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John C. Stennis Space Center
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SSTD-8070-0044-PIPE Rev. A
October 2012

Compliance Is Mandatory

John C. Stennis Space Center STANDARD FOR CARBON STEEL PIPING SYSTEMS A, CC, D, J, J1, K1, K2, L, M, M1, N, Q, S, SS, V, and W

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Document History Log

Change/ Revision	Change Date	Originator/ Phone	Description
Basic	10.21.11	D. Dike/ ext. 2803	Initial release. Supersedes SSC standards SSC-47-011, 47-013, 47-022, 47-023, 47-026, 47-027, 47-031, 47-036, 47-040, and SSTD-8070-0068-PIPE; and piping systems J1, K1, K2, M1, S and SS from specifications 110GK-GMK2 and 110GT-GM03. SSC CEF Archive Note: This standard also supersedes COE Contracts 1544; 1550 Piping Spec. V; 1573; 1580; 2090 Piping Spec. N, Q and CC; 2488; 2588; 2876 Piping Spec J and D; 2889 Piping Spec. B and C; and 2899 Piping Spec. L, A, B, W, and M.
A	10.05.12	D. Dike/ Ext. 2803	Replaced SSTD-8070-0089-FLUIDS with RPTSTD-8070-0001 and cite cleanliness levels of the latter standard. In Section 5.2, added referencing to applicable parts of Section 7.0 for Piping Systems CC, J1, L, Q, N, and M to cover allowances and requirements for NPT threaded pipe and fittings. Correct typ-O in piping material entry for Piping System W, was "ASTM A1067 Gr. B." Deleted reference to Piping System L in Section 7.0a. Added Section 7.0e: For Piping System L, NPT threaded end connections may be used for ½" through 1½" Sch. 40 pipe. For air and nitrogen service, NPT threaded end connections may be used for ½" through 3" Sch. 40 pipe. Pipe fittings per ASME B16.11 with NPT threaded ends made of ASTM A105 or A181 carbon steel may also be used with threaded pipe. Pipe fittings per ASME B16.3 and made of ASTM A47 or A197 malleable iron may also be used with the threaded pipe. Added new Sections 7.0g and 7.0h to cover requirements for use of PTFE tape with threaded pipe and fittings and field repairs and recoating of galvanized pipe and fittings. Added definition of appurtenances in Section 10.0. Inserted new Section 10.0a, formerly was under Section 10.0b. to have the requirement cover on-site coating application processes for all piping systems under this standard. Inserted new Section 10.0c.3. to cover painting of threaded surfaces.

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1.0 PURPOSE

This John C. Stennis Space Center (SSC) standard (SSTD) specifies materials and procedures for the fabrication, assembly, erection, maintenance, repair, cleaning and testing of carbon steel pipe systems at SSC, except as noted in 2.0b.

2.0 APPLICABILITY

- a. This SSTD shall be used for specifying pipe and pipe fitting materials to be incorporated into carbon steel piping systems at SSC.
- b. This SSTD does not apply to Piping System AG, High Pressure Industrial Water Piping; see SSTD-8070-0067-PIPE
- c. Authority for modifications to existing piping systems, solely for the purpose of meeting criteria in this standard, is not implied.
- d. Piping system drawings are drawn in schematic form and are identified by system and class. Pipe spool/section marking and labeling, on drawings and spool/sections, shall be in accordance with SSTD-8070-0112-IDCODES.

3.0 REFERENCES

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

ANSI/API Spec 5L, *Specification for Line Pipe*
ASME B16.3, *Malleable Iron Threaded Fittings*
ASME B16.5, *Pipe Flanges and Flanged Fittings*
ASME B16.9, *Factory-Made Wrought Steel Butt welding Fittings*
ASME B16.11, *Forged Steel Fittings, Socket-Welding and Threaded*
ASME B16.20, *Metallic Gaskets for Pipe Flanges-Ring-Joint, Spiral-Would, and Jacketed*
ASME B16.21, *Nonmetallic Flat Gaskets for Pipe Flanges*
ASME B16.25, *Butt welding Ends*
ASME B16.28, *Wrought Steel Butt welding Short Radius Elbows and Returns*
ASME B16.37, *Hydrostatic Testing Of Control Valves*
ASME B16.39, *Malleable Iron Threaded Pipe Unions*
ASME B16.47, *Large Diameter Steel Flanges*
ASME B18.2.1, *Square, Hex, Heavy Hex, And Askew Head Bolts And Hex, Heavy Hex, Hex Flange, Lobed Head, And Lag Screws (Inch Series)*
ASME B18.2.2, *Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, And Coupling Nuts (Inch Series)*

