



Standard Specification for Magnesium Alloy Anodes for Cathodic Protection¹

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1. Scope

1.1 This specification covers magnesium alloy anodes in the form of cast and extruded shapes.

2. Referenced Documents

2.1 ASTM Standards:

E 35 Test Methods for Chemical Analysis of Magnesium and Magnesium Alloys²

E 55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition²

E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition²

G 97 Test Method for Laboratory Evaluation of Magnesium Sacrificial Anode Test Specimens for Underground Applications³

3. Significance and Use

3.1 This specification is prescriptive and not performance in nature.

4. Ordering Information

4.1 Orders for anodes under this specification shall include the following information:

4.1.1 Grade (Section 5 and Table 1),

4.1.2 Quantity (number of pieces), and

4.1.3 Size, form, and shape as negotiated between purchaser and supplier.

5. Chemical Composition

5.1 *Limits*—The material shall conform to the chemical composition requirements prescribed in Table 1.

5.2 Sampling:

5.2.1 Sufficient samples shall be taken by the manufacturer to ensure conformance to the chemical composition requirements of the metal. Samples may be taken from the molten metal when the cast anode or extrusion ingot is poured, or from the finished anode. Samples shall be representative of the material.

5.2.2 In case of dispute, the sample for chemical analysis shall meet the requirements of Practice E 55 or E 88.

5.2.3 *Method of Analysis*—Any suitable method of chemical analysis may be used. In case of dispute, the analysis shall be made by methods given in Test Methods E 35.

6. Property Testing

6.1 Sufficient samples may be taken for property testing as negotiated between purchaser and supplier. Testing will be done in compliance with Test Method G 97.

7. General Quality

7.1 Magnesium cast and extruded anodes shall have a clean surface and be commercially free of dirt, slag, or other foreign material.

8. Rejection

8.1 Material that does not conform to the requirements of this specification may be rejected, and if rejected, the conditions of replacement shall be as agreed upon between the purchaser and the supplier.

9. Packaging and Package Marking

9.1 The material shall be packaged in such a manner as to prevent damage in ordinary handling and transportation. The type of packing and gross weight of the individual container shall be left to the discretion of the supplier, unless otherwise agreed upon between the purchaser and the supplier. Packing methods and containers shall be so selected as to permit maximum utility of mechanical equipment in unloading and subsequent handling.

9.2 Packages or containers shall be such as to ensure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery.

9.3 Each shipment shall be marked with the purchaser's order number, form, quantity, specification number, gross and net weights, and the name of the manufacturer.

10. Keywords

10.1 cathodic protection; magnesium anodes

¹ This specification is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.04 on Magnesium Alloy Cast and Wrought Products.

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² *Annual Book of ASTM Standards*, Vol 03.05.

³ *Annual Book of ASTM Standards*, Vol 03.02.

TABLE 1 Chemical Requirements^A

| Element | Grade | | | | | |
|---------------------------------|--------------------|--------------------|--------------------|-----------|-----------|-----------|
| | AZ63B ^B | AZ63C ^B | AZ63D ^B | M1C | AZ31B | AZ31D |
| | UNS | | | | | |
| | M11632 | M11634 | M11636 | M15102 | M11311 | M11313 |
| Aluminum | 5.3–6.7 | 5.3–6.7 | 5.0–7.0 | 0.01 | 2.5–3.5 | 2.5–3.5 |
| Zinc | 2.5–3.5 | 2.5–3.5 | 2.0–4.0 | ... | 0.6–1.4 | 0.6–1.4 |
| Manganese | 0.15–0.7 | 0.15–0.7 | 0.15–0.7 | 0.50–1.3 | 0.20–1.0 | 0.20–1.0 |
| Silicon | 0.10 | 0.30 | 0.30 | 0.05 | 0.10 | 0.05 |
| Copper | 0.02 | 0.05 | 0.10 | 0.02 | 0.05 | 0.04 |
| Nickel | 0.002 | 0.003 | 0.003 | 0.001 | 0.005 | 0.0010 |
| Iron | 0.003 | 0.003 | 0.003 | 0.03 | 0.005 | 0.002 |
| Calcium | ... | ... | ... | ... | 0.04 | 0.04 |
| Other metallic impurities, each | | | | 0.05 | ... | 0.01 |
| Others, total | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Magnesium | remainder | remainder | remainder | remainder | remainder | remainder |

^ALimits are given as maximum weight percent unless shown as a range.

^BAlloys AZ63B, AZ63C, and AZ63D are commonly known as H1A, H1B, and H1C, respectively.

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