Nye®

Lubenotes:

Design Engineers' Guide to Selecting a Lubricant

Greases for Rolling Element Bearings

Quality rolling element bearing greases function over a wide temperature range; offer thermooxidative stability and low volatility; and have base oils that retain the viscosity needed to provide an adequate lubricant film throughout a specified range of operating temperatures, speeds and loads. Using these general characteristics as the yardstick for selecting a lubricant will help ensure high performance and long life for rolling element bearing applications.

Enhancing grease performance. Greases are formulated by combining a base oil with a thickening agent. They lubricate rolling bearings by bleeding a small amount of oil out of the "reservoir" of the grease thickener and into the raceway. The oil provides the elastohydrodynamic lubricating film needed to reduce friction and wear. Greases can also serve as effective seals to protect bearings from contaminants and moisture. For greater loads, especially where vibration or shock loading is likely, special anti-wear additives can improve grease performance. Likewise, special thickeners and additive packages can augment a grease's natural resistance to wash-out by water or salt-water spray. Thickeners can also be processed to reduce the noise-generating characteristics of a grease. Finally, other additives can tailor a grease to specific application needs: PTFE for low temperature torque, molybdenum disulfide for high loads, special additives to promote electrical conductivity, and specific chemistry for low vapor pressure applications.

Ultrafiltration services. Nye will ultrafilter any of its oils and greases, and recommends this service for precision bearing applications to extend bearing life. Standards of cleanliness are clearly defined by the US government for both oil and grease. MIL-STD 1246 includes five cleanliness levels for oil: 50, 25, 10, 5, and 1, where each number refers to the largest particle (in microns) allowed in an oil. There are three cleanliness levels for grease. Unfiltered grease can contain particles larger than 75 microns. Filtered or "clean grease" cannot have any particles larger than 75 microns, and there must be less than 1,000 particles per cubic centimeter between 24 and 74 microns in size (MIL-G-81322, Aircraft Grease). Ultrafiltered or "ultraclean grease" must not have any particles larger than 35 microns, nor may it have more than 1000 particles per cubic centimeter between 10 and 34 microns in size (MIL-G-81937, Ultraclean Instrument Grease). Nye offers ultrafiltration services in a Class 100 environment for our own oils or greases - and for those of other manufacturers, which continues to be a sizable portion of our operations.

Selecting the right lubricant for your application. On the back is a partial list of Nye lubricants for rolling element bearings. Additional oils and greases are available to meet a wide range of application requirements. For technical specifications, evaluation samples, questions about any Nye products, or to discuss a lubricant *custom-designed* for your application — call us at (508) 996-6721 or visit our Web site at www.nyelubricants.com.

Lubenotes: Greases for Rolling Element Bearings

Grease (Temp. Range °C)	Oil	Thickener	NLGI Grade	Dropping Point (°C)	Evaporation	Water Washout	4-Ball Wear Scar	Rust Test	Application Notes
Rheolube 374A (-40 to 150)	PAO	Lithium Complex	2	273	0.3% (100°C)	3.2%	0.44mm	pass	High speed bearings. Mil-PRF-32014
Rheolube 374B (-40 to 150)	PAO	Lithium Complex	2	>260	0.8% (150°C)	4.1%	0.45mm	pass	High load, lower-speed bearings.
Rheolube 374C (-40 to 150)	PAO	Lithium Complex	4	280	0.9% (150°C)	2.8%	0.35mm	pass	Light load, high-speed bearings.
Rheotemp 500 (-54 to 175)	Ester	Sodium	1.5	202	1.5% (135°C)	7.3%	0.45mm (100°C)	—	High speed bearings.
Rheolube 716R (-54 to 150)	Ester	Lithium	2	185	0.2% (100°C)	4.5% (40°C)	0.50mm	pass	Low-noise, low-torque, precision bearings.
Fluorocarbon Gel 813-1 (-70 to 200)	Silicone	PTFE	1	>260	3.3% (150°C)	0.6%	—	—	Wide-temp. instrument bearings.
Nyogel 758G (-40 to 150)	Ester	Lithium	3	>260	0.6% (100°C)	3.9%	0.81mm	—	Electrically conductive grease for motor shaft bearings.
Rheolube 2000 (-45 to 125)	MAC	Sodium	2	>260	0.1% (100°C)	—	0.38mm	—	Aerospace and other low vapor pressure applications. Vapor pressure @ 25°C = 10^{-8} torr.
UniFlor™ 8771 (-50 to 250)	PFPE	PTFE	2	>260	0% (100°C)	0.4%	0.56mm (20kg)	—	Wide-temp. bearings in extreme environments. Vapor pressure @ 25°C = 10^{-9} torr.

Nye Product Test Protocols

Dropping Point ASTM D-566

Evaporation FTM 791B, 321.2 (24 hrs.)

Water Washout ASTM D-1264 (60 min. @ 80°C)

4-Ball Wear Scar ASTM D-2266 (1 hr., 75°C, 40kg, 1200RPM)

Rust Test ASTM D-1743

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