & Test Directorate

9-25-19
Date

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NASA SSC Safety & Mission Assurance

9-24-19
Date

Issued by

ISSUED CEF
Central Engineering Files

9-24-19
Date

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SUBJECT: ASME Weld Procedure for Carbon Steel Pipe (SMAW)		

Document History Log

Change/ Revision	Change Date	Originator/ Phone	Description
Basic	09/29/2014	Doug Dike Ext. 8-2803	Initial release, supersedes SSC STD 34-108-PI. Revised 1.0, adding “and fittings” after “carbon steel pipe”. Revised application defined in 2.0.a.
Basic-1	12/12/2018	Carol Wolfram 8-1620	Administrative change, deleting references to GTAW, as that process is covered in neither the document text nor its attached WPS/PQR forms.
A	9/20/2019	Doug Dike Ext. 8-2803	Five-year review. Updated directorate titles on cover sheet as necessary. Updated references and acronyms. Updated WPS to SSC-937.

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1.0 PURPOSE

This John C. Stennis Space Center (SSC) standard (SSTD) outlines the qualified American Society of Mechanical Engineers (ASME) welding procedure for joining carbon steel pipe and fittings by Shielded Metal Arc Welding (SMAW) wire at SSC.

2.0 APPLICABILITY

- a. This SSTD applies to all contractor and subcontractor personnel involved with the welding of carbon steel, listed as a P-No. 1, Group 1 or 2 material under ASME Boiler and Pressure Vessel Code, Section IX, using SMAW weld wire.
- b. This SSTD is for use in conjunction with ASME stamp work only.

3.0 REFERENCES

All references are assumed to be the latest version unless otherwise indicated.

ASME Boiler and Pressure Vessel Code, Section II, *Materials*

ASME Boiler and Pressure Vessel Code, Section IX, *Welding, Brazing and Fusing Qualifications*

SPR 1440.1, *SSC Records Management Program Requirements*

SSTD-8070-0005-CONFIG, *SSC Preparation, Review, Approval, and Release of SSC Standards*

SSTD-8070-0013-WELD, *Classes of Welding Inspection*

SSTD-8070-0014-WELD, *Qualifying Welders and Welding Procedures*

4.0 RESPONSIBILITIES

- a. Users of this SSTD shall comply with its requirements, ensure use of the correct version of this SSTD and the documents it references, and inform the appropriate organization of needed changes in accordance with SSTD-8070-0005-CONFIG.
- b. Responsibilities for the use and control of this SSTD and for the review and approval of revisions or cancellation of this SSTD shall be as specified in SSTD-8070-0005-CONFIG and the applicable documents referenced therein.

5.0 REQUIREMENTS AND PROCEDURES

- a. Items denoted as essential variables in the attached weld procedure specifications (WPS) shall not be altered when using the WPS. An alternate WPS may be used only if approved prior to use by the NASA SSC Center Operations Directorate Design and Construction Project Management Division (PMD), the NASA SSC Center Operations

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Directorate Operations and Maintenance Division (OMD), the NASA SSC Engineering and Test Directorate (E&TD), the NASA SSC Safety and Mission Assurance (S&MA) Office, and in accordance with ASME Boiler and Pressure Vessel Codes, Section IX, requirements.

- b. The attached Procedure Qualification Record (PQR) is the PQR for the original WPS in this SSTD. When performing new qualifications, a new, approved PQR shall be completed showing all pertinent data and results of the weld procedure qualification.
- c. Welders shall be qualified in accordance with SSTD-8070-0014-WELD.
- d. Inspection methods for welds shall be in accordance with SSTD-8070-0013-WELD.

6.0 RECORDS AND FORMS

- a. Records required by the procedures of this SSTD shall be maintained in accordance with SPR 1440.1 and as specified in this SSTD.
- b. All records and forms are the latest version unless otherwise indicated.
- c. Forms may be obtained from the SSC Electronic Forms repository or from the NASA SSC Forms Management Officer. Quality Records are identified in the SSC Master Records Index.
- d. The original, signed WPS and PQR forms and Certificates of Analysis (copies of which are provided in the Attachments of this SSTD) shall be maintained in Central Engineering Files (CEF).


