

GREASE THICKENERS- TECHNICAL CONCEPT



Thickeners - In simple words thickeners are the thickening agents for oil. Thickeners help to turn oil into grease and make it easier to apply on the equipment where oil can't be applied. Thickener is a material that, in combination with the base oil, will produce the solid to semi-fluid mass i.e grease.

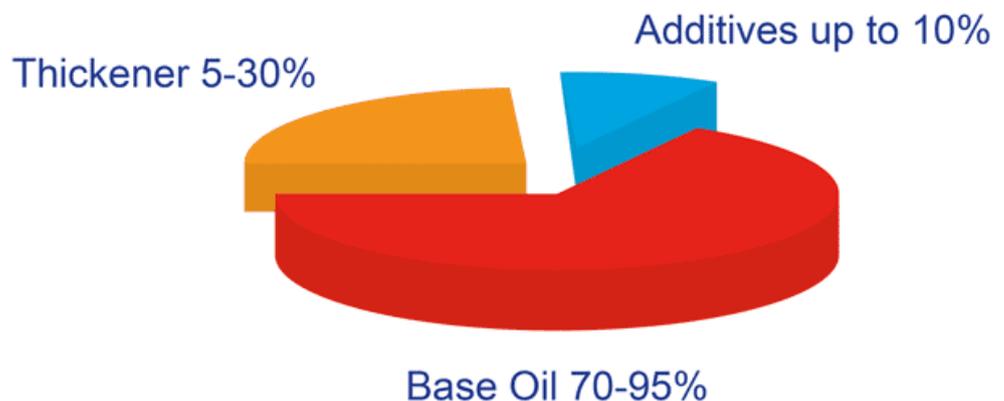
WHAT IS A THICKENER?

Thickener is a component in lubricating grease that creates the differentiation between grease and fluid lubricants. The myth is that grease is a thickener, but in reality, a thickener is a material that holds the lubricant oil to form a semi-solid structure. Various types of thickening agents can be used to thicken lubricating oil.

THICKENERS ARE CLASSIFIED AS BELOW

- Simple soap thickener
- Complex soap thickener
- Nonsoap thickener

GREASE CONSTITUENTS



SIMPLE SOAP THICKENER

- They are formed by the reaction of alkali metal and long-chain organic acid.
(Stearic Acid, 12 HSA, etc)
- This is an acid-base reaction product
- These are the most common thickeners used in grease

COMPLEX SOAP THICKENER

- Complex greases are made by a combination of alkali metal/metals with more than one fatty acid.
- This is also called a hybrid thickener
- These thickeners have an advantage over simple soap because of their better high-temperature properties

NON-SOAP THICKENER

- Non-soap greases are thickened with clay, polyurea, calcium sulfonate, silica, and other materials.
- They do not have a definite dropping point. There may be the formation of the drop or there will be loss of oil on heating.

TYPES OF SIMPLE SOAP, COMPLEX SOAP & NON - SOAP THICKENERS ARE AS FOLLOWS

Simple Soap	Complex Soap	Non Soap
Lithium	Lithium Complex	Silica
Calcium	Calcium Complex	Clay
Aluminum	Aluminum Complex	PTFE
Sodium	Sodium Complex	Polyurea
-	Barium Complex	Calcium Sulfonate

TYPES OF SIMPLE SOAPS :

LITHIUM SOAP :

- Lithium greases have good lubricity, shear ability, thermal resistance, and relatively low oil separation.
- Its Drop point lies between 177 – 204 °C.
- Better water resistance properties compared to sodium soap greases.
- Better low-temperature properties compared to calcium soap greases.
- Lithium greases work well up to temperature 145 °C.

CALCIUM SOAP :

- Anhydrous and Hydrated Calcium soap.
- Better water resistance than lithium greases.
- Drop point range from 90 - 140°C.
- Can only be used at maximum operating temperature up to 110 °C

ALUMINIUM SOAP :

- These have excellent oxidative resistance and good water resistance.
- Low dropping point of only 110-115 °C.
- Their usage is generally limited to operating conditions less than 80 °C.
- They have poor shear stability.

SODIUM SOAP :

- These greases can be used only up to 120 °C because of poor oxidative stability and high oil bleed.
- Drop point range from 160 - 190°C.
- They do provide good lubricity and shear stability.
- They do not perform well (Poor to fair) when coming in contact with water



TYPES OF NON - SOAP BASE THICKENER

SILICA :

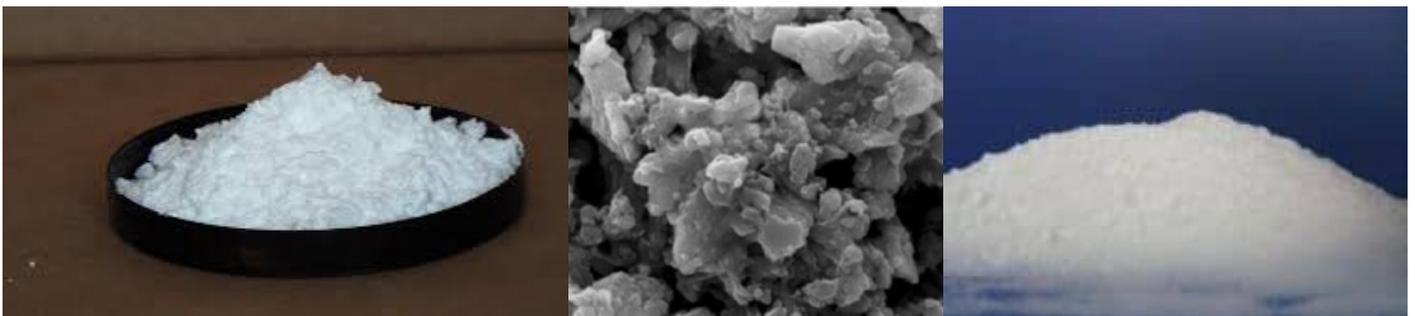
- Silica greases have excellent heat resistance.
- The upper operating temperature of silica grease is determined by the base oil with which it is combined.
- Silica inherently has poor water resistance, but when treated its water-resistant can be increased.
- Silica is also a very efficient thickener as it has a small particle size (micron level).

