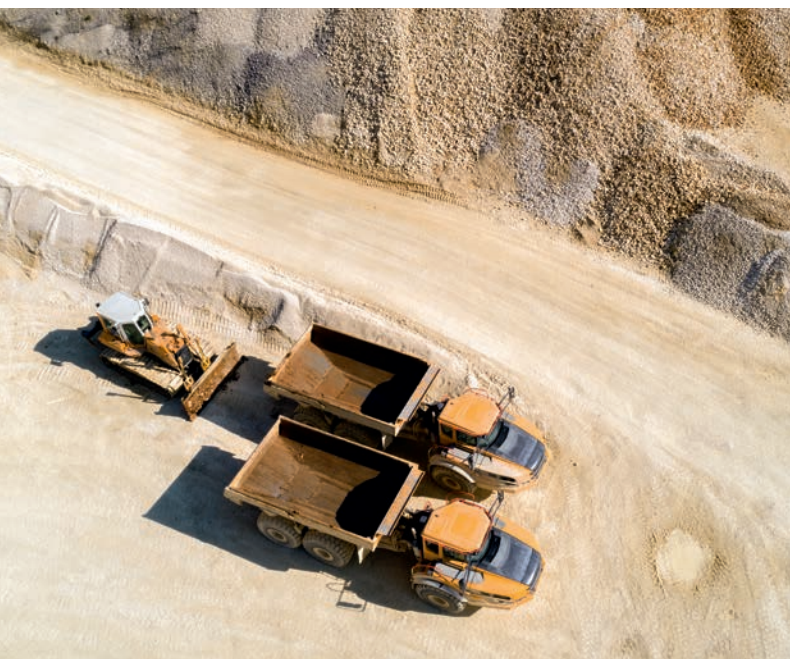




**REPSOL**

*Let's invent the future*

# Catalogue of High-Performance Lubricating Greases







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# 1. General criteria for selecting a grease

Grease is a semi-fluid product that consists of the dispersion of a thickening agent in a liquid lubricant, together with other ingredients that give the grease unique properties (additives). To guarantee the most reliable performance in your equipment, the Repsol team offers you the latest catalog of high-performance lubricating greases. By selecting suitable oils, thickeners, and additives, the properties of the lubricating greases can be optimally adjusted for the most diverse applications. The grease structure allows the lubricant to remain solid until the shear stress between surfaces reaches a certain level, and the grease begins to flow and becomes a mobile compound.

Lubricating greases may be selected on several different criteria. The most common are: **Industry segment** and **Operating conditions**.

1. INDUSTRY SEGMENT			
Off-Road/ Mining Construction	Agriculture/ Public Works	Paper Industry	Steel Industry
Protector Lithium EP 12	Protector Calcium 12, Protector Lithium MP 12, Protector Lithium EP 12	Protector Lithium Complex 12	Protector Lithium EP 12, Protector Lithium Complex 12

2. OPERATING CONDITIONS			
Very high temperatures	Mainstream medium temperatures	Low speeds/ High loads	Water resistant
Protector Lithium Complex 12	Protector Lithium EP 12, Protector Lithium Complex 12	Protector Lithium MP 12, Protector Lithium EP 12, Protector Calcium 12	Protector Calcium 12

To make the proper choice, the three components which must be taken into consideration are listed down below:

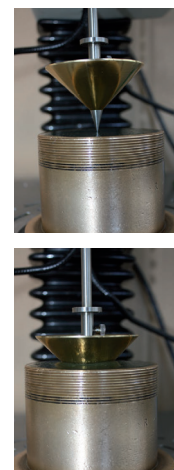
- The lubricating base oil (Mineral or synthetic)
- The thickener (The soap of the grease) and The additives (MP, EP...)

The most important properties to be considered when choosing the greases are Consistency, Base oil viscosity.

- EP and anti-wear additives and Dropping point
- Resistance to high/low temperatures and Resistance to environmental working conditions

## CONSISTENCY

CONSISTENCY (NLGI grade)	PENETRATION (60w, 25°C) ASTM D-217 (0.1 mm)	APPEARANCE	APPLICATIONS
000	445 to 475	Very light, like a viscous oil	Gears
00	400 to 430	Very light, like a viscous oil	Gears and centralised systems
0	355 to 385	Soft	Bearings and centralised systems
1	310 to 340	Soft	Bearings and centralised systems
2	265 to 295	Creamy	Bearings
3	220 to 250	Almost solid	Bearings
4	175 to 205	Hard	Plain bearings. Briquettes
5	130 to 160	Very hard, like soap	Plain bearings. Briquettes
6	85 to 115	Very hard, like soap	Plain bearings. Briquettes





The consistency determines the thickness of the grease and is influenced by the type and percentage of the thickener used. It also provides the structure [like a sponge] that stores the lubricant base oil.

