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SSTD-8070-0075-PIPE
Rev. B
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COMPLIANCE IS MANDATORY

John C. Stennis Space Center PLUMBING AND ORDINARY SERVICE COPPER TUBING

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Document History Log

Change/ Revision	Change Date	Originator/ Phone	Description
Basic	04.29.10	Doug Dike/ ext. 2803	Initial release, supersedes SSC 47-222. 5.0, change the tube size range for both water and natural gas to 1/8 inch to 4 inches.
Basic-1	09.08.10	K. King/2682	<i>Archive Note: This standard supersedes MTF-STD-PP/AH.</i>
A	04/01/15	Doug Dike / Ext. 2803	Five-year review. Revised cover sheet to reflect approval by CO PMD, and concurrence by OMD, E&TD and SMA. Updated references and acronyms. Revised 6.0 Requirements, Tube Material and Details, to read, "ASTM B88, Type K or L, Drawn; Type L is preferred."
B	06.25.20	Matt Medick / Ext. 3861	Five-year revision. Updated directorate titles on cover sheet as necessary. Updated references and acronyms. Minor administrative changes, including update of acronyms. Section 1.0: Added "or repairs of above-ground systems" after "installation". Section 2.0: Added subsections 2.2 and 2.3. Section 3.0: Updated references, including deletion of FED-SPEC-WW-T-799c, Tube, Copper, Seamless for use with Solder-type or Flared-tube Fittings (Note: This specification was cancelled in 1993, but is included as a reference for existing systems that contain tubing previously fabricated in accordance with this standard. ASTM B88 has been designated as the replacement for this specification.) Section 5.0: "Max Operating Pressure" column head changed to "Design Pressure". Added "Working Pressure" column. Section 6.0: Pressure Test requirements have been revised in their entirety. In Contamination Level, "To be specified by Design Engineering" was replaced by content noted. Code Compliance row added. Section 9.0: Added Definitions.

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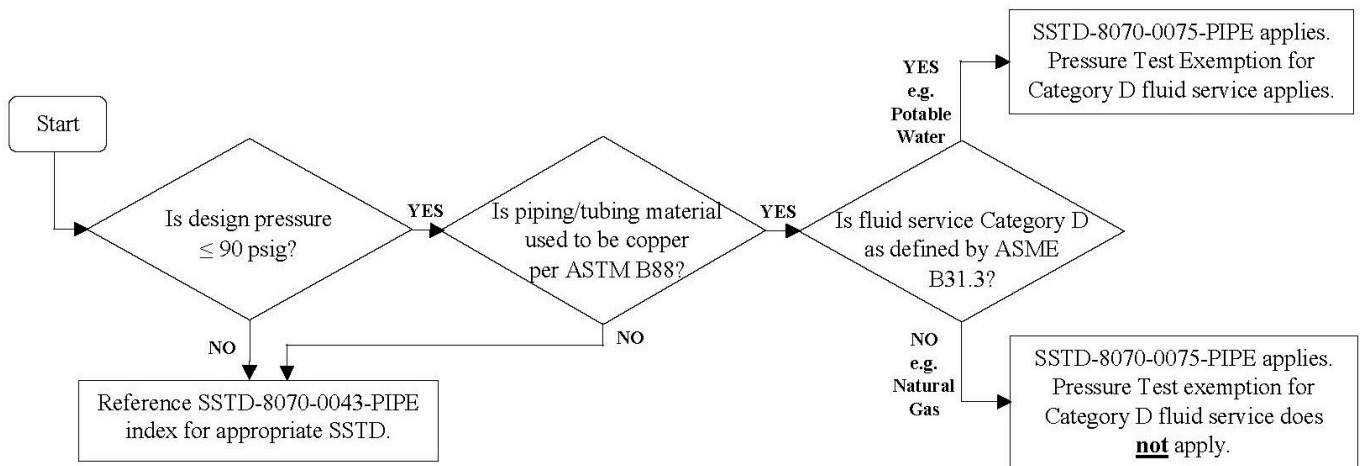
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1.0 PURPOSE

This John C. Stennis Space Center (SSC) standard (SSTD) specifies the materials and procedures of the construction of Facility Tubing Systems as described in this SSTD for installation or repairs of above-ground systems only at SSC.

