

INCH-POUND

MIL-B-6039E
23 Mar 94
SUPERSEDING
MIL-B-6039D
12 Oct 84
SUPERSEDING
MIL-B-6039C
7 Jul 71

MILITARY SPECIFICATION

BEARINGS, BALL, ROD END, DOUBLE ROW, SELF-ALIGNING

This specification is approved for use by all departments
and agencies of the Department of Defense

1. SCOPE

1.1 Scope. This specification covers sealed, self-aligning, anti-friction, rod end ball bearings with application in temperature ranges (1) -65°F to 250°F and (2) -65°F to 300°F with 20% reduction of dynamic load carrying capacity.

1.2 Classification. The bearings shall be of the following types, as specified (see 6.2):

- Type I - Bearing, ball, solid shank, rod end (MS 21150)
- Type II - Bearing, ball, external thread, rod end (MS 21151)
- Type III - Bearing, ball, hollow shank, rod end (MS 21152)
- Type IV - Bearing, ball, internal thread, rod end (MS 21153)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: (WR-ALC, ATTN.: LKJE, 460 2nd St, STE 221, Robins AFB, GA. 31098-1640) by using the self-addressed Standardization Document Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 3110

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

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue 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)

SPECIFICATIONSMILITARY

MIL-P-197	Bearings, Anti-Friction, Associated Parts and Sub-assemblies, Preparation for Delivery of
MIL-B-1083	Balls, Bearing, Ferrous and Non-Ferrous (for use in bearings and valves)
MIL-S-8879	Screw Threads, Controlled Radius Root with Increased Minor Diameter; General Specification for
MIL-G-23827	Grease, Aircraft and Instrument, Gear and Actuator Screw
MIL-G-81322	Grease, Aircraft General Purpose, Wide Temperature Range

STANDARDSFEDERAL

FED TEST METHOD STD NO. 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
MIL-STD-202	Test Methods for Electronic and Electrical Components
MIL-STD-1949	Inspection, Magnetic Particle
MS 21150	Bearing, Ball, Rod End, Double Row, Precision, Solid Shank, Self-Aligning, Airframe, Type I, -65°F to 300°F
MS 21151	Bearing, Ball, Rod End, Double Row, Precision,

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External Thread, Self-Aligning, Airframe, Type II,
-65°F to 300°F

MS 21152 Bearing, Ball, Rod End, Double Row, Precision, Hollow
Shank, Self-Aligning, Airframe, Type III, -65°F to
300°F

MS 21153 Bearing, Ball, Rod End, Double Row, Precision,
Internal Thread, Self-Aligning, Airframe, Type IV,
-65°F to 300°F

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN.: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DODISS - Department of Defense Index of Specifications and Standards.

United States Government Printing Office (GPO) Style Manual.

(Copies of the DODISS are available on a yearly subscription basis either from the Government Printing Office hard copy, or microfiche copies are available from the director, Navy publications and Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111-5093. Copies of the GPO Style Manual are available from the Superintendent of Documents, U.S Government Printing Office, Washington DC 20402-0001.)

(Copies of specifications, standards, handbooks, drawings, publications, and other Government documents 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 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

AMS 2417 Plating, Zinc - Nickel Alloy

(Application for copies of the above publication should be addressed to SAE International, 400 Commonwealth Drive, Warrendale, PA. 15096-0001.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B46.1 Surface Texture (Surface Roughness, Waviness and lay.)

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(Copies of the above publication may be obtained from the American National Standards Institute, ATTN.: Sales Dept., 1430 Broadway, New York, NY 10018-3363.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), 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 Military Standards (MS). The individual item requirements shall be specified herein and in accordance with the applicable MS sheets. In the event of any conflict between the requirements of this specification and the MS sheet, the latter shall govern.

3.1.1 Product change. Any change in product design, including raceway geometry or dimensions, rolling element dimensions, rolling element quantity, seals, materials or plant location shall be reported to the qualifying activity and will require requalification of the product to an extent determined by the qualifying activity. Any other specific changes which must be brought to the qualifying activity's attention will be identified in the qualification notification letter.

