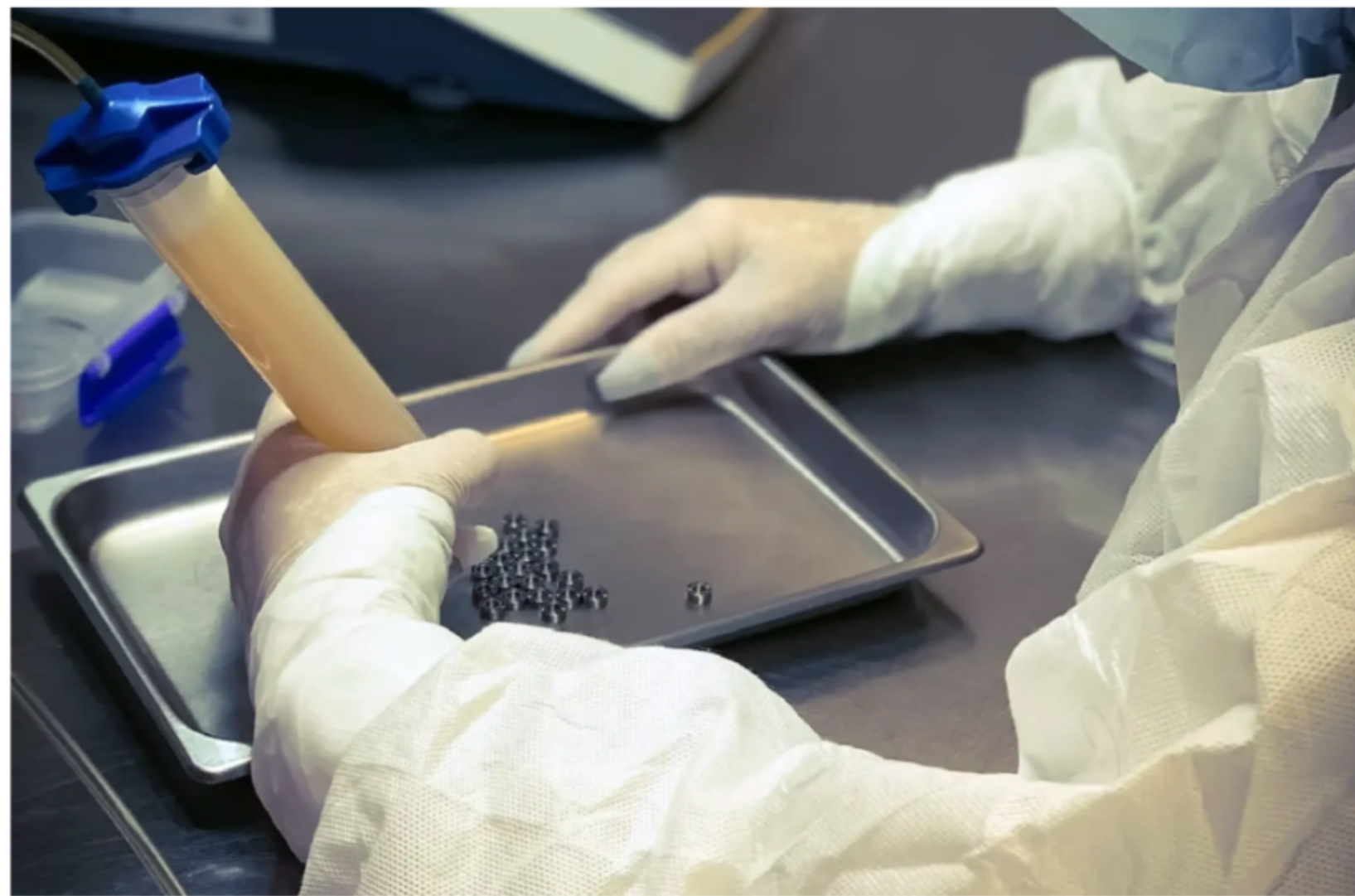


Bearing Lubrication 101: How to Pick the Right Grease



The right bearing lubricant helps reduce friction, manage heat, protect against corrosion, and minimize wear throughout operation. Selecting the appropriate lubricant helps support smooth operation, consistent performance, and long-term bearing reliability.

For maintenance engineers, designers, and OEMs, bearing grease selection starts with the application. Speed, load, temperature, operating environment, bearing design, and service expectations all influence which lubricant is appropriate. Even the amount applied can affect how a bearing operates.

IBSCO supports specialized lubrication needs with more than 800 lubricants in stock, including greases, oils, synthetics, food-grade options, dry films, and specialty formulations. Precision relubrication and application-specific fills are also available through [IBSCO's ISO Class 6 cleanroom capabilities](#).

