Choosing a Grease

Knowing how to select the right grease depends on many factors. When selecting a grease, you need to consider not only the properties of the grease but also the application and operating conditions in which the grease will function.

A common misunderstanding is that the function of grease is denoted by its colour. Very often a client will ask for a particular-coloured grease rather than a grease best suited to the application at hand. This has very little to do with the grease type or performance but more to marketing.

First, consider the properties of the grease. In simple terms greases are made up of a base oil (for example a mineral oil, a synthetic oil like PAO or PAG and esters, vegetable oils, pharmaceutical grade white oils, or combinations of these different oils), a thickener, and various types of additives to enhance particular properties required for the grease.

Base Oil Type: The type of base oil used in a grease is determined by the conditions in which the grease will operate, such as high and/or low temperatures, high or low load, and speed.

Thickener Type: The thickener used in a grease is what holds the lubricant in place, somewhat like a sponge. Some types of thickeners are simple metallic soaps, complex metallic soaps, & non-soap thickeners like bentonite clay, polyurea, calcium sulphonate, PTFE, PFPE, and silica. A good thickener type will be compatible with the equipment manufacturer recommendations and will be able to withstand the conditions under which it must perform. The most common thickeners are lithium soap, lithium complex, calcium sulphonate complex, aluminium complex and polyurea.

Additives: The performance of a grease can be greatly enhanced by the addition of different types of additives into the grease formulation. Some of the most used additives in grease include oxidation inhibitors, anti-wear additives, extreme pressure (EP) additives, solid film additives such as molybdenum disulphide, graphite, and powdered PTFE, rust and corrosion preventing additives, tackiness additives, polymers for rheology modification, friction modifiers, metal deactivators, and seal swell additives. While we're talking additives it is worth mentioning that some thickeners also behave as a performance enhancing additive such as calcium sulphonate complex which provides exceptional load carrying properties to the grease.

With an understanding of what makes up a grease, here are four key attributes of the grease that are important to consider: -

1. NLGI Classification
2. Base Oil Viscosity
3. Thickener Type
4. Dropping Point

NLGI Classification: The National Lubricant Grease Institute (NLGI) developed a classification for greases based upon the consistency or thickness of the grease (refer to our Resources page – NLGI Grease Classification). The thickness of the grease is dependent on the oil content and the thickener type and amount in the grease, so grease with high oil content and a lower thickener content will get a lower rating such as 00 or 000 as is the case of a semi-fluid grease. In much hotter climates like the Middle East or Africa, it is common to find greases with a higher NLGI rating such as NLGI 3.

Base Oil Viscosity: By far the most crucial feature of any grease product or any lubricant for that matter is its viscosity. Base oil viscosity is a critical property to consider when looking at the type of load regime in the application that needs to be grease lubricated. In general terms, most high-speed applications will use grease with a lower base oil viscosity grade like an ISO 100 or ISO 150 and for more heavily loaded applications like slow moving industrial machinery you may require a grease with a higher base oil viscosity of ISO 460.

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Thickener Type: The thickener type has a big influence over the performance characteristics of the grease and along with the base oil will determine the basic structure of the grease. The thickener type can have a large influence on grease properties such as: -

1. Water Resistance
2. Pumpability
3. Dropping Point
4. Thermal Stability, and
5. Mechanical Stability

Not all thickeners are compatible however, so care must be taken if you are replacing a grease with one type of thickener with a grease of a different type of thickener. If not sure, refer to our Grease Compatibility Chart also when selecting a grease.

Dropping Point: The dropping point refers to the operating temperature at which a grease changes from a semisolid to a liquid state. It is crucial to select a grease with a dropping point that will suit the type and nature of the application. The dropping point is usually well above the maximum usable temperature of a grease.

When selecting a grease for a particular application, it is important to understand the conditions that the grease will need to work in and under. By this we mean the **load** that the grease will be under, the **environment** that the grease will need to operate in, the **temperature** that the grease will be subjected to both for long operating periods and for peak periods, (when the temperature of the application may increase in temperature for a period of time), and the **speed** that the grease will be to exposed to in the application.

These four key considerations will help you to determine what type and composition of grease is best suited for your application, and what key properties of the grease to look for.

Here are some general guidelines that may assist with grease selection:

Load Conditions

Load	Base Oil Viscosity	NLGI Grade	Comments
High	220 320 460 680	1 - 2	High base oil viscosity. EP and Anti-Wear additives.
Low	100 150 220	2 - 3	Low base oil viscosity. Firm consistency

Operating Environment Conditions

Environment	Grease Requirements	Comments
Wet Conditions	Rust & Corrosion Protection Water Washout Protection	Rust & corrosion prevention additives. Demulsifier additive. Tackiness additive.
Dirt/Dusty Conditions	Protection against dirt/silica ingress into equipment	Tackiness additive. Solid film lubrication additive. Regular re-lubrication.

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Temperature Conditions

Temperature	Temperature Extreme	Base Oil	Thickener
High	Up to 200°C	Silicone Synthetic – PAO,PAG,Ester Mineral	Calcium Sulphonate complex. Modified Organo clay. Silica. Polyurea. Solid film lubricants
Moderate	Up to 180°C	Mineral Synthetic – PAO,PAG,Ester	Lithium complex. Polyurea
Low	Down to -20°C	Synthetic – PAO Mineral	Lithium soap Lithium complex Calcium Sulphonate complex Polyurea
Very Low	Down to -60°C	Synthetic - PAO	Lithium soap Lithium complex

Speed

Speed	Load	Base Oil Viscosity, ISO	NLGI Grade	Comments
High	Low	100 to 150	2 - 3	Low base oil viscosity. Firm consistency.
Low	High	220 to 680	2	High base oil viscosity. Normal consistency.