

GREASY INFO

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GREASE CHARACTERISTICS

What is grease?

GREASE = BASE OIL + ADDITIVES + THICKENER

A lubricating grease is made by mixing 2% - 15% of a thickener and other additives into a lube base oil.

How does grease work?

The thickeners in grease absorb lubricants and additives like a sponge and release them when under pressure. The lubricants prevent friction and create a barrier or film between moving parts.

What are the properties of grease?

- Amount and type of thickener.
- Additives.
- Solids (i.e. Moly, Graphite).
- Water washout and spray off.
- Mechanical stability.
- Oil separation.
- Storage life.
- Oxidation resistance.
- Rust / corrosion resistance.
- Viscosity and type of base oil.
- Bearing life (wheels, electric motors).
- Compatibility (other greases, seals).
- Low temperature torque.

What type of Thickeners are used?

- Clay (Organo Clay, i.e. Bentone).
- Lithium.
- Lithium Complex.
- Lithium / Calcium Mixed Complex.
- Calcium Complex.
- Aluminium Complex.
- Others (Calcium, Sodium, Polyurea).

What types of Base Oils are used?

- Castor Oils.
- Mineral Oils (Min).
- Synthetic Oils (Syn) (Group 3 & 4, PAO & Ester).
- White Oils (Pharmaceutical Grade).
- Vegetable Oils (Food Grade).

GREASE ADDITIVES

- Extreme Pressure Additives.
- Oxidation inhibitors.
- Rust/Corrosion inhibitors.
- Anti Wear Additives.
- Tacky Additive - Adhesive/ Cohesive (Polymers/resins).
- Dyes, Pigments.
- Insoluble Solids (Moly, Copper Graphite, Zinc Oxide)

GREASE TYPES

There are many types of greases which are shown below. As can be seen they have different properties which helps to define where they are best suited.

THICKENER	DROP POINT, °C	MAX SERVICE CONTINUOUS OPERATING TEMP, °C	HIGH TEMP USE	STRUCTURE	SHEAR STABILITY	WATER RESISTANCE
Calcium	100	<80	Red	Purple	Circle	Blue
Lithium	160 - 200	125	Grey	Purple	Blue	Blue
Calcium Complex	>260	150	Green	Purple, Yellow	Blue	Green
Lithium Complex	>240	160	Green	Purple	Green	Green
Aluminium Complex	>260	150	Green	Purple, Orange	Blue	Green
Barium Complex	>200	150	Blue	Light Blue	Circle	Green
Polyurea	>230	150	Green	Yellow	Blue	Green
Bentone	NA	150	Green	Purple	Circle	Blue
Sodium	170 - 190	125	Blue	Light Blue	Blue	Red

■ Very Poor
 ■ Poor
 ○ Fair
 ■ Good
 ■ Excellent
■ Buttery
 ■ Smooth
 ■ Fibrous
 ■ Gel
 ■ Opaque

GREASE SERVICE CLASSIFICATION

There are different categories for greases developed by the NLGI (National Lubricating Grease Institute). The classification (ASTM D 4950) covers greases designed for the lubrication of chassis components and wheel bearings of passenger cars, trucks and other vehicles.

Consistency - Is the degree of hardness of a grease and may vary considerably with temperature i.e. from fluid to very hard. This is determined by the NLGI Grade Penetration. The viscosity of the base oil used in grease also varies from ISO 15 (very thin) to 1500 (extremely thick), and can have an effect on consistency.

NLGI Grade Penetration - NLGI is measured by a cone drop method. A special cone is dropped into the grease at 25° Centigrade and the depth of the fall is measured. This describes the consistency of a grease via and NLGI grade number. A grease is identified by an NLGI number that ranges from 000 to 6. NLGI 000 is a pourable or fluid grease and an NLGI 6 grease is solid, like wax.

GREASE TESTING

Drop Point Test: The dropping point of grease is the temperature at which the thickener can no longer hold the base oil. Grease is placed in a small cup and heated in an oven-like device. When a drop of oil falls from the lower opening of the cup, the dropping point of the grease is calculated using the temperatures in the oven and inside the cup.

4 Ball Weld Test: A 12.7mm steel ball is rotated against three stationary balls of the same size. Lubricant surrounds the balls. Test conditions are 1770 rpm, 25°C and 10 seconds duration. Testing steps continue with new balls and an increased load until welding of the four balls occurs.

