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AEROSPACE MATERIAL SPECIFICATION

SAE AMS-WW-T-700/6

Issued JUL 2001

Tube, Aluminum Alloy, Drawn, Seamless, 6061

NOTICE

This document has been taken directly from U.S. Military Specification WW-T-700/6F, Amendment 2, and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace WW-T-700/6F, Amendment 2. Any part numbers established by the original specification remain unchanged.

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The complete requirements for procuring seamless tube drawn from aluminum alloy 6061 described herein shall consist of this document and the latest issue of WW-T-700/GEN (see 2.1).

1. SCOPE AND CLASSIFICATION:

1.1 Scope:

This specification covers the specific requirements for seamless tube drawn from aluminum alloy 6061.

1.2 Classification:

1.2.1 Tempers: The drawn seamless tube shall be of the following tempers: O, T4, T42, T6, T62, or F, as specified (see 6.2 and 6.3). The definition of these tempers shall be as specified in WW-T-700/GEN.

1.2.2 Types: The tube shall be of the following types:

Type		Appearance
I	-	Round
II	-	Rectangular and square
III	-	Streamline
IV	-	Oval
V	-	Odd shapes

2. APPLICABLE DOCUMENTS:

The issues of the following documents, in effect on date of invitation for bids or solicitation for offers, form a part of this specification to the extent specified herein.

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

WW-T-700/GEN Tube, Aluminum and Aluminum Alloy, Drawn, Seamless, General Specification for

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions, as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

2.1 (Continued):

(Single copies of this specification and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from the General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

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3. REQUIREMENTS:

3.1 Chemical composition:

The chemical composition shall conform to the requirements specified in table I.

TABLE I. Chemical composition 1/

Element	Percent	
	Minimum	Maximum
Silicon	0.40	0.8
Iron	-	0.7
Copper	0.15	0.40
Manganese	-	0.15
Magnesium	0.8	1.2
Chromium	0.04	0.35
Zinc	-	0.25
Other elements, each	-	0.05
Other elements, total	-	0.15
Aluminum	Remainder	

1/ Except for "Aluminum" and "Others", analysis normally is made for elements for which specific limits are shown

2/ The sum of those "Others" metallic elements 0.010 percent or more each, expressed to the second decimal before determining the sum

3.2 Mechanical properties:

3.2.1 Tensile strength, yield strength and elongation properties: The tensile strength, yield strength and elongation mechanical properties parallel to the direction of drawing shall conform to the requirements specified in table II.

TABLE II. Tensile strength, yield strength and elongation properties

Temper	Wall thickness, inch	Tensile strength, minimum, ksi	Yield strength		Percent elongation in 2 inches or 4D 1/, minimum, kind of specimen	
			At 0.2 percent, offset, minimum, ksi	At extension under load, inch per inch	Full section	Cut-out
0	0.018 to 0.500, incl	22.0 2/	14.0 2/	0.0024	15	15
T4	0.025 to 0.049, incl.	30.0	16.0	0.0036	16	14
	0.050 to 0.259, incl.	30.0	16.0	0.0036	18	16
	0.260 to 0.500, incl.	30.0	16.0	0.0036	20	18
T42 3/	0.025 to 0.049, incl.	30.0	14.0	0.0024	16	14
	0.050 to 0.259, incl.	30.0	14.0	0.0024	18	16
	0.260 to 0.500, incl.	30.0	14.0	0.0024	20	18
T6 and T62 3/	0.025 to 0.049, incl.	42.0	35.0	0.0055	10	8
	0.050 to 0.259, incl.	42.0	35.0	0.0055	12	10
	0.260 to 0.500, incl.	42.0	35.0	0.0055	14	12
F	All	4/	4/	4/	4/	4/

1/ Round tube 2 inches or less in outside diameter and square tube 1-1/2 inches or less on a side shall be tested in full section unless the limitations of the testing machine preclude the use of such a specimen. For round tube over 2 inches in diameter, for square tube over 1-1/2 inches on a side, for all sizes of tube other than round or square, or in those cases when a full section specimen cannot be used, a cut-out specimen shall be used. D represents diameter of cut-out specimen

2/ Maximum

3/ Material in the T42 or T62 tempers is not available fron the materials producers

4/ No requirements

3.2.2 Flattening: When specified (see 6.2), round tube (type 1) in 0, T4, and T6 tempers shall withstand, without cracking, the flattening test or the alternative bend test specified in WW-T-700/GEN. The values for flattening factor “F” are specified in table III.

TABLE III. Flattening factor

Temper	Wall thickness, inch	F
O	Up through 0.120	3
	0.121 to 0.238, incl.	4
	0.239 to 0.500, incl.	6
T4	0.025 to 0.500, incl.	6
T6	0.025 to 0.500, incl.	8

3.2.2.1 Alternative bending factor “N”: The values for the alternative bending factor “N” are specified in table IV.

TABLE IV. Bending factor

Temper	Wall thickness, inch	N
O	0.120 and less	1
	Over 0.120 to 0.238, incl.	2
	Over 0.238 to 0.500, incl.	4
T4	0.025 to 0.500, incl.	4
T6	0.025 to 0.500, incl.	6

3.2.2 Cleanliness: When specified (see 6.2), the internal surface of the tube shall be examined for cleanliness as specified in WW-T-700/GEN.

3.2.3 Leak test: When specified (see 6.2), round tube (type I) shall withstand either the pressure test or the electromagnetic (eddy current) test specified in WW-T-700/GEN.

3.2.4 Flaring: When specified (see 6.2), round tube (type I) in the 0, T4 and T42 tempers shall be capable of being flared as specified in WW-T-700/GEN.

3.2.5 Mechanical properties after heat treatment: In addition to conforming to the requirements of 3.2.1, material in the tempers identified in the following paragraphs shall, after having been processed to tempers also specified therein, have properties conforming to those specified in Tabe II, as applicable.

3.2.5.1 Material in the 0 and F tempers: Material in the 0 and F tempers, without the subsequent imposition of cold work or forming operations, shall, after proper solution heat treatment and natural aging, develop the properties specified for the T42 temper.

3.2.5.2 Material in the T4 and T6 tempers: Material in the T4 and T6 tempers, without the subsequent imposition of cold work or forming operations, shall be heat treatable to the properties specified for the T42 temper. Tube in the T42 temper shall be precipitation heat treatable to the properties specified for the T62 temper. Such capabilities shall be demonstrated when specified (see 6.2 and 6.3).