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400 Commonwealth Dr., Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

AMS 4387D

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An American National Standard

Superseding AMS 4387C

MAGNESIUM ALLOY EXTRUSIONS
2.3Zn - 0.62Zr (ZK21A-F)
As Extruded

UNS M16210

1. SCOPE:

1.1 Form: This specification covers a magnesium alloy in the form of extruded bars, rods, wire, tubing, and shapes.

1.2 Application: Primarily for parts requiring good weldability and moderate strength and which do not require stress relief after welding.

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 documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2205 - Tolerances, Aluminum Alloy and Magnesium Alloy Extrusions
MAM 2205 - Tolerances, Metric, Aluminum Alloy and Magnesium Alloy Extrusions
AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings
MAM 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM B660 - Packaging/Packing of Aluminum and Magnesium Products
ASTM E9 - Compression Testing of Metallic Materials at Room Temperature

3. TECHNICAL REQUIREMENTS:

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

	min	max
Zinc	2.0	2.6
Zirconium	0.45	0.8
Other Impurities, each	--	0.10
Other Impurities, total	--	0.30
Magnesium	remainder	

3.2 Condition: As extruded.

3.2.1 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within the dimensional tolerances of 3.5.

3.3 Properties: Extrusions shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as follows, determined in accordance with AMS 2355 or MAM 2355:

3.3.1.1 Bars, Rods, Wire, and Solid Shapes Under 5 Square Inches (32 cm^2) in Cross-Sectional Area:

Tensile Strength, minimum	38,000 psi (262 MPa)
Yield Strength at 0.2% Offset, minimum	28,000 psi (193 MPa)
Elongation in 4D, minimum	4%

3.3.1.2 Tubing 3.0 Inches (76 mm) and Under in Nominal OD and Hollow Shapes:

Tensile Strength, minimum	34,000 psi (234 MPa)
Yield Strength at 0.2% Offset, minimum	26,000 psi (179 MPa)
Elongation in 4D, minimum	4%

3.3.1.3 Tensile property requirements for bars, rods, wire, and solid shapes 5 square inches (32 cm^2) and over in cross-sectional area and for tubing over 3.0 inches (76 mm) in nominal OD shall be as agreed upon by purchaser and vendor.

3.3.2 Compressive Properties: Shall be as follows, determined in accordance with ASTM E9 on specimens taken in the longitudinal direction from bars, rods, tubing, and shapes:

3.3.2.1 Bars, Rods, and Solid Shapes Under 5 Square Inches (32 cm^2) in Cross-Sectional Area:

Compressive Yield Strength at 0.2% Offset, minimum 20,000 psi (138 MPa)

3.3.2.2 Tubing 3.0 Inches (76 mm) and Under in Nominal OD and Hollow Shapes:

Compressive Yield Strength at 0.2% Offset, minimum 14,000 psi (97 MPa)

3.3.2.3 Compressive property requirements for bars, rods, and solid shapes 5 square inches (32 cm^2) and over in cross-sectional area and for tubing over 3.0 inches (76 mm) in nominal OD shall be as agreed upon by purchaser and vendor.

3.4 Quality: Extrusions, as received by purchaser, shall be uniform in quality and condition, sound, and free from segregation and foreign materials and from imperfections detrimental to usage of the extrusions.

3.5 Tolerances: Shall conform to all applicable requirements of AMS 2205 or MAM 2205.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of extrusions shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the extrusions conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.3.1), and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for compressive properties (3.3.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355 or MAM 2355.

4.4 Reports: The vendor of extrusions shall furnish with each shipment a report stating that the extrusions conform to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, AMS 4387D, size or section identification number, and quantity.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2355 or MAM 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Extrusions shall be identified as follows:

5.1.1 Each straight bar, rod, and tube 0.500 inch (12.70 mm) and over in nominal OD or least width of flat surface and each straight shape with configuration allowing access to a flat surface at least 0.500 inch (12.70 mm) wide recessed not more than 1/8 inch (3.2 mm) below the outline of the shape shall be marked in a row of characters recurring at intervals not greater than 3 feet (914 mm) with the alloy number temper, AMS 4387 or applicable Military specification designation, and manufacturer's identification. The inspection lot number shall be included in the row marking or shall be marked near one end. The characters shall be of such size as to be legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling. The markings shall have no deleterious effect on the extrusions or their performance.

5.1.2 All straight extrusions other than those of 5.1.1 shall be securely bundled, boxed, or secured on lifts and identified by two durable tags marked with the information of 5.1.1, including the inspection lot number, and attached, not farther than 2 feet (610 mm) from each end, to the extrusions in each bundle, box, or lift.

5.1.3 Coiled bar, rod, wire, and tubing and spooled wire shall be identified with the information of 5.1.1, including the inspection lot number, marked on a durable tag attached to each coil or directly on one flange of each spool.

5.2 Protective Treatment: Extrusions shall be coated, prior to shipment, with a light corrosion-inhibiting oil.

5.3 Packaging:

5.3.1 Extrusions shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the extrusions to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.3.2 For direct U.S. Military procurement, packaging shall be in accordance Ø with ASTM B660, Commercial Level, unless Level A is specified in the request for procurement.