



Standard Guide for Instrument and Precision Bearing Lubricants—Part 2 Greases¹

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1. Scope

1.1 This guide is a tool to aid in the choice of lubricating grease for precision rolling element bearing applications. The recommendations in this guide are not intended for general purpose bearing applications. There are two areas where this guide should have the greatest impact: (1) when lubricating grease is being chosen for a new bearing application and (2) when grease for a bearing has to be replaced because the original grease specified for the bearing can no longer be obtained. The Report (see Section 5) contains a series of tests on a wide variety of greases commonly used in bearing applications to allow comparisons of those properties of the grease that the committee thought to be most important when making a choice of lubricating grease. Each test was performed by the same laboratory. This guide contains a listing of the properties of greases by base oil type, that is, ester, perfluoropolyether (PFPE), polyalphaolefin (PAO), and so forth. This organization is necessary since the operational requirements in a particular bearing application may limit the choice of grease to a particular base oil type and thickener due to its temperature stability, viscosity index or temperature-vapor pressure characteristics, etc. The guide provides data to assist the user in selecting replacement greases for those greases tested that are no longer available. The guide also includes a glossary of terms used in describing/discussing the lubrication of precision and instrument bearings.

1.2 The lubricating greases presented in this guide are commonly used in precision rolling element bearings (PREB). These greases were selected for the testing based on the grease survey obtained from DoD, OEM and grease manufacturers and evaluated according to the test protocol that was designed by Subcommittee F34 on Tribology. This test protocol covers the essential requirements identified for precision bearing greases. The performance requirements of these greases are very unique. They are dictated by the performance expectations of precision bearings including high speed, low noise, extended

life, and no contamination of surrounding components by the bearing's lubricant system. To increase the reliability of test data, all tests were performed by a DoD laboratory and three independent testing laboratories. There were no grease manufacturer's data imported except for base oil viscosity. Most of tests were performed by U.S. Army Tank–Automotive Research, Development and Engineering Center (TARDEC) and three independent laboratories, and the results were monitored by the Naval Research Laboratory (NRL). This continuity of testing should form a solid basis for comparing the properties of the multitude of lubricating greases tested by avoiding some of the variability introduced when greases are tested by different laboratories using different or even the “same” procedures. Additional test data will be considered for inclusion, provided the defined protocol is followed and the tests are performed by independent laboratories.

1.3 This study was a part of DoD Aging Aircraft Replacement Program and supported by Defense Logistic Agent (DLA) and Defense Supply Center Richmond (DSCR).²

1.4 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:³

D217 Test Methods for Cone Penetration of Lubricating Grease

D972 Test Method for Evaporation Loss of Lubricating Greases and Oils

¹ This guide is under the jurisdiction of ASTM Committee F34 on Rolling Element Bearings

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² Rhee, In-Sik, “Precision Bearing Grease Selection Guide,” U.S. Army TARDEC Technical Report No. 15688, Defense Technical Information Center, 8725 John. J. Kingman Rd., Suite 0944, Ft. Belvoir, VA 22060–6218.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.