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Compliance Is Mandatory

John C. Stennis Space Center

STANDARD FOR STAINLESS STEEL PIPING

SYSTEMS AA, ACK1, ACK4, ACK6, B, BCK1, BCK3, BCK4, BCK6, BCK10, C, EE, G, H, JJ, K3, L1, L2, NCK1, NCK2, NCK3, NCK10, NCK11, P, R, T, and Z

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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 stainless steel (S/S) pipe systems at SSC with the exception of low pressure vacuum jacketed piping covered by SSTD-8070-0069-PIPE. For vacuum jacketed piping not covered by SSTD-8070-0069-PIPE, this standard may be used or referenced for requirements that govern inner piping (pipelines inside the vacuum annulus and outer vacuum piping).

2.0 APPLICABILITY

- This SSTD shall be used for specifying pipe and pipe fitting materials to be incorporated into S/S piping systems at SSC.
- Authority for modifications to existing piping systems, solely for the purpose of meeting criteria in this standard, is not implied.
- Piping system drawings are drawn in schematic form and are identified by system and class. Pipe spool/section marking and labeling, on drawings and spools/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.

29 CFR 1915.1001, *Occupational Safety and Health Standards for Shipyard Employment, Toxic and Hazardous Substances, Asbestos*

29 CFR 1926.1101, *Safety and Health Regulations for Construction, Toxic and Hazardous Substances, Asbestos*

ANSI/API Spec 5L, *Specification for Line Pipe*

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*

ASME B16.20, *Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral-Wound, and Jacketed*

ASME B16.21, *Nonmetallic Flat Gaskets for Pipe Flanges*

ASME B16.25, *Buttwelding Ends*

ASME B16.28, *Wrought Steel Buttwelding Short Radius Elbows and Returns*

ASME B16.3, *Malleable Iron Threaded Fittings*

ASME B16.37, *Hydrostatic Testing Of Control Valves*

ASME B16.39, *Malleable Iron Threaded Pipe Unions*

ASME B16.47, *Large Diameter Steel Flanges*

ASME B16.5, *Pipe Flanges and Flange Fittings*

ASME B16.9, *Factory-Made Wrought Steel Buttwelding Fittings*

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)*

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ASME B18.2.2, *Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, And Coupling Nuts (Inch Series)*

ASME B31.1, *Power Piping*

ASME B31.3, *Process Piping*

ASME B36.10, *Welded and Seamless Wrought Steel Pipe*

ASME B36.19, *Stainless Steel Pipe*

ASME Boiler and Pressure Vessel Code (B&PV), Section II, *Materials*

ASME Boiler and Pressure Vessel Code (B&PV), Section VIII, *Pressure Vessels*

ASME Boiler and Pressure Vessel Code (B&PV), Section IX, *Welding, Brazing, and Fusing Qualifications*

ASME PCC-1, *Guidelines For Pressure Boundary Bolted Flange Joint Assembly*

ASME PCC-2, *Repair of Pressure Equipment and Piping*

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 A123, *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*

ASTM A182, *Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service*

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 A266, *Standard Specification for Carbon Steel Forgings for Pressure Vessel Components*

ASTM A276, *Standard Specification for Stainless Steel Bars and Shapes*

ASTM A290, *Standard Specification for Carbon and Alloy Steel Forgings for Rings for Reduction Gears*

ASTM A312, *Standard Specification for Seamless Welding and Heavily Cold Worked Austenitic Stainless Steel Pipes*

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 and Other Applications with Required Notch Toughness*

ASTM A350, *Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components*

ASTM A351, *Standard Specification for Castings, Austenitic, for Pressure-Containing Parts*

ASTM A358, *Standard Specification for Electric-Fusion-Welded Austenitic Chromium-Nickel Stainless Steel Pipe For High-Temperature Service and General Applications*

ASTM A385, *Standard Practice For Providing High-Quality Zinc Coatings (Hot-Dip)*

ASTM A403, *Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings*

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ASTM A420, *Standard Specification for Piping Fitting of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service*

ASTM A480, *Standard Specification for General Requirements for Flat-Rolled Stainless Steel and Heat-Resisting Steel Plate, Sheet and Strip*

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*

ASTM SB165, *Standard Specification for Nickel-Copper Alloy (UNO NO4400) Seamless Pipe and Tube*

ASTM SB564, *Standard Specification for Nickel Alloy Forgings*

AWWA C651, *Standard for Disinfecting Water Mains*

AWWA M28, *Rehabilitation of Water Mains*

CSINCS, *United States National CAD Standard*

MIL-G-21032, *Spiral Wound Gasket Fasteners*

MSFC-STD-3535, *Standard for Propellant and Pressurants Used for Test and Test Support Activities at SSC and MSFC*

MSS SP-6-2012, *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 (Parts 1 and 2)*

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 DWG 11000-GM14, *Specification for Procurement of Spiral Wound Gaskets*

SSC DWG 54000-GM00, *Specification for Procurement of Glass Filled Teflon Gasket Material*

SSC DWG 54000-GM30, *Specification for Materials LOX/GOX Service*

SSTD-8070-0002-CONFIG, *SSC Facility Drafting Manual*

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

SSTD-8070-0007-CONFIG, *Standard for Variance and Alternate Standard Requests*

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

SSTD-8070-0017-WELD, *Gas Tungsten ARC welding of Austenitic Stainless Steel Pipe/Plate*

SSTD-8070-0037-WELD, *ASME Procedure for Welding Nitronic 40 Stainless Steel Alloy*

SSTD-8070-0038-WELD, *ASME Procedure for Welding Nitronic 40 Stainless Steel Alloy to 300 Series Austenitic Stainless Steel*

