SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS4820 | REV. E

Issued 1940-01
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Reaffirmed 2012-02

Superseding AMS4820D

Bearings, Leaded Copper
70Cu - 28.5Pb
Steel Back

(Composition similar to UNS C98400)

RATIONALE

AMS4820E has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Form:

This specification covers bearings of leaded copper cast on one or both faces of a steel backing.

1.2 Application:

Primarily for shims, thrust washers, bushings, and bearings.

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, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2370	Quality Assurance Sampling of Carbon and Low-Alloy Steels, Wrought Products Except Forgings and Forging Stock
AMS 2800	Identification, Finished Parts

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http://www.sae.org/technical/standards/AMS4820E

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM E 18	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 478	Chemical Analysis of Copper Alloys

3. TECHNICAL REOUIREMENTS:

3.1 Composition:

3.1.1 Bearing Metal: Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 478, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

TABLE 1 – Composition

Element	min	max
Lead	26.0	33.0
Silver	--	1.5
Iron	--	0.7
Zinc	--	0.50
Tin	--	0.50
Nickel	--	0.50
Antimony	--	0.50
Phosphorus	--	0.10
Copper	--	(see 3.1.1.2)
Sum of named elements (3.1.3)	99.5	

3.1.1.1 These composition limits do not preclude the presence of other elements. Limits may be established and analysis required for unnamed elements by agreement between the manufacturer or supplier and purchaser.

3.1.1.2 Copper may be reported as “remainder”, or as the difference between the sum of results for all elements and 100%, or as the result of direct analysis.

3.1.1.3 When all elements in the table are analyzed, the sum shall be 99.5% minimum, but such determination is not required for routine acceptance of each lot.

3.1.2 Backing: Shall be a low-carbon steel.

3.2 Condition:

Shall be a composite material produced by casting leaded copper onto one or both faces of a steel backing.

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3.3 Properties:

Bearings shall conform to the following requirements:

3.3.1 Hardness: Steel backing shall have hardness not higher than 78 HR15N, or equivalent, determined in accordance with ASTM E 18.

3.3.2 Cladding Structure: Shall be free of excessive lead segregation. Methods of testing and standards for acceptance shall be as agreed upon by purchaser and vendor.

3.4 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.

3.4.1 Cladding shall be firmly and continuously bonded to the steel backing, determined by a procedure 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 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 bearings conform to specified requirements.

4.2 Classification of Tests:

All technical requirements of this specification are acceptance tests and preproduction tests and shall be performed prior to or on the first-article shipment of a bearing to a purchaser, on each lot, when a change in material and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling:

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

4.3.1 Steel Backing: In accordance with AMS 2370.

4.3.2 Bearing Metal: Two samples from each heat of alloy melted at the same time.

4.3.3 Bearings: Three samples from each lot.

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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 and/or processing 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, hardness, and cladding structure. This report shall include the purchase order number, heat and lot numbers, AMS 4820E, part number, and quantity for each lot.

4.6 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the parts may be based on the results of testing two additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the parts represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Bearings shall be identified in accordance with AMS 2800.

5.1.2 Bearings shall be protected, during shipment and storage, by coating with a suitable corrosion-preventive compound which is readily removable by hydrocarbon solvents.

5.1.3 Bearings having different part numbers shall be packed in separate containers.

5.1.4 Each container of bearings shall be marked with not less than the following information:

BEARINGS, LEADED COPPER, STEEL BACK
AMS 4820E
PART NUMBER _____
PURCHASE ORDER NUMBER _____
QUANTITY _____
MANUFACTURER"S IDENTIFICATION _____

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