

AEROSPACE MATERIAL SPECIFICATION



AMS 4265A

Issued NOV 1994
Cancelled JUL 2000

Superseding AMS 4265

Aluminum Alloy, Particulate Reinforced Extrusions
6092/SiC/25p - T6P
Solution Heat Treated, Quenched, and Precipitation Heat Treated

CANCELLATION NOTICE

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1. SCOPE:

1.1 Form:

This specification covers particulate reinforced aluminum metal matrix composites in the form of extruded shapes.

1.2 Application:

These extrusions have been used typically for structural applications requiring moderate static strength and high elastic modulus, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

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

AMS 2205	Tolerances, Aluminum Alloy and Magnesium Alloy Extrusions
MAM 2205	Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Extrusions
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 2750	Pyrometry
AMS 2811	Identification, Aluminum and Magnesium Alloy Wrought Products

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM D 3553	Fiber Content by Digestion of Reinforced Metal Matrix Composites
ASTM E 18	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

2.3 Federation of European Producers of Abrasive Products::

Available from The British Abrasive Federation, P.O. Box 58, Trafford Park Road, Trafford Park, Manchester M17 1JD Great Britain.

FEPA 42-GB-1984	Standard for Bonded Abrasive Grains of Fused Alumina and Silicon Carbide
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3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall be as follows:

- 3.1.1 Matrix Alloy Composition: Shall conform to the percentages by weight shown in Table 1, determined by atomic absorption (AA) or inductively coupled plasma (ICP) techniques.

TABLE 1 - Composition of Matrix Alloy

Element	min	max
Magnesium	0.80	1.20
Copper	0.70	1.00
Silicon	0.40	0.80
Oxygen (3.1.3)	0.05	0.50
Iron	--	0.30
Zinc	--	0.25
Manganese	--	0.15
Chromium	--	0.15
Titanium	--	0.15
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

- 3.1.2 Reinforcement Volume Fraction: The concentration of particulate in the extruded product shall be $0.25\% \pm 0.02$ by volume, using 3.22 g/cc as the density for silicon carbide, determined in accordance with ASTM D 3553.

- 3.1.3 Determination not required for routine acceptance. Analyze powder for oxygen using fast neutron activation or other analytical method acceptable to purchaser.

3.2 Condition:

Solution heat treated, quenched, and precipitation heat treated to T6P condition. Minimum area reduction ratio by extrusion shall be 12:1.

- 3.2.1 Reinforcement Size: The size of the alpha silicon carbide particles shall be between 1 and 25 microns. Particle size shall be determined on the silicon carbide particles by FEPA 42-GB-1984 prior to incorporation into the composite.

3.3 Heat Treatment:

Extrusions shall be solution heat treated by heating to a temperature in the range 1025 to 1030 °F (552 to 554 °C), holding at heat for 3 hours $\pm$ 0.25, and quenching in water or glycol-water solution. After drying, precipitation heat treat by heating to 325 °F $\pm$ 10 (163 °C $\pm$ 6) and holding at heat for 5 hours $\pm$ 0.25. Pyrometry shall be in accordance with AMS 2750.

3.4 Properties:

Extrusions shall conform to the following requirements; tensile properties and hardness shall be determined in accordance with AMS 2355 or MAM 2355.

3.4.1 Tensile Properties: Shall be as shown in Table 2 for extrusions 0.200 to 0.800 inch (5.08 to 20.32 mm) in nominal thickness.

TABLE 2 - Minimum Tensile Properties

Property	Specimen Orientation	Value ksi	Value MPa
Tensile Strength	L	73.0	503
	LT	66.0	455
Yield Strength at 0.2% Offset	L	55.0	379
	LT	52.0	358
Elongation in 1 Inch (25.4 mm)	L	2.0%	2.0%

3.4.2 Hardness: Shall be not lower than 80 HRB.

3.5 Quality:

Extrusions, as received by purchaser, shall be uniform in quality and condition, sound, smooth, and free from hard and soft spots, cracks, edge tears, internal voids and cavities, surface defects running lengthwise and appearing as folded-over metal or crevices, kinks, damaged ends, and other imperfections detrimental to usage of the extrusions. Discoloration due to thermal treatment is acceptable.

3.5.1 The silicon carbide particles shall be uniformly dispersed throughout the aluminum matrix of the extruded product. Methods, standards, and frequency for determination of uniformity of reinforcement shall be agreed upon by purchaser and vendor.

3.6 Tolerances:

Extrusion dimensions shall conform to tolerances shown on the extrusion drawing. When tolerances are not shown on the extrusion drawing, requirements of AMS 2205 or MAM 2205 shall apply.