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AEROSPACE MATERIAL SPECIFICATION

AMS 4083F
Superseding AMS 4083E

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ALUMINUM ALLOY TUBING, HYDRAULIC, SEAMLESS, DRAWN, ROUND
1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T6)

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

2. APPLICATION: Primarily for parts and assemblies, operating under high pressure, such as hydraulic systems, fuel and oil lines, where high quality is required.

3. COMPOSITION:

	min	max
Magnesium	0.8	1.2
Silicon	0.40	0.8
Copper	0.15	0.40
Chromium	0.04	0.35
Iron	--	0.7
Zinc	--	0.25
Manganese	--	0.15
Titanium	--	0.15
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

4. CONDITION: Solution and precipitation heat treated, then drawn if required to meet dimensional tolerances.

4.1 Unless otherwise specified, tubing shall be supplied unground with an as-drawn surface finish.

5. TECHNICAL REQUIREMENTS: The product shall conform to the following requirements; tensile properties shall be determined in accordance with the latest issue of AMS 2355.

5.1 Tensile Properties:

Nominal Wall Thickness Inch	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E = 9,900,000)		Elongation % in 2 in. or 4D min	
		psi, min	Extension Under Load in. in 2 in.	Strip	Full Section
0.025 to 0.049, incl	42,000	35,000	0.0111	8	10
Over 0.049 to 0.259, incl	42,000	35,000	0.0111	10	12
Over 0.259 to 0.500, incl	42,000	35,000	0.0111	12	14

5.1.1 Tensile properties shall be as agreed upon by purchaser and vendor for tubing having nominal wall thickness under 0.025 inch.

5.1.2 When a dispute occurs between purchaser and vendor over the yield strength values, yield strength determined by the offset method shall apply.

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5.2 Hardness: Tubing should have hardness not lower than Rockwell B 50 or equivalent, but shall not be rejected on the basis of hardness if the tensile property requirements are met.

5.3 Flattening: Tubing having nominal wall thickness less than 10% of the nominal OD shall be capable of withstanding, without cracking, flattening sideways under a load applied gradually at room temperature until the outside dimension under load is equal to 8 times the nominal wall thickness.

5.3.1 If tubing does not pass the flattening test of 5.3, a section of the tube not less than 1/2 in. in length and embracing 1/3 to 1/2 the circumference of the tube shall be capable of withstanding, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to 6 times the nominal wall thickness of the tubing with axis of bend parallel to axis of tube and with inside of tube on inside of bend.

5.4 Flarability: Tubing with nominal OD of 0.375 in. and under shall be capable of being double-flared and tubing with nominal OD over 0.375 in. shall be capable of being single-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 except for sizes 0.375 in. and under. 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 flare having the permanent expanded OD specified in the following table:

Nominal OD Inches	Expanded OD Inches, min	Nominal OD Inches	Expanded OD Inches, min
0.125	0.200	0.750	0.937
0.188	0.302	1.000	1.187
0.250	0.359	1.250	1.500
0.312	0.421	1.500	1.721
0.375	0.484	1.750	2.106
0.500	0.656	2.000	2.356
0.625	0.781	2.500	2.856
		3.000	3.356

5.4.1 Tubing with intermediate nominal OD shall take the same percentage flare as that for the next larger OD.

5.4.2 Tubing with nominal OD greater than 3.000 in. or less than 0.125 in. shall have flarability as agreed upon by purchaser and vendor.

5.5 Hydraulic Strength: Each length of tubing shall be capable of withstanding an internal hydrostatic pressure (P), based on the following formula, without developing leaks and without an increase in mean diameter of more than 0.2%.

$$P = S \frac{D^2 - d^2}{D^2 + d^2}$$

where, S = Minimum yield strength from 5.1.
D = Maximum OD (nominal OD plus tolerance) inches.
d = Maximum ID (computed as D minus twice the minimum permissible wall thickness) inch.

5.5.1 Mean diameter is the average of two diameters at right angles to each other in the same transverse plane; measurements before and after testing should be taken at substantially the same location.

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