3.1.2 Product manufacture. The bearing manufacturer shall be capable of performing the preponderance of manufacturing operations in-house, but may subcontract these operations at its option. Component inspection shall be performed at the plant listed on the Qualified Products List. If manufacturing operations are performed in more than one plant, the manufacturer's additional plant(s) shall be reported to the qualifying activity. The manufacturer is responsible for meeting all requirements of the specification and for the quality of the end product, whether it is manufactured totally in-house or some of the operations are performed by a subcontractor. Inherent in the responsibility for the end product is the responsibility to verify that the subcontractors processes meet specification requirements. A change in subcontractor need not be reported to the qualifying activity unless specifically identified in the qualification notification letter. (NOTE: Bearings partly or completely manufactured in foreign countries shall be subject to the laws and procurement regulations pertaining to acquisition of foreign made products.)

3.2 Qualifications. The bearings furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4 and 6).

3.3 Material. The bearing shall conform to materials as listed on MS 21150, MS 21151, MS 21152, or MS 21153, as applicable (see 6.2b). Recycled and recovered raw materials should be used to the maximum extent possible in lieu of virgin raw materials as long as these materials do not jeopardize the intended use and fully comply with all contract requirements. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not

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specified herein shall be of the same quality used for the intended purpose in commercial practice. None of the above shall be interpreted to mean that the use of used or rebuilt products will be allowed.

3.4 Design and construction. Only factory new bearings, as specified herein, shall be furnished. Details of the working parts shall be optional.

3.4.1 Rings. The outer ring shall be of single-piece construction with the rod end shank. The inner ring shall be of a single-piece construction.

3.4.2 Balls. Balls shall meet the requirements of MIL-B-1083, Grade 24.

3.4.3 Threads. Threads shall conform to UNJF-3A and UNJF-3B in accordance with MIL-S-8879. External threads shall be fully formed by a single rolling process after final heat treat. Internal threads may be machined.

3.4.4 Dimensions and tolerances. Dimensions and tolerances shall be in accordance with the applicable MS.

3.4.5 Shank alignment. The point representing the center of self-alignment motion shall be coincident with the axis of the rod end within 0.010 inch.

3.4.6 Weight. The weight of the bearing shall be as specified on the applicable MS.

3.4.7 Finish. All external surfaces of the rod end, excluding the bore and seal retainer, shall be Zn-Ni plated in accordance with AMS 2417 Type 2. All external unthreaded surfaces shall have a plating thickness of 0.0003 to 0.0006 inches. External threaded surfaces shall have a plating thickness range of 0.0002 to 0.0005 inches.

3.4.8 Identification of products. Bearings shall be permanently and legibly marked with the manufacturer's name and part number. The individual bearing package and container shall be marked with the complete MS part number, and the manufacturer's name and part number, and date of lubrication in accordance with MIL-STD-129.

3.4.9 Hardness. The inner ring and balls shall be through-hardened and shall have a hardness as specified on the applicable MS. The outer raceways shall be case hardened, and the hardness on the surface shall be as specified on the applicable MS. The effective case depth shall be from a minimum of 25% to a maximum of 50% of the ring thickness. The rod end shank shall have a hardness of HR_B 92.5 min. to HR_C 34 max. and the banjo head O.D. shall have a hardness of HR_C 32 to 48.

3.4.10 Surface roughness. The sides of the inner ring shall have a smooth machine finish that will not exceed 63 microinches (AA). Otherwise, the surface roughness shall be as specified on the applicable MS.

3.4.11 Seals. The seals shall be capable of withstanding the test requirements as specified in 4.5.4.1 without failure. After completion of the dust test specified in 4.5.4.2, the bearings shall meet the following requirements:

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a. Starting torque increase no more than 100 percent over the initial measured value.

b. Radial play increase no more than 50 percent over the initial measured value.

3.4.12 Lubrication. The bearing shall be thoroughly cleaned prior to lubrication. Grease conforming to MIL-G-81322 or MIL-G-23827 shall be injected into the bearing, filling the bearing voids 80% minimum full. The bearing bore and the inside diameter of hollow or internally threaded shanks shall also be coated with MIL-G-81322 or MIL-G-23827 Grease. The bearing shall have not been lubricated more than 24 months prior to date of delivery of the bearing under contract. The bearing shall be coated with the same grease that is packed in the bearing.

3.4.13 Stability. The bearing components shall be dimensionally stable for operation at the temperature specified on the applicable MS and shall be tested as specified in 4.5.6.

