Grease Compatibility

If possible, bearings should be thoroughly cleaned or purged prior to changing grease types. If this is not possible, any added grease must be compatible with any residual grease already present, otherwise softening, or in extreme cases, a complete breakdown of the grease may occur.

	Aluminium Complex	Barium	Calcium	Calcium 12-Hydroxy Stearate	Calcium Complex	Clay	Lithium	Lithium 12-Hydroxy Stearate	Lithium Complex	Polyurea
Aluminium Complex	X	I	I	C	I	I	I	I	C	I
Barium	I	X	I	C	I	I	I	I	I	I
Calcium	I	I	X	C	I	C	C	B	C	I
Calcium 12-Hydroxy Stearate	C	C	C	X	B	C	C	C	C	I
Calcium Complex	I	I	I	B	X	I	I	I	C	C
Clay	I	I	C	C	I	X	I	I	I	I
Lithium	I	I	C	C	I	I	X	C	C	I
Lithium 12-Hydroxy Stearate	I	I	B	C	I	I	C	X	C	I
Lithium Complex	C	I	C	C	C	I	C	C	X	I
Polyurea	I	I	I	I	C	I	I	I	I	X

BASE FLUID COMPATIBILITY

Base Fluid	Mineral Hydrocarbon	Synthetic	Polyglycol	Ester	Silicone
Mineral	C	C	I	B	I
Synthetic Hydrocarbon	C	C	I	B	I
Polyglycol	I	I	C	I	I
Ester	B	B	I	C	I
Silicone	I	I	I	I	C

How are the different types of grease defined?

All greases conform to some form of consistency specification, which indicates the softness or hardness of the grease. This is generally the ISO system (International Standards Organisation) or NLGI (National Lubricating Grease Institute) system, which are defined as follows:

Description	ISO 2137 Penetration	NLGI Grade
Very Soft Greases	445-475 400-430	000 00
Soft Greases	355-385 310-340	0 1
Medium Greases	265-295 220-250 175-205	2 3 4
Hard Greases	130-160 85-115	5 6

How do i select the most appropriate grease for the job?

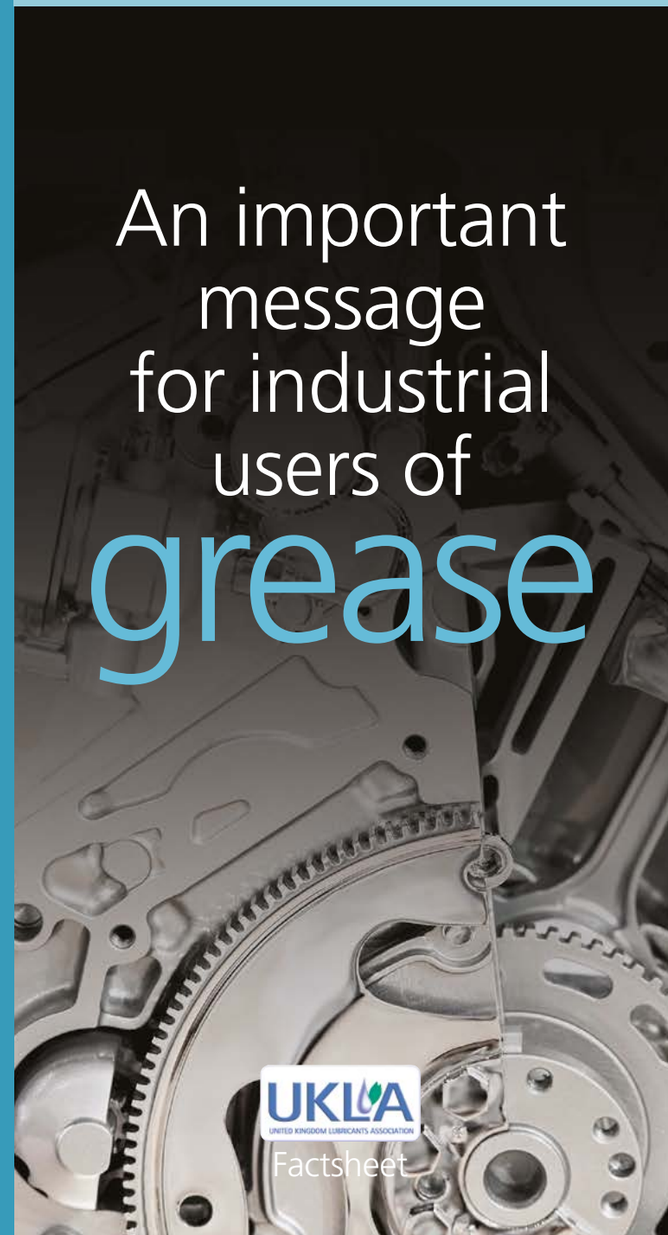
Selection of the most appropriate grease is not always straightforward, and the equipment manufacturer or grease supplier should be consulted if in any doubt. Selection must be based upon a number of criteria, including thickener characteristics, base fluid characteristics, additive content, compatibility with elastomers used in the equipment, compatibility with grease already present and cost.

Berkhamsted House
121 High Street, Berkhamsted
Hertfordshire, HP4 2DJ, United Kingdom

Tel: +44 (0)1442 875922
Websites: www.ukla.org.uk

Select the correct grease for the application

An important message for industrial users of grease



UKLA
UNITED KINGDOM LUBRICANTS ASSOCIATION

Factsheet

Using the correct lubrication...
- Saves energy
- Reduces maintenance
- Extends machinery life

Correct lubrication can save plant engineers literally the price of many thousands of pounds a year in reduced maintenance costs and extended life of plant equipment. Aimed at those who consider 'a grease is just a grease', this leaflet explains the many different types of grease which exist, together with their particular application requirements.

