AERONAUTICAL MATERIAL SPECIFICATION

AMS 4139 B

Society of Automotive Engineers, Inc.
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ALUMINUM ALLOY FORGINGS
5.6Zn - 2.5Mg - 1.6Cu - 0.25Cr (75S)

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

2. **FORM:** Die forgings, hand forgings, and stock for forgings.

3. **COMPOSITION:**

Zinc	5.10 - 6.10
Magnesium	2.10 - 2.90
Copper	1.20 - 2.00
Chromium	0.15 - 0.40
Iron	0.70 max
Silicon	0.50 max
Manganese	0.30 max
Titanium	0.20 max
Other Impurities, each	0.05 max
Other Impurities, total	0.15 max
Aluminum	remainder

4. **CONDITION:** (a) Die Forgings.- Solution and precipitation heat treated. Quenching from the solution temperature shall be at a rate fast enough for the material to meet the following requirements, but shall be as slow as practicable in order to keep the internal stresses at a minimum.

   (b) Hand Forgings.- As forged.

   (c) Stock for Forgings.- As fabricated.

5. **TECHNICAL REQUIREMENTS:**

   (a) Die Forgings.-

   (1) Test specimens, machined after heat treatment from separately forged coupons or from forging stock representing the forgings and heat treated with the forgings, or machined from prolongations on the heat treated forgings, shall conform to the following minimum requirements:

Tensile Strength, psi	75,000
Yield Strength at 0.2% offset or at 0.0165 inch in 2 in. extension under load, psi	65,000
Elongation, % in 4D	10

   (2) When test specimens are machined from heat treated forgings not over 3 in. thick with the axis approximately parallel to the forging flow lines, the physical properties shall conform to those specified in (1) above, except that elongation may be as low as 7.0%, unless otherwise agreed upon by purchaser and vendor.

(3) Heat treated forgings and test specimens shall have hardness not lower than Brinell 135, using 500 kg load and 10 mm ball or the equivalent, or not lower than Brinell 140, using 1000 kg load and 10 mm ball.

(b) Hand Forgings.-

(1) Hand forgings 3 in. and under in thickness, and test coupons not more than 3 in. in thickness out from larger hand forgings, shall, after proper solution and precipitation heat treatment, conform to the following minimum requirements, based on the cross-sectional area of the forging. Test specimens in accordance with ASTM E8 are acceptable and shall be taken parallel to and perpendicular to the length of the forging in such a manner as to represent the center of the forging.

Cross-Sectional Area	Direction of Test	Tensile Strength	Yield Strength at 0.2% offset or at extension indicated		Elongation
				Extension Under Load	
Square Inches		psi	psi	Inch in 2 In.	% in 4D
9 and under	Long.	75,000	65,000	0.0165	10
	Trans.	75,000	65,000	0.0165	5
Over 9 to 16, incl	Long.	74,000	64,000	0.0163	8
	Trans.	72,000	62,000	0.0159	3
Over 16 to 38, incl	Long.	73,000	62,000	0.0159	7
	Trans.	71,000	60,000	0.0155	3
Over 36 to 64 incl	Long.	72,000	61,000	0.0157	6
	Trans.	70,000	59,000	0.0154	2
Over 64 to 80 incl	Long.	68,000	56,000	0.0148	5
	Trans.	66,000	54,000	0.0144	2

(2) Heat treated hand forgings not over 3 in. thick shall have hardness not lower than Brinell 135, using 500 kg load and 10 mm ball or the equivalent, or not lower than Brinell 140, using 1000 kg load and 10 mm ball.

(3) Unless otherwise specified, tolerances shall be in accordance with commercial practice.

(c) Stock for Forging.-

(1) When a sample of the stock is forged to a test coupon, a test specimen taken from the coupon after proper heat treatment shall show the physical properties in paragraphs 5(a)(1) and 5(a)(3), but this test is not required in routine inspection. If a test specimen taken from the stock after proper heat treatment shows the properties in paragraphs 5(a)(1) and 5(a)(3), the test shall be accepted as equivalent to the test of the forged coupon, but this test is not required.

(2) Unless otherwise specified, tolerances shall be in accordance with commercial practice for the class ordered.