

DEOXIDIZER, ACIDIC, FOR MAGNESIUM ALLOYS

1. SCOPE:

1.1 Form: This specification covers an acidic deoxidizer in the form of a liquid.

1.2 Application: Primarily for removing oxides and corrosion from magnesium alloys.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) 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 2350 - Standards and Test Methods

AMS 4377 - Magnesium Alloy Sheet and Plate, 3.0Al - 1.0Zn (AZ31B - H24)

2.2 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Specifications:

MIL-P-25690 - Plastic, Sheets and Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant

2.2.2 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

AMS documents are protected under United States and international copyright laws. Reproduction of these documents by any means is strictly prohibited without the written consent of the publisher.

### 3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall be optional with the manufacturer but shall yield a product conforming to the requirements of 3.2.

3.2 Properties: Deoxidizer shall conform to the following requirements; tests shall be conducted in accordance with specified test methods on the product at the lowest use dilution recommended by the manufacturer, unless otherwise specified:

3.2.1 Oxide Removing Ability: The deoxidizer shall remove oxide from magnesium alloy surfaces as well as, or better than, the control formula of 3.2.1.1.1, determined in accordance with 3.2.1.1.

3.2.1.1 Clean six AMS 4377 magnesium alloy specimens of convenient size by wiping with a clean cloth wet with methyl ethyl ketone or other suitable solvent. Immediately immerse three of the six specimens in the deoxidizer solution maintained at the midpoint of the manufacturer's recommended operating temperature range. When manufacturer makes no recommendation on temperature, the deoxidizer solution shall be maintained at  $90^{\circ}\text{C} \pm 3$  ( $195^{\circ}\text{F} \pm 5$ ). Immerse the other three remaining specimens in the control solution of 3.2.1.1.1. The test solution and the control solution shall not be agitated during the immersion period. After 60 sec  $\pm$  15, remove the specimens from the solutions. Flush surfaces of the specimens with flowing tap water followed by rinsing with flowing distilled or deionized water. Allow specimens to air dry. Visually compare the degree of oxide removal from the specimens immersed in the deoxidizer solution with the specimens immersed in the control solution.

3.2.1.1.1 Deoxidizer Control Solution: Shall be a solution containing 165 - 195 g chromium trioxide ( $\text{CrO}_3$ ) per litre of solution dissolved in distilled or deionized water and operated at  $90^{\circ}\text{C} \pm 3$  ( $195^{\circ}\text{F} \pm 5$ ).

3.2.2 Etch Rate on Magnesium Alloy: The deoxidizer, tested in accordance with 3.2.2.1, shall not remove more than 10 mg from any single test specimen.

3.2.2.1 Clean three AMS 4377 magnesium alloy specimens, approximately 0.040 x 1 x 2 in. (1 x 25 x 50 mm), by wiping with a clean cloth wet with methyl ethyl ketone or other suitable solvent. Allow specimens to air dry. Weigh each specimen to the nearest 0.1 milligram. Immerse specimens for 30 min.  $\pm$  0.25 in 500 mL of deoxidizer solution maintained at the highest temperature of the manufacturer's recommended operating range. When manufacturer makes no recommendation on temperature, the deoxidizer solution shall be maintained at  $90^{\circ}\text{C} \pm 3$  ( $195^{\circ}\text{F} \pm 5$ ). Test solution shall not be agitated during the immersion period. Remove specimens and immediately flush residual deoxidizer solution from the specimen surfaces with flowing tap water, followed by rinsing with flowing deionized or distilled water. Allow to air dry. Reweigh specimens and calculate weight loss of each specimen.

#### 4. QUALITY ASSURANCE PROVISIONS:

- 4.1 Responsibility for Inspection: The vendor of the deoxidizer 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 4.5. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the deoxidizer conforms to the requirements of this specification.
- 4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and as preproduction tests and shall be performed on or prior to the initial shipment of deoxidizer to a purchaser, on each lot, when a change in material or processing, or both, requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.
- 4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.
- 4.3 Sampling: Sufficient deoxidizer shall be taken at random from each lot to perform all required tests. The number of samples for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three. A lot shall be all deoxidizer manufactured at one time from one group of raw materials and presented for vendor's inspection at one time.
- 4.4 Approval:
- 4.4.1 Sample deoxidizer shall be approved by purchaser before deoxidizer for production use is supplied, unless such approval be waived by purchaser. Results of tests on production deoxidizer shall be essentially equivalent to those on the approved sample.
- 4.4.2 Vendor shall use ingredients, manufacturing procedures, and methods of inspection on production deoxidizer which are essentially the same as those used on the approved sample deoxidizer. If necessary to make any change in ingredients or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material or processing, or both, and, when requested, sample deoxidizer. Production deoxidizer made by the revised procedure shall not be shipped prior to receipt of reapproval.
- 4.5 Reports: Unless waived by purchaser, the vendor of the deoxidizer shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, AMS 1538, manufacturer's identification, lot number, and quantity.