



AEROSPACE MATERIAL SPECIFICATION

AMS4272™

Issued

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Aluminum Alloy, Alclad Sheet and Plate (Alclad 2029-T8)
3.6 Cu, 0.30 Mn, 0.95 Mg, 0.40 Ag, 0.12 Zr
Solution Heat Treated, Cold Worked and Aged

RATIONALE

AMS4272 is a new specification for Alclad 2029-T8 sheet and plate.

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of sheet and plate, clad on both sides, from 0.063 to 0.600 inch inclusive (1.60 to 15.24 mm, inclusive), in nominal thickness (see 8.5).

1.2 Application

These products have been used typically for applications requiring high damage tolerance and moderate strength, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2355 Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings

AMS2772 Heat Treatment of Aluminum Alloy Raw Materials

AS1917 Clarification of Terms Used in Aerospace Metals Specifications

AS1990 Aluminum Alloy Tempers

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on this Technical Report, please visit
<http://www.sae.org/technical/standards/AMS4272>

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B666/B666M	Identification of Aluminum and Magnesium Alloy Products
ASTM B646	Fracture Toughness Testing of Aluminum Alloys
ASTM E561	K-R Curve Determination

2.3 ANSI Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

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 1A and 1B, determined in accordance with AMS2355.

Table 1A - Composition - core (2029)

Element	min	max
Silicon	--	0.12
Iron	--	0.15
Copper	3.2	4.0
Manganese	0.20	0.40
Magnesium	0.8	1.1
Titanium	--	0.10
Silver	0.30	0.50
Zirconium	0.08	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

Table 1B - Composition - cladding (1230)

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

3.2 Condition

Solution heat treated, stretched, and precipitation heat treated to the –T8 temper (see AS1990). Solution and precipitation heat treatment shall be performed in accordance with AMS2772 as applicable to 2XXX alloys. The actual practices are considered proprietary.

3.3 Properties

The product shall conform to the following requirements, determined in accordance with AMS2355 on the mill product.

3.3.1 Mechanical property requirements for product outside of the range covered by Tables 2 through 5 shall be agreed upon between purchaser and producer.

3.3.2 Tensile Properties

Shall be as specified in Tables 2 and 3.

Table 2A – Minimum longitudinal tensile properties, inch/pound units

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.063 to 0.164, incl	61.0	55.0	8
0.165 to 0.249, incl	61.0	55.0	10
0.250 to 0.499, incl	61.0	56.0	11
0.500 to 0.600, incl	63.0	58.0	13

Table 2B – Minimum longitudinal tensile properties, SI units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
1.60 to 4.17, incl	421	379	8
Over 4.17 to 6.32, incl	421	379	10
Over 6.32 to 12.67, incl	421	386	11
Over 12.67 to 15.24, incl	434	400	13

Table 3A – Minimum long-transverse tensile properties, inch/pound units

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.063 to 0.164, incl	61.0	54.0	9
0.165 to 0.249, incl	61.0	54.0	10
0.250 to 0.499, incl	61.0	54.0	10
0.500 to 0.600, incl	64.0	56.0	11

Table 3B – Minimum long-transverse tensile properties, SI units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
1.60 to 4.17, incl	421	372	9
Over 4.17 to 6.32, incl	421	372	10
Over 6.32 to 12.67, incl	421	372	10
Over 12.67 to 15.24, incl	441	386	11

3.3.3 Fracture Toughness

Plane-stress fracture toughness (K_{app}), shall be tested in accordance with ASTM E561 and ASTM B646 in the T-L orientation. The specimen shall be of the M(T) type and have a width (W) of 16 inches (406 mm). The original crack size (2a₀) shall be 4 inches (102 mm). For sheet, the specimen thickness (B) shall be the full sheet thickness. For plate, the specimen shall have a thickness (B) of 0.25 inch (6.35 mm) and shall be centered at mid-thickness (T/2).

A K_{app} value meeting the requirements of ASTM B646 shall meet or exceed the values shown in Table 4.

Table 4 – Minimum T-L plane-stress fracture toughness

Nominal Thickness Inches	Nominal Thickness Millimeters	Specimen Orientation	ksi √inch	MPa √m
0.063 to 0.499, incl	1.60 to 12.67, incl	T-L	95	104
0.500 to 0.600, incl	Over 12.67 to 15.24, incl	T-L	95	104

3.3.4 Cladding Thickness

After rolling, the average cladding thickness shall conform to the requirements of Table 5.

Table 5 - Average cladding thickness

Total Thickness of Composite Product Inch	Total Thickness of Composite Product Millimeters	Average Cladding Thickness Per Side % of Total Thickness min
0.063 to 0.600, incl	1.60 to 15.24, incl	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 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 specified requirements.