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SSTD-8070-0041-WELD, *ASME Weld Procedure for Joining Stainless Steel by Gas Tungsten Arc Welding (GTAW) Wire*

SSTD-8070-0069-PIPE, *Low Pressure Vacuum Jacketed Pipe*

SSTD-8070-0095-PRESSUR, *SSC Pressurization Standard in Support of the Recertification of Pressure Vessels and Pressure Systems*

SSTD-8070-0112-IDCODES, *SSC Line Designator Numbers*

SSTD-8070-0126-PIPE, *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 and where new pipe and pipe fittings are installed into or joined to lines and components of existing systems.
- b. For each piping system designator, welding shall be in accordance with the SSC standard specified for the respective piping system designator in Section 5.2. Consumable inserts and/or backing rings are not permitted. Assembly of flanged joints shall conform to recommended practices of ASME PCC-1.
- c. For each pipe system designator, weld inspections of circumferential weldments shall be performed in accordance with SSTD-8070-0013-WELD inspection class specified for the respective designator in Section 5.2. All longitudinal welds on pipe and fittings shall be inspected in accordance with SSTD-8070-0013-WELD, Class I. All welds not accessible to radiographic inspection shall be 100% dye-

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penetrant inspected at the root and core pass. All weld inspection and acceptance criteria shall be in accordance with “Normal Service Conditions” per ASME B31.3 unless otherwise specified.

- d. For each piping system, the designated system pressure shall be less than or equal to the maximum design pressure stated in Section 5.2.
- e. Unless indicated otherwise in Section 5.2, all piping systems or sections and spools thereof shall be tested in accordance with ASME B31.1 requirements for pressure tests or ASME B31.3 requirements for leak tests, whichever applies. Pneumatic tests may be used instead of hydrostatic test with permission of the project designer and National Aeronautics and Space Administration (NASA) representative. The following requirements apply and shall be satisfied for all pneumatic pressure tests:
 1. All safety precautions stated in ASME PCC-2, Part 5, Section 6.2 have been reviewed with supporting documentation and implemented to the maximum extent practicable and where they do not conflict with allowances and requirements of this standard.
 2. All safety precautions mandated by ASME PCC-2, Part 5, Section 6.2, with the exception of Subsection 6.2 (h), have been implemented and documented, and;
 3. The NASA/SSC Safety organization has approved this type of test.
- f. 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 with a dewpoint of -40°F or lower, unless indicated otherwise in Section 5.2. If the tested pipe system has been precision cleaned in accordance with RPTSTD-8070-0001 prior to leak tests, the test gas purity or the purity of each gas constituent of a test gas mixture (prior to mixing) shall conform to requirements of MSFC-STD-3535.
- g. 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.

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- h. 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.
- i. 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.
- j. For all pressure and leak tests performed with liquid test media, no visible leakage is permitted.
- k. 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, or bubble formation at locations where the soap solution is applied.
- l. 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 h., i, j., and k. above, the piping system, system section(s), or spool(s) shall be depressurized to zero (0) pounds per square inch gage (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(s), or spool(s).
- m. Where RPTSTD-8070-0001 is indicated for “cleaning” in section 5.2, the cleanliness level requirements stated in this standard for specific system types and fluid service media or cleanliness level breaks on drawings specify cleaning and cleanliness level verification requirements for all service media wetted surfaces and internal volumes of piping systems. The applicable cleanliness or RPTSTD-8070-0001 cleanliness level shall be acquired and maintained prior to and during activation and operational service of the piping system and sections or spools thereof.
- n. Code compliance shall be per ASME B31.1 or ASME B31.3, whichever applies. Pipe schedule wall thickness and wall thickness tolerances and the piping outside diameter (OD) and OD tolerance corresponding to nominal pipe sizes in Section 5.2 shall be as stated in ASME B36.10 and ASME B36.19.

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5.2 Requirements by Piping System

Low Pressure Service		
Piping System	Z	NCK3
Service	CA, HA, LO, GO, LN, GN, LH, GH	HE, H202, HA, JP-4, JP-5, JP-7, JP-8, RP-1, Water, IPA, LO, LN, GN, GH, LH, GO
Max. Design Pressure (psig)	LH/GH, LN/GN, LO/GO: 20 CA: 150 HA: 230	150
Temperature Range (°F)	LO/GO, -297°F to 100°F LN/GN, -320°F to 100°F LH/GH, -423°F to 100°F BA/CA/HA, 20°F to 150°F	-423°F to 100°F
Piping Material	1/4" thru 1": See Sections 6.0 and 9.1. 1" thru 12": ASTM A312 TP304L, electric fusion welded or seamless; beveled ends. 14" thru 24" and 30" and 36": ASTM A358 TP 304L Class 5, electric fusion welded, beveled ends. Radiographic inspection for all longitudinal welds shall conform to applicable pipe material specification ASTM A312 RT or ASTM A358 CI 5.	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 12": ASTM A312 TP304L, electric fusion welded or seamless, beveled ends. 14" thru 20" and 24" thru 30": ASTM A358 TP 304L Class 5, electric fusion welded or seamless, corrosion resistant S/S, beveled ends. 32" thru 42": ASTM A358 TP304L Class 5, standard weight (0.375) electric fusion welded, corrosion resistant S/S, beveled ends.
Pipe Sizes and Schedules	1/4" thru 1": See Sections 6.0 and 9.1. 1" thru 12" and 14" thru 24": Sch. 10S. (See Section 9.1.) (Sch. 5S pipe and fittings may be used in lieu of Sch. 10S when deemed acceptable by engineering design. PSK, P&ID, and other piping drawings shall specifically note locations of Sch. 5S pipe, fittings, and spools.) 30" and 36": Standard weight (.375" wall)	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 30": Sch. 5S. 32" thru 42": Standard weight (.375" wall)
Fitting Material	1/4" thru 1": See Section 6.0 and Section 9.1. 1" and larger: ASTM A403 Gr. WP304L or WP316L or ASTM A182 Gr. F304L or F316L	
Fitting Details	1/4" thru 1": See Sections 6.0 and 9.1. 1" thru 12" and 14" thru 24": See Sections 6.0 and 9.1. ASME B16.9, wrought or forged, Sch. 10S butt weld ends. 30" and 36": ASME B16.28, wrought. Match pipe bore and wall thickness at weld ends.	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 42": Wrought corrosion resistant S/S Sch. 5S or 10S, butt weld ends, match pipe wall thickness. ASME B16.9, ASME B16.28. (See Sections 6.0 and 9.1.)
Piping System (Continued)	Z	NCK3

