



National Aeronautics and
Space Administration

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

SSTD-8070-0013-WELD Rev. A
SEPTEMBER 2015

COMPLIANCE IS MANDATORY

John C. Stennis Space Center CLASSES OF WELDING INSPECTION

Approved by:

Scott Olive

NASA SSC Center Operations
Design & Construction Project
Management Division

9-21-15
Date

Concurrence by:

M. Killam

NASA SSC Center Operations Directorate
Operations and Maintenance Division

9-21-15
Date

Bartt J. Hebert

NASA SSC Engineering & Test Directorate

9-18-15
Date

Son Le

NASA SSC Safety & Mission Assurance

9-18-15
Date

Issued by

Issued CEF

Central Engineering Files

9-22-15
Date

Stennis Standard	SSTD-8070-0013-WELD	A
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 18, 2015
	Review Date:	September 18, 2020
Page 2 of 25		
Responsible Office: NASA SSC Center Operations Directorate		
SUBJECT: Classes Of Welding Inspection		

Document History Log

Status/ Change/ Revision	Change Date	Originator/ Phone	Description
Basic	09.28.10	Doug Dike/2803	Initial release, supersedes SSC STD 34-004.
A	09.18.15	Doug Dike/2803	Five-year review. Revised cover sheet to require approval from NASA SSC Center Operations Design & Construction Project Management Division, with concurrence from NASA SSC Center Operations Directorate Operations & Maintenance Division, NASA SSC Engineering and Test Directorate, and NASA SSC Safety and Mission Assurance. Updated references and acronyms. Administrative changes throughout. Added General Requirements 5.0-i and 5.0-j. Added SSC NDT Level III inspector approval to that of Authorized Inspector throughout document.

Stennis Standard	SSTD-8070-0013-WELD	A
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 18, 2015
	Review Date:	September 18, 2020
Page 3 of 25		
Responsible Office: NASA SSC Center Operations Directorate		
SUBJECT: Classes Of Welding Inspection		

Table of Contents

1.0	PURPOSE	4
2.0	APPLICABILITY	4
3.0	REFERENCES	4
4.0	RESPONSIBILITIES	4
5.0	GENERAL	5
6.0	CLASS I WELD INSPECTION	6
6.1	Newly Constructed Pressure Vessels	6
6.2	In-Service Code Stamped Pressure Vessels	7
6.3	In-Service Non-Code Stamped Pressure Vessels	8
6.4	Newly Constructed Piping/Pressure Systems	9
6.5	In-Service Piping/Pressure Systems	10
6.6	Repairs	11
7.0	CLASS II WELD INSPECTION	11
7.1	Newly Constructed Pressure Vessels	11
7.2	In-Service Code Stamped Pressure Vessels	12
7.3	In-Service Non-Code Stamped Pressure Vessels	13
7.4	Newly Constructed Piping/Pressure Systems	14
7.5	In-Service Piping/Pressure Systems	15
7.6	Repairs	16
8.0	CLASS IIA WELD INSPECTION	17
8.1	Newly Constructed Piping/Pressure Systems	17
8.2	Repairs	18
9.0	CLASS III WELD INSPECTION	18
9.1	Newly Constructed Pressure Vessels	18
9.2	In-Service Code Stamped Pressure Vessels	19
9.3	In-Service Non-Code Stamped Pressure Vessels	20
9.4	Newly Constructed Piping/Pressure Systems	21
9.5	In-Service Piping/Pressure Systems	22
9.6	Repairs	22
10.0	CLASS IV WELD INSPECTION	23
11.0	CLASS V WELD INSPECTION	24
12.0	GENERAL INSPECTION	24
13.0	ATTACHMENT WELDS	25
14.0	REPAIR OF WELD DEFECTS	25
15.0	RECORDS AND FORMS	25
16.0	ACRONYMS AND ABBREVIATIONS	25

Stennis Standard	SSTD-8070-0013-WELD	A
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 18, 2015
	Review Date:	September 18, 2020
Page 4 of 25		
Responsible Office: NASA SSC Center Operations Directorate		
SUBJECT: Classes Of Welding Inspection		

1.0 PURPOSE

This John C. Stennis Space Center (SSC) standard (SSTD) sets forth the criteria for each class of inspection required for welding at SSC.

2.0 APPLICABILITY

This SSTD applies to contractors and/or subcontractors involved with welding at SSC.

