



AEROSPACE STANDARD

AS85560™**REV. C**Issued 2004-11
Revised 2019-05

Superseding AS85560B

(R) Bearings, Fiber Reinforced Plastic, Sleeve, Plain and Flanged,
Self-Lubricating; General Specification for

RATIONALE

Adding/updating fluid contaminants, specifying type and concentration of anti-icing fluid to be used for testing, and revising pass/fail criteria for the anti-icing test. An addition to the Notice section that states the finding of reduced life from exposure to the AMS1424 anti-icing fluids.

NOTICE

Laboratory testing has found a significant reduction in life from exposure to the AMS1424 anti-icing fluids, and, as a consequence, the bearing life has been derated for that particular contaminant (see 3.6.3). It is suggested to avoid design usage in areas of potential exposure or shielding the bearings from exposure.

1. SCOPE

1.1 Scope

This standard defines the requirements for fiber reinforced plastic (FRP) composite plain and flanged sleeve bearings that are self-lubricating and which are compatible with graphite-epoxy composites.

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 International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS1424	Fluid, Aircraft Deicing/Anti-Icing, SAE Type I
AS8243	Anti-Icing and Deicing-Defrosting Fluids
AS85560/1	Bearing, Fiber Reinforced Plastic, Sleeve, Plain, Self-Lubricating, +250 °F
AS85560/2	Bearing, Fiber Reinforced Plastic, Sleeve, Flanged, Self-Lubricating, +250 °F

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Documents
Document Sharing Hub

2.2 ANSI Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.3 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

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

ASME Y14.100 Engineering Drawing Practices

2.4 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

MIL-DTL-197 Packaging of Bearings, Associated Parts and SubAssemblies

MIL-DTL-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5MIL-HDBK-1599Bearings, Control System Components and Associated Hardware Used in the Design and Construction of Aerospace Mechanical Systems and Subsystems

MIL-PRF-5606 Hydraulic Fluid, Petroleum Base; Aircraft; Missile and Ordnance

MIL-PRF-7808 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

MIL-PRF-83282 Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537

MIL-STD-129 Military Marking for Shipment and Storage

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

MIL-STD-2073-1 Standard Practice for Military Packaging

3. REQUIREMENTS

3.1 Aerospace Standard (AS) Sheets

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 sheet, the latter shall govern.

3.2 Qualification

Products furnished under this standard shall be products which are authorized by the qualifying activity for listing on the applicable Qualified Products List (QPL-AS85560) at the time of award of contract (see 4.3 and 6.3). Refer to Qualified Products Database (QPD) at <https://assist.dla.mil/>, <https://qpldocs.dla.mil/>, or <https://quicksearch.dla.mil/>.

3.2.1 Retention of Qualification

To maintain status in the Qualified Products Database, certification shall be submitted to indicate continued compliance with the requirements of this standard (see 4.3.3).

3.2.2 Product Change

Any change in product design, description, materials, or processing procedures (see 6.4) or plant location shall be reported to the qualifying activity and may require requalification of the product to the extent determined by the qualifying activity. Any other specific changes, which must be brought to the qualifying activity's attention, shall be identified in the qualification notification letter.

3.2.3 Product Manufacture

Except for the winding, bonding, and curing operations, the manufacturer is permitted to sub-contract manufacturing operations without violating the requirements of 3.2.2. The winding, bonding, and curing operations shall be performed in the plant listed in the Qualified Products Database. The manufacturer may subcontract the winding process provided that (1) process specifications to control the winding process are established by the manufacturer and are imposed upon the subcontractor; and (2) the qualifying activity is notified during the qualification process of the subcontractor performing the winding process. Manufacture of the self-lubricating liner material may also be subcontracted. Any change in the materials used in the manufacture of the liner will require requalification to an extent determined by the qualifying activity.

3.3 Materials

Unless otherwise specified in the AS sheet, the materials used in the base composite shall be at the option of the bearing manufacturer. The materials shall be compatible with graphite-epoxy composite and meet the requirements of this standard. The materials shall be recorded in the certified test report (see 4.3.2). The self-lubricating portion of the bearing shall be incorporated in the bore of the bearing and, in flanged bearings, at the outer flange face in accordance with the applicable specification sheet. The self-lubricating material shall contain tetrafluoroethylene (TFE) and may be in the form of a liner bonded to a composite substrate or be an integral part of the composite.