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ASME B31.1, *Power Piping*
 ASME B31.3, *Process Piping*
 ASME Boiler and Pressure Code (B&PV), *Sections VIII and IX*
 ASME PCC-1, *Guidelines For Pressure Boundary Bolted Flange Joint Assembly*
 ASTM A47, *Standard Specification for Ferritic Malleable Iron Castings*
 ASTM A53, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*
 ASTM A105, *Standard Specification for Carbon Steel Forgings for Piping Applications*
 ASTM A106, *Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service*
 ASTM A123, *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*
 ASTM A181, *Standard Specification for Carbon Steel Forgings For General-Purpose Piping*
 ASTM A193, *Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications*
 ASTM A194, *Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both*
 ASTM A197, *Standard Specification for Cupola Malleable Iron*
 ASTM A234, *Standard Specification for Piping Fitting of Wrought Carbon Steel and Alloy Steel for Moderate to High Temperature Service*
 ASTM A266, *Standard Specification for Carbon Steel Forgings for Pressure Vessel Components*
 ASTM A290, *Standard Specification for Carbon and Alloy Steel Forgings for Rings for Reduction Gears*
 ASTM A307, *Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength*
 ASTM A320, *Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service*
 ASTM A333, *Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service*
 ASTM A350, *Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components*
 ASTM A385, *Standard Practice For Providing High-Quality Zinc Coatings (Hot-Dip)*
 ASTM A420, *Standard Specification for Piping Fitting of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service*
 ASTM A487, *Standard Specification for Steel Castings Suitable for Pressure Service*
 ASTM A780, *Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings*
 ASTM B766, *Standard Specification for Electrodeposited Coatings Of Cadmium*
 ASTM F104, *Standard Classification System for Nonmetallic Gasket Materials*
 AWWA C651, *Disinfecting Water Mains*
 AWWA M28, *Rehabilitation of Water Mains*

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MSS SP-6-2007, *Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings*
NACE MR0175/ISO 15156, *Petroleum and natural gas industries Materials for use in H₂S-containing environments in oil and gas production*
NFPA 54, *National Fuel Gas Code*
RPTSTD-8070-0001, *Surface Cleanliness Standard of Fluid Systems for Rocket Engine Test Facilities of the NASA Rocket Propulsion Test Program*
SAE-AS28775, (R) *Packing, Preformed – MS28775 O-Ring*
SAE-AS5202, *Port or Fitting End, Internal Straight Thread*
SPR 1440.1, *SSC Records Management Program Requirements*
SPR 1740.1, *SSC Pressure Vessel and Pressurized System Procedural Requirements*
SPR 8715.1, *SSC Safety and Health Program Requirements*
SSC-34-008, *SSC Weld Procedure for Carbon Steel Pipe*
SSC 45-001, *SSC Pressurization Standard in Support of the Recertification of Pressure Vessels and Pressure Systems*
SSC DWG 54000-GM00, *Specification for Procurement of Glass Filled Teflon Gasket Material*
SSTD-8070-0005-CONFIG, *SSC Preparation, Review, Approval, and Release of SSC Standards*
SSTD-8070-0013-WELD, *Classes of Welding Inspection*
SSTD-8070-0112-IDCODES, *SSC Line Designator Numbers*
SSTD-8070-0126, *Tubing Systems for Facility Systems, Special Test Equipment, and Aerospace Hardware*

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

5.1 General

- a. Existing piping systems designed and constructed prior to the issue date of this standard do not need to be modified solely to be brought into compliance with this standard. Existing piping systems, piping system sections, and pipe spools that are modified or repaired after the issue date of this standard shall conform to this standard at the specific locations where the modifications and repairs are made

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and where new pipe and pipe fittings are installed into or joined to lines and components of existing systems.

- b. Piping System J shall not be used for new construction. For Piping System J requirements of this standard govern repairs to or replacements of existing systems, system sections, and pipe spools.
- c. Welding shall be per SSC-34-008. Consumable inserts and/or backing rings are not permitted.
- d. Assembly of flanged joints shall conform to recommended practices of ASME PCC-1.
- e. For each piping system, the designated system pressure shall be less than or equal to the maximum design pressure stated in Section 5.2.
- f. Unless indicated otherwise in Section 5.2, all piping systems or sections and spools thereof shall be hydrostatically tested in accordance with ASME B31.1 or ASME B31.3, as appropriate. Pneumatic tests may be used instead of hydrostatic test with permission of the project designer and NASA representative.
- g. A system leak test to assure leaktightness of all mechanical joints and other areas susceptible to leakage (which may include welded joints) shall be performed for each and every piping system or section thereof after assembly. The test pressure shall be no less than the designated system pressure and no more than 105% of this pressure unless stated otherwise in Section 5.2. The test pressure shall be held for no less than 10 minutes or until all mechanically sealed joints and other areas of interest are inspected, whichever is the longer amount of time. The test media shall be gaseous air or nitrogen unless indicated otherwise in Section 5.2.
- h. When the designated system pressure is less than the maximum design pressure, each pipe system section, pipe spool, or fitting shall be permanently and conspicuously marked with the designated system pressure, the hydrostatic or pneumatic test pressure, and the date of the pressure test.
- i. When the designated system pressure is less than the maximum design pressure, pipe system drawing(s) shall indicate the designated system pressure of these pipe system sections, pipe spools, pipes or fittings.
- j. For all pressure and leak tests, no permanent deformation of the tested piping system, system section(s), or spool(s) is allowed except as permitted by ASME B31.1 or B31.3, whichever applies.