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End Fitting Material	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 12": ASTM A403 Gr. WP304L or ASTM A182 Gr. F304L or F316L.	
End Fitting Details	1/4" thru 1": See Sections 6.0 and 9.1. 1" thru 12" and 14" thru 24": ASME B16.5 150# WNRF flanges serrated finish on face, bore and wall thickness to match pipe. RTJ flanges may be used as needed to connect to existing piping systems. RTJ flanges, when used, shall conform to ASME B16.5, except that 32 RMS finish on flange sealing surfaces and 23° ± 0.2° groove angle is required. Serrations shall be concentric for hydrogen service. (See Section 9.1.) 30" and 36": ASME B16.47 150# WNRF flanges serrated finish on face, bore and wall thickness to match pipe. Serrations shall be concentric for hydrogen service.	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1/2" thru 3": ASME B16.5 300# WNRF flanges. 4" thru 24": ASME B16.5 150# WNRF flanges. 26" thru 42": API 605 WNRF Flanges 150# Class. For all flange sizes, 90° V-Groove Serrations in flange face, all sizes. Serrations shall be concentric for hydrogen service. Bore to match pipe I.D.
Bolting	Studs: Full-thread (strain hardened) ASTM A320 Gr. B8. (See Section 8.0.) Nuts: Heavy Hex ASTM A194 Gr. 8.	Studs: Full-thread (strain hardened) ASTM A320 Gr. B8, corrosion resistant type 304 S/S. (See Section 8.0.) Nuts: Heavy Hex ASTM A194 Gr. 8, corrosion resistant Type 304 S/S.
Gaskets/Seals/Clamps	ASME B16.20 spiral wound Type 304L or 316L S/S. Flexitallic style CGI, Class 150 gaskets with virgin PTF filler per SSC DWG 11000-GM14.(See Section 9.3.)	ASME B16.20 spiral wound 304L or 316L S/S, virgin PTFE filled Flexitallic style CGI gaskets per SSC DWG 1100-GM14 (See Section 9.3); Class 300 for 1" thru 3" size and Class 150 for 4" thru 42" size.
Welding	SSTD-8070-0017-WELD	
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD, Class IIA	
Special Pressure and Leak Testing Requirements	See Section 5.1.	See Section 5.1. Test gas to be nitrogen-helium mixture with 5% minimum helium by mole fraction.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	

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Low Pressure Service		
Piping System	NCK11	ACK6
Service	LO, LN, GN, LH, GO, GH, HE, H2O2, HA, JP-4, JP-5, JP-7, JP-8, RP-1, Water, IPA	GH
Max. Design Pressure (psig)	150	175
Temperature Range (°F)	-423°F to 100°F	-20°F to 1400°F
Piping Material	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 16": ASTM A312 TP304L, electric fusion welded or seamless, corrosion resistant S/S, beveled ends.	1/4" thru 1": See Section 6.0. 12", 16", 24": ASTM A312 Gr. 316H, electric fusion welded, corrosion resistant S/S, beveled ends.
Pipe Sizes and Schedules	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 16": Sch. 10S (See Section 9.1.)	1/4" thru 1": See Section 6.0. 12" and 16": Sch. 80. 24": Sch. 100.
Fitting Material	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 16": ASTM A403 Gr. WP304L or ASTM A182 Gr. F304L	1/4" thru 1": See Section 6.0. 12", 16", 24": ASTM A403 WP316H or ASTM A182 Gr. F316H
Fitting Details	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 16": Wrought corrosion resistant S/S Sch. 10S, match pipe bore and wall thickness at weld ends, butt weld ends. ASME B16.9, ASME B16.28. (See Sections 6.0 and 9.1.)	1/4" thru 1": See Section 6.0. 12" and 16": Sch. 80, ASME B16.9 or B16.28 24": Sch. 100, ASME B16.9 or B16.28
End Fitting Material	1/4" thru 1 1/2": See Sections 6.0 and 9.1. ASTM A182 Gr. F304L or F316L	1/4" thru 1": See Section 6.0. 12", 16", 24": ASTM A182 F316H
End Fitting Details	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 16": ASME B16.5 150# Class WNRF flanges, forged corrosion resistant S/S, butt weld ends, 125-250 AARH or RMS face finish, bore to match pipe schedule, with 90° "V" groove ring serrations in flange face. Serrations shall be concentric for hydrogen service. (See Sections 6.0 and 9.1.)	See Appendix A and Section 6.0.
Bolting	Studs: Full-thread (strain hardened) ASTM A320 Gr. B8, Class 2. (See Section 8.0.) Nuts: Heavy Hex ASTM A194 Gr. 8, corrosion resistant type 304 S/S	Studs: Full-thread ASTM A320 Gr. B8M Class 1 ASTM A193 Gr. B8M Class 1, Type 304 S/S. Nuts: Heavy Hex ASTM A194 Gr. 8MA, Type 304 S/S.