3.4 Design

Bearing design shall conform to that shown on AS85560/1 and AS85560/2.

3.5 Construction

The bearings shall be constructed in accordance with the manufacturer's process specifications and quality control documents. The manufacturing specifications shall be recorded by name and date in the certified test report (see 4.3.2).

3.5.1 Dimensions and Tolerances

Dimensions and tolerances shall be as specified on the applicable AS sheet. Dimensions not shown shall be at the option of the manufacturer.

3.5.2 Surface Texture

The surface texture shall be in accordance with the applicable AS sheet. Unless otherwise specified, liner surfaces are exempt from surface texture measurements. Bearings shall be free of any surface defects that may be detrimental to satisfactory installation, performance, or bearing life.

3.5.3 Lubrication

Lubrication with grease or oil shall not be permitted.

3.5.4 Liner Condition and Bond Integrity

3.5.4.1 Visual Examination

The visual appearance of the exposed surface of the self-lubricating portion of the sleeve shall be uniform in texture and shall contain no imbedded contaminants. If a liner is used, it shall be positioned uniformly within the bore and on the flange face and shall be free of folds.

3.5.4.2 Bond Integrity

The liner condition shall exhibit a degree of workmanship consistent with proper manufacturing process controls (see 4.6.6). The liner edge condition and setback shall meet the applicable drawing requirements. The liner shall be tightly adherent to the substrate over at least 90% of the contact area and shall exhibit a peel strength of 1.5 pounds per inch or greater. No void shall be allowed which cannot be fully included within a circumscribing circle with a diameter equal to 25% of the race width or 0.25 inch, whichever is smaller.

3.6 Performance

3.6.1 Radial Static Loads

3.6.1.1 Limit Load

When the radial static load listed in Table 1 has been applied in accordance with 4.6.1 and 4.6.1.1, the deflection shall not be greater than 0.0100 inch. The permanent set after application of the radial static load shall not exceed 0.0030 inch for M85560/1 or /2-04 through -22 sizes and shall not exceed 0.0045 inch for M85560/1 or /2-24 through -32 sizes.

3.6.1.2 Ultimate Load

There shall be no crushing of the composite material when 1-1/2 times the radial static limit load listed in Table 1 has been applied at room temperature (see 4.6.1 and 4.6.1.2).

Table 1 - Load values

Bearing Size	Static Limit Load (lbr)	Dynamic Load (lbr)
(0.500 inch bore, 0.375 inch L)	6875	3440
(1.000 inch bore, 0.500 inch L)	20000	10000
(1.500 inch bore, 0.500 inch L)	30000	15000

3.6.1.3 Creep Load

After 2/3 of the radial static load listed in Table 1 has been applied and held for 336 hours at room temperature, the amount of creep (see 6.4) shall be not greater than 0.003 inch and there shall be no crushing of the composite (see 4.6.1 and 4.6.1.3).

3.6.2 Oscillation Under Radial Load

When tested under the dynamic load specified in Table 1, the total wear of the bearing shall not be greater than 0.0045 inch after 25000 cycles and there shall be no crushing of the composite portion of the sleeve. If a bonded liner is used in the bore, there shall be no separation of the liner from the composite substrate. The bond integrity shall be as specified in 3.5.4.2. The measured loaded breakaway torque shall be measured and recorded before and upon completion of the oscillation test (see 4.6.2).

3.6.3 Fluid Compatibility

When tested under the dynamic load specified in Table 1, the bearings shall be compatible with the fluids listed in 4.6.3. The total bearing wear shall not be greater than 0.0045 inch after 25000 cycles with the exception of fluid (d). For propylene-glycol-based AMS1424 anti-icing fluids, the wear and cycles requirement are derated; the total bearing wear shall not be greater than 0.008 inch after 10000 cycles. There shall be no crushing of the composite portion of the sleeve. If a bonded liner is used in the bore, there shall be no separation of the liner from the composite substrate. The bond integrity shall be as specified in 3.5.4.2.