

MIL-B-13501C(MI)
30 September 1986
SUPERSEDING
MIL-B-13501B(MI)
26 October 1976

MILITARY SPECIFICATION

BEARINGS AND BUSHINGS, BRASS AND BRONZE, MACHINED OR FORMED

This specification is approved for use within U.S. Army Missile Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers bearings and bushings of brass and bronze, machined or formed.

1.2 Classification. The bearings and bushings shall be of the following compositions (see 6.2):

Composition A
Composition B
Composition C

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless other specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Missile Command, ATTN: AMSMI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5276, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 3120

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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SPECIFICATIONS

FEDERAL

PPP-B-585	Box, Wood, Wirebound
PPP-B-601	Boxes, Wood, Cleated - Plywood
PPP-B-636	Box, Shipping, Fiberboard

MILITARY

MIL-P-116	Preservation, Methods of
MIL-P-14232	Parts, Equipment and Tools for Army Materiel, Packaging of

STANDARDS

FEDERAL

FED-STD-151	Metals, Test Methods
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MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless other specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D3951	Packaging, Commercial
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(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103).

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(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Chemical composition. The chemical composition of the bearings and bushings shall meet the requirements in Table I.

TABLE I. Chemical Requirements (Percent)

Composition	Copper	Tin	Lead	Zinc	Iron Max	Phosphorus	Total Other Elements Max
A	88.0-92.0*	0.25-0.75*	-	Remainder	0.1	-	0.2
B	Remainder	3.5-4.5*	3.5-4.5*	1.5-4.0*	0.1	-	0.2
C	Remainder	3.5-5.8*	0.05 max	0.3 max	0.1	0.03-0.35*	-

* See 3.1.1

3.1.1 Chemical analysis. The supplier shall furnish a chemical analysis of the bearings and bushings showing the percentage of the elements designated in table I. The analysis shall be made regularly for the elements specifically designated by an asterisk in table I. If, however, the presence of other named elements is suspected or indicated in the course of routine analysis, further analysis shall be made to determine that the other named elements are not in excess of the limits specified. If other named elements are outside the limits specified in table I, they shall constitute a cause for rejection.

3.2 Dimensions and tolerances. Except as provided in 3.2.1, bearings and bushings shall meet such dimensions and tolerances as shown on the applicable drawings (see 6.2).

3.2.1 Finishing after assembly. When specified, bearings and bushings shall be furnished with sufficient stock on the bearing surfaces for finish boring and reaming after assembly.

3.3 Oil grooves. Oil grooves of bearings and bushings shall be as specified on applicable drawings or as agreed upon by the purchaser and the supplier (see 6.2).

3.4 Hardness. The hardness of the bearings shall be specified on the drawings.

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3.5 Graphited bearings and bushings. When specified, bearings and bushings shall be furnished with graphite filled indentations or grooves on the bearing surface. The graphite shall be firmly adherent to the surface. The size, shape, and location of indentations or grooves shall be specified in the contract or on the applicable drawings.

3.6 Cylindrical bushings. Unless otherwise specified, full cylindrical bushings shall be formed from tubing or from flat strip with a butt joint parallel to the longitudinal axis of the bushing.

3.7 Workmanship. Bearings and bushings shall be of uniform quality and structure and shall be free from defects such as dirt, dross, oxides, porous or spongy spots, shrinkage cavities, cracks, cold-shuts, blow-holes, hard spots, blisters, or other injurious defects.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Lot. A lot shall consist of bearings or bushings of the same composition, construction, design and size submitted for delivery at the same time.

4.3 Inspection. Dimensional and visual inspection for lot acceptance shall be in accordance with MIL-STD-105, with classification of defects and acceptable quality level to be furnished by the procuring activity (see 6.2).

4.4 Preparation for delivery examination. Preservation, packing, and marking for shipment and storage shall be examined to determine compliance with section 5.

4.5 Test methods.

4.5.1 Chemical analysis. Sampling and testing for chemical analysis shall be in accordance with FED-STD-151, Method 111.1 or 112.1.