What is grease?

The word 'grease' originates from the latin word 'crassus' meaning fat, since simple animal fats were probably the earliest known examples of lubricants and were used to lubricate the axles of chariot wheels by the Egyptians some 3,500 years ago.

Right up until the Industrial Revolution mechanisms were still being lubricated with vegetable oils and animal fats, but in the 19th century rapid developments in engineering developed a need for more sophisticated lubricants. Included in these lubricants, which were making increasing use of the newly discovered petroleum and its associated by-products, were the first of the modern greases.

A grease is defined as:
'A solid or semi-solid product of the dispersion of a thickening agent in a liquid lubricant. Other ingredients imparting special properties may be included'

Thus a grease is composed of three main types of ingredient,
Thickener
Fluid Base
Additives

The first greases consisted of a heavy mineral oil fluid thickened with simple soaps derived from calcium and animal fats , e.g. calcium stearate. By dissolving or forming the calcium soap in the oil at temperatures above the melting point of the soap and then cooling gradually, the dispersed soap solidified in the form of a fibrous structure , which retained the oil in a cohesive mass, in the same way that a sponge retains water.

These early greases, whilst having good lubrication and water-resistant properties, suffered from a very limited temperature range and could not be used at temperatures above 60°C. Later, the calcium soaps were replaced by sodium soaps, which could operate at much higher temperatures, but had the disadvantage of being readily emulsified by water.

It was not until the Second World War that the most common grease of today was developed, namely, lithium soap greases, which had the ideal properties of water resistance combined with the ability to withstand high temperatures (up to 120°C).

THICKENER CHARACTERISTICS

Thickener Type	Maximum temparature for Prolonged Use (O°C)	Effect of Water	Resistance to Softening	Principal Uses
Calcium Soap	55-65	Highly Resistant	Fair to Good	Chassis Grease General Purpose Industrial Grease
Calcium Hydroxysteorote	80-90	Highly Resistant	Excellent	Multipurpose Grease
Calcium Complex	120-150	Highly Resistant	Excellent	Industrial Grease
Sodium Soap	120-140	Suscpetible	Fair	Ball & Roller Bearings Electric Motors
Sodium Complex	150-175	Highly Resistant	Excellent	Multipurpose Industrial Grease
Aluminium Complex	110-135	Resistant	Good	Industrial Grease
Lithium Soap	110-130	Resistant	Fair	Multipurpose Automotive and Industrial Grease
Lithium Complex	150-175	Resistant	Excellent	Multipurpose Automotive and Industrial Grease
Polyurea	150-175	Highly Resistant	Fair to Excellent	Multipurpose Automotive and Industrial Grease
Bentone	140-160	Resistant	Good	General purpose grease for high temperature bearings where re-lubrication is frequent

FLUID CHARACTERISTICS

	Lubricity	Low Temperature Performance	Volatility	Aggressivity Resistance on Standard Joint	Oxidation	Average Cost
Naphthenic Mineral Oils	Good	Good	Good	Average to Poor	Average to Poor	1,2
Paraffinic Mineral Oils	Good	Average to Poor	Good	Good	Good	1
Alkylates	Average	Excellent to Good	Average	Good to Average	Good to Average	2,5
Polybutenes	Average	Good to Average	Average	Good	Average	3
Polyalpha olefins	Good	Excellent	Excellent	Good	Excellent	5 to 10
Esters and di-Esters	Excellent	Excellent	Excellent	Average to Poor	Excellent	8 to 15
Polyglycols	Excellent	Excellent	Average	Poor	Good	5
Silicones	Poor	Excellent	Excellent	Good	Excellent	25 to 50

What are the different types of grease?

Greases are in the main divided into soap-thickened and non-soap thickened varieties, and can be based on mineral oil (most common) or on other types of fluid base.

Soaps can include:
Lithium
Calcium (Hydrous and Anhydrous) Sodium
Barium Aluminium Lithium Complex
Calcium Complex
Aluminium Complex
Non-soaps can include:
Bentone clays
Silica
Polyurea

Base Fluids can include:
Mineral Oils (Paraffinic and Naphthenic)
Vegetable Oils (Rapeseed Oil, Sunflower Oil, etc.)
Synthetic Ruids (Polyalphaolefins, Polyglycols, Polybutenes, Silicones, Ethers, Esters, Alkylates, Fluorocarbons, etc.)

Additives can include:
Antioxidants Anti-wear
Extreme Pressure
Anti-rust
Solid lubncants (Graphite, Molybdenum Disulphide, etc.)

Why use a grease?

It is always preferable to use oil rather than a grease since it is easier to handle, flows directly to the part needing lubrication and conducts heat away from the moving parts. This is why oil makes up some 95% of the total lubricants market. However, the use of oil necessitates the use of an associated reservoir, sometimes together with a pump and piping, which is not always practicable, e.g. in wheel bearings of cars. In such cases, greases are preferred which can be sealed into the bearing and which are designed to last the lifetime of the bearing without re lubrication.

The grease is therefore required to:
- Reduce friction and wear
- Protect against rust and corrosion
- Seal the bearing from possible contaminants
- Not leak, drip, or be thrown off
- Retain its consistency over a wide temperature range and for long periods
- Permit the free motion of moving parts
- Be compatible with seals and all other bearing materials
- Tolerate the presence of water without loss of performance