

**TUBING, STEEL, CORROSION RESISTANT,
TYPES 304 AND 316, SEAMLESS, ANNEALED,
SPECIFICATION FOR**

Export Control Determination

NOT EXPORT CONTROLLED

This document has been reviewed by the KSC Export Control Office and it has been determined that it does not meet the criteria for control under the International Traffic in Arms Regulations (ITAR) or Export Administration Regulations (EAR).

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March 13, 2023

Engineering Directorate

National Aeronautics and
Space Administration
John F. Kennedy Space Center



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**TUBING, STEEL, CORROSION RESISTANT,
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SPECIFICATION FOR**

Approved by:

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March 13, 2023

JOHN F. KENNEDY SPACE CENTER, NASA

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RECORD OF REVISIONS/CHANGES

REV LTR	CHG NO.	DESCRIPTION	DATE
-		Basic issue.	
A			
B			
C			
D			July 1, 1991
E			October 20, 1994
F		Canceled document.	February 15, 2022
G		Reinstated document. Aligned requirements with KSC-DE-512-SM, Rev. M.	March 13, 2023

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1. SCOPE

This specification defines the requirements for pressure tubing suitable for use with standard, 37-degree, flared tube fittings and buttwelding tube fittings in ground support equipment fluid systems at the John F. Kennedy Space Center (KSC), NASA.

These procurement requirements are extracted from KSC-DE-512-SM. Tubing system design and application details for the use of this tubing in Ground Systems shall be in accordance with KSC-DE-512-SM.

2. APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. When this document is used for procurement, including solicitations, or is added to an existing contract, the specific revision levels, amendments, and approval dates of said documents should be specified in an attachment to the solicitation, statement of work, or contract.

The applicable documents are accessible via the NASA Standards and Technical Assistance Resource Tool at <http://standards.nasa.gov> or may be obtained directly from the standards developing organizations or other document distributors.

Citations of applicable documents are hyperlinked to their appearance in 2.1.

2.1 Non-Government Documents

ASTM A213	Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes
ASTM A269	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A967	Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts

2.2 Order of Precedence

This specification does not supersede or waive established Agency requirements found in other documentation. Conflicts between this specification and applicable documents cited herein will be resolved by the responsible Technical Authorities. The following is the order of precedence:

1. Federal, state, and local laws and regulations
2. Agency and Center Directives
3. Agency mandatory standards

3. GENERAL REQUIREMENTS

3.1 Material

- a) Type 304/304L stainless steel tubing shall be seamless, UNS S30400/S30403 dual-certified in accordance with [ASTM A269](#) or [ASTM A213](#).
- b) Type 316/316L stainless steel tubing shall be seamless, UNS S31600/S31603 dual-certified in accordance with [ASTM A269](#) or [ASTM A213](#).

3.2 Wall Thickness

Stainless steel tubing shall have a wall thickness tolerance of $-0/+10\%$.

3.3 Tensile Testing

Stainless steel tubing tensile properties shall be verified in accordance with [ASTM A213](#).

3.4 Passivation Testing

Stainless steel tubing shall be tested in accordance with Practice D in [ASTM A967](#).

3.5 Intergranular Corrosion Testing

Stainless steel tubing shall be tested for intergranular corrosion in accordance with [ASTM A269](#) or [ASTM A213](#), supplementary requirement S4.

3.6 Marking

Stainless steel tubing shall be marked with one of the following:

- a) ASTM standard (A269 or A213), the specific alloy (304/304L or 316/316L), and the required wall thickness tolerance ($-0/+10\%$), or
- b) KSC-SPEC-Z-0007 Rev. G and the specific alloy (304/304L or 316/316L).