Why Bearing Lubrication Matters

Rolling elements and raceways operate under concentrated contact loads. [Lubrication](#) creates a film between these surfaces, helping reduce direct metal-to-metal contact while controlling friction and wear.

The lubricant can also help protect bearing surfaces against corrosion and contamination. In applications using circulating oil, it may provide an additional way to transfer heat away from the bearing.

These functions make lubrication part of the overall bearing specification rather than a secondary decision made after the component has been selected.

Grease vs. Oil: What Is the Difference?

Grease and oil are two common approaches to bearing lubrication, although dry films and other specialty solutions may be appropriate for certain environments.

Grease combines a base oil, thickener, and additives. The base oil performs the primary lubricating function, while the thickener gives the grease its structure and helps retain it at the lubrication point. Additives can introduce characteristics such as oxidation resistance and corrosion protection.

Because grease remains in place more readily, it can be useful when frequent lubricant replenishment is impractical. However, grease can create greater starting and running torque and may have lower speed capabilities than oil in some applications.

Oil can be advantageous at higher speeds or when heat removal is an important consideration. Depending on the equipment, it may be delivered through circulating, bath, mist, drip-feed, or other lubrication systems.

Neither option is universally better. Selection depends on the bearing and the conditions surrounding it.

What Are NLGI Grease Grades?

NLGI grades are used to classify grease by consistency, or how firm or soft the grease is. Lower NLGI grades indicate softer greases, while higher grades indicate firmer consistencies. IBSCO-hosted manufacturer guidance identifies NLGI grades 0 through 3 among the grades commonly used for bearing lubrication, depending on operating conditions.

NLGI grade is only one part of bearing grease selection. Base oil viscosity, thickener type, temperature, speed, load, and other application requirements also influence which lubricant is appropriate. Two greases with the same NLGI grade can have different formulations and performance characteristics, so consistency should always be considered alongside the needs of the application.

Why Base Oil Matters

The base oil performs the primary lubricating function within a grease and has a significant influence on how the formulation behaves.

Base oils can be mineral-based or synthetic. Mineral oils are widely used in bearing greases and provide effective general-purpose lubrication across many conventional operating conditions.

Synthetic oils can be useful when an application involves wider temperature ranges, low-temperature operation, elevated temperatures, lower volatility, or other specialized demands. IBSCO-hosted technical resources reference synthetic chemistries including diesters, synthetic hydrocarbons, silicones, and fluorinated compounds.

These fluids do not behave identically, which makes the individual formulation more important than the broad label of “synthetic.”

Viscosity is another key consideration. Lower-viscosity base oils are generally better suited to higher rotational speeds or lower temperatures, while higher-viscosity oils may be appropriate for heavier loads or elevated temperatures. The correct viscosity depends on the operating conditions and bearing design.

What Do Grease Thickeners Do?

If the base oil provides lubrication, the thickener gives the grease its structure.

Common formulations may use lithium, calcium, sodium, or non-soap thickeners such as urea-based compounds. Thickener chemistry can influence characteristics such as mechanical stability, water resistance, and usable operating conditions.

For example, manufacturer documentation hosted by IBSCO describes lithium soap grease as offering heat resistance, water resistance, and mechanical stability. Calcium soap formulations provide strong water resistance but lower heat resistance, while sodium soap formulations provide heat resistance with less resistance to water. Non-soap formulations can also be used where greater heat resistance is required.

These differences are another reason NLGI grade alone cannot determine whether two greases are interchangeable.

What Role Do Additives Play?

Additives are incorporated into lubricant formulations to provide or enhance particular characteristics.

Depending on the grease, these may include oxidation inhibitors, rust preventives, corrosion inhibitors, or extreme-pressure agents. The appropriate additive package depends on what the bearing will encounter during operation.

A heavily loaded industrial bearing, for example, may have different lubrication priorities from a precision bearing operating in a cleanroom or vacuum environment.

Formulation differences also make compatibility important when changing lubricants. Mixing products with different base oils, thickeners, or additive systems can alter grease properties. Even products that use similar thickener chemistry should not automatically be assumed compatible.

Before introducing a new lubricant into an existing bearing or system, compatibility and manufacturer guidance should be reviewed.

How Does Temperature Affect Bearing Lubrication?

Temperature can change lubricant viscosity, consistency, oxidation behavior, and its ability to maintain an effective lubricating film.

Every lubricant has its own operating range. There is no single temperature range that applies to all mineral oils, synthetic oils, or bearing greases. Individual formulations can differ considerably based on their chemistry and intended use.