3.0 REFERENCES

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

API-510, Pressure Vessel Inspector Program

API-570, Piping Inspector Program

ANSI/ASNT CP-105, Training Outlines for Qualification of Nondestructive Personnel

ASME B31, Standards of Pressure Piping

ASME Boiler & Pressure Vessel Code, Section V, Nondestructive Examination

ASME Boiler & Pressure Vessel Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, UW-51 and UW-52

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

NAS 410, Certification And Qualification Of Nondestructive Test Personnel

AWS D1.1, Structural Welding Code-Steel

NB-23, National Board of Inspection Code

SPR 1440.1, SSC Records Management Program Requirements

SSTD-8070-0033-WELD, SSC Standard for Certified Welding Electrodes and Rods

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

- b. Order of Precedence

In case of conflict between this SSTD and another applicable technical requirement or document, the most stringent technical requirements shall take precedence.

4.0 RESPONSIBILITIES

- a. Users of this SSTD shall comply with its requirements, ensure use of the correct version of this standard and the documents it references, and inform the appropriate organization of needed changes in accordance with SSTD-8070-0005-CONFIG.

Stennis Standard	SSTD-8070-0013-WELD	A
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 18, 2015
	Review Date:	September 18, 2020
Page 5 of 25		
Responsible Office: NASA SSC Center Operations Directorate		
SUBJECT: Classes Of Welding Inspection		

- b. Responsibilities for the use and control of this SSTD and for the review and approval of revisions or cancellation of this standard shall be as specified in SSTD-8070-0005-CONFIG and the applicable documents referenced therein.

5.0 GENERAL

- a. Only Weld Wire/Rod qualified per SSTD-8070-0033-WELD shall be used. Class of welding inspection is a requirement specified on drawings or other documents.
- b. The class of inspection shall be as delineated by this SSTD. Welding requiring Classes I, II, IIA, III, or IV inspection require certified procedures and certified welders.
- c. The welding setup for qualifying a welding procedure shall be inspected to assure that material, fit-up tolerances, surface preparation and joint tooling comply with the requirements of the written welding standards.
- d. Classes I, II, IIA and III are applicable to pressure retaining welds and welds to pressure retaining boundaries.
- e. Class IIA is applicable to welding, alterations, or repairs of pressure piping.
- f. Classes IV and V are not applicable to pressure retaining welds.
- g. Class V shall be used only when no other class of welding inspection applies.
- h. Throughout this SSTD, the “code of construction” shall be considered the governing standard or specification for the construction, fabrication, manufacture or repair project.
- i. Any acceptance criteria for B31.3 shall be Normal Fluid Service/Category M, unless otherwise specified.
- j. All personnel performing welding for construction and repair projects and other field work at NASA/SSC, including employees of off-site contractors performing work on site at NASA/SSC, shall be qualified for all groove and fillet weld positions in accordance with requirements of ASME Boiler and Pressure Vessel Code, Section IX. For each of these welders, this qualification for all positions applies to all governing WPSs (Weld Procedure Specifications) that cover welds he or she produces on site.

Stennis Standard	SSTD-8070-0013-WELD	A
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 18, 2015
	Review Date:	September 18, 2020
Page 6 of 25		
Responsible Office: NASA SSC Center Operations Directorate		
SUBJECT: Classes Of Welding Inspection		

6.0 CLASS I WELD INSPECTION

6.1 Newly Constructed Pressure Vessels

a. Visual Inspection

1. All welding shall be one hundred (100) percent visually inspected.
2. The acceptance criteria shall be per the edition and addenda of the ASME Boiler and Pressure Vessel Code (BPVC) used in the construction of the pressure vessel.
3. The welds shall be full, smooth and well profiled.
4. The welds shall be free from flux, salt bath residue, weld spatter and other contaminates.
5. Visual examination shall, at a minimum, meet the requirements specified in the code of construction and ASME BPVC Sect. V, article 9.
6. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

b. Radiographic Testing

1. One hundred (100) percent radiographic examination shall be performed on all full penetration welds.
2. The acceptance criteria shall be per the edition and addenda of the ASME BPVC used in the construction of the pressure vessel.
3. Radiography shall at a minimum meet the requirements specified in the code of construction, ASME BPVC Sect. V, article 2, and state and local jurisdictional requirements.
4. Alternative examinations in lieu of radiographic examination shall be performed as specified in the code of construction.
5. Alternative examinations in lieu of radiographic examination shall be approved by the Authorized Inspector and the SSC NDT Level III inspector.
6. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

c. Magnetic Particle or Dye Penetrant Testing

1. Magnetic particle or dye penetrant examination shall be performed on the root and final pass of all welds which cannot be radiographed, such as socket, fillet and partial penetration welds.
2. The acceptance criteria shall be per the edition and addenda of the ASME BPVC used in the construction of the pressure vessel.
3. Magnetic particle examination shall, at a minimum, meet the requirements specified in the code of construction and ASME BPVC Sect. V, article 7.
4. Magnetic particle examination shall be used only on ferro-magnetic materials.

