

AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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Revised

STEEL TUBING (SEAMLESS FOR MACHINED PARTS)

.55 Ni .50 Cr .25 Mo (.33-.38 C)

Normalized or Heat-Treated (90,000 T.S.)

CANCELLED

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1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. COMPOSITION:

Individual Tube
Check Analysis
Over or Under

Carbon	0.33 - 0.38	0.02
Manganese	0.75 - 1.00	0.04
Phosphorus	0.040 max	0.005
Sulphur	0.040 max	0.005
Silicon	0.20 - 0.35	0.02
Nickel	0.40 - 0.70	0.03
Chromium	0.40 - 0.60	0.03
Molybdenum	0.20 - 0.30	0.03

3. GRAIN SIZE: 5 or finer as determined on the billet, ASTM E19-39T, method a, unless otherwise ordered. A heat of steel predominately five or finer with grains as large as three is permissible.
4. CONDITION: After the last cold draw pass, the tubing shall be normalized, stress relieved, or otherwise heat treated to conform to the following physical properties:

	<u>Wall Thickness, inch</u>	
	<u>Up to</u> <u>0.188 incl.</u>	<u>Over</u> <u>0.188</u>
Tensile Strength, psi	95,000 - 125,000	90,000 - 125,000
Yield Strength (0.2% offset), psi	80,000 min	75,000 min
Equivalent Extension Under Load, inch in 2 in.	0.0093	0.0090
Elongation, % in 2 in. - Full Tube	12 min	15 min
	Strip	7 min
		10 min

5. QUALITY: (a) The tubing shall be uniform in quality and temper and shall not reveal injurious defects during the fabrication of parts. Unless otherwise specified the steel used in the manufacture of this tubing shall be aircraft quality.

(b) The tubing shall have a good workmanlike finish consistent with established commercial practice.

(c) Machined surfaces of finished parts may be subject to magnetic inspection.



Documents

6. **TOLERANCES:** (a) Diameter and Wall Thickness.- The following variations in nominal outside diameter and wall thickness are permissible:

Nominal Outside Diameter Inches	Tolerance, Individual Diameter Measurement (1) Inch	Tolerance Wall Thickness (2) %
Over 0.5 to 1.5, incl.	± 0.005	± 10 (3)
Over 1.5 to 3.5, incl.	± 0.010	± 10
Over 3.5 to 5.5, incl.	± 0.015	± 10
Over 5.5	± 0.030	± 10

Notes: (1) If so specified on the purchase order, the tolerance for outside diameter shall apply to the inside diameter instead, but not to both inside and outside diameter of the same lot of tubing.

(2) For tubes falling under the following conditions the inside diameter may vary over or under by an amount equal to 10% of the wall thickness. The wall thickness may have a variation of $\pm 12 \frac{1}{2}\%$.

- (a) I.D. is less than 50% of O.D.
- (b) Wall thickness is more than 25% of O.D.
- (c) Wall thickness is over $1 \frac{1}{4}$ inches.
- (d) Tube weighs more than 90 lbs per ft.

(3) Tubing with $\frac{1}{2}$ inch or less inside diameter (or less than $\frac{5}{8}$ inch when the wall thickness is more than 20% of the O.D.) may have a wall thickness variation of $\pm 15\%$ and, the inside diameter will be governed by the outside diameter and wall thickness variations.

(b) Length.- When exact lengths are specified, the following variations are permissible:

Length	Tolerance, Inches	
	Plus	Minus
4 ft. and less	$\frac{1}{16}$	0
Over 4 ft. to 10 ft., incl.	$\frac{3}{32}$	0
Over 10 ft.	$\frac{1}{8}$	0

(c) Straightness.- In no part of any tube shall the departure from straightness exceed 1 part in 600 parts of length.

7. **REPORTS:** (a) The material manufacturer shall furnish three copies of a notarized report of the chemical composition, grain size and physical properties of each heat and size in each shipment. This report shall include the purchase order number, material specification number, heat number, size, and quantity.