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4.5.2 Hardness tests. One bearing or bushing from each 500 or portions thereof, but not less than two bearings or bushings from each lot, shall be tested for hardness in accordance with FED-STD-151.

5. PACKAGING

5.1 Preservation. Preservation shall be level A, B or Commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Preservation and unit packing. Bearings and bushings which are not graphite filled, shall be cleaned by process C-5, dried, coated with preservative compound conforming to type P-2, and packed individually in accordance with method IC-2, of MIL-P-116. Graphite filled bearings and bushings shall be packed individually in accordance with method IC-2 of MIL-P-116. Unit containers for method IC-2 shall conform to PPP-B-636, class domestic box closure shall be as specified in the applicable specification or appendix thereto.

5.1.1.2 Intermediate packing. Unit-packed bearing and bushings shall be placed in an intermediate container conforming to PPP-B-636 class weather-resistant. The quantity of unit packs to be placed in the intermediate container shall be in accordance with instructions furnished by the purchasing agency (see 6.2).

5.1.2 Level B. When Level B is specified in contract or purchase order and detailed packing requirements defining the package are not provided with the contract or purchase order, the item shall be packed in accordance with the requirements for Level A and MIL-P-14232.

5.1.3 Commercial. Unit packing shall be in accordance with ASTM D3951.

5.2 Packing. Packing shall be Level A, B or Commercial as specified (see 6.2).

5.2.1 Level A. Bearings and bushings preserved as specified in 5.1 shall be packed in overseas type shipping containers conforming to PPP-B-585, or PPP-B-601. Exterior containers shall be uniform in shapes and size, of minimum cube and tare consistent with the protection required, and contain identical quantities. Containers shall be closed and strapped as specified in the applicable specification or appendix thereto. The gross weight shall not exceed 200 pounds.

5.2.2 Level B. Bearings and bushings preserved as specified (see 6.2) shall be packed in domestic type exterior containers conforming to PPP-B-585, PPP-B-591, or PPP-B-636. Exterior containers shall be of minimum cube and tare consistent with the protection required. As far as practical, exterior containers shall be of uniform shape and size and contain identical quantities. Containers shall be closed and strapped as specified in the applicable specification or appendix thereto. Gross weight shall not exceed 200 pounds or as specified by the container specification.

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5.2.3 Commercial. Packing shall be in accordance with ASTM D3951.

5.3 Marking. In addition to any other marking required by the contract or order, interior and exterior shipping containers shall be marked as specified in MIL-STD-129.

6. NOTES

6.1 Intended use. Bearings and bushings covered by this specification are intended for use in application as follows:

Alloy A (wrought solid brass) is hard, strong, and has good fatigue resistance. It is used in applications for intermediate load oscillating motion such as tie rods, brake shafts, etc. Alloy B (wrought solid bronze) is a general purpose bearing material, good shock and load capacity, is high temperature resistant, hard shaft desirable, and less score resistant than the alloys containing higher lead content. Used for moderate to high loads, such as transmission brushings and thrust washers, piston, pin bushings, etc. Alloy C (wrought or cast bronze) has heavy load carrying capacity, low coefficient of friction, good resistance to abrasion and is nonmagnetic. Used for pinion bearings and general machine bushings.

6.2 Ordering data. Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Composition of the bearings or bushing liner (see 1.2 and 3.1.1).
- (c) Drawings, when necessary, giving required dimensions, tolerances, hardness, and design details (see 3.2 and 3.2).
- (d) Selection of Level A, B or Commercial preservation and packing (see 5.1 and 5.2).
- (e) Classification of defects and AQL desired (see 4.3).
- (f) Marking requirements in addition to 5.3, if other.

6.3 Oil grooving. Care should be used in designing oil grooves to insure that they can be produced commercially on an economical basis. Generally, simple straight grooves with well chamfered edges located in an unloaded area of the bearing or bushing should be adhered to.

6.4 Subject term (key word) listing.

Bearing
Bushings

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6.5 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army-MI

Preparing Activity:
Army-MI

Review Activities:
Army-SM
DLA-IS

Project No. 3120-A001

User Activity:
Army-ME

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE		
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	