7.0 ACRONYMS AND ABBREVIATIONS

ASME	American Society of Mechanical Engineers
E&TD	NASA SSC Engineering and Test Directorate
NASA	National Aeronautics and Space Administration
OMD	Operations and Maintenance Directorate
PMD	Project Management Division
PQR	Procedure Qualification Record
S&MA	NASA SSC Safety and Mission Assurance Office
SMAW	Shielded Metal Arc Welding
SSC	John C. Stennis Space Center
SSTD	John C. Stennis Space Center Standard
SPR	Stennis Procedural Requirements
WPQ	Welder Performance Qualification
WPS	Weld Procedure Specification

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8.0 WELDING PROCEDURE SPECIFICATION (WPS)

 National Aeronautics and Space Administration John C. Stennis Space Center Stennis Space Center, MS 39529-6000		ASME - WELDING PROCEDURE SPECIFICATIONS (WPS)																																																																																		
Welding Procedure Specification Record Number WPS 34-108-P1		Date September 29, 2019	Revision Number B																																																																																	
Qualified To ASME Boiler and Pressure Vessel Code		Company Name Syncom Space Services (S3)																																																																																		
Supporting PQR(s) 34-108-P1		Reference Docs. SSTD-8070-0040-WELD																																																																																		
Scope ASME Carbon Steel Pipe Weld Procedure		Joint See Design Sheet Attached Page 3 of 3.																																																																																		
BASE METALS Type Carbon Steel P-no. P-1 Grp-no. 1 - 2 Welded To Carbon Steel P-no. P-1 Grp-no. 1 - 2 Backing No P-no. Grp-no. Retainers Filler Metal / None Notes See Note A.		THICKNESS RANGE QUALIFIED <table border="1"> <thead> <tr> <th></th> <th>Min. As-welded</th> <th>Max.</th> <th>Min. With PWHT</th> <th>Max.</th> </tr> </thead> <tbody> <tr> <td>Complete Pen.</td> <td>.188"</td> <td>1.00"</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>Complete Pen.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Impact Tested</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Impact Tested</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Fillet Welds</td> <td>All</td> <td></td> <td>N/A</td> <td>N/A</td> </tr> </tbody> </table> DIAMETER RANGE QUALIFIED <table border="1"> <thead> <tr> <th></th> <th>Min. As-welded</th> <th>Max.</th> <th>Min. With PWHT</th> <th>Max.</th> </tr> </thead> <tbody> <tr> <td>Nominal Pipe Size</td> <td>All</td> <td></td> <td>N/A</td> <td>N/A</td> </tr> </tbody> </table>			Min. As-welded	Max.	Min. With PWHT	Max.	Complete Pen.	.188"	1.00"	N/A	N/A	Complete Pen.					Impact Tested					Impact Tested					Fillet Welds	All		N/A	N/A		Min. As-welded	Max.	Min. With PWHT	Max.	Nominal Pipe Size	All		N/A	N/A																																									
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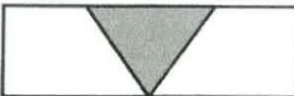


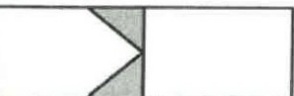



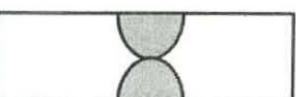
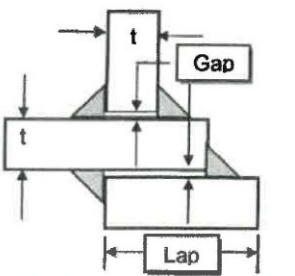
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Welding Procedure Specification Record Number WPS 34-108-P1		Date September 29, 2019	Revision Number B
Qualified To ASME Boiler and Pressure Vessel Code		Company Name Syncom Space Services (S3)	

Weld Joint Designs

Attachment #1

Single-V Groove	Single-Bevel Groove	Double-V Groove
		
Groove Angle: 50 to 75 deg Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.	Groove Angle: 37.5 to 45 deg Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.	Groove Angle: 50 to 75 deg Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.
Double-Bevel Groove	Single-J Groove	Double-J Groove
		
Groove Angle: 37.5 to 45 deg Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.	Groove Angle: 37.5 to 45 deg Groove Radius: 3/8 in. Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.	Groove Angle: 37.5 to 45 deg Groove Radius: 3/8 in. Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.
Single-U Groove	Double-U Groove	Fillet Weld T or Lap
		
Groove Angle: 50 to 75 deg Groove Radius: 3/8 in. Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.	Groove Angle: 50 to 75 deg Groove Radius: 3/8 in. Root Opening: 1/16 to 3/16 in. Root Face: 0 to 1/16 in. Misalignment: 1/16-in. max.	Gap: 1/16-in. max. / Lap: 5 x t or 1 in. min.

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9.0 PROCEDURE QUALIFICATION RECORD (PQR)

QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORD (PQR) (See QW-201.2, Section IX, ASME Boiler and Pressure Vessel Code) Record Actual Conditions Used to Weld Test Coupon.

Company Name <u>Pan Am World Services, Inc.</u>	
Procedure Qualification Record No. <u>34-108-P1 Appendix A, Rev. A</u> Date <u>AUG. 19, 1987</u>	
WPS No. <u>34-108-P1, Rev. A</u>	
Welding Process(es) <u>Shielded Metal ARC (SMAW)</u>	
Types (Manual, Automatic, Semi-Auto.) <u>Manual</u>	

JOINTS (QW-402)

REV. A
DIMENSIONS CORRECTED TO CONFIRM TO ACTUAL TEST COUPON. ERROR MADE IN CALCULATING AREA AND ULTIMATE STRESS FOR SPECIMENT T2.