3.5 Performance.

3.5.1 Internal play (qualification). Radial and axial play, measured before the radial and axial limit load rating tests (4.5.7 and 4.5.8), shall not exceed the limits as specified on the applicable MS.

3.5.2 Internal play (acceptance). The radial play and axial play shall be within the limits specified on the applicable MS.

3.5.3 Radial strength.

3.5.3.1 Radial limit load rating. The bearing shall have a radial limit load rating of not less than the values specified on the applicable MS.

3.5.3.2 Radial fracture load. The minimum static fracture load shall be not less than 1-1/2 times the radial limit load value specified on the applicable MS.

3.5.4 Axial strength.

3.5.4.1 Axial limit load rating. The bearing shall have an axial limit load rating of not less than the values specified on the applicable MS.

3.5.4.2 Axial fracture load. The minimum static fracture load shall be not less than 1-1/2 times the axial limit load value specified on the applicable MS.

3.5.5 Radial dynamic load rating. When tested in accordance with 4.5.13, the bearing shall have a radial dynamic load rating of not less than the value specified on the applicable MS.

3.5.6 Bearing starting torque. The amount of torque required to begin rotation of the bearing shall be measured as specified (see 4.5.15). Starting torque shall be within the maximum allowable values as specified on the applicable MS.

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3.6 Workmanship. Part shall not contain sharp edges, burrs, loose chips, dirt, or other foreign matter. The raceways and balls shall be free of tool marks, galling, and scratches after assembly.

4. QUALITY ASSURANCE PROVISION

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any other commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspection 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 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.

4.1.2 Test records. The manufacturer shall maintain a record showing quantitative results of all tests performed to the requirements of this specification. This record shall be available to the purchaser and shall be signed by an authorized representative of the manufacturer or the testing laboratory, as specified.

4.2 Classification of inspections. The examination and testing of the bearing shall be classified as:

- a. Qualification inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall consist of all the examination and tests specified under 4.5 and in accordance with Table I.

4.3.1 Test samples. Unless otherwise specified by the qualifying activity, representative sizes for qualification testing of bearings in all associated MS standards shall be represented by MS 21151-2, MS 21151-8, and MS 21151-10. The 32 samples shall be identified with the manufacturers part number and such other information as required by the procuring activity (see 6.3).

4.4 Quality conformance inspection. Quality conformance inspection shall consist of individual tests and sampling tests.

4.4.1 Individual tests. The individual tests shall consist of the examination of product and 100% magnetic particle inspection of banjo portion of bearing in accordance with MIL-STD-1949.

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4.4.2 Sampling tests. The sampling tests shall consist of the tests of 4.5 except 4.5.4, 4.5.6, 4.5.9, 4.5.10, 4.5.11, 4.5.12, & 4.5.13.

4.4.2.1 Lot. A lot shall consist of all bearings of the same type and part number manufactured under the same conditions and offered for acceptance at one time.

4.4.2.1.1 Sample for quality conformance inspection. A random sample of bearings shall be selected in accordance with MIL-STD-105, Inspection Level II, AQL 1.0, except torque shall be inspected in accordance with MIL-STD-105, Inspection Level I, AQL 0.40.

4.5 Inspection methods.

4.5.1 Examination of product. Each bearing in the sample shall be carefully examined for conformance to this specification and the applicable MS with respect to materials, construction, dimensions, tolerances, weight, finish, identification, marking and workmanship.

4.5.1.1 Magnetic particle inspection. This inspection shall be in accordance with MIL-STD-1949. The bearing outer race and shank shall be 100% magnetically inspected by both longitudinal and circular methods prior to assembly. Certification of such inspection shall be furnished with qualification sample.

4.5.1.2 Plating. Zinc - Nickel alloy plating as specified on the applicable MS shall be tested for thickness and adhesion in accordance with AMS 2417 Type 2. Two bearings of each MS size shall be tested. Failure of any bearing to conform to the applicable MS shall be cause for rejection of the represented lot.

4.5.2 Hardness. Three bearings of each MS size shall be disassembled and tested for hardness using a standard Rockwell hardness tester. The test shall be made on the rolling contact area of the inner and outer raceways and on three balls. Readings for balls shall be taken on a flat surface. Readings for rod ends exterior shall be taken on the shank and banjo head O.D. areas, except for externally threaded shanks which shall have readings taken near the approximate centerline of the shank. The hardness shall be as specified in 3.4.9; otherwise the bearing shall be rejected. The effective case depth shall be determined by the micro hardness method and shall be defined as that distance from the raceway to the point where the hardness diminishes to value less than $HR_c 50$.

