

# AEROSPACE MATERIAL SPECIFICATION

**SAE AMS4036**

**REV. K**

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Reaf Nonc 2012-04

Superseding AMS4036J

Aluminum Alloy Sheet and Plate, Alclad One Side  
4.4Cu - 1.5Mg - 0.60Mn  
Alclad One Side 2024 and 1-1/2% Alclad One Side 2024-T3 Sheet;  
1-1/2% Alclad One Side 2024-T351 Plate

A82024

## RATIONALE

AMS4036K has been reaffirmed to comply with the SAE five-year review policy.

## NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of October, 2006. It is recommended, therefore, that this specification not be specified for new designs.

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## 1. SCOPE:

### 1.1 Form:

This specification covers an aluminum alloy in the form of sheet and plate clad on one side with a different aluminum alloy.

### 1.2 Application:

These products have been used typically for structural components including chemically-milled parts, but usage is not limited to such applications.

- 1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP823 recommends practices to minimize such conditions.

## 2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order form a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

### 2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

|          |                                                                                                                                                                                    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AMS 2355 | Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings                    |
| MAM 2355 | Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units |
| AMS 2772 | Heat Treatment of Aluminum Alloy Raw Materials                                                                                                                                     |
| ARP823   | Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products                                                                                             |

### 2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

|                   |                                                           |
|-------------------|-----------------------------------------------------------|
| ASTM B 660        | Packaging/Packing of Aluminum and Magnesium Products      |
| ASTM B 666/B 666M | Identification Marking of Aluminum and Magnesium Products |

### 2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products

ANSI H35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

## 3. TECHNICAL REQUIREMENTS:

### 3.1 Composition:

Shall conform to the percentages by weight shown in Tables 1 and 2, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition, Core (2024)

| Element               | min       | max  |
|-----------------------|-----------|------|
| Silicon               | --        | 0.50 |
| Iron                  | --        | 0.50 |
| Copper                | 3.8       | 4.9  |
| Manganese             | 0.30      | 0.9  |
| Magnesium             | 1.2       | 1.8  |
| Chromium              | --        | 0.10 |
| Zinc                  | --        | 0.25 |
| Titanium              | --        | 0.15 |
| Other Elements, each  | --        | 0.05 |
| Other Elements, total | --        | 0.15 |
| Aluminum              | remainder |      |

TABLE 2 - Composition, Cladding (1230)

| Element                 | min   | max  |
|-------------------------|-------|------|
| Iron + Silicon          | --    | 0.70 |
| Copper                  | --    | 0.10 |
| Manganese               | --    | 0.50 |
| Magnesium               | --    | 0.5  |
| Zinc                    | --    | 0.10 |
| Titanium                | --    | 0.03 |
| Vanadium                | --    | 0.05 |
| Other Elements, each    | --    | 0.03 |
| Aluminum, by difference | 99.30 | --   |

### 3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Sheet: Solution heat treated in accordance with AMS 2772 and cold worked.

3.2.2 Plate: Solution heat treated in accordance with AMS 2772 and stretched to produce a nominal permanent set of 2% but not less than 1-1/2% nor more than 3%.

3.2.2.1 Plate shall receive no further straightening operations after stretching.

### 3.3 Properties:

The product shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355 on the mill produced size:

3.3.1 Tensile Properties: Shall be as specified in Table 3.

TABLE 3A - Minimum Tensile Properties, Inch/Pound Units

| Nominal<br>Thickness<br>Inches | Tensile<br>Strength<br>ksi | Yield Strength<br>at 0.2% Offset<br>ksi | Elongation in<br>2 Inches or 4D<br>% |
|--------------------------------|----------------------------|-----------------------------------------|--------------------------------------|
| 0.010 to 0.020, incl           | 61.0                       | 40.0                                    | 12                                   |
| Over 0.020 to 0.062, incl      | 61.0                       | 40.0                                    | 15                                   |
| Over 0.062 to 0.128, incl      | 62.0                       | 41.0                                    | 15                                   |
| Over 0.128 to 0.249, incl      | 63.0                       | 41.0                                    | 15                                   |
| Over 0.249 to 0.499, incl      | 63.0                       | 41.0                                    | 12                                   |

TABLE 3B - Minimum Tensile Properties, SI Units

| Nominal<br>Thickness<br>mm | Tensile<br>Strength<br>MPa | Yield Strength<br>at 0.2% Offset<br>MPa | Elongation in<br>50.8 mm or 4D<br>% |
|----------------------------|----------------------------|-----------------------------------------|-------------------------------------|
| 0.25 to 0.51, incl         | 421                        | 276                                     | 12                                  |
| Over 0.51 to 1.57, incl    | 421                        | 276                                     | 15                                  |
| Over 1.57 to 3.25, incl    | 427                        | 283                                     | 15                                  |
| Over 3.25 to 6.32, incl    | 434                        | 283                                     | 15                                  |
| Over 6.32 to 12.67, incl   | 434                        | 283                                     | 12                                  |

- 3.3.2 Bending: Product 0.010 to 0.249 inch (0.25 to 6.32 mm), inclusive, in nominal thickness shall withstand, without cracking, bending at room temperature through an angle of 180 degrees around a diameter equal to the bend factor specified in Table 4 times the nominal thickness of the product with axis of bend parallel to the direction of rolling. The bare (unclad) surface shall be on the outside of the bend.

TABLE 4 - Bending Parameters

| Nominal Thickness<br>Inch | Nominal Thickness<br>mm | Bend<br>Factor |
|---------------------------|-------------------------|----------------|
| 0.010 to 0.040, incl      | 0.25 to 1.02, incl      | 4              |
| Over 0.040 to 0.124, incl | Over 1.02 to 3.15, incl | 5              |
| Over 0.124 to 0.249, incl | Over 3.15 to 6.32, incl | 8              |

- 3.3.3 Cladding Thickness: After rolling, the average cladding thickness shall be as specified in Table 5.

TABLE 5 - Average Cladding Thickness

| Nominal Thickness<br>Inch | Nominal Thickness<br>mm  | Average<br>Cladding Thickness<br>Per Side<br>% of Thickness<br>min |
|---------------------------|--------------------------|--------------------------------------------------------------------|
| 0.010 to 0.062, incl      | 0.25 to 1.57, incl       | 4.0                                                                |
| Over 0.062 to 0.187, incl | Over 1.57 to 4.75, incl  | 2.0                                                                |
| Over 0.187 to 0.499, incl | Over 4.75 to 12.67, incl | 1.2                                                                |

#### 3.4 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

#### 3.5 Tolerances:

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

### 4. QUALITY ASSURANCE PROVISIONS:

#### 4.1 Responsibility for Inspection:

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the specified requirements.