

GREASY INFO

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 ACT Grease XEP2 High Temperature Wheel Bearing Grease |
| | 460 | | | |
| | 680 | | | |
| Low | 100 | 2-3 | Low Base Oil Viscosity Firm Consistency | Indgrease Lith R3 Indgrease 100 LXEP2 |
| | 150 | | | |
| | 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 |
| | | | 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 Indgrease 100 LXEP2 |
| | | 150 | | | |
| Low | High | 220 | 2 | High Base Oil Viscosity Soft Consistency | QCA Grease MX9 |
| | | 680 | | | |