GREASE SHELF LIFE

The shelf life of any grease is affected by the type and amount of thickener used, consistency of the grease, manufacturing method employed and the formulation complexity. Generally, straight Lithium, Lithium Complex and Calcium Complex greases remain stable for a long time. Aluminium Complex greases tend to set and harden, but remain stable. Bentone and Barium greases tend to soften on aging. Based on these observations: However Steering Box Lubricant and Semi Fluid Grease only have a 2 year shelf life.

GREASE COMPATIBILITY

Occasionally, grease substitution in an application may be necessary to correct problems arising from the original product in service. If the thickeners are incompatible, the mixture will not meet the properties of the individual greases and in some cases, the greases will fall apart. The below table provides a rough guide.

	Calcium	Lithium	Calcium Complex	Lithium Complex	Aluminium Complex	Barium Complex	Polyurea	Bentone	Sodium
Calcium		✓	✓	✓	●	✗	✓	✗	✗
Lithium	✓		✓	✓	●	●	✓	✗	●
Calcium Complex	✓	✓		●	✗	●	●	✗	✗
Lithium Complex	✓	✓	●		●	●	✓	✗	●
Aluminium Complex	✗	●	✗	●		✗	●	✗	✗
Barium Complex	✗	●	●	●	✗		●	✗	✗
Polyurea	✓	✓	●	✓	●	●		✗	✗
Bentone	✗	✗	✗	✗	✗	✗	✗		✗
Sodium	✗	●	✗	●	✗	✗	✗	✗	

✓ Compatible ✗ Incompatible ● Borderline

It is strongly advised that, in all cases, the old grease be purged or cleaned out from the system before a new one is introduced. However, compatibility between greases is temperature dependent. As the temperature rises, the problems associated with incompatibility also increase. With unknown competitors' products, it is strongly advised to treat them as incompatible.

GREASE COLOUR

A grease's colour is determined by base oil, thickener, additive and dye. A grease can be made to almost any colour to suit a particular environment, application or for identification purposes.

WHICH GREASE DO I USE?

FOLLOW THE "L.E.T.S PRINCIPLE"

LOAD . ENVIRONMENT . TEMPERATURE . SPEED

LOAD				
Load	ISO	NLGI	Additives/Base	Recommended Penrite Grease
High	220	1-2	High Base Oil Viscosity EP & AW Additives	Extreme Pressure Grease
	460			ACT Grease XEP2
	680			High Temperature Wheel Bearing Grease
Low	100	2-3	Low Base Oil Viscosity Firm Consistency	Indgrease Lith R3
	150			Indgrease 100 LXEP2
	220			

ENVIRONMENT			
ENV	Protection Type	Additives/Base	Recommended Penrite Grease
Water	Rust Protection	Corrosion Preventative	Marine Grease
	Water Resistance	Adhesiveness Tackiness	Indgrease 1615 WR Indgrease CXOG-05
Acid / Alkali	Acid Protection Alkali Protection	Inert Thickener & Additives	Indgrease BM3
Long Dispensing Lines	Good Pumpability Soft Consistency		Indgrease Lith EP 0 Indgrease 100 LXEP2

TEMPERATURE			
Temperature	Protection Type	Additives/Base	Recommended Penrite Grease
Very High	Up to 180°C	Clay Based Greases	Copper Eze Indgrease BM3
High	Up to 170°C	Complex Greases	Marine Grease High Temperature Wheel Bearing Grease
Moderate	Up to 140°C	Lithium Greases	Indgrease Moly HT Indgrease 1615 WR ACT Grease XEP2 QCA Grease MX9
Low	Down to -20°C	Lithium & Complex Greases	Extreme Pressure Grease Molygrease EP 3% Indgrease 100 LXEP2 ACT Grease XEP2 QCA Grease MX9

SPEED					
Speed	Load	ISO	NLGI	Additives/Base	Recommended Penrite Grease
High	Low	100	2-3	Low Base Oil Viscosity Firm Consistency	Indgrease Lith R3
		150			Indgrease 100 LXEP2
Low	High	220 680	2	High Base Oil Viscosity Soft Consistency	QCA Grease MX9