SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS6039 | REV. D

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Superseding AS6039C

(R) Bearings, Ball, Rod End, Double Row, Self-Aligning

RATIONALE

The reason for updating this document is to clarify the definition of Section 3.2.1 Product Change. Additional updates were also done to meet the current SAE Aerospace Technical Report Style Manual dated January 2008.

NOTICE

This document references a part which contains cadmium as a plating material. Consult local officials if you have questions concerning cadmium's use.

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 when subjected to operation above 250° F.

1.2 Classification

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

Type I - Bearing, ball, solid shank, rod end (AS21150)
Type II - Bearing, ball, external thread, rod end (AS21151)
Type III - Bearing, ball, hollow shank, rod end (AS21152)
Type IV - Bearing, ball, internal thread, rod end (AS21153)

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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)

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SAE WEB ADDRESS:

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2417 Plating, Zinc-Nickel Alloy

AMS3652 Polytetrafluoroethylene (PTFE) Film Non-Critical Grade

AMS3666 Polytetrafluoroethylene (PTFE) Sheet, Glass Cloth Reinforced

AMS6274 Steel Bars, Forgings, and Tubing, 0.50Cr - 0.55Ni - 0.20Mo (0.18 - 0.23C) (SAE 8620)

AMS6440 Steel Bars, Forgings, and Tubing, 1.45Cr (0.93 - 1.05C) (SAE 52100), For Bearing Applications

AS8879 Screw Threads - UNJ Profile, Inch Controlled Radius Root With Increased Minor Diameter

AS21150 Bearing, Ball, Rod End, Double Row, Precision, Solid Shank, Self-Aligning, Airframe, Type I, -65 to 300 °F

AS21151 Bearing, Ball, Rod End, Double Row, Precision, External Thread, Self-Aligning, Airframe, Type II, -65 to 300 °F

AS21152 Bearing, Ball, Rod End, Double Row, Precision, Hollow Shank, Self-Aligning, Airframe, Type III, -65 to 300 °F

AS21153 Bearing, Ball, Rod End, Double Row, Precision, Internal Thread, Self-Aligning, Airframe, Type IV, -65 to 300 °F

AMS-QQ-P-416 Plating, Cadmium (Electrodeposited)

2.2 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. Tel: 215-697-6257, http://assist.daps.dla.mil/quicksearch/.

MIL-STD-129 Military Marking For Shipment And Storage

MIL-STD-130 Identification Marking of U.S. Military Property

MIL-DTL-197 Packaging of Bearings, Associated Parts and Subassemblies.

MIL-PRF-23827 Grease, Aircraft and Instrument, Gear and Actuator Screw, NATO Code Number G-354, Metric

MIL-PRF-81322 Grease, Aircraft, General Purpose, Wide Temperature Range

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI/ABMA Std. 4 Tolerance Definitions and Gauging Practices Dimensions/Tolerances/Gauging Practices for Ball and Roller Bearings

2.4 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 4550 Standard Classification for Thermoplastic Elastomer-Ether-Ester

ASTM E 1444 Standard Practice for Magnetic Particle Inspection

ASTM F 2215 Standard Specification for Balls, Bearings, Ferrous and Nonferrous for Use in Bearings, Valves, and Bearing Applications

2.5 ASME Publications

Available from American Society of Mechanical Engineers, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900, Tel: 973-882-1170, www.asme.org.

ASME B46.1 Surface Texture (Surface Roughness, Waviness and Lay)

3. REQUIREMENTS

3.1 Aerospace Standards (AS)

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

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 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, processing procedures 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. For the purposes of this specification "change in processing procedures" means a change in any of the following: (1) the company performing the outer raceway case hardening, or (2) the company performing the final machining of the outer and inner race.

3.2.2 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.)

3.2.3 Certification of Qualification

To retain qualification of a product approved for listing on the Qualified Products List (QPL), the Qualifying Activity shall require the manufacturer to verify by certification that the manufacturer's product complies with the requirements of this specification. This verification by certification will be in 2 year intervals from the date of original qualification and will be initiated by the Qualifying Activity. The Qualifying Activity reserves the right to re-examine or require the manufacturer to retest the qualified product whenever deemed necessary to ensure that the product continues to meet any or all of the specification requirements. Sample size and applicable tests to be determined by the qualifying activity.

3.3 Material

The bearing shall conform to materials as listed on AS21150, AS21151, AS21152, or AS21153, as applicable (see 6.2b). Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not 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 ASTM F2215 and be as specified on the applicable AS sheet.

3.4.3 Threads

3.4.3.1 Class 1 Rod Ends (External Thread)

Dimensions, form and contour shall conform to AS8879. Rerolling of threads to correct dimensional deficiencies shall not be permitted.

3.4.3.2 Class 2 Rod Ends (Internal Thread)

Threads shall conform to AS8879.

3.4.3.3 Thread Discontinuities (Laps, Seams and Surface Irregularities)

Threads shall have no multiple or single laps at the root or on the sides (Figure 3), except that laps are permissible at the crest which do not exceed 25% of basic thread depth, and on the sides outside the pitch diameter (see Figure 4). Deviation from the thread contour is permissible at the crest of the thread as shown in Figure 4. The incomplete thread at each end of the thread may also deviate from contour.

3.4.4 Dimensions and Tolerances

Dimensions and tolerances shall be in accordance with the applicable AS sheet.

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.