

AERONAUTICAL MATERIAL SPECIFICATION

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Revised

STEEL TUBING (SEAMLESS FOR MACHINED PARTS TO BE HEAT-TREATED)

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

Cold Finished or Hot Finished

Page 1 of 3 pages

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

2. USE: Intended for use in machined parts to be heat-treated.

3. 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 |

4. GRAIN SIZE: 5 or finer as determined on the billet, ASTM E19-39T, method a unless otherwise ordered. A heat of steel predominately 5 or finer with grain as large as 3 is permissible.

5. CONDITION: (a) Unless otherwise ordered, the tubing shall be supplied cold finished in a strain annealed condition suitable for machining, with a hardness of not more than Rockwell C-25 maximum.

6. 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.

7. TOLERANCES: (a) Cold Finished Tubing: The following variations in nominal outside diameter and wall thickness are permissible:

| | | Tolerance, Individual Diameter Measurement (1) | | | |
|---------------------------------------|---|---|--------|---|----------------------------------|
| Nominal Outside Diameter Inches | Ratio of Wall Thickness to Outside Diameter | Outside Diameter Inches | | Inside Diameter (If Specified) Inches | Tolerance Wall Thickness % |
| | | | | (2)(3) | (2)(3) |
| Over 0.5 to 1.5 Incl. | All thicknesses | -0.000 | +0.005 | -0.005 +0.000 | ±10 |
| Over 1.5 to 3.5 Incl. | All thicknesses | -0.000 | +0.010 | -0.010 +0.000 {2} | ±10 {2} |
| Over 3.5 to 5.5 Incl. | All thicknesses | -0.000 | +0.015 | -0.015 +0.005 {2} | ±10 {2} |
| Over 5.5 | Under 5% | -0.030 | +0.030 | -0.035 +0.035 | ±10 |
| | 5% to 7.5% | -0.020 | +0.020 | -0.025 +0.025 | ±10 |
| | Over 7.5% | -0.000 | +0.030 | -0.030 +0.015 | ±10 (2) |

- Notes: (1) Tolerances are applicable only to two dimensions (length excepted).
- (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 $\frac{5}{8}$ in. 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 the wall thickness variations.
- (b) Hot Finished Tubing: When hot finished tubing is ordered, the following variations in nominal outside diameter and wall thickness are permissible:

| Nominal Outside Diameter Inches | Ratio of Wall Thickness to Outside Diameter | Tolerances, Individual Diameter Measurement Inches | Tolerance, Wall Thickness | | | |
|---------------------------------------|---|--|---------------------------|------------------------------------|------------------------------------|-------------------|
| | | | .109 & Under % | Over .109 to .172 Incl. % | Over .172 to .203 Incl. % | Over .203 % |
| Under 3.0 | All thicknesses | ±0.023 | ± 16.5 | ±15 | ±14 | ±12.5 |
| 3.0 to 5.499 Incl. | All thicknesses | ±0.031 | | ±15 | ±14 | ±12.5 |
| 5.5 to 7.999 Incl. | All thicknesses | ±0.047 | | | | ±12.5 |
| 8 to 10.75 Incl. | Under 5% | ±0.063 | | | | ±12.5 |
| 8 to 10.75 Incl. | 5% and over | ±0.047 | | | | ±12.5 |