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Piping System (Continued)	NCK11	ACK6
Gaskets/Seals/ Clamps	ASME B16.20 spiral wound 304L or 316L S/S virgin PTFE filled Flexitallic style CGI gaskets per SSC DWG 1100-GM14 (See Section 9.3.); Class 150 for all sizes.	Everlube 1120-8® (Molybdenum Disulfide) coated Inconel 625 seal rings. For cleaning and pressure testing, other than leak tests, use PTFE coated 17-4PH S/S seal rings.
Welding	SSTD-8070-0017-WELD	SSTD-8070-0017-WELD or SSTD-8070-0041 WELD
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD, Class IIA	SSTD-8070-0013-WELD, Class I
Special Pressure and Leak Testing Requirements	Section 5.1.	Hydrostatic pressure test at 1,700 psig. Pneumostatic pressure tests are not permitted. Pneumostatic leak test at 1,140 psig only after successful completion of hydrostatic pressure tests. For leak tests, test gas shall be helium or nitrogen-helium mixture with mole fraction of helium $\geq 25\%$.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	

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Medium Pressure Service		
Piping System	NCK1	H
Service	GH, HE, GN, GO, H2O2, HA, JP-4, JP-5, JP-7, JP-8, LH, LN, LO, RP-1, Water, IPA	GN, GO, LN, LO
Max. Design Pressure (psig)	230	275
Temperature Range (°F)	-423°F to 100°F	-320°F to 100°F
Piping Material	1/4" thru 1 1/2": See Sections 6.0 (Tubing and Tube Fittings) and 9.1. 1" thru 12": ASTM A312 TP304L, electric fusion welded or seamless, corrosion resistant S/S, beveled ends. 14" thru 30" and 32" thru 42": ASTM A358 TP304L Class 5, electric fusion welded, corrosion resistant S/S, beveled ends.	ASTM A312 TP304L, electric fusion welded or seamless, corrosion resistant S/S, beveled ends.
Pipe Sizes and Schedules	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 30": Sch. 10S. (See Section 9.1.) 32" thru 42": Standard weight (0.375" wall). See Section 9.1.	1/2" thru 12": Sch. 10S (See Section 6.0)
Fitting Material	1/4" thru 1 1/2": See Sections 6.0 (Tubing and Tube Fittings) and 9.1. ASTM A403 WP304L or WP316L	ASTM A403 WP304L or ASTM A182 Gr.F304L or F316L
Fitting Details	1/4" thru 1 1/2": See Sections 6.0 (Tubing and Tube Fittings) and 9.1. 1" thru 30": Sch. 10S, ASME B16.9 or B16.28. (See Sections 6.0 and 9.1.) 32" thru 42": Standard weight (0.375" wall), ASME B16.9 or B16.28.	ASME B16.9, Sch. 10S
End Fitting Material	1/4" thru 1 1/2": See Sections 6.0 (Tubing and Tube Fittings) and 9.1. ASTM A182 Gr. F304L or F316L	ASTM A182 Gr.F304L or 316L (See Sections 9.2 and 9.8.)
End Fitting Details	1/4" thru 1 1/2": See Sections 6.0 (Tubing and Tube Fittings) and 9.1. 1" thru 3": ASME B16.5 300# (See Sections 6.0 and 9.1.) 4" thru 24": ASME B16.5 150#. 26" thru 42": API 605 150#. For all flange sizes, WNRF flanges, forged corrosion resistant S/S, butt weld ends, bore to match I.D. for pipe schedule, 90° "V" groove ring serrations in flange face. Concentric serrations are required for hydrogen service.	ASME B16.5 Class 150 or 300 WNRF flanges, forged corrosion resistant S/S, butt weld ends, bore for pipe schedule, 90° V-groove ring serrations in flange face.(See Sections 6.0, 7.0 and 9.14)

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Piping System (Continued)	NCK1	H
Bolting	Studs: Full-thread ASTM A320 Gr. B8 (See Section 8.0.) Type 304 S/S. Nuts: Heavy Hex ASTM A194 Gr.8, Type 304 S/S.	Studs: Full-thread ASTM A320 Gr. B8 (See Section 8.0.), corrosion resistant, Type 304 S/S. Nuts: Heavy Hex ASTM A194 Gr. 8, corrosion resistant, Type 304 S/S
Gaskets/Seals/ Clamps	ASME B16.20 304L or 316L, Flexitallic style CGI, spiral wound type 304 or 304L with S/S with pure virgin PTFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge rings. Gaskets to compress to 1/8" thickness. (See Section 9.3.) 1" thru 3": Class 300. 4" thru 42": Class 150.	ASME B16.20 304L or 316L, Class 150 or 300, Flexitallic Style CGI spiral wound S/S with pure virgin PTFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge rings. (Gaskets to compress to 1/8" thickness.) (See Section 9.3.)
Welding	SSTD SSTD-8070-0017-WELD or SSTD-8070-0041 WELD	SSTD-8070-0017-WELD
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD, Class IIA	SSTD-8070-0013-WELD, Class IIA
Special Pressure and Leak Testing Requirements	See Section 5.1.	See Section 5.1. Test gas shall be nitrogen.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	

