AEROSPACE MATERIAL SPECIFICATION

AMS4371	REV. A

Issued 2013-03
Revised 2013-08

Superseding AMS4371

Magnesium Alloy, Plate
4.0Y - 2.25Nd - 0.5Zr (WE43C - T5)
Precipitation Heat Treated
(Composition similar to UNS M18434)

RATIONALE

AMS4371A results from a limited scope ballot to revise Composition (3.1.2, Table 1).

1. SCOPE

1.1 Form

This specification covers a magnesium alloy in the form of rolled plate.

1.2 Application

This product has been used typically for parts requiring a combination of light weight, high yield strength up to 480 °F (250 °C), relatively high corrosion resistance, and good flammability resistance for magnesium alloys,but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms 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 cancelled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4371A

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 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

AMS2750 Pyrometry

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 B 117 Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM B 557 Tension Testing Wrought and Cast Aluminium- and Magnesium- Alloy Products

ASTM B 557 M Tension Testing Wrought and Cast Aluminium- and Magnesium- Alloy Products

ASTM B 660 Packaging/Packing of Aluminum and Magnesium Products

ASTM B 666/B 666M Identification Marking of Aluminum and Magnesium Products

ASTM B 953 Sampling Magnesium and Magnesium Alloys for Spectrochemical Analysis

ASTM B 954 Analysis of Magnesium and Magnesium Alloys by Atomic Emission Spectrometry

2.3 ANSI PUBLICATIONS

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.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 Table 1, determined by spectrochemical methods in accordance with ASTM B 954, or by other analytical methods acceptible to purchaser.

TABLE 1 - COMPOSITION

Element	min	max
Yttrium	3.7	4.3
Neodymium	2.0	2.5
Zinc	--	0.06
Zirconium	0.2	1.0
Other Rare Earths (3.1.1)	0.3	1.0
Manganese	--	0.03
Copper	--	0.02
Iron	--	0.005
Nickel	--	0.0020
Other Elements, each (3.1.2)	--	0.01
Magnesium	remainder	

3.1.1 Other Rare Earths are heavy rare earths, such as Gadolinium, Dysprosium, Erbium, Samarium, and Ytterbium. The total of Gadolinium + Dysprosium + Erbium shall be 0.3 to 1.0%. Samarium shall not exceed 0.04% and Ytterbium shall not exceed 0.02%.

3.1.2 Determination not required for routine acceptance.

3.2 Condition

Precipitation heat treated.

3.2.1 Rolled plate shall be supplied with an as-rolled surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within specified dimensional tolerances.

3.3 Heat Treatment

Plate shall be precipitation heat treated by heating to a temperature between 392 to 482 °F (200 to 250 °C), and holding at heat for the proper time for precipitation heat treatment to meet the requirements of 3.4, and air cooling. Pyrometry shall be in accordance with AMS2750.

3.4 Properties

Plate shall conform to the requirements of 3.4.1.

3.4.1 Tensile Properties

Shall be as specified in 3.4.1 determined in accordance with ASTM B557 or ASTM B557M:

3.4.1.1 Shall be as shown in Table 2.

TABLE 2A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
0.5 to 1.5	44.0	33.0	12

TABLE 2B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
12.7 to 38.1	303	228	12

3.4.2 Corrosion Resistance

Corrosion rate of material, tested in accordance with 3.4.2.1, shall be less than 50 mpy.

3.4.2.1 Corrosion rate shall be determined in accordance with ASTM B117 except that, prior to exposure, specimens shall be accurately weighed to within ±0.01 g (W_1). Specimens shall be exposed to the salt spray for not less than 120 hours. Following exposure, specimens shall be rinsed with tap water and cleaned of adherent corrosion product by immersing in a hot (190 °F [88 °C]) 20% Chromic acid plus 1% silver nitrate solution for 1 to 2 minutes. Cleaned specimens shall be rinsed in hot water, dried in a stream of hot air, and weighed (W_2). The measured weight loss (WL) shall be calculated (W_1 - W_2) and used for calculating corrosion rate, using the following equations:

$$CR\ (mcd) = WL / (SA \times EP) \qquad \text{(Equation 1)}$$

$$CR\ [mils\ (0.001\ inch)\ per\ year] = (CR\ (mcd) / D) \times 143.7 \qquad \text{(Equation 2)}$$

Where:

WL = Measure weight loss in mg

SA = Total surface area of specimen in cm^2

EP = Exposure time in days

D = Density, 1.82 $gram/cm^3$

mcd = mg/cm^2 per day

3.5 Quality

Plate, 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 plate.

3.6 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 plate 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 plate conforms to specified requirements.