

INCH - POUND

MIL-B-13501D (MI)

11 February 1991

MIL-B-13501C (MI)

30 September 1986

MILITARY SPECIFICATION

BEARINGS AND BUSHINGS, BRASS AND BRONZE, MACHINED OR FORMED

This specification is approved for use by the 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.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standard, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Missile Command, ATTN: AMSMI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5270 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

DISTRIBUTION STATEMENT A.
is unlimited.

FSC 3120

Approved for public release; distribution

MIL-B-13501D (MI)**SPECIFICATIONS****FEDERAL**

PPP-B-585	-	Boxes, Wood, Wirebound
PPP-B-591	-	Boxes, Fiber Board, Wood-Cleated
PPP-B-601	-	Boxes, Wood, Cleated - Plywood
PPP-B-636	-	Boxes, Shipping, Fiberboard

MILITARY

MIL-P-116	-	Preservation, Methods of
-----------	---	--------------------------

STANDARDS**FEDERAL**

FED-STD-151	-	Metals, Test Methods
-------------	---	----------------------

MILITARY

MIL-STD-129	-	Marking for Shipment and Storage
MIL-STD-1190	-	Minimum Guidelines for Level C Preservation, Packing and Marking

(Unless otherwise indicated, copies of the federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Ave., Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.4.

3.2 Chemical composition. The chemical composition of the bearings and bushings shall be in accordance with the requirements specified in table I (see 6.2).

MIL-B-13501D (MI)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 3.2.1

MIL-B-13501D (MI)

3.2.1 Chemical analysis. Chemical analysis as specified in the contract or order shall be furnished showing the percentage of the elements designated in table I (see 4.6.1). If during the course of routine analysis, the presence of other named elements is suspected or indicated, further analysis shall be made to determine that the elements are not in excess of the limits specified. Other elements in excess of the limits specified in table I shall be cause for rejection.

3.3 Dimensions and tolerances. Dimensions and tolerances for bearings and bushings shall be as specified on the applicable drawings (see 6.2) unless otherwise specified (see 3.3.1).

3.3.1 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.

3.4 Oil grooves. Oil grooves of bearings and bushings shall be as specified on applicable drawings or as specified in the contract or order (see 6.2).

3.5 Hardness. The hardness of the bearings shall be specified on the applicable drawings (see 4.6.2).

3.6 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.

3.7 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.

3.8 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 (examinations and tests) 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

MIL-B-13501D (MI)

4.1.1 Responsibility for compliance. All items shall 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 ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4).
- b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.4, 4.5 and 4.6.

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

4.4 First article inspection. When specified in the contract or order (see 6.2), a first article sample shall be subjected to first article inspection. Subsequent units shall not be considered for acceptance until Government approval of the first article sample has been obtained.

4.5 Quality conformance inspection. Quality conformance inspections shall be as specified in table II.

Table II. Quality conformance inspection.

INSPECTION	REQUIREMENT PARAGRAPH	TEST PARAGRAPH
Chemical Analysis	3.2.1	4.6.1
Dimensions and tolerances	3.3	4.5.1
Hardness test	3.5	4.6.2
Workmanship	3.8	4.5.1

4.5.1 Inspection. Dimensional and visual inspection of samples shall be conducted to determine compliance with the requirements specified in 3.3 and 3.8.

4.6 Test methods.

MIL-B-13501D (MI)

4.6.1 Chemical analysis. Sampling and testing for chemical analysis shall be in accordance with FED-STD-151, Method 111.1 or 112.1 (see 3.2.1).

4.6.2 Hardness tests. Unless otherwise specified, one bearing or bushing from each 500 or portion thereof, but not less than two bearings or bushings from each lot shall be tested for hardness in accordance with FED-STD-151.

4.7 Inspection of packaging. The sampling and inspection of the preservation and interior package marking shall be in accordance with groups A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of packing for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specifications shown in section 5. The inspection of marking for shipment and storage shall be in accordance with MIL-STD-129.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or C 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 bearings 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 C. Level C preservation shall be in accordance with MIL-STD-1190.

5.2 Packing. Packing shall be Level A, B or C 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 be not greater than 200 pounds.

5.2.2 Level B. Bearings and bushing preserved as specified (see 6.2) shall be packed in domestic type exterior container conforming to PPP-B-585, PPP-B-591, or PPP-B-636.

MIL-B-13501D (MI)

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 be not greater than 200 pounds or as specified by the container specification.

5.2.3 Level C. Level C packing shall be as specified in MIL-STD-1190.

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

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Bearings and bushings covered by this specification are intended for use as follows (see 3.2):

a. Alloy A (wrought solid brass) is hard, strong, and has good fatigue resistance. It is used in applications of intermediate load oscillating motion such as tie rods, brake shafts, etc.

b. 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 contents. Used for moderate to high loads, such as transmission bushings and thrust washers, piston, pin bushings, etc.

c. Alloy C (wrought or cast bronze) has heavy load carrying capacity, low coefficient of friction, good resistance to abrasion and is non magnetic. Used for pinion bearings and general machine bushings.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of the specification

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1)

c. Chemical composition of the bearings or bushing (see 3.2)

d. Drawings, when required, providing dimensions, tolerances, hardness, and other design details (see 3.3, 3.5 and 3.6).

e. When first article is required (see 3.1 and 4.4)

MIL-B-13501D (MI)

- f. First article sample size (see 4.4)
- g. Levels of preservation, packing and marking (see section 5).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerers whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory and the number of items to be tested as specified in 4.4. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 Metrication. Wherever inch/pound dimensions are used in this document, metric equivalents in accordance with FED-STD-376 are acceptable.

6.5 Subject term (keyword) listing.

Sleeve, copper alloy
Tube, copper alloy

6.6 Changes from previous issue. Marginal notations 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 activity:
Army - SM
DLA - IS

User Activity:
Army - ME

Project No. 3120 - A002

Filename: 13501D.DOC
Directory: A:
Template: C:\WINWORD\NORMAL.DOT
Title:
Subject:
Author: Jim Patton
Keywords:
Comments:
Creation Date: 11/24/95 8:09 AM
Revision Number: 12
Last Saved On: 04/08/96 11:28 AM
Last Saved By: Preferred Customer
Total Editing Time: 80 Minutes
Last Printed On: 04/10/96 7:51 AM
As of Last Complete Printing
Number of Pages: 8
Number of Words: 2,050 (approx.)
Number of Characters: 11,689 (approx.)