4.5.3 Surface roughness. Surface roughness shall be measured in accordance with ANSI B46.1. The test shall be made on the three bearings of each MS size disassembled in 4.5.2. Any failure to comply with the surface roughness requirements of the applicable MS shall be cause for rejection.

4.5.4 Performance tests.

4.5.4.1 Seal test. Three bearings of each MS size shall be maintained at $-65^{\circ} \pm 5^{\circ}F$ for 100 hours and then at $300^{\circ} F$ for 100 hours while being rotated in the test chamber at three revolutions per minute (rpm) with no applied bearing load. The bearings shall be mounted on a horizontal shaft with the bodies held stationary. No less than 50 percent of the bearing's lubricant by weight shall

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be retained in the bearing at the end of the test.

4.5.4.2 Dust test. Three bearings of each MS size shall be subjected to the dust test. The bearings shall be tested at $77^{\circ} \pm 5^{\circ}\text{F}$ in the closed test chamber specified in 4.5.4.2.1. Duration of test shall be 100 hours for rigid bearings and 48 hours for self-aligning bearings. The bearings shall be mounted on a horizontal shaft and shall be rotated at three revolutions per minute (rpm) with no applied bearing load and with the bodies held stationary. Pre-test values of starting torque and radial play shall be recorded. Post-test measurements shall be made in the "as tested" condition. Before post-test measurement of radial clearance, seal retainers shall be removed and the bearings cleaned thoroughly and relubricated with the same type grease as originally lubricated. The bearings shall be reassembled before radial clearance is measured.

4.5.4.2.1 Test chamber requirements. The test chamber shall be cubic, 2 feet per side, and shall provide view ports for test observation. A minimum layer of 1 inch of test media shall be maintained on the chamber floor. Test chamber actuation shall provide continuous movement of dust, creating a uniform cloud which shall render test specimens not readily visible through the view ports. Test specimens shall have a minimum spacing of 3 inches from each other and from chamber walls, and the mounting shaft centerline shall be 8 to 16 inches above the chamber bottom.

4.5.4.2.2 Dust test media. Testing shall be conducted with Arizona Road Dust supplied to SAE Coarse Grade.

4.5.5 Lubrication. The lubricant shall be inspected for quality and cleanliness and shall be in conformance with the type of grease specified in 3.4.12. Lubricant manufacturer's certification and QPL listing shall be the basis for lubricant quality assurance.

4.5.6 Stabilization (qualification). Three bearings of each MS size submitted for qualification shall be tested at $250^{\circ} \pm 10^{\circ}\text{F}$ for 300 hours, allowed to return to room temperature, then measured. Any bearings that show a dimensional change of more than 0.0001 inch per inch of diameter shall be considered to have failed. The bearings shall then be cold soaked at $-65^{\circ} \pm 10^{\circ}\text{F}$ for four hours, allowed to return to room temperature, then measured. Any bearings that show a dimensional change of more than 0.0001 inch per inch of diameter from the last reading shall be considered to have failed. All measurements shall be made at room temperature and shall be made at a single reference position on the bearing outside diameter.

4.5.7 Radial play. Five bearings of each MS size shall be tested for radial play. The inner ring shall be held rigidly and a radial load of 5-1/2 pounds applied alternately in opposite directions to the outer ring. An indicating device shall be used to measure total movement of the outer ring. This value shall be recorded. As applicable from para 3.5.2, the radial movement shall be in conformance with the radial clearance values specified on the applicable MS.

4.5.8 Axial play. Five bearings of each MS size shall be tested for axial play. The outer ring shall be held rigidly and an axial load of 5-1/2 pounds applied alternately in opposite directions to the inner ring. An indicating device shall be used to measure total movement of the inner ring. This value

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should be recorded. As applicable from para 3.5.2, the axial movement shall be in conformance with the axial clearance values specified on the applicable MS.

