

# AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.  
29 West 39th Street  
New York City

AMS 5542A

Issued 9-1-47

Revised 3-1-49

ALLOY SHEET, CORROSION AND HEAT RESISTANT  
Nickel Base - 15Cr - 7Fe - 2.5Ti - 1Cb - 0.7Al

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
2. **APPLICATION:** Primarily parts, such as buckets, blades, turbine nozzle vanes, and combustion chamber liners requiring high strength up to 1500 F and oxidation resistance up to 1800F, and parts which may be formed and then heat treated to improve strength at elevated temperatures. Processing and heat treatments affect available properties at various elevated temperatures.

3. **COMPOSITION:**

|           |               |
|-----------|---------------|
| Carbon    | 0.08 max      |
| Manganese | 0.30 - 1.00   |
| Silicon   | 0.30 max      |
| Sulfur    | 0.01 max      |
| Chromium  | 14.00 - 16.00 |
| Nickel    | 70.00 min     |
| Columbium | 0.70 - 1.20   |
| Titanium  | 2.25 - 2.75   |
| Aluminum  | 0.40 - 1.00   |
| Iron      | 5.00 - 9.00   |
| Copper    | 0.20 max      |

4. **CONDITION:** Unless otherwise specified, material shall be supplied cold rolled, annealed, pickled, and leveled.

5. **TECHNICAL REQUIREMENTS:**

- 5.1 **Properties as received:** Material shall conform to the following requirements; tensile test specimens shall be taken with the axis perpendicular to the direction of rolling:

5.1.1 **Material having nominal thickness 1/8 in. and under:**

|                                                                                       |             |
|---------------------------------------------------------------------------------------|-------------|
| Tensile Strength, psi                                                                 | 130,000 max |
| Yield Strength at 0.2% offset or at<br>0.0082 inch in 2 in. extension under load, psi | 65,000 max  |
| Elongation, % in 2 in.                                                                | 40 min      |

5.1.2 **Material having nominal thickness over 1/8 in.:**

|                        |          |
|------------------------|----------|
| Elongation, % in 2 in. | 35 min   |
| Hardness, Rockwell     | C-30 max |

on 7C of the SAE Technical Board rules provides that: "All technical reports, including standards, approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

- 5.2 Properties after Aging: Material shall, after aging at 1300 F  $\pm$  10 for 20 hr and air cooling, conform to the following requirements; tensile test specimens shall be taken with the axis perpendicular to the direction of rolling:
- |                                                                                       |                           |
|---------------------------------------------------------------------------------------|---------------------------|
| Tensile Strength, psi                                                                 | 150,000 min               |
| Yield Strength at 0.2% offset or at<br>0.0105 inch in 2 in. extension under load, psi | 100,000 min               |
| Elongation, % in 2 in.                                                                | 20 min                    |
| Hardness, Rockwell                                                                    | C 30-37 (Vickers 285-353) |
- 5.3 Grain Size: The grain size shall average not over 0.008 in. in diameter when determined in accordance with ASTM E2-44T, method a.
6. QUALITY: Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts.
7. TOLERANCES: Unless otherwise specified, tolerances for sheet and strip 44 in. and under in width and 0.025 in. and over in thickness shall conform to the latest issue of AMS 2262 as applicable. Thickness tolerances shall conform to Table I.
8. REPORTS:
- 8.1 Unless otherwise specified, the vendor of the sheet shall furnish with each shipment three copies of a notarized report of the results of tests for chemical composition and grain size of each heat in the shipment. This report shall include the purchase order number, material specification number, thickness, size, and quantity from each heat.
- 8.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a notarized report showing the purchase order number, material specification number, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification and shall include in the report a certification that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.
9. IDENTIFICATION: Unless otherwise specified, each sheet shall be marked near one end with AMS 5542A, manufacturer's identification, heat number, and nominal thickness in inches. The characters shall be not less than 3/8 in. in height, shall be applied using a suitable marking fluid, and shall be capable of being removed in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effects on the material or its performance. The characters shall be sufficiently stable to withstand ordinary handling, and shall not interfere with welding procedures.
10. APPROVAL: Production parts shall not be supplied to this specification until samples have been approved by the purchaser. After such approval, the methods of processing shall not be changed without the purchaser's permission. Production parts shall be essentially equal to the approved samples.