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Medium Pressure Service		
Piping System	JJ	C
Service	RP-1	GN, GH, GO, LO, LH, LN
Max. Design Pressure (psig)	275	
Temperature Range (°F)	-20°F to 100°F	-423°F to 100°F
Piping Material	ASTM A312 TP304 or ASTM A358 TP304L S/S butt weld	S/S, weld beveled ends or straight cut. 1" thru 12": ASTM A312 TP304L or TP304/304L. 14" thru 20": ASTM A358 TP304L or TP304/304L
Pipe Sizes and Schedules	1/2" thru 20": Sch. 10S (See Section 6.0.)	1 1/4" thru 20": Sch. 10S (See Section 6.0.)
Fitting Material	ASTM A403 WP304	ASTM A480 ASTM A403 Gr.WP304L or WP304/304L
Fitting Details	1/2" thru 20": ASME B16.9 (butt weld ends), Sch. 10S (See Section 6.0.)	1/2" thru 20": ASME B16.9 (butt weld ends), Sch. 10S (See Section 6.0.)
End Fitting Material	ASTM A182 Gr.F304L or F316L (See Sections 9.2 and 9.8.)	ASTM A182 Gr.F304 or F316L (See Sections 9.2 and 9.8.)
End Fitting Details	1/2" thru 20": ASME B16.5, 150#, RF, weld neck, bore for Sch. 10S pipe. (See Section 7.0.)	ASME B16.5, 300# WNRF or WNRTJ flanges bore to match Sch. 10S. Bore to match Sch. 20S or 40S with counterbore to match Sch. 10S at butt weld end of flange is permitted; counterbore shall conform to ASME B16.9 requirements (See Section 7.0.) For WNRF flanges, 90° V-Groove serrations in flange face unless drawings state otherwise; for hydrogen service, serrations shall be concentric. For WNRTJ flanges, Ring Joint: Groove dimensions per ASME B16.20 except that 32 RMS or smoother finish is required on sealing surfaces.
Bolting	Studs: ASTM A193 Gr.B8 or ASTM A320 Gr. B8 TP304L S/S Nuts: ASTM A194 Gr.8F TP304 S/S (Gr. 8F TP303S/S permitted for existing lines constructed before issue date of this standard.)	Studs: Full-thread ASTM A320 Gr. B8 (Gr. 8F TP 303S/S permitted for existing lines constructed before issue date of this standard.), TP304 (See Section 8.0) Nuts: Heavy Hex ASTM A194 Gr.8 S/S, TP304

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Piping System (Continued)	JJ	C
Gaskets/Seals/ Clamps	Flexitallic Style CGI Class 150 spiral wound Type 304 or 304L S/S with PTFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge rings. (MIL-G-21032 TP2 150# ring, spiral wound, TP304 S/S with asbestos filler, 0.175" thickness, Flexitallic TP CG or equal in existing systems is permitted provided that gasket removal, handling, inspection, and reinstallation conforms to all applicable 29 CFR 1915.1001 and 1926.1101 requirements.)	For WNRF flanges: SSC DWG 54000-GM00 Class 300, Flexitallic Style CGI spiral wound Type 304 or 304L S/S and pure virgin PTFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge rings. Gaskets to compress to 1/8" thickness. (See Section 9.3.) For WNRTJ flanges: Octagonal ring type 304 S/S gasket per ASME B16.20 except that groove angle shall be 23° ±0.2 and 32° RMS or smoother finish required on sealing surfaces. Max Brinnell Hardness is HB140.
Welding	SSTD-8070-0017-WELD	
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD, Class II	SSTD-8070-0013-WELD, Class I
Special Pressure and Leak Testing Requirements	See Section 5.1.	
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	

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Medium Pressure Service		
Piping System	NCK2	AA
Service	HE, H202, HA, JP-4, JP-5, JP-7, JP-8, RP-1, Water, IPA, LO, GO, LN, GN, LH, GH	LO, LN
Max. Design Pressure (psig)	350	400
Temperature Range (°F)	-423°F to 100°F	LO, -297°F to 100°F LN, -320°F to 100°F
Piping Material	1" thru 16": ASTM A312 TP304L, electric fusion welded or seamless, corrosion resistant S/S, beveled ends.	½" thru 12": ASTM A312 Gr. TP304L S/S 14": ASTM A358 Gr. TP 304L S/S
Pipe Sizes and Schedules	1/4" thru 1 1/2": (See Sections 6.0 and 9.1.) 1" thru 8": Sch. 10S. 10" thru 16": Sch. 40S.	1/2" thru 12": Sch. 10S. 14": 0.250" minimum wall.
Fitting Material	ASTM A403 WP304L or WP316L Wrought, corrosion resistant S/S	
Fitting Details	1/4" thru 1 1/2": (See Sections 6.0 and 9.1.) 1½" thru 8": Sch. 10S, ASME B16.9 (butt weld ends) 10" thru 16": Sch. 40S, ASME B16.9 (butt weld ends)	ASME B16.9 (butt weld ends) 1/2" thru 12": Sch. 10S. 14": 0.250 minimum wall.
End Fitting Material	ASTM A182 Gr. F304L or F316L	ASTM A182 Gr. F304L or F316L
End Fitting Details	1/4" thru 1 1/2": See Sections 6.0 and 9.1. 1" thru 16": ASME B16.5, WNRF flanges 300# with bore to match pipe ID, 90° V-Groove serrations in flange face; if hydrogen service, serrations shall be concentric.	1/2" thru 12": ASME B16.5 300# WNRF flanges, 90° V-Groove serrations on face, bore to match ID of connected pipe or fitting. (See Sections 6.0 and 7.0.)
Bolting	Studs: Full-thread ASTM A320, Gr. B8 (See Section 8.0.), type 304. Nuts: Heavy Hex ASTM A194 Gr.8, type 304.	Studs: Full-thread (strain hardened) ASTM A320 Gr. B8 (See Section 8.0.) Nuts: Heavy Hex ASTM A194 Gr. 8
Gaskets/Seals/Clamps	ASME B16.21 304L/316L Flexitallic Style CGI Class 300 spiral wound with S/S and virgin TFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge ring. (Gasket compresses to 1/8" thickness.) (See Section 9.3.)	304L or 316L S/S, Class 300 to match flanges, Flexitallic style CGI spiral wound Type 304 or 304L S/S with pure virgin PTFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge rings. (Gaskets shall compress to 1/8" thickness). (See Section 9.3.)

