AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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NICKEL-COPPER ALLOY TUBING, SEAMLESS, CORROSION RESISTANT
67Ni - 30Cu
Annealed

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

2. APPLICATION: Primarily for fluid lines, such as primer and fuel lines, requiring corrosion resistance with strength relatively high for nonferrous alloys.

3. COMPOSITION:

Nickel	63.00 - 70.00
Iron	2.50 max
Manganese	2.00 max
Silicon	0.50 max
Aluminum	0.50 max
Carbon	0.30 max
Sulfur	0.02 max
Copper	remainder

4. CONDITION: Cold-drawn and annealed.

5. TECHNICAL REQUIREMENTS:

5.1 Physical Properties:

Tensile Strength, psi	85,000 max
Yield Strength at 0.2% offset or at 0.0062 inch in 2 in. extension under load, psi	28,000 min
Elongation, % in 2 in.	32 min

5.2 Flarability: Tubing shall be capable of being flared without formation of cracks or other visible defects. Specimens for flaring may be cut from any portion of the tube, or an entire tube may be used as a specimen. The end of the specimen to be flared shall be cut square, with the cut end smooth and free from burrs, but not rounded. The specimen shall, at room temperature, be forced axially with steady pressure over a hardened and polished tapered steel pin having a 74 degree included angle, to produce a flare having the permanent expanded OD specified in the following table. The specimen and pin shall be clean and dry during test.

Nominal OD Inch	Expanded OD Inch, min	Nominal OD Inch	Expanded OD Inch, min
0.188	0.290	0.750	0.937
0.250	0.359	1.000	1.187
0.312	0.421	1.250	1.500
0.375	0.484	1.500	1.721
0.500	0.656	1.750	2.106
0.625	0.781	2.000	2.356

Note: For sizes with nominal OD greater than 2.00 in. flarability shall be as agreed upon by purchaser and vendor.

5.3 Hydraulic Strength: Tubing shall show no bulges, leaks, or other defects when subjected to internal hydrostatic pressure P determined from the formula $P = \frac{2ST}{D}$ where:

P = Hydrostatic test pressure in psi
S = Minimum yield strength from 5.1
T = Nominal tube wall thickness, in inches
D = Inside diameter of the tube in inches

6. QUALITY: Tubing shall be uniform in quality and condition, clean, sound, smooth, and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts.

7. TOLERANCES: Unless otherwise specified, tolerances shall be as follows:

Nominal OD, Inches	Nominal Wall Thickness Inch	OD Tolerance (Includes Ovality), Inch				Wall Thickness Tolerance, % T
		Individual OD Measurements		Mean OD Measurements		
		plus	minus	plus	minus	plus and minus
Under 0.032	All	0.002	0	--	--	10
0.032 to 0.188, excl	All	0.003	0	--	--	10
0.188 to 0.500, excl	All	0.004	0	--	--	10
0.500 to 0.625, incl	0.083 and less	0.005	0	--	--	10
0.500 to 0.625, incl	Over 0.083	--	--	0.005	0	12.5
Over 0.625 to 1.50, incl	Under 0.065	0.010	0.010	--	--	10
Over 0.625 to 1.50, incl	0.065 an over	--	--	0.005	0.005	10
Over 1.50 to 3.50, incl	Under 0.095	0.020	0.020	--	--	10
Over 1.50 to 3.50, incl	0.095 and over	--	--	0.010	0.010	10
Over 3.50 to 4.50, incl	Under 0.150	0.020	0.020	--	--	10
Over 3.50 to 4.50, incl	0.150 and over	--	--	0.010	0.010	10

8. REPORTS:

8.1 Unless otherwise specified, the vendor of tubing shall furnish with each shipment three copies of a notarized report of the results of tests to determine conformance to the requirements of this specification or stating that the chemical composition and physical properties of the tubing conform to the requirements specified. This report shall include the purchase order number, material specification number, size, and quantity.

8.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a notarized report showing the purchase order number, material specification number, contractor or other direct supplier of tubing, part number, and quantity. When tubing for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of tubing to determine conformance to the requirements of this specification, and shall include in the report a certification that the tubing conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.