

# AERONAUTICAL MATERIAL SPECIFICATIONS

**AMS 4041E**

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

Issued 11-1-41  
Revised 4-15-58ALUMINUM ALLOY SHEET AND PLATE, ALCLAD  
4.5Cu - 1.5Mg - 0.6Mn (Alc 2024; -T3 Sheet, -T4 Plate)

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 structural parts of good strength which are required to exhibit maximum corrosion resistance.
3. **COMPOSITION:**

|                         | Core       |                         | Cladding  |
|-------------------------|------------|-------------------------|-----------|
| Copper                  | 3.8 - 4.9  | Iron + Silicon          | 0.7 max   |
| Magnesium               | 1.2 - 1.8  | Copper                  | 0.10 max  |
| Manganese               | 0.30 - 0.9 | Zinc                    | 0.10 max  |
| Iron                    | 0.50 max   | Manganese               | 0.05 max  |
| Silicon                 | 0.50 max   | Other Impurities, each  | 0.05 max  |
| Zinc                    | 0.25 max   | Other Impurities, total | 0.15 max  |
| Chromium                | 0.10 max   | Aluminum, by difference | 99.30 min |
| Other Impurities, each  | 0.05 max   |                         |           |
| Other Impurities, total | 0.15 max   |                         |           |
| Aluminum                | remainder  |                         |           |

#### 4. **CONDITION:**

- 4.1 **Sheet:** Solution heat treated and stretcher leveled (0.249 in. and under).
- 4.2 **Plate:** Solution heat treated (over 0.249 in.).

#### 5. **TECHNICAL REQUIREMENTS:**

- 5.1 **Cladding Thickness:** After rolling, the average cladding thickness shall be as shown. Routine measurements are not required.

|  | Total Thickness of<br>Composite Product<br>Inches | Cladding Thickness Per Side<br>% of Total Thickness |     |
|--|---------------------------------------------------|-----------------------------------------------------|-----|
|  |                                                   | min                                                 | max |
|  | 0.062 and under                                   | 4.0                                                 | --  |
|  | Over 0.062 to 0.187, incl                         | 2.0                                                 | --  |
|  | Over 0.187 to 0.499, incl                         | 1.2                                                 | --  |
|  | Over 0.499                                        | 1.2                                                 | 3.0 |

- 5.2 **Tensile Properties:** Test specimens shall conform to ASTM E8-54T except from material less than 3/4 in. wide, and shall be cut across the direction of rolling except from material less than 9 in. wide. Elongation requirements apply only to material 3/4 in. and over in width.

| Ø Nominal Thickness<br>Inches | Yield Strength at 0.2% Offset<br>or at Extension Indicated<br>(See 5.2.1) |          |                                      | Elongation<br>% in 2 in.<br>min |
|-------------------------------|---------------------------------------------------------------------------|----------|--------------------------------------|---------------------------------|
|                               | Tensile<br>Strength<br>psi, min                                           | psi, min | Extension Under Load<br>in. in 2 in. |                                 |
| 0.008 to 0.009, incl          | 58,000                                                                    | 39,000   | 0.0122                               | 10                              |
| Over 0.009 to 0.020, incl     | 59,000                                                                    | 39,000   | 0.0122                               | 12                              |
| Over 0.020 to 0.062, incl     | 59,000                                                                    | 39,000   | 0.0122                               | 15                              |
| Over 0.062 to 0.128, incl     | 62,000                                                                    | 40,000   | 0.0120                               | 15                              |
| Over 0.128 to 0.187, incl     | 62,000                                                                    | 40,000   | 0.0120                               | 13                              |
| Over 0.187 to 0.249, incl     | 63,000                                                                    | 41,000   | 0.0122                               | 15                              |
| Over 0.249 to 0.499, incl     | 63,000                                                                    | 40,000   | 0.0120                               | 11                              |
| Over 0.499 to 1.000, incl     | 62,000                                                                    | 40,000   | 0.0116                               | 8                               |
| Over 1.000 to 1.500, incl     | 60,000                                                                    | 40,000   | 0.0116                               | 7                               |
| Over 1.500 to 2.000, incl     | 60,000                                                                    | 40,000   | 0.0116                               | 6                               |
| Over 2.000 to 3.000, incl     | 56,000                                                                    | 40,000   | 0.0116                               | 4                               |

5.2.1 Extension under load is based upon the following values of E:

| Ø Nominal Thickness<br>Inches | E          |
|-------------------------------|------------|
| 0.062 and under               | 9,500,000  |
| Over 0.062 to 0.499, incl     | 10,000,000 |
| Over 0.499                    | 10,600,000 |

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

5.3 Bending: Material shall be capable of withstanding, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to the bend factor times the nominal thickness of the material, with axis of bend parallel to direction of rolling.

| Nominal Thickness<br>Inch | Bend<br>Factor |
|---------------------------|----------------|
| 0.010 to 0.040, incl      | 4              |
| Over 0.040 to 0.124, incl | 5              |
| Over 0.124 to 0.249, incl | 8              |

6. QUALITY: Material 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, tolerances shall conform to the latest issue of AMS 2202 as applicable. Thickness tolerances shall conform to Table II.

8. REPORTS:

8.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report stating that the product conforms to the chemical composition and technical requirements of this specification. This report shall include the purchase order number, material specification number, thickness, size, and quantity.