Stennis Standard	SSTD-8070-0013-WELD	A
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 18, 2015
	Review Date:	September 18, 2020
Page 7 of 25		
Responsible Office: NASA SSC Center Operations Directorate		
SUBJECT: Classes Of Welding Inspection		

5. Dye penetrant examination shall, at a minimum, meet the requirements specified in the code of construction and ASME BPVC Sect. V, article 6.
6. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

6.2 In-Service Code Stamped Pressure Vessels

a. Visual Inspection

1. All welding shall be one hundred (100) percent visually inspected.
2. The acceptance criteria shall be per the most recent edition and addenda of the National Board Inspection Code, NB-23.
3. The welds shall be full, smooth and well profiled.
4. The welds shall be free from flux, salt bath residue, weld spatter and other contaminates.
5. Visual examination shall, at a minimum, meet the requirements specified in the inspection code and ASME BPVC Sect. V, article 9.
6. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

b. Radiographic Testing

1. One hundred (100) percent radiographic examination shall be performed on all full penetration welds.
2. The acceptance criteria shall be per the most recent edition and addenda of the National Board Inspection Code, NB-23.
3. Radiography shall at a minimum meet the requirements specified in the inspection code, ASME BPVC Sect. V, article 2 and state and local jurisdictional requirements.
4. Alternative examinations in lieu of radiographic examination shall be approved by the Authorized Inspector and the SSC NDT Level III inspector.
5. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

c. Magnetic Particle or Dye Penetrant Testing

1. Magnetic particle or dye penetrant examination shall be performed on the root and final pass of all welds which cannot be radiographed, such as socket, fillet and partial penetration welds.
2. The acceptance criteria shall be per the most recent edition and addenda of the National Board Inspection Code, NB-23.
3. Magnetic particle examination shall, at a minimum, meet the requirements specified in the inspection code and ASME BPVC Sect. V, article 7.
4. Magnetic particle examination shall be used only on ferro-magnetic materials.

Stennis Standard	SSTD-8070-0013-WELD	A
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 18, 2015
	Review Date:	September 18, 2020
Page 8 of 25		
Responsible Office: NASA SSC Center Operations Directorate		
SUBJECT: Classes Of Welding Inspection		

5. Dye penetrant examination shall, at a minimum, meet the requirements specified in the inspection code and ASME BPVC Sect. V, article 6.
6. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

6.3 In-Service Non-Code Stamped Pressure Vessels

a. Visual Inspection

1. All welding shall be one hundred (100) percent visually inspected.
2. The acceptance criteria shall be per the most recent edition and addenda of the API-510.
3. The welds shall be full, smooth and well profiled.
4. The welds shall be free from flux, salt bath residue, weld spatter and other contaminates.
5. Visual examination shall, at a minimum, meet the requirements specified in the inspection code and ASME BPVC Sect. V, article 9.
6. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

b. Radiographic Testing

1. One hundred (100) percent radiographic examination shall be performed on all full penetration welds.
2. The acceptance criteria shall be per the most recent edition and addenda of API-510.
3. Radiography shall, at a minimum, meet the requirements specified in the inspection code, ASME BPVC Sect. V, article 2 and state and local jurisdictional requirements.
4. Alternative examinations in lieu of radiographic examination shall be approved by the Authorized Inspector and the SSC NDT Level III inspector.
5. Incomplete fusion, incomplete penetration or surface cracks shall be cause for rejection.

c. Magnetic Particle or Dye Penetrant Testing

1. Magnetic particle or dye penetrant examination shall be performed on the root and final pass of all welds which cannot be radiographed, such as socket, fillet and partial penetration welds.
2. The acceptance criteria shall be per the most recent edition and addenda of API-510.
3. Magnetic particle examination shall, at a minimum, meet the requirements specified in the inspection code and ASME BPVC Sect. V, article 7.
4. Magnetic particle examination shall be used only on ferro-magnetic materials.