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Piping System (Continued)	NCK2	AA
Welding	SSTD-8070-0017-WELD	
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD, Class IIA	SSTD-8070-0013-WELD, Class I
Special Pressure and Leak Testing Requirements	See Section 5.1. Test gas shall be nitrogen- helium mixture with helium mole fraction $\geq 5\%$.	See Section 5.1.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	RPTSTD-8070-0001 Cleanliness Level 1000A (formerly Level 1) is the default if clean level is not indicated on drawings.

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Medium Pressure Service		
Piping System	EE	NCK10
Service	RP-1	GH, HE, GN, GO H202, HA, JP-4, JP-5, JP-7, JP-8, LH, LN, LO, RP-1, Water, IPA
Max. Design Pressure (psig)	440	600 (Can uprate to 720 psig per Sections 9.4 and 9.5.)
Temperature Range (°F)	-20°F to 100°F	-423°F to 100°F
Piping Material	ASTM A312 TP304L seamless or welded S/S	ASTM A312 TP304L electric fusion welded or seamless, corrosion resistant S/S, beveled ends. (See Section 9.6.) 14" and smaller nominal sizes: (See Sections 6.0 and 9.6) 16" nominal size: (See Sections 9.5 and 9.6.)
Pipe Sizes and Schedules	1/2" thru 8": Sch. 10S.	1/4" thru 1 1/2": See Sections 6.0, 9.1 and 9.7. 1" thru 6": Sch.10S 8" to 16": Sch. 40S (See Section 9.5.)
Fitting Material	ASTM A403 WP304L or WP316L	1/4" thru 1 1/2": See Sections 6.0 (Tubing and Tube Fittings) and 9.7. 1" thru 16": ASTM A403 WP304L or WP316L or ASTM A182 Gr. F304L or F316L. (See Sections 9.5 and 9.6.)
Fitting Details	1/2" thru 8": ANSI B16.9 (buttweld) Sch. 10S	1/4" thru 1 1/2": Forged S/S 37° flared tube fittings with SAE (AN/MS) straight thread patterned connections. (See Sections 6.0, 9.1, and 9.7.) 1" thru 6": Sch. 10S, wrought or forged corrosion resistant S/S, buttweld ends. (See Sections 6.0 and 9.1.) 8" thru 16": Sch. 40S, wrought or forged corrosion resistant S/S, buttweld ends. (See Section 9.5.)
End Fitting Material	ASTM A182 Gr. F304L or F316L	1/4" thru 1 1/2": See Sections 6.0 (Tubing and Tube Fittings), 9.1, and 9.7. 1" thru 16": ASTM A182 F304L or F316L ASME B16.5 (See Section 9.4)

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Piping System (Continued)	EE	NCK10
End Fitting Details	1/2" thru 8": ASME B16.5, WNRF flanges 300# with bore to match pipe ID, 90° V-Groove serrations in flange face; if hydrogen service, serrations shall be concentric. (See Sections 6.0 and 7.0.)	1/4" thru 1 1/2": (See Sections 6.0, 9.1, and 9.7.) 1" thru 16": ASME B16.5 300# WNRF flanges forged corrosion resistant S/S buttweld ends bore for pipe schedule with 90° V-Groove ring serrations in flange face, bore to match ID of connected pipe or fitting. Serrations in flange face shall be concentric for hydrogen service. (See Sections 6.0, 9.4, and 9.5.)
Bolting	Studs: Full-thread ASTM A320, Gr. B8 (See Section 8.0.), type 304. Nuts: Heavy Hex ASTM A194 Gr.8, type 304.	Studs: Full-thread (strain hardened) ASTM A320 Gr. B8 (See Section 8.0.) Nuts: Heavy Hex ASTM A194 Gr. 8
Gaskets/Seals/ Clamps	ASME B16.21 304L/316L Flexitallic style CG Class 300 spiral wound with S/S and virgin TFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge ring. (Gasket compresses to 1/8" thickness.) (See Section 9.3.)	304L or 316L S/S, Class 300 to match flanges, Flexitallic style CGI spiral wound Type 304 or 304L S/S with pure virgin PTFE filler 0.175" thick with 0.125" thick S/S inner and outer gauge rings. (Gaskets shall compress to 1/8" thickness). (See Section 9.3.)
Welding	SSTD-8070-0017-WELD	
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD, Class IIA	SSTD-8070-0013-WELD, Class I
Special Pressure and Leak Testing Requirements	See Section 5.1.	See Section 5.1. Test gas shall be nitrogen-helium mixture with helium mole fraction $\geq 5\%$.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	

