

Issued 1999-08
Revised 2005-02

Superseding AS8952

Bearings, Roller, Rod End, Antifriction Self-Aligning

FSC 3110

1. SCOPE:

1.1 This specification covers sealed, self-aligning, anti-friction, rod end roller bearings operating in the temperature range of -65 to +300 °F (-54 to +149 °C) and intermittent spikes to 350 °F (177 °C).

1.2 Classification:

Bearings shall be of the following types, as specified (see 6.2):

Type I External thread rod end bearings (AS21221, AS21223, AS21429)
Type II Internal thread rod end bearings (AS21220)

2. APPLICABLE DOCUMENTS:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and 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.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS-QQ-P-416 Plating, Cadmium (Electro Deposited)

AMS 2417 Plating, Zinc-Nickel Alloy

AS8879 Screw Threads, Controlled Radius Root With Increased Minor
Diameters; General Specification For

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SAE WEB ADDRESS:

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2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-DTL-197	Bearings, Antifriction, Associated Parts and Subassemblies, Packaging of
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of US Military Property
MIL-PRF-23827	Grease, Aircraft and Instrument, Gear and Actuator Screw
MIL-PRF-81322	Grease, Aircraft, General Purpose Wide Temperature Range

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI/ASME B46.1	Surface Texture (Surface Roughness, Waviness, and Lay)
ANSI/ASQC Z1.4	Sampling Procedures and Tables for Inspection by Attributes

2.4 ASTM Publications:

Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM A 380	Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems
ASTM E 1444	Inspection, Magnetic Particle

2.5 AIA Publications:

Available from AIA, 1250 Eye Street N.W., Washington DC 20005.

NAS 516	Fitting, Lubrication - 1/8 Inch Drive, Flush Type
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3. REQUIREMENTS:

3.1 Aerospace Standards (AS):

The individual item requirements shall be as specified herein and in accordance with the applicable AS sheets. In the event of any conflict between requirements of this specification and the AS sheets, the latter shall govern.

3.2 Qualification:

The bearings furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time prior to the award of a contract (see Sections 4 and 6).

3.2.1 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 attention of the qualifying activity will be identified in the qualification notification letter.

3.2.2 Product Manufacture: The bearing manufacturer shall be capable of performing the majority 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 (QPL). If manufacturing operations are performed in more than one plant, the manufacturer's additional plant(s) shall be reported to the qualifying activity and will be listed accordingly on the QPL. 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 subcontractor's 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.

3.3 Material:

The bearings shall conform to the applicable AS sheets.

3.4 Design and Construction:

Only factory new bearings conforming to requirements specified herein shall be furnished.

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- 3.4.1 Hardness: The inner ring and rollers shall be through-hardened and shall have a hardness of HRc 60 to 65. The outer raceway be through-hardened or case-hardened and shall have a minimum hardness of HRc 60. Total case depth shall not exceed 50% of cross sectional area. Rod end shanks shall have a uniform cross sectional hardness with minimum hardness of HRc 27.
- 3.4.2 Surface Roughness: The sides of the inner ring shall have a smooth, machined finish that will not exceed 125 microinches Ra. Otherwise, the surface roughness shall be as specified on the AS sheets.
- 3.4.3 Seals: Seals of contact type shall be provided to prevent entrance of dust and to retain the lubricant throughout the temperature range specified. The material shall be reinforced PTFE fiberglass or polyether-ester.
- 3.4.4 Relubrication Provisions: Provisions for lubrication shall be made by use of an external lubrication fitting as specified on the AS sheets.
- 3.4.5 Retainers: Roller retainers shall be made of steel, beryllium-copper, or copper alloy in accordance with applicable AS sheets.
- 3.4.6 Rings: The outer rings shall be of single piece construction with the rod end shank. The inner ring shall be of single piece construction.
- 3.4.7 Threads: Threads shall conform to UNJF-3A and UNJF-3B in accordance with AS8879 for external and internal threads, respectively.
- 3.4.8 Lubrication: The bearings shall be thoroughly cleaned and dried before being lubricated. The bearings shall be filled with grease conforming to MIL-PRF-81322 or MIL-PRF-23827 so that at least eighty percent of the bearing void shall be filled. Bearings shall not have been lubricated more than 36 months prior to date of delivery. The bearing shall be preserved with the operating lubricant or compatible oil per MIL-DTL-197.
- 3.4.9 Dimensions and Tolerances: Dimensions and tolerances shall be in accordance with the applicable AS sheets.
- 3.4.10 Shank Alignment: The point representing the center of self-alignment motion shall be coincident with the axis of the rod end within .010 inch.
- 3.5 Performance:
 - 3.5.1 Radial Strength:
 - 3.5.1.1 Radial Limit Load Rating: When tested in accordance with 4.5.6, the bearing shall have a radial limit load rating of not less than the value specified on the AS sheet. If starting torque increases by 100% or more, bearing shall be considered to have failed.