4.5.9 Radial limit load (qualification). The five bearings of each MS size tested per 4.5.7 shall be mounted in a rigid support as shown in figure 1. A 5-1/2 pound radial load shall be applied, and the bearing shall be rotated by hand to determine smoothness of operation before testing. The load shall then be removed and the applicable radial limit load, specified on the applicable MS, shall be applied for 1 minute. The limit load shall be removed, and the 5-1/2 pound radial load shall be reapplied. The radial play shall then be measured as specified in 4.5.7. If the smoothness of operation of the bearing has been lessened perceptibly or the radial play has increased by more than 0.0002 inch from the initial measurement, the bearing shall be considered to have failed and the lot rejected.

4.5.10 Radial fracture load (qualification). The radial fracture load of 1-1/2 times the radial limit load specified on the applicable MS shall be applied to the bearing for 1 minute. After removal of the load, the bearings shall be examined for failure. Bearings that cannot be turned by hand, or that have parts fractured, shall be considered to have failed. Three bearings of each MS size submitted shall be tested.

4.5.11 Axial limit load (qualification). The five bearings of each MS size tested per 4.5.8 shall be mounted in rigid support as shown in figure 2. A 5-1/2 pound axial load shall be applied, and the bearing shall be rotated by hand to determine smoothness of operation before testing. The load should then be removed, and the applicable axial limit load, specified on the applicable MS, shall be applied 1 minute. The limit load shall be removed and the 5-1/2 pound axial load shall be reapplied. The axial play shall then be measured as specified in 4.5.8. If the smoothness of operation of the bearing has been lessened perceptibly or if the axial play has increased by more than 0.0005 inch from the initial measurement, the bearing shall be considered to have failed and the lot rejected.

4.5.12 Axial fracture load (qualification). The axial fracture load of 1-1/2 times the axial limit load specified on the MS shall be applied to the bearing for 1 minute. After removal of the load, the bearing shall be examined for failure. Bearings that cannot be turned by hand, or that have parts fractured, shall be considered to have failed. Three bearings of each MS size submitted shall be tested.

4.5.13 Radial dynamic load (qualification). The bearing shall be mounted in a test fixture having suitable support bearings and drive linkages to provide oscillation of the inner ring (CASE I RATING on the applicable MS). The radial dynamic load specified on the applicable MS shall be applied and maintained within $\pm 1\%$ for the duration of the test. The bearing shall be oscillated through an arc of 90° and back to the starting position for 10,000 cycles at room temperature. The bearing shall be disassembled and the raceways inspected. Any pitting or evidence of surface fatigue on the raceways or balls shall be considered as evidence of bearing failure. Ten bearings of each MS size submitted shall be tested. If more than five bearings show evidence of failure, the entire lot shall be considered to have failed the test.

4.5.14 Preservation, packaging, and marking. Preservation, packaging, and

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marking shall be examined for conformance with Section 5.

4.5.15 Bearing starting torque.

4.5.15.1 Bearing mounting. The bearing shall be mounted with the rotation axis of the bearing either horizontal or vertical so that one race may be rotated while the other race is held stationary.

4.5.15.2 Torque measurement. Torque shall be applied either by using an electrically driven torque measuring device which starts at a static state and slowly increases torque until rotation occurs or applied manually using a torque watch. The torque indicator shall be calibrated and shall indicate torque in inch-ounces. The indicator shall be accurate to sub-divisions of torque not greater than 10% of the maximum allowable torque for the bearing measured. The torque shall be measured in both rotational directions and the higher value of the two shall be recorded.

5. PACKAGING

5.1 Preservation. Preservation shall be in accordance with MIL-P-197, level A, C or commercial as specified(see 6.2).

5.2 Packing. Packing shall be in accordance with MIL-P-197, level A, B, C or commercial as specified(see 6.2).

5.3 Marking. Marking shall be in accordance with MIL-P-197 and MIL-STD-129.

6. NOTES

6.1 Intended use. These sealed, anti-friction, rod end bearings are intended for use in aircraft control systems where high rotative speeds are not involved. These bearings are rated for operation up to 250°F maximum. When subjected to operation above 250°F, the ratings should be reduced 20%.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and complete MS number (see 1.2 and 3.2).
- c. Quantity.
- d. Levels of preservation, packaging, and packing (see 5.1).