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Medium Pressure Service		
Piping System	P	NCK12
Service	GH, HE, GN	GH, HE, GN, GO, H202, HA, HE, IPA, HE, JP-4, JP-5, JP-7, JP-8, LH, LN, LO, RP-1, Water
Max. Design Pressure (psig)	810	1200
Temperature Range (°F)	-50°F to 150°F	-423°F to 100°F
Piping Material	ASTM A312 Gr. TP304L S/S seamless or welded, beveled ends.	ASTM 312 Gr. TP 304/304L or TP316/316L dual rated (See Sections 9.2, 9.8, and 9.17.)
Pipe Sizes and Schedules	1/2" thru 3": Sch. 10S.	1/4" thru 1 1/2": See Section 6.0, 9.1, and 9.7. 1" thru 2 1/2": Sch. 10S. 3" thru 10", Sch. 40S. 12" thru 14": Sch. 80S.
Fitting Material	ASTM A403 Gr. WP304L	ASTM A182 Gr. F304/304L or F316/F316L dual rated. (See Sections 9.2, 9.8, and 9.17.)
Fitting Details	1/2" thru 3": ASME/ANSI B16.9 (butt weld ends), Sch. 10S.	ASME B16.9 or B16.28 (butt weld ends). 1/4" thru 1 1/2": See Section 6.0, 9.1, and 9.7. 1" thru 2 1/2": Sch. 10S. 3" thru 10", Sch. 40S. 12" thru 14": Sch. 80S.
End Fitting Material	ASTM A182 Gr. F304L or F316L	ASTM A182 Gr. F304L or F316L or ASTM A403 Gr. WP304L or WP316L (See Sections 9.2, 9.7, 9.8, and 9.17.)
End Fitting Details	1/2" thru 3": ASME/ANSI B16.5 600# WNRF flanges, 90° V-Groove serrations on face, bore for Sch. 10S pipe. Serrations shall be concentric for hydrogen service. (See Section 7.0.)	1/4" thru 1 1/2": See Section 6.0, 9.1, and 9.7. 1" thru 14": ASME B16.5 600# WNRF flanges, 90° V-Groove serrations on face, bore to match I.D. of butt welded pipe or fitting; serrations shall be concentric for hydrogen service. (See Sections 6.0, 9.1, and 9.7.)
Bolting	Studs: ASTM A193 Gr.B8 or ASTM A320 Gr.B8 (ASME/ANSI Type 304 S/S) Nuts: ASTM A194 Gr. 8 (ASME/ANSI Type 304 S/S) (ASTM A194 Gr. 8F, Type 303 is permitted before issue of this standard.)	Studs: Full-thread ASTM A320 Gr. B8 Class 2 (See Section 8.0.), Type 304 SS Nuts: Heavy Hex, ASTM A194 Gr. 8 Type 304 S/S
Gaskets/Seals/Clamps	Must meet requirements of SSC Drawing 54000-GM00.	Flexitallic Style CGI Spiral Wound Type 304 or 304L S/S with virgin PTFE filler with inner and outer retention rings; 0.175" thick, compresses to 0.125" thick, conforms to SSC DWG 54000-GM14. (See Section 9.3.)

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Piping System (Continued)	P	NCK12
Welding	SSTD-8070-0017-WELD	
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD 8070-0013-WELD The following weld inspection classes apply: ·GH Lines, MOP $\leq$ 125 psig: Class I for field welds; Class II, but change 25% to 50%, for shop welds. ·GH Lines, MOP $\geq$ 125 psig: Class I ·HE and GN Lines, MOP $\leq$ 125 psig: Class IIA ·HE and GN Lines, 125 psig < MOP $\leq$ 1500 psig: Class II ·HE and GN Lines MOP > 1000 psig: Class I	SSTD-8070-0013-WELD, Class I
Special Pressure and Leak Testing Requirements	See Section 5.1.	See Section 5.1. Test gas shall be nitrogen-helium mixture with helium mole fraction $\geq$ 5%.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001, Level VC (formerly Level 2) for GH Service, unless indicated otherwise on drawings. Level 1000A (formerly Level 1), for GN and HE Service, unless indicated otherwise on drawings.	RPTSTD-8070-0001

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Medium Pressure Service		
Piping System	L1	AN
Service	Air, GH, HE, GN	GN, GO, LN, LO, RP-1, Hydraulic Fluid
Max. Design Pressure (psig)	1500	1800
Temperature Range (°F)	-20°F to 100°F	Nitrogen and Oxygen, -320°F to 100°F; RP-1 and Hydraulic, -20°F to 100°F
Piping Material	1/4" thru 1": See Section 6.0 (Tubing and Tube Fittings). 1" thru 4": ASTM 312 TP304L or TP316L S/S seamless, beveled butt weld ends.	ASTM A312 Gr. TP 304L or TP316L S/S
Pipe Sizes and Schedules	1/4" thru 1": See Section 6.0. 1" thru 4": Sch. 40S.	1" thru 1 1/2": Sch. 10S (See Section 7.0.) 2" thru 4": Sch. 40S
Fitting Material	1/4" thru 1": See Section 6.0 (Tubing and Tube Fittings). 1" thru 4": ASTM A403 Gr. WP304L or WP316L	ASTM A403 Gr. WP304L or WP316L
Fitting Details	1/4" thru 1": See Section 6.0 (Tubing and Tube Fittings). 1" thru 4": Sch. 40S, ASME B16.9 and B16.28 (butt weld ends)	ANSI B16.9 butt weld ends. 1" thru 1 1/2", Sch. 10S. (See Section 7.0.) 2" thru 4": Sch. 40S
End Fitting Material	See Appendix B and Section 6.0.	ASTM A182 Gr. F304L Gr. F304L or F316L
End Fitting Details	1/4" thru 1": See Section 6.0 (Tubing and Tube Fittings). See Appendix B and Section 6.0.	ANSI B16.5 WNRF flanges bore to match I.D. of butt welded pipe or fitting. 900# Class flanges for 1800 psig ≥ MOP > 1200 psig 600# Class flanges for 1200 psig ≥ MOP > 800 psig 400# Class flanges for 800 psig ≥ MOP > 600 psig 300# Class flanges for 600 psig ≥ MOP > 230 psig 150# Class flanges for 230 psig ≥ MOP (See Section 7.0)
Bolting	See Appendix B.	Studs: Full-thread ASTM A320 Gr. B8 Type 304 S/S (See Section 8.0.) Nuts: Hex ASTM A194 Gr. 8 (AISI Type 304 S/S) (ASTM A194 Gr. 8F, Type 303 S/S allowed prior to issue date of this standard.)
Gaskets/Seals/Clamps	See Appendix B.	Must meet requirements of procurement specification 54000-GM00.
Welding	SSTD-8070-0017-WELD	
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD 8070-0013-WELD Class IIA	SSTD 8070-0013-WELD, Class I (for nitrogen and oxygen service, Class II for RP-1 and hydraulic fluid service.)
Special Pressure and Leak Testing Requirements	See Section 5.1. Test gas shall be helium for lines in GH or HE service.	See Section 5.1.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	

