



# AEROSPACE MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc.

485 Lexington Ave., New York, N. Y. 10017

## AMS 4141

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Revised

### ALUMINUM ALLOY DIE FORGINGS 5.6Zn - 2.5Mg - 1.6Cu - 0.25Cr (7075-T73)

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **FORM:** Die forgings and forging stock.
3. **APPLICATION:** Primarily for parts requiring improved resistance to stress corrosion cracking, but with lower strength than T6 temper.
4. **COMPOSITION:**

	min	max
Zinc	5.1	6.1
Magnesium	2.1	2.9
Copper	1.2	2.0
Chromium	0.18	0.40
Iron	--	0.70
Silicon	--	0.50
Manganese	--	0.30
Titanium	--	0.20
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

5. **CONDITION:**
  - 5.1 **Die Forgings:** Solution and precipitation heat treated to develop the required mechanical properties and resistance to stress corrosion cracking.

- 5.2 **Forging Stock:** As ordered by the forging manufacturer.

6. **TECHNICAL REQUIREMENTS:**

- 6.1 **Die Forgings:**

- 6.1.1 **Tensile Properties:**

- 6.1.1.1 **Test Specimens:** Test specimens machined from separately forged coupons or from forging stock representing the forgings and, in either case, heat treated with the forgings, or machined from prolongations on heat treated forgings shall conform to the following requirements:

Tensile Strength, psi	66,000 min
Yield Strength at 0.2% Offset or at 0.0149 in.	
in 2 in. Extension Under Load (E = 10,300,000), psi	56,000 min
Elongation, % in 2 in. or 4D	7 min

- 6.1.1.2 **Forgings, Parallel to Grain Flow:** When test specimens are machined from forgings not over 3 in. in thickness with the axis approximately parallel to the forging flow lines, the tensile properties shall conform to those specified in 6.1.1.1.

- 6.1.1.3 Forgings, Across Grain Flow: When test specimens are machined from forgings not over 3 in. in thickness so that the axis is other than approximately parallel to the forging flow lines, the tensile properties shall conform to the following requirements:

Tensile Strength, psi	62,000 min
Yield Strength at 0.2% Offset or at 0.0143 in. in 2 in. Extension Under Load (E = 10,300,000), psi	53,000 min
Elongation, % in 2 in. or 4D	3 min

- 6.1.1.4 If any individual specimen fails to meet the requirements of 6.1.1.1, two additional specimens shall be cut from a forging in the lot represented. Should either of these specimens fail to meet the requirements of 6.1.1.2 for specimens cut parallel to the forging flow lines or of 6.1.1.3 for specimens cut other than parallel to the forging flow lines, the entire lot shall be subject to rejection.
- 6.1.1.5 The elongation requirement shall not apply to test specimens having a gage length diameter less than 0.25 in., or located in immediate proximity to an abrupt change in section thickness, or located so that any part of the specimen gage length is located within 1/8 in. of the trimmed flashline.
- 6.1.1.6 If the section thickness of the forgings is greater than 3 in. the tensile properties shall be as agreed upon by purchaser and vendor.
- 6.1.2 Hardness: Should be not lower than Brinell 125 using 500 kg load and 10 mm ball, or 1000 kg load and 9/16 in. ball, or not lower than Brinell 130 using 1000 kg load and 10 mm ball, but forgings shall not be rejected on the basis of hardness if other technical requirements are met.
- 6.1.3 Conductivity:
- 6.1.3.1 If the conductivity is below 38% IACS (International Annealed Copper Standard), the material is considered unsatisfactory and must be reprocessed, regardless of property level.
- 6.1.3.2 If the conductivity is 40% IACS or higher and tensile properties meet specified requirements, the forgings are considered to be satisfactory.
- 6.1.3.3 If conductivity is 38 - 40% IACS, if the tensile properties meet specified requirements, and if the yield strength does not exceed the specified minimum by more than 11,900 psi, the forgings are considered to be satisfactory.
- 6.1.3.4 If conductivity is below 40% IACS and yield strength exceeds the specified minimum value by 12,000 psi or more, the forgings are considered suspect.
- 6.1.3.5 When forgings are considered suspect, they may be reprocessed or a sample of the forgings may be heated for not less than 30 min. at  $870\text{ F} \pm 10$  ( $465.6\text{ C} \pm 5.6$ ) and quenched in cold water. Conductivity shall then be measured within 15 min. after quenching. If the difference between this measurement and the original measurement on the forgings is 6% or more, the forgings are satisfactory. If the difference is less than 6%, the forgings must be reprocessed.
- 6.1.4 Stress Corrosion Cracking Test: Material shall be capable of showing no evidence of stress corrosion cracking when subjected to the following test:
- 6.1.4.1 A tensile test specimen, cut from a forging or from a forged test block heat treated with the forgings so that the axis of the specimen is parallel to the short transverse direction of the forging or test block, shall be stressed to 42,000 psi and held at constant strain in a suitable fixture. The stressed specimen shall be subjected to cyclic immersion for 30 days in a 3-1/2% solution of sodium chloride conforming to the purity and pH requirements of ASTM B117 and maintained at room temperature; each cycle shall consist of 10 min. immersion in the solution and 50 min. out of the solution. Specimens shall be dried prior to each immersion.