Groove Design of Test Coupon
(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.)

BASE METALS (QW-403)

Material Spec. A-36 to A-36

Type or Grade Not Applicable

F-No. 1 to P-No. 1

Thickness of Test Coupon 1/2"

Diameter of Test Coupon Not Applicable

Other _____

FILLER METALS (QW-404)

SFA Specification	<u>5.1</u>	<u>5.1</u>
AWS Classification	<u>E6010</u>	<u>E7018</u>
Filler Metal F-No.	<u>3</u>	<u>4</u>
Weld Metal Analysis A-No.	<u>1</u>	<u>1</u>
Size of Filler Metal		
Other	<u>F3 1/8"</u>	
	<u>F4</u>	<u>3/8"</u>
Deposited Weld Metal	<u>SMAW</u>	<u>SMAW</u>

POSTWELD HEAT TREATMENT (QW-407)

Temperature Not Applicable

Time _____

Other _____

POSITION (QW-405)

Position of Groove IG Flat

Weld Progression (Uphill, Downhill) Uphill

Other Downhill Not Allowed

GAS (QW-408) Not Applicable

	Percent Composition		Flow Rate
	Gas(es)	(Mixture)	
Shielding			
Trailing			
Backing			

PREHEAT (QW-406)

Preheat Temp. 85° F

Interpass Temp. _____

Other _____

TECHNIQUE (QW-410)

Travel Speed F3-410M/F4 10-14 IDM

String or Weave Bead F3-STRING/F4 WEAVE 2 & 6: 3-5

Oscillation Not Applicable

Multipass or Single Pass (per side) Single

Single or Multiple Electrodes Single

Other _____

(12/86)

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Stennis Standard	SSTD-8070-0040-WELD A
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SUBJECT: ASME Weld Procedure for Carbon Steel Pipe (SMAW)	

QW-483 (Back)

PQR No. 34-108-P1 App. A
Rev. A

Tensile Test (QW-150)

Specimen No.	Width	Thickness	Area	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
T1	.750"	.500"	.375"	24,100	64,266.6	OUT OF WELD
T2	.750"	.498"	.3735"	26,800	71,753.7	OUT OF WELD

Guided-Bend Tests (QW-160)

Type and Figure No.	Result
SB #1 QW 462.2	SATISFACTORY
SB #2 QW 462.2	SATISFACTORY
SB #3 QW 462.2	SATISFACTORY
SB #4 QW 462.2	SATISFACTORY

Toughness Tests (QW-170)

Specimen No.	Notch Location	Notch Type	Test Temp.	Impact Values	Lateral Exp.		Drop Weight	
					% Shear	Mils	Break	No Break

Fillet-Weld Test (QW-180)

Result — Satisfactory: Yes _____ No _____ Penetration into Parent Metal: Yes _____ No _____

Macro—Results _____

Other Tests

Type of Test _____

Deposit Analysis _____

Other _____

Welder's Name Walter C. King 9/5/87 Stamp No. 19

Tests conducted by: Brian York Laboratory Test No. TWR # 80 & 130

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer PAN AM WORLD SERVICES, INC.

Date 8/19/87 By R. J. Nyberg

(Detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)

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10.0 CERTIFICATE OF ANALYSIS



Sverdrup Technology, Inc.
NSTL Group
NSTL 5700000000000000

501 688-2211

August 21, 1987

TO: Pan Am World Services
Anthony Gelsomino
Building 2205
SSC , MS. 39529

SUBJECT: PQR No. 34-108-P1 App. A

Dear Mr. Gelsomino,

In reference to PQR No. 34-108-P1 App. A, Sverdrup Technology, Inc.'s NDT/E Department contacted Mobile Lab., Inc. concerning the incorrect calculations recorded on Tensile Test Specimen T2.

Mr. Richard Walker, District Manager for Mobile Lab., Inc., will send Sverdrup Technology, Inc. a letter noting the correct calculations for Tensile Test Specimen T2 as noted below.

QW-483 (Back)

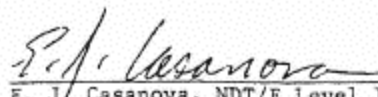
PQR No. 34-108-P1 APP. A

Tensile Test (QW-150)

Specimen No.	Width	Thickness	Area	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
T1	.750	.500	.375	24,100	64,266.6	O.W.
T2	.750	.498	.3735	26,800	71,753.7	O.W.

Sverdrup Technology, Inc.'s NDT/E Department deeply regrets the complications that Pan Am World Services have, as a result of the miscalculations. If the NDT/E Department can be of any further assistance to remedy this unfortunate incident, please feel free to call on us.

Sincerely,


E. J. Casanova, NDT/E Level III
Science Laboratories Section
Sverdrup Technology, Inc.

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