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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 4815E

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Superseding AMS 4815D

BEARINGS, SILVER PLATED
Steel Back

1. SCOPE:

1.1 Form: This specification covers bearings of low-carbon steel plated on one or both faces with silver.

1.2 Application: Primarily for shims, thrust washers, bushings, and bearings.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications 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 2259 - Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2350 - Standards and Test Methods
AMS 2370 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Wrought Products Except Forgings and Forging Stock
AMS 2800 - Identification, Finished Parts

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B571 - Adhesion of Metallic Coatings
ASTM E350 - Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron
ASTM E378 - Spectrographic Analysis of Silver by the Powder Technique

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

2.3.1 Military Standards:

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

2.4 ANSI Publications: Available from American National Standards Institute, 1430 Broadway, New York, NY 10018.

ANSI B46.1 - Surface Texture

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

3.1.1 Basis Steel: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E350 or by spectrographic or other analytical methods approved by purchaser:

	min	max
Carbon	0.10	0.25
Manganese	0.30	1.00
Phosphorus	--	0.040
Sulfur	--	0.050

3.1.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2259.

3.1.2 Plate: Shall be plated silver having a minimum purity of 99.9%, determined by spectrographic methods in accordance with ASTM E378 or by other methods agreed upon by purchaser and vendor.

3.2 Condition: Shall be a composite material produced by electrodeposition of silver to one or both faces of a carbon-steel backing.

3.3 Procedure:

3.3.1 Preparation:

3.3.1.1 Texture of surfaces to be plated, prior to cleaning, shall be not rougher than 80 microin. (2.0 μm), determined in accordance with ANSI B46.1.

3.3.1.2 Bearings having hardness higher than 55 HRC in any area which is ground before plating shall be suitably stress relieved between grinding and cleaning for plating.

3.3.1.3 Bearings shall be clean when immersed in plating solutions.

3.3.2 Plating:

3.3.2.1 Electrical contacts shall be made in such manner as will ensure that no chemical or immersion deposition will occur.

3.3.2.2 Plating of bearings shall be conducted in the following sequence: nickel strike, unless copper strike is specified by purchaser, silver strike, and silver plate.

3.3.3 Heating: Bearings shall be heated as follows after plating:

3.3.3.1 Nickel Strike: Bearings shall be heated to 940° - 960°F (505° - 515°C) and held at heat for 20 - 60 minutes. Temperature of the bearings shall not be over 400°F (205°C) for more than 7 hr; above 400°F (205°C) the heating and cooling medium shall be either a neutral or reducing atmosphere or a neutral or non-oxidizing molten salt bath.

3.3.3.2 Copper Strike: Bearings shall be heated to 325° - 500°F (165° - 260°C) and held at heat for not less than 2 hr, unless such heating would reduce hardness below drawing limits, in which case heating shall be at the highest practicable temperature which will maintain specified properties. Heating medium shall be such as will prevent harmful oxidation.

3.4 Properties: Bearings shall withstand, before and after heating, a shear or chisel test to indicate quality of bond, conducted in accordance with ASTM B571. Silver shall shear away with no parting of plate and basis metal.

3.5 Quality: Bearings, 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 bearings.

3.5.1 Plate shall be firmly and continuously bonded to the steel backing. Bearings, after heating as in 3.3.3, shall show no blisters or other indications of poor bond.

3.5.2 Silver plate which is not subsequently machined shall be smooth, continuous, uniform in color, and free from blisters and other defects. Boundaries between plated and unplated areas shall be sharply defined.

3.5.3 Silver plate which is to be machined shall be sound and free from excessive nodulation or treeing at edges, visible pits, excessive porosity, and other defects.

3.5.4 Inspection standards and procedures shall be as agreed upon by purchaser and vendor.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of bearings shall supply all samples for vendor's test 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 bearings conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for basis steel composition (3.1.1) and quality (3.5) are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for plate composition (3.1.2) and bond properties (3.4) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the first-article shipment of a bearing to a purchaser, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.3.1 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: Shall be in accordance with the following; a lot shall be all bearings of one size and configuration made from a single heat of steel backing processed in one run and presented for vendor's inspection at one time:

4.3.1 Steel Backing: AMS 2370.

4.3.2 Silver Plate: As agreed upon by purchaser and vendor.

4.3.3 Bearings: Three samples from each lot.

4.4 Approval:

4.4.1 Sample bearings shall be approved by purchaser before bearings for production use are supplied, unless such approval be waived by purchaser.

4.4.2 Vendor shall use materials, manufacturing procedures, processes, and methods of inspection on production bearings which are essentially the same as those used on the approved sample bearings. If necessary to make any change in materials, manufacturing procedures, or processing, vendor shall submit for reapproval a statement of the proposed changes in material, processing, or both and, when requested, sample bearings. Production bearings made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports: The vendor of bearings shall furnish with each shipment a report showing the results of tests for chemical composition of each heat of steel backing. This report shall include the purchase order number, lot number, AMS 4815E, part number, and quantity.