2.0 APPLICABILITY

- 2.1 This standard shall be used for specifying materials and components to be incorporated into the Facility Tubing Systems as designated on the SSC Site-wide Operational and Repair Documentation (SOR) Drawing System.
- 2.2 Existing systems in operational service prior to the effective date of the current revision are not required to comply with the current revision of this SSTD. Any modifications or changes to existing systems shall meet the minimum requirements of the current revision of this SSTD.
- 2.3 This SSTD shall be used for piping systems which extend from the point of delivery to the appliance connections. Point of delivery shall be the outlet of the service meter assembly or, where no meter is provided, the outlet of the service regulator or service shutoff valve. Natural gas pipeline intended for transportation or distribution to points of delivery shall use SSTD-8070-0092-PIPE. The applicable SSTD to be used for Plumbing and Ordinary Service Tubing will be determined as follows:



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3.0 REFERENCES

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

ANSI/ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250*
ANSI/ASME B16.22, *Wrought Copper and Copper Alloy Solder-Joint Pressure Fitting*
ANSI/ASME B31.3, *Process Piping*
ASME PCC-1, *Guidelines For Pressure Boundary Bolted Flange Joint Assembly*
ASME PCC-2, *Repair of Pressure Equipment and Piping*
ASTM B32, *Standard Specification for Solder Metal*
ASTM B75, *Standard Specification for Seamless Copper Tube*
ASTM B88, *Standard Specification for Seamless Copper Water Tube*
CID A-A-59617, *Unions, Brass or Bronze, Threaded Pipe Connections and Solder Joint Tube Connections*
International Plumbing Code 2018
NFPA 54, *National Fuel Gas Code*
SPR 1440.1, *SSC Records Management Program Requirements*
SPR 8715.1, *SSC Safety and Health Program Requirements*
SSTD-8070-0005-CONFIG, *SSC Preparation, Review, Approval, and Release of SSC Standards*
SSTD-8070-0092-FLUIDS, *Design, Installation and Maintenance of Sitewide Natural Gas Distribution System*

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 OPERATING CONDITIONS

Service	Working Pressure	Design Pressure	Temperature Range
Water	65/78* psig	90 psig	0°F to +200°F, for tubes 1/8 inch to 4 inches
Natural Gas	40 psig	90 psig	0°F to +150°F, for tubes 1/8 inches to 4 inches

*Nominal base-side potable water system supply is maintained at 65 psig. Test complex potable water system supply is maintained at 78 psig.

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6.0 REQUIREMENTS

Size	<p>1/8 inch through 4 inches</p> <ol style="list-style-type: none"> a. Sizes listed on construction drawings or specifications shall be copper water tube as shown in Tube Materials and Details below. b. Copper water tube size is 1/8 inch smaller than the tube's nominal outside diameter.
Tube Material and Details	ASTM B88, Type K or L, Drawn; Type L is preferred.
Fitting Material	ASTM B75, <i>Seamless Copper Tube</i>
Fitting Details	ANSI/ASME B16.22
Unions and Flanges	<p>CID A-A-59617 (unions) for tubes of 1/8 inch to 2 inches, must be used in conjunction with solder joint to American Standard Pipe Thread (NPT) adapters per ANSI B16.22.</p> <p>ANSI/ASME B16.1 (flanges) for tubes 2-1/2 inches to 4 inches, must be used in conjunction with solder joint to American Standard Pipe Thread (NPT) adapters per ANSI B16.22.</p>
Solder	ASTM B32, less than .2 percent lead
Pressure Test <i>(Continued on next page.)</i>	<p><u>For Potable Water service pipe hydrostatic tests:</u></p> <ol style="list-style-type: none"> a. Test in accordance with ASME B31.3, Section 345.4. Hydrostatic pressure test to 1.5 times design pressure. b. At the owner's option, Category D fluid service may be subjected to an Initial Service Leak Test in lieu of a Hydrostatic Test. Test in accordance with ASME B31.3 Section 345.7. Final test pressure shall be the fluid working pressure. c. No external leakage or permanent deformation shall result. <p><i>Continued on next page.</i></p>