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Medium Pressure Service		
Piping System	L2	K3
Service	Air, GH, HE, GN	Hydraulic Fluid
Max. Design Pressure (psig)	2500	3000
Temperature Range (°F)	-20°F to 100°F	-20°F to 200°F
Piping Material	ASTM A312 TP304L or TP316L S/S seamless, beveled butt weld ends.	1/4" thru 1": See Section 6.0. 1" thru 4": ASTM A312 TP304L, S/S seamless, beveled butt weld ends.
Pipe Sizes and Schedules	1/4" thru 1": See Section 6.0 1" thru 1 1/4": Sch. 40S. 1 1/2" thru 3": Sch. 80S. 4": Sch. 120 or 160.	1/4" thru 1": See Section 6.0 1" thru 4": Sch. 160.
Fitting Material	1/4" thru 1": See Section 6.0. 1" thru 4": ASTM A403 Gr. WP304L or WP316L	1/4" thru 1": See Section 6.0. 1" thru 4": ASTM A182, TP304L or TP316L
Fitting Details	1/4" thru 1": See Section 6.0. 1" thru 1 1/4": Sch. 40S, ANSI B16.9 or B16.28, (butt weld ends) 1 1/2" thru 3": Sch. 80S, ANSI B16.9 or B16.28, (butt weld ends) 4": Sch. 120 or 160, ANSI B16.9 or B16.28, (butt weld ends)	1/4" thru 1": See Section 6.0. 1" thru 4": ANSI B16.9 and B16.28. (Butt weld ends); Sch. 160
End Fitting Material	See Appendix C and Section 6.0.	See Appendix D and Section 6.0.
End Fitting Details	See Appendix C and Section 6.0.	See Appendix D and Section 6.0..
Bolting	See Appendix C.	See Appendix D.
Gaskets/Seals/Clamps	See Appendix C.	See Appendix D.
Welding	SSTD-8070-0017-WELD	SSTD-8070-0017-WELD or SSTD-8070-0041-WELD
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD Class IIA	SSTD-8070-0013-WELD, Class IIA for shop welds. Class I for field welds
Special Pressure and Leak Testing Requirements	See Section 5.1. Test gas shall be helium or nitrogen-helium gas mixture with helium mole fraction $\geq 10\%$ for lines in GH and HE service.	See Section 5.1. Pneumostatic and leak tests are not required if hydrostatic pressure tests have been performed.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	RPTSTD-8070-0001 Clean Level 100 (formerly Level 4)

Stennis Standard	SSTD-8070-0047-PIPE	Basic
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Medium Pressure Service		
Piping System	BCK3	B
Service	GH, GN, GO, H2O2, HA, HE, IPA, JP-4, JP-5, JP-7, JP-8, RP-1, Water	GH, HE, GN, HA
Max. Design Pressure (psig)	3300	3700
Temperature Range (°F)	-100°F to 100°F	-320°F to 150°F
Piping Material	¼" thru ¾": See Section 6.0 (Tubing and Tube Fittings). 1" thru 12": ASTM A312, TP304L or TP316L seamless corrosion resistant S/S, beveled ends. (See Section 9.17.)	ASTM A312 TP304L or TP316L S/S seamless, beveled ends (See Sections 9.2 and 9.8.)
Pipe Sizes and Schedules	¼" thru ¾": See Section 6.0 (Tubing and Tube Fittings). 1" thru 12": Sch. 160.	½" and ¾": Sch. 40S (See Section 7.0). 1" and 1½": Sch. 80S (See Section 7.0). 2" thru 6": Sch. 160
Fitting Material	ASTM A403 WP304L or WP316L or ASTM A182 Gr. F304L or F316L (See Section 9.17.)	ASTM A403 WP 304L or WP316 (See Sections 9.2 and 9.8.)
Fitting Details	¼" thru ¾": See Section 6.0 (Tubing and Tube Fittings). 1" thru 12": Sch. 160, ASME B16.9 or B16.28 (butt weld ends)	½" and ¾": Sch. 40S (See Section 7.0). 1" and 1½": Sch. 80S, ASME B16.9 (butt weld ends) (See Section 7.0). 2" thru 6": Sch. 160, ASME B16.9 (butt weld ends)
End Fitting Material	¼" thru ¾": See Section 6.0 (Tubing and Tube Fittings). 1" thru 12": ASTM A182, Gr. F304L or F316L (See Sections 6.0 and 9.17.)	ASTM A182 Gr. F304L or F316L (See Appendix F and Section 7.0.)
End Fitting Details	See Appendix E and Section 6.0.	See Appendix F and Section 7.0.
Bolting	See Appendix E.	See Appendix F.
Gaskets/Seals/Clamps	See Appendix E and Section 9.3.	See Appendix F.
Welding	SSTD-8070-0017-WELD or SSTD-8070-0041-WELD	SSTD-8070-0017-WELD
Weld Inspection (circumferential welds only unless noted otherwise)	SSTD-8070-0013-WELD, Class I	SSTD-8070-0013-WELD, Class I
Special Pressure and Leak Testing Requirements	See Section 5.1. Test gas shall be a nitrogen-helium mixture with helium mole fraction ≥5%	See Section 5.1.
Cleaning (See Section 5.1.m)	RPTSTD-8070-0001	