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- k. For all pressure and leak tests performed with liquid test media, no visible leakage is permitted.
- l. For all pressure and leak tests performed with gaseous test media, Leak-Tek ® or an equal soap solution shall be applied to all mechanically sealed and welded joints, unless stated otherwise in Section 5.2, and no visible leakage is permitted. Visible leakage is indicated by blowing, frothing, bubble formation at locations where the soap solution is applied.
- m. For all pressure and leak tests where permanent deformation (not permitted by ASME B31.1 or ASME B31.3, whichever applies) or leakage occurs as stated in i., j., k. and l. above, the piping system, system section, or spool(s) shall be depressurized to zero (0) psig and then repaired as needed to correct the observed deformations, prevent further deformations, and stop the observed leaks. The pressure and leakage tests shall be repeated for the repaired piping system, system section, or spool(s).
- n. Unless stated or noted otherwise by RPTSTD-8070-0001 cleanliness level or cleanliness level breaks on drawings, cleaning requirements for all service media wetted surfaces and internal volumes are as indicated in Section 5.2. The applicable cleanliness or RPTSTD-8070-0001 cleanliness level shall be acquired and maintained prior to and when piping system is activated for operational service.
- o. Code compliance shall be per ASME B31.1 or ASME B31.3, as appropriate.
- p. Galvanized iron and steel piping and pipe fittings shall not be painted. Pipe and pipe fittings not made of iron or carbon steel shall not be painted unless stated otherwise in Section 10.0.

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5.2 Requirements by Piping System

Low Pressure Service			
Piping System	CC	M1	J1
Service	Vacuum		Natural Gas (NG)
Max. Design Pressure (psig)	20		150
Temperature Range (°F)	-20 to 150		
Piping Material	ASTM A106 Gr. B		ASTM A53 Gr. A or B, Type S or E
Piping Schedules	½" thru 12": Sch. 40 (See Section 7.0 f.)	1-1/4" thru 3": Sch. 40	1" thru 3": Sch. 40, threaded ends
End Fitting Material	1/8" thru 1-1/2": ASTM A105; 2" thru 12": ASTM A181	ASTM A181	ASTM A197, Galvanized Malleable Iron
End Fitting Details	1/8" thru 1-1/2": Unions per ASME B16.11 w/ Socket-Weld ends and fully confined PTFE seal rings (See Section 7.0 f.); 2" thru 12": ASME B16.5 WNRF 150# Class Flange w/90° V-Groove Serrations in Face, WN FF Flanges with 16 RMS finish on face may be used to match commercial components or existing equipment, bore to match pipe I.D. (See Section 7.0 f.)	ASME B16.5 WN FF 150# Class Flange, bore to match pipe I.D.	1" thru 3": ASME B16.39 Class 150 (See Section 7.0 c.)
Fitting Material	1/8" thru 1-1/2": ASTM A105 or A181; 2" thru 12": ASTM A105 or A234 Gr. WPB (See Section 7.0 f.)	ASTM A234 Gr. WPB	ASTM A197, Galvanized Malleable Iron
Fitting Details	1/8" thru 1-1/2": ASME B16.11 w/ Socket-Weld ends (See Section 7.0 f.); 2" thru 12": ASME B16.9 Sch. 40, butt weld ends (See Section 7.0 f.)	1-1/4" thru 3": ASME B16.9 Sch. 40, butt weld ends	1" thru 3": ASME B16.3 & B16.39 Class 150 (See Section 7.0 c.)
Bolting	Studs: ASTM A193 Gr. B7, full thread; Nuts: ASTM A194 Gr. 2H Hex	Studs/Bolts: ASME B18.2.1, Hex, full thread studs, ASTM A193 Gr. B7; Nuts: ASME B18.2.2 Hex, ASTM A194 Gr. 2H Hex; Waterproof lubrication on all connections	N/A
Gaskets	High Vacuum Gaskets with Buna-N Seals, Vacuum Research Co. Series G-1 or Equal	ASME B16.21, Buna-N	See Section 7.0
Weld Inspection	SSTD-8070-0013-WELD Class III	SSTD-8070-0013-WELD Class IIA	N/A
Special Pressure & Leak Testing Requirements		See Section 9.0	Leak test with GN at 188 psig test pressure IAW NFPA 54 Part 4
Cleaning	Commercial Clean (See Section 5.1.n)		