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<p>Pressure Test <i>(Continued from previous page)</i></p>	<p><i>Continued from previous page.</i></p> <p><u>For Potable Water service pipe pneumatic tests:</u></p> <ol style="list-style-type: none"> a. Test in accordance with ASME B31.3, Section 345.5. Hydrostatic pressure test to 1.25 times design pressure. b. No external leakage, determined by soap test, or permanent deformation shall result. <p><u>For Natural Gas service pipe pneumatic tests:</u></p> <ol style="list-style-type: none"> a. Conduct pressure test in accordance with NFPA 54, Section 8.1.4, but the test pressure shall be no less than 1.5 times design pressure and not less than 3 psig. Where the test pressure exceeds 125 psig, the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe. b. The test medium shall be air, nitrogen, carbon dioxide, or an inert gas. Oxygen shall not be used as a test medium. c. No external leakage, as determined by soap test, or permanent deformation shall result. <p>The following safety requirements apply and shall be satisfied for all pneumatic pressure tests:</p> <ol style="list-style-type: none"> 1) All safety precautions stated in ASME PCC-2, Part 5, Article 501, Sub-article 501-6.2 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, Article 501, Sub-article 501-6.2, with the exception of Sections <i>(i)</i> and <i>(l)</i> of this sub-article, have been implemented and documented, and; 3) The NASA/SSC Safety organization has approved this type of test.
Contamination Level	Commercially Clean
Code Compliance	ANSI/ASME B31.3 NFPA 54, for Natural Gas only

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7.0 RECORDS AND FORMS

Records and forms required by the procedures of this standard shall be maintained in accordance with SPR 1440.1. All records and forms are assumed to be the latest edition unless otherwise indicated. Forms may be obtained from the SSC Electronic Forms repository or from the National Aeronautics and Space Administration (NASA) SSC Forms Management Officer. Quality Records are identified in the SSC Master Records Index.

8.0 ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
CID	Commercial Item Description
°	Degrees
F	Fahrenheit
FED-SPEC	Federal Specification
GC	Generally Clean
NASA	National Aeronautics and Space Administration
NFPA	National Fire Protection Association
NPT	National Pipe Thread Tapered Thread
PCC	Post Construction Code
psig	Pounds per Square Inch Gage
SORD	Site-wide Operational and Repair Documentation
SPR	Stennis Procedural Requirements
SSC	John C. Stennis Space Center
SSTD	John C. Stennis Space Center Standard

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9.0 DEFINITIONS

Commercially Clean

Freedom from manufacturing residue, dirt, oil, grease, scale, carbon deposits, process debris, or other extraneous contamination. This level can be achieved by washing, brushing, or rinsing. This cleanliness level also is defined as the absence of all particulate and non-particulate matter visible to the normal unaided (except corrected vision) eye. Particulate is identified as matter of size with observable length, width, and/or thickness; nominally 40 microns or larger. Non-particulate matter is a film or residue without definite dimension. Scale-free discoloration due to surface treatments (i.e., passivation, anodizing, etching, etc.) or thermal processes (i.e., welding, heat treatments, etc.) is permitted.

Design Pressure

The maximum allowed internal pressure of a piping system at its most severe in-service operating condition with coincident temperature and external pressure (minimum or maximum), except as provided by exceptions specified in ASME B31.3. If the exceptions allowed under ASME B31.3 are invoked, written approval of the NASA/SSC Office of Safety and Mission Assurance is required before implementation. For the purposes of this standard, the coincident temperature corresponding to the most severe operating condition is the maximum temperature of the fluid contained in the system unless specified otherwise. For purposes of this standard, the coincident external pressure corresponding to the most severe operating condition is 14.7 psia (0.0 psig), unless specified otherwise. [Internal piping system pressures during leak tests per ASME B31.3 or pressure tests per ASME B31.1 will almost always be higher than the design pressure, and this is allowable because the piping system is not in operational service during the time of these tests.]

Working Pressure

The nominal pressure at which the system is operated. System working pressure tolerance is +/- 2 psig.