CLAY :

- They have outstanding heat resistance.
- They have good oxidative stability and are usable at least up to the temperature that the constituent oil evaporates.
- These lubricating greases also have excellent water resistance.
- Clay greases tend to soften quite a bit when worked and also have fair shear stability and tend to soften quite a bit when worked

PTFE:

- PTFE greases are high-temperature greases that have good thermal stability, water resistance, shear stability, and lubricity.
- PTFE greases typically have dropping points over 260°C.
- PTFE grease has a very low coefficient of friction.



POLYUREA :

- Polyurea greases are high-performance greases as they perform well in high temperature, continuous use bearing applications.
- Polyurea thickened greases have the excellent anti-oxidant capability.
- Polyurea greases are also characterized by dropping points above 250 °C and low oil separation.
- The maximum usable temperature is 177 °C.

CALCIUM SULFONATE :

- Calcium-sulfonate greases have superior mechanical and shear stability compared to lithium-complex greases.
- The dropping point of calcium-sulfonate greases is an excess of 287 °C.
- Have inherent extreme pressure and anti-wear properties.
- The only limitations with calcium-sulfonate greases are their inferior pumpability and cost.
- Calcium sulfonate has inherent water-resistance properties.
- It can withstand very high temperatures.

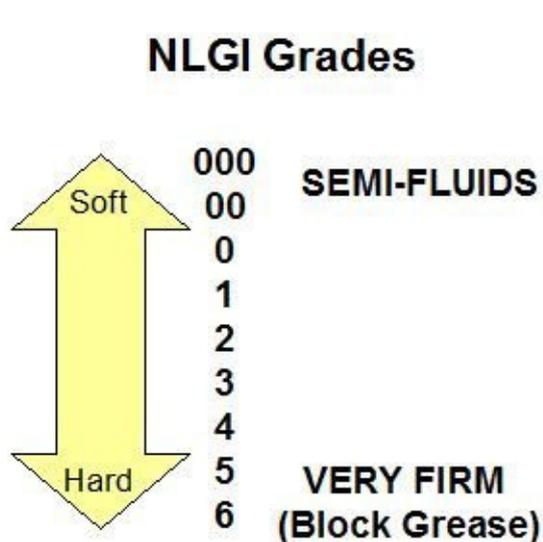
NLGI CLASSIFICATIONS:

- The other key classification for grease is thickness. The thickness of grease is measured by penetration. The range of grades is 000 to 6. The thickener in the grease defines the consistency and the NLGI grade
- Commonly most greases used are between NLGI 1 and 3 grades. NLGI 2 is the most common grade being used. Grades with 000 and 00 can be used in central systems and colder environments.

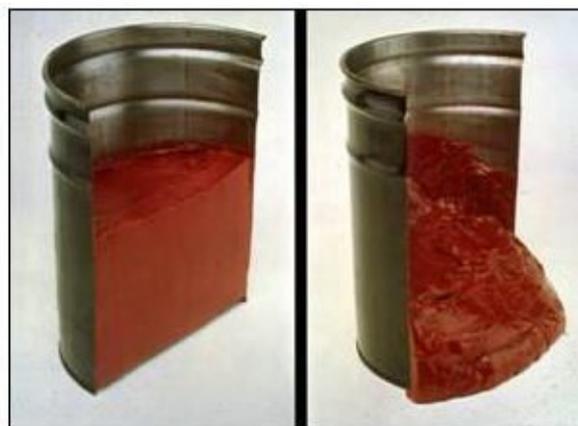


NLGI Grades

A measure of the consistency of grease.



NLGI 3 vs. NLGI 00



CONSIDERING THICKENER FOR LUBRICATING GREASE:

BASED ON PARAMETERS :

- Drop Point: Polyurea, lithium complex and clay have high drop points
- Shear stability: Lithium and lithium complex have excellent mechanical and shear stability
- Pumpability: Polyurea, lithium, and lithium complex are good

BASED ON APPLICATION :

- Re-lubrication frequency: Polyurea is excellent for re-lubrication interval
- OEM requirements: Specified by the equipment manufacturer
- Compatibility: Compatibility must be observed based upon the requirement of the application
- Water-resistant: Lithium complex, polyurea, calcium sulfonate, lithium all have good water resistance

After understanding and going through different types of thickeners and their properties one can decide the thickening system and NLGI grade to be used for lubricating grease based on the requirement of its application.

Mosil lubricants are specialty grease manufacturer that has a wide and specialty grease range of products with a combination of different types of thickeners, oil & additive for different application. One can contact and with the help of Mosil personnel can select the most appropriate and optimum solution of lubricating grease for the effective and efficient functioning of machines