6.3 Qualification. With respect to product requiring qualification, awards will be made only for such products as have, prior to the time set for opening for bids, been tested and approved for inclusion in the applicable Qualified Products List, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is

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WR-ALC/LKJE, 460 2nd St, STE 221, Robins AFB, GA 31098-1640, and information pertaining to qualification or products may be obtained from that activity.

6.3.1 Qualification of a bearing distributor. Department of Defense standardization regulations have specific requirements covering qualification approval of a distributor. Details of these requirements may be obtained from the qualifying activity.

6.3.2 Procurement of bearings from a distributor not listed on the QPL. Government contractors and subcontractors who plan to procure a qualified bearing from a distributor not listed on the QPL should be aware that distributors frequently stock bearings which were manufactured several years earlier. Since specification requirements are occasionally changed without a corresponding change in part marking the part offered for sale by the distributor may not meet current specification requirements. To assure that these parts meet current specification requirements, the contractor should require the following information from the distributor:

- (1) Certification that the bearings have been inspected for compliance to the current specification requirements.
- (2) Certification of the original manufacturer's name, part number, and date of lubrication on the outside of each package.

(NOTE: DOD regulations state that only distributors who have obtained written permission from the original bearing manufacturer and who have been approved by the qualifying activity for listing on a QPL may rebrand a QPL listed item.

6.4 Dust test media source. Dust may be purchased from Powder Technologies Inc., P.O. Box 1464, Burnsville, MN 55337, or from other sources.

6.5 Subject term (key word) listing.

Double Row
Self - Aligning
Sealed Rod End
Radial Fracture
Axial Fracture
Zinc - Nickel

6.6 Changes from previous issues. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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TABLE I - QUALIFICATION INSPECTION SAMPLES

INSPECTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	-	32	PARAGRAPH
Examination of Products	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	4.5.1
Preservation, Packaging, Packing, and Marking	X	X	X	X	X	X	X																			4.5.14
Lubrication	X	X	X																							4.5.5
Plating	X	X																								4.5.1.2
Surface Roughness	X	X	X																							4.5.3
Hardness	X	X	X																							4.5.2
Seal Test															X	X	X									4.5.4.1
Dust Test																	X	X	X							4.5.4.2
Stabilization																				X	X	X				4.5.6
Bearing Starting Torque				X	X	X	X	X																		3.5.6
Radial Play				X	X	X	X	X																		4.5.7
Radial Limit Load				X	X	X	X	X																		4.5.9
Radial Fracture Load				X	X	X																				4.5.10
Axial Play									X	X	X	X	X	X												4.5.8
Axial Limit Load									X	X	X	X	X	X												4.5.11
Axial Fracture Load									X	X	X															4.5.12
Radial Dynamic Load																							X	-	X	4.5.13

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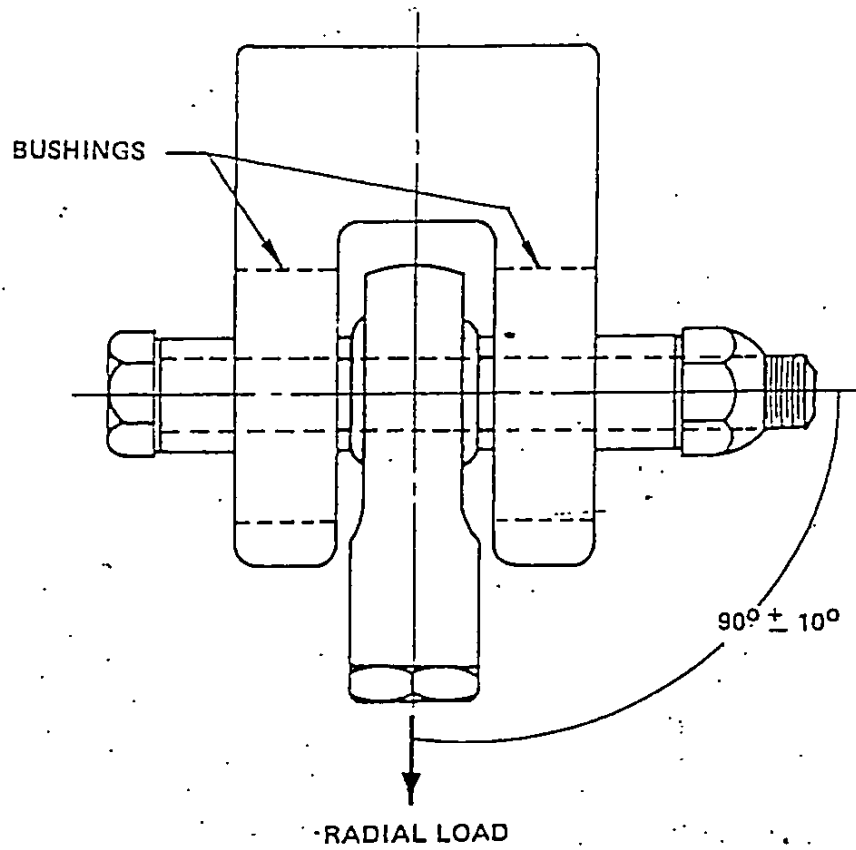


