



AEROSPACE MATERIAL SPECIFICATION

AMS4399™**REV. A**

Issued 2010-10
Reaffirmed 2016-05
Revised 2024-04

Superseding AMS4399

Magnesium Alloy Welding Wire
5.1Y - 3.0Re - 0.7Zr (WE54A)
(Composition similar to UNS M18410)

RATIONALE

AMS4399A results from a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (see 3.7, 4.4.1, 5.5.1, and 8.5), provide options for weld wire cut lengths (see 3.6.2), update Applicable Documents (see Section 2) and Ordering Information (see 8.6), relocate Definitions (see 2.2), and allow the use of the immediate prior specification revision (see 8.4).

1. SCOPE

1.1 Form

This specification covers a magnesium alloy in the form of welding wire (see 8.6).

1.2 Application

This wire has been used typically as filler metal for gas-metal-arc and gas-tungsten-arc welding of magnesium alloys of similar composition, 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.

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

AMS2813 Packaging and Marking of Packages of Welding Wire, Standard Method

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Full document details: SAE AMS4399A

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS4399A>

Documents
Document Sharing Hub

ARP1876 Weldability Test for Weld Filler Metal Wire

ARP4926 Alloy Verification and Chemical Composition, Inspection of Welding Wire

AS7766 Terms Used in Aerospace Metals Specifications

2.2 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight as shown in Table 1, determined in accordance with AMS2355.

Table 1- Composition

Element	Min	Max
Yttrium	4.75	5.5
Neodymium	1.5	2.0
Zirconium	0.40	1.0
Other Rare Earths (see 3.1.1)	--	2.0
Zinc	--	0.2
Lithium	--	0.2
Manganese	--	0.15
Copper	--	0.03
Iron	--	0.01
Silicon	--	0.01
Nickel	--	0.005
Other Elements, total	--	0.30
Magnesium	remainder	

3.1.1 Other rare earths shall be principally heavy rare earths (e.g., gadolinium, dysprosium, erbium, and ytterbium) (see 8.2).

3.1.2 Chemical analysis of initial ingot, bar, or rod stock is acceptable provided the processes used for manufacture and cleaning are controlled to ensure conformance to composition requirements and the facility employs procedures to ensure traceability of wire to the originally analyzed ingot.

3.2 Condition

Wire for cut lengths shall be extruded and for spooled wire shall be extruded and sized. Drawn wire may be supplied if acceptable to the purchaser.

3.3 Fabrication

3.3.1 Butt welding is permissible provided both ends to be joined are identified by chemical analysis or the repair is made at the wire processing station. The butt weld shall not interfere with uniform, uninterrupted feeding of the wire in machine welding equipment.

3.3.2 Oxides, dirt, and extruding compounds shall be removed by cleaning processes that will neither result in pitting nor cause gas absorption by the wire or deposition of substances harmful to welding operations.