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400 Commonwealth Dr., Warrendale, PA 15096

# AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 4054B

Issued 9-15-57
Revised 1-1-87

Superseding AMS 4054A

## ALUMINUM ALLOY SHEET, CLAD ONE SIDE
## 0.6Mg - 0.35Si - 0.28Cu (No. 21-0 Brazing Sheet)

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of April 11, 1986. It is recommended that this specification not be specified for new designs.

This cover sheet should be attached to the "B" revision of the subject specification.



This specification is under the jurisdiction of AMS Committee "D".

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

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AMS4054B
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## ALUMINUM ALLOY SHEET, CLAD ONE SIDE
## 0.6Mg - 0.35Si - 0.28Cu (No. 21-0 Brazing Sheet)



1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of sheet.

1.2 Application: Primarily for brazed assemblies which are subject to heat treatment after joining.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2202 - Tolerances, Aluminum-Base and Magnesium-Base Alloy Sheet and Plate
AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum-Base and Magnesium-Base Alloys, Wrought Products (Except Forgings and Forging Stock) and Flash Welded Rings

2.2 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355:

| | Core (6951) | | | Cladding (4343) | | |
|---|---|---|---|---|---|---|
| | min | max | | min | max | |
| Magnesium | 0.40 | 0.8 | Silicon | 6.8 | 8.2 | |
| Silicon | 0.20 | 0.50 | Iron | -- | 0.8 | |
| Copper | 0.15 | 0.40 | Copper | -- | 0.25 | |
| Iron | -- | 0.8 | Zinc | -- | 0.20 | |
| Zinc | -- | 0.20 | Manganese | -- | 0.10 | |
| Manganese | -- | 0.10 | Other Impurities, each | -- | 0.05 | |
| Other Impurities, each | -- | 0.05 | Other Impurities, total | -- | 0.15 | |
| Other Impurities, total | -- | 0.15 | Aluminum | remainder | | |
| Aluminum | remainder | | | | | |

3.2 Condition: Annealed.

3.3 Cladding: Shall be applied to only one face of the core.

3.3.1 Cladding Thickness: After rolling, the average cladding thickness shall be as follows:

| Total Thickness of Composite Product | | Cladding Thickness % of Total Thickness |
|---|---|---|
| Inch | (Millimetres) | min avg |
| 0.010 to 0.091, excl | (0.25 to 2.31, excl) | 8 |
| 0.091 to 0.249, incl | (2.31 to 6.32, incl) | 4 |

3.4 Properties: Sheet shall conform to the following requirements, determined in accordance with AMS 2355:

3.4.1 As Annealed:

3.4.1.1 Tensile Properties: Shall be as shown in Table I.

TABLE I

| Nominal Thickness Inch | Tensile Strength psi, max | Elongation in 2 in. %, min |
|---|---|---|
| 0.010 to 0.020, excl | 20,000 | 14 |
| 0.020 to 0.031, incl | 20,000 | 18 |
| Over 0.031 to 0.050, incl | 20,000 | 20 |
| Over 0.050 to 0.249, incl | 20,000 | 23 |

TABLE I (SI)

| Nominal Thickness Millimetres | Tensile Strength MPa, max | Elongation in 50.8 mm %, min |
|---|---|---|
| 0.25 to 0.51, excl | 138 | 14 |
| 0.51 to 0.79, incl | 138 | 18 |
| Over 0.79 to 1.27, incl | 138 | 20 |
| Over 1.27 to 6.32, incl | 138 | 23 |



3.4.1.2 Bending: Sheet shall withstand, without cracking, bending at room temperature through an angle of 180 deg (3.14 rad) around a diameter equal to the bend factor times the nominal thickness of the sheet with axis of bend parallel to the direction of rolling.

| Nominal Thickness | | |
|---|---|---|
| Inch | (Millimetres) | Bend Factor |
| 0.010 to 0.128, incl | (0.25 to 3.25, incl) | 1 |
| Over 0.128 to 0.249, incl | (Over 3.25 to 6.32, incl) | 2 |

3.4.2 After Solution and Precipitation Heat Treatment: Sheet, after proper solution and precipitation heat treatment, shall meet the following requirements:

3.4.2.1 Tensile Properties: Shall be as shown in Table II.

TABLE II

| Nominal Thickness Inch | Tensile Strength psi, min | Yield Strength at 0.2% Offset psi, min | Elongation in 2 in. %, min |
|---|---|---|---|
| 0.010 to 0.020, incl | 35,000 | 30,000 | 6 |
| Over 0.020 to 0.249, incl | 35,000 | 30,000 | 8 |

TABLE II (SI)

| Nominal Thickness Millimetres | Tensile Strength MPa, min | Yield Strength at 0.2% Offset MPa, min | Elongation in 50.8 mm %, min |
|---|---|---|---|
| 0.25 to 0.51, incl | 241 | 207 | 6 |
| Over 0.51 to 6.32, incl | 241 | 207 | 8 |

3.4.2.2 Bending: Sheet shall withstand, without cracking, bending at room temperature through an angle of 180 deg (3.14 rad) around a diameter equal to the bend factor times the nominal thickness of the sheet with axis of bend parallel to the direction of rolling.

| Nominal Thickness Inch | Nominal Thickness (Millimetres) | Bend Factor |
|---|---|---|
| 0.010 to 0.036, incl | (0.25 to 0.91, incl) | 3 |
| Over 0.036 to 0.064, incl | (Over 0.91 to 1.63, incl) | 4 |
| Over 0.064 to 0.128, incl | (Over 1.63 to 3.25, incl) | 5 |
| Over 0.128 to 0.249, incl | (Over 3.25 to 6.32, incl) | 6 |

3.5 Quality: Sheet, as received by the purchaser, shall be uniform in quality and condition, sound, and Ø free from foreign materials and from internal and external imperfections detrimental to usage of the sheet.

3.6 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2202.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of sheet shall supply all samples and shall be responsible for Ø performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the sheet conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to composition (3.1), tensile property as annealed Ø (3.4.1.1), and tolerance (3.6) requirements are classified as acceptance tests.

4.2.2 Periodic Tests: Tests to determine confromance to cladding thickness (3.3.1), tensile property after Ø solution and precipitation heat treatment (3.4.2.1), and bending (3.4.1.2 and 3.4.2.2) requirements are classified as periodic tests.

4.3 Sampling: Shall be in accordance with AMS 2355. Frequency of sampling for periodic tests shall be as Ø agreed upon by purchaser and vendor.

4.4 Reports:

4.4.1 The vendor of sheet shall furnish with each shipment, three copies of a report stating that the sheet conforms to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, size and quantity.