FIGURE 1. Radial Strength Test Setup

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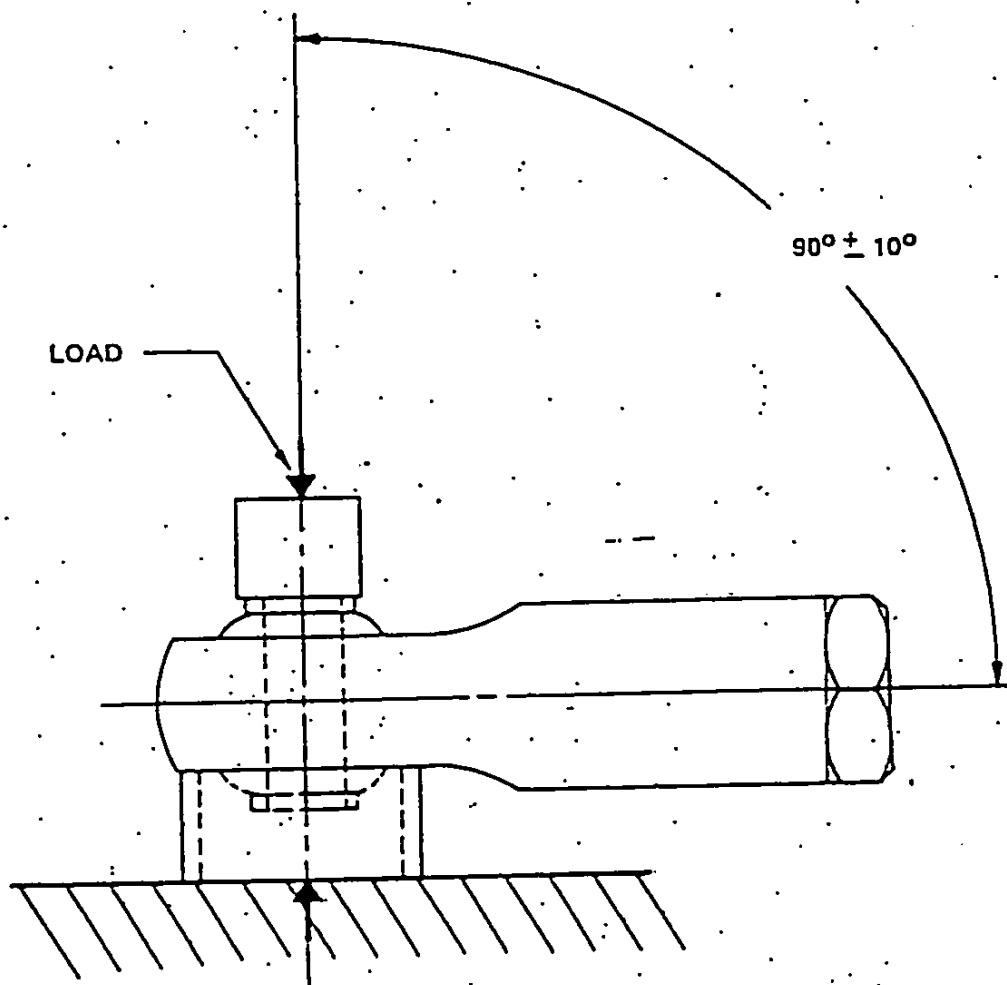


FIGURE 2. Axial Strength Test Setup

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Custodians:

Navy - AS
Army - AV
AF - 99

Preparing activity:

AF - 84

Project No. 3110-0821

Reviewer activities:

Army - AT
DLA - IS