

AEROSPACE MATERIAL SPECIFICATIONS

AMS 4942

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

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Revised

TITANIUM TUBING, SEAMLESS Annealed, 40,000 psi, Yield

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **APPLICATION:** Primarily for parts requiring strength up to 400 F (205 C) and oxidation resistance up to 600 F (315 C).

3. **COMPOSITION:** The product shall conform to the following:

	min	max
Oxygen	--	0.25
Iron	--	0.20
Carbon	--	0.10
Nitrogen	--	0.05
Hydrogen	--	0.015 (150 ppm)
Other Elements, total	--	0.15
Titanium	remainder	

- 3.1 **Check Analysis:** Composition variations shall meet the requirements of the latest issue of AMS 2249.

4. **CONDITION:** Cold drawn, annealed, and descaled, unless otherwise ordered.

5. **TECHNICAL REQUIREMENTS:** Tubing shall conform to the following requirements and shall be capable of meeting these requirements after being heated to any temperature up to 1300 F (704 C) for approximately 30 min. in air, cooled in air, and descaled.

- 5.1 **Tensile Properties:** These properties apply when the rate of strain is maintained at 0.003 - 0.007 in. per in. per min. through the yield strength, and then is increased so as to produce failure in approximately one additional minute. When a dispute occurs between purchaser and vendor over the yield strength values, a referee test shall be performed on a test machine having a strain rate pacer, using a rate of 0.005 in. per in. per min. through the yield strength.

Tensile Strength, psi	50,000 min
Yield Strength at 0.2% Offset or at 0.0092 in.	
in 2 in. Extension Under Load (E = 15,500,000), psi	40,000 - 65,000
Elongation, % in 2 in.	20 min

- 5.2 Flattening: Tubing having nominal wall thickness of 7 - 15% of the nominal OD shall withstand, without cracking, flattening sideways under a load applied gradually at room temperature until the outside dimension under load is equal to 5 times the nominal wall thickness.
- 5.2.1 If tubing does not pass the flattening test of 5.2, a section of tube not less than 1/2 in. in length and embracing 1/3 to 1/2 the circumference of the tube shall withstand, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to 3 times the nominal wall thickness of the tubing with axis of bend parallel to axis of tube with inside of tube on inside of bend. Cut edges of the specimen shall be smooth and free from burrs.
- 5.3 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 deg included angle, to produce a permanent expanded OD not less than 1.25 times the original nominal OD.
- 5.4 Pressure Testing: The tubing shall show no bulges, leaks, or other defects when subjected to an internal hydrostatic pressure, based on nominal dimensions, sufficient to cause a tensile stress of 20,000 psi in the tubing wall. The hydrostatic pressure (P) shall be based on:

$$P = \frac{2St}{D}$$

Where, S = 20,000 psi tensile stress

t = minimum wall thickness (nominal thickness minus maximum negative tolerance) in inches

D = Nominal OD in inches

6. QUALITY: Tubing shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.
7. TOLERANCES: Unless otherwise specified, the following tolerances apply:

7.1 Diameter:

Nominal OD Inches	Tolerance, Inch Plus and Minus
Up to 0.093, excl	0.002
0.093 to 0.188, excl	0.003
0.188 to 0.500, excl	0.004
0.500 to 1.500, excl	0.005

Note. The term "excl" is used to apply only to the higher figure of the specified range.