That makes product-specific data more useful than selecting a grease simply because it is marketed for “high-temperature” or “low-temperature” operation.

The full operating cycle should also be considered. A bearing may experience low temperatures during startup and significantly higher temperatures after the equipment reaches normal operating conditions. Speed and load can create additional heat during operation, further influencing lubricant behavior.

Evaluating the minimum, maximum, and typical operating temperatures provides a better foundation for selection.

Key Factors in Bearing Grease Selection

NLGI grade, base oil, thickener, additives, and temperature capability describe the lubricant itself. Selecting the right product requires comparing those characteristics with the conditions inside the application.

Speed

Rotational speed affects heat generation and the lubricant's ability to maintain an appropriate film.

Higher speeds may favor lower-viscosity lubricants, while very high-speed applications may use oil because it can circulate and assist with heat removal. When grease is used, consistency, base oil viscosity, and fill quantity should all be evaluated.

Load

Bearing load influences the lubrication film required to keep contact surfaces separated.

As loads increase, base oil viscosity and additive chemistry can become more important. The correct choice depends on both the magnitude and type of loading the bearing will experience.

Operating Environment

Moisture, contamination, vacuum conditions, chemicals, corrosion exposure, and cleanliness requirements can influence lubricant selection.

A formulation appropriate for general industrial machinery may not be suitable for an aerospace, medical, semiconductor, food-processing, or vacuum application.

IBSCO supports specialized [lubrication options](#) for these environments, including food-grade products, dry films, corrosion solutions, electrically conductive grease, and other specialty formulations.

Bearing Design

Bearing size, type, closures, internal geometry, and lubrication system can affect how lubricant reaches and remains within the contact area.

A sealed miniature ball bearing and an open industrial roller bearing may require very different lubrication strategies even if they operate within similar temperature ranges.

Lubricant Quantity

Selecting the correct grease is only part of the process. The amount placed inside the bearing also matters.

More grease is not automatically better. Excessive fill can increase churning and heat generation, particularly at higher speeds. Precision and low-torque applications may require carefully controlled quantities, while other operating environments may call for different fill levels based on the bearing and housing design.

IBSCO's precision relubrication capabilities allow lubricant quantities to be controlled down to 1 mg for applications requiring tightly controlled fills.

Questions to Ask Before Choosing a Bearing Lubricant

The most effective bearing grease selection process begins with a clear understanding of how the component will operate.

Before specifying a grease or oil, engineers, designers, and maintenance teams should consider:

- What speed will the bearing operate at?
- What loads will it experience?
- What are the minimum, maximum, and normal operating temperatures?
- Will the bearing encounter moisture, contamination, chemicals, or vacuum conditions?
- Is low starting or running torque important?
- Does the application require corrosion resistance or another specialized characteristic?
- What lubricant does the bearing manufacturer specify or approve?
- How much lubricant should be applied?
- Will relubrication be possible during the expected service interval?
- Does the application require controlled cleanroom processing?

Answering these questions helps narrow the available options based on the actual demands of the equipment rather than relying on a single specification such as NLGI grade.

How IBSCO Supports Bearing Lubrication Requirements

[IBSCO](#) has specialized in bearing relubrication for more than 40 years and maintains more than 800 lubricants in stock. Available options include oils, greases, synthetics, food-grade products, dry films, protective coatings, corrosion solutions, electrically conductive greases, and specialized formulations.

For contamination-sensitive applications, IBSCO operates an [ISO 14644-1:2015 Class 6](#) certified cleanroom with Class 5 bench capabilities. Services include cleaning, inspection, customer-specified relubrication, controlled handling, and specialized packaging. IBSCO also lists factory relubrication certifications for NMB, NHBB, Myonic, and RBC.

These capabilities support applications where standard factory lubrication does not align with the operating environment, lubricant specification, or required fill quantity. IBSCO works with customers to identify lubrication requirements and provide precision relubrication, specialized fill quantities, cleaning, and packaging based on the needs of the application.

The Right Lubricant Starts with the Application

There is no single bearing grease that is right for every application.

NLGI grade provides useful information about consistency, but it is only one part of the selection process. Base oil, viscosity, thickener, additives, temperature, speed, load, environment, bearing design, and fill quantity all influence how a lubricant will perform.

Evaluating these factors together gives engineers and maintenance teams a stronger foundation for selecting a lubricant that matches the bearing and the conditions in which it will operate.

When standard lubrication does not meet the application, IBSCO can assist with lubricant selection, precision relubrication, controlled cleanroom processing, and application-specific fill requirements.