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- 3.5.1.2 Radial Ultimate Load: When tested in accordance with 4.5.7, the minimum static fracture capacity shall be not less than 1.5 times the radial limit load rating specified on the applicable AS sheet. Following the test, bearings that cannot be turned by hand, or that have fractured parts, shall be considered to have failed.
- 3.5.1.3 Radial Dynamic Load Rating: When tested in accordance with 4.5.8, the bearings shall have a radial dynamic load rating of not less than the values specified on the applicable AS sheet. A bearing shall be considered to have failed if any of the following defects are detected: wear of the outer raceway greater than .002 inches or .002 inches in radial displacement during dynamic testing; spalling, cracking detected by MPI, or fracture of any component. The bearings shall have a B₅₀ life of 10,000 cycles or the entire lot shall be considered to have failed the test.
- 3.5.2 Axial Strength:
- 3.5.2.1 Axial Limit Load Rating: When tested in accordance with 4.5.9, the bearing shall have an axial limit load rating of not less than the value specified on the applicable AS sheet. If starting torque increases by 100% or more, the bearings shall be considered to have failed.
- 3.5.2.2 Axial Ultimate Load: When tested in accordance with 4.5.10, bearings that cannot be turned by hand or that have parts fractured, shall be considered to have failed.
- 3.5.3 Radial Internal Clearance: When tested in accordance with 4.5.11, radial internal clearance measured before the radial limit load rating test (4.5.6) shall be as specified on the applicable AS sheet.
- 3.5.4 Axial Internal Clearance: When tested in accordance with 4.5.12, axial internal clearance measured before the axial limit load rating test (4.5.9) shall be as specified on the applicable AS sheet.
- 3.5.5 Seal Performance:
- 3.5.5.1 Seal Test (Lubricant Retention): Bearings shall withstand the seal test specified in 4.5.13, without failure. Not less than 25% of the lubricant's weight shall be retained in the bearing at the end of the test.
- 3.5.5.2 Dust: Bearings subjected to the dust test procedure specified in 4.5.14 shall meet the following requirements:
- Starting torque increase no more than 100% or 2 inch-ounces over initial measured value, whichever is greater.
 - Radial internal clearance increase no more than 50% or .0002 inches over initial measured value, whichever is greater.

3.6 Weight:

The approximate weight of the bearings shall be as specified on the applicable AS sheet.

3.7 Plating:

Plating, when specified, shall be zinc-nickel alloy plated in accordance with AMS 2417, Type 2, or cadmium plating in accordance with AMS-QQ-P-416, Type I, Class 2, to a thickness of .0003 to .0006 inch. Plating shall be on all external steel surfaces, except bore, seals and seal retainers.

3.8 Identification of Product:

Bearings shall be permanently and legibly marked with the manufacturer's name, part number, and CAGE code. 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.

3.9 Workmanship:

All details of workmanship shall be high grade to ensure satisfactory service life. Parts shall not contain sharp edges, burrs, loose chips, dirt, or other foreign matter. The mating surfaces of the rod end the inner ring with rollers shall be free of tool marks, galling, and scratches after assembly.

3.10 Magnetic Particle Inspection:

Certification of such inspection, in accordance with 4.5.1.2, shall be furnished with Qualification and Quality conformance inspection samples.

4. QUALITY ASSURANCE PROVISIONS:

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 purchaser. The purchaser 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 the prescribed requirements.