The NLGI (National Lubricating Grease Institute) grades show the penetration of a standard cone in a sample of grease under certain conditions. A low value indicates a high level of penetration, while a high NLGI value will be obtained for a harder grease. As general recommendations, we use consistency grades 1 and 2 for general lubrication, the lowest grades [0 and 00] for centralised systems and gear lubrication, and the highest grades [3] for elements in high temperature conditions.

## BASE OIL VISCOSITY AND OTHER PROPERTIES

The selection of the base oil viscosity will depend on the load and speed conditions of the application, as well as the degree of separation of the oil and pumpability of the grease. Greases formulated with high viscosity base oils offer advantages such as greater adhesion and water resistance, as well as lower oil separation, and are therefore well suited to applications with high loads. However, low viscosity base oils give the grease better heat transfer and enhanced performance at low temperatures and are therefore the best option for equipment with light loads and high speeds.

The dropping point is defined as the temperature at which the grease changes from a semi-solid to a liquid state. It is a qualitative indication of the grease's resistance to heat in those instances where a semi-solid lubricant is required.

Complex soaps have higher dropping points than their simple soap equivalents. The maximum working temperature is determined both by the nature of the base oil and the thickener used. The base oil's viscosity and the grease's consistency are decisive in terms of their performance at low temperatures.

ISO VG (cSt@40°C)	APPLICATIONS	LOAD	SPEED	OIL SEPARATION	PUMPABILITY
100	High speeds Electric motors	↓	↑	↑	↑
150	Wheel bearings				
220	Paper industry Industrial applications				
460	Paper and steel industry				
1000	Mining equipment				
1500	High loads/vibrations	↓	↓	↓	↓

DIN 51825 classifies greases according to their operating temperature range. The presence of an adequate layer of lubricating oil to prevent direct contact of the surfaces protected by the grease is essential. For this purpose, it is necessary to select the right viscosity of the base oil, as well as special anti-wear and extreme-pressure additives.

The presence of humidity or extremely dirty environments has a huge influence on the nature of the grease to be used. Aspects such as anti-rust or anti-corrosion protection, water resistance, biodegradability, and equipment noise limitation requirements are crucial when it comes to selecting the right grease.



## 2. High-performance lubricating greases

### REPSOL GREASES

#### PROTECTOR CALCIUM I2

Formulated with highly refined mineral oil and thickened with an anhydride calcium soap, which endows it with excellent water-resistant properties. It has low ash content and good stability and mechanical resistance properties. Especially suitable for equipment mechanisms working outdoors and in damp environments, such as cars, public works machinery, agricultural machinery, etc. It is recommended for greasing chassis and self-chassis, industrial and vehicle water pumps, crane guides, carwashes, and the Lubrication of flat bearings, balls, and rollers, where special grease is not needed. Field tested in application over a range of temperatures from -20 to 100 °C.

Product	Base	Thickener	NLGI	Dropping Point	Working temperature	Quality level
Protector Calcium I2	460	Anhydride Calcium Soap	2	120	-20 to 100 °C	DIN 51825 K 2G-20

#### PROTECTOR LITHIUM EP I2

It is developed from highly refined paraffinic-based oils, thickened with lithium soap [hydroxy stearate]. Contains antioxidant, anticorrosive, anti-wear, and extreme pressure additives. It is the mainstream solution to release the best performance in general industry greasing, rolling mills, couplings, chains, guides, and shearing bearings. It can also perform in all load and vibration-supporting rollers (iron and steel industry mills, rolling mills, and public works machinery). Field of application from -20 °C to 120 °C.

Product	Base	Thickener	NLGI	Dropping Point	Working temperature	Quality level
Protector Lithium EP I2	220	Lithium Soap	2	220	-20 to 120 °C	EP-2: DIN 51825 KP 2K-20

#### PROTECTOR LITHIUM COMPLEX I2

High-quality grease, formulated with highly refined mineral oil, thickened with a complex lithium soap. Contains extreme pressure additives and antioxidant and anticorrosive additives. It is developed to lubricate industrial machinery elements with temperatures of up to 140 °C and point temperatures of 160 °C. Lubricating grease for any mechanisms and bearings subjected to high temperatures, heavy loads, and pressures, such as sifter bearings, presses, ceramic and waste furnaces, and mills. Also suitable for Lubrication of vibrating rollers, asphalt spreaders, heat source coupling, roller boxes guide in lamination, etc.

Product	Base	Thickener	NLGI	Dropping Point	Working temperature	Quality level
Protector Lithium Complex I2	220	Complex Lithium Soap	2	295	160 °C	DIN 51825 KP 2N-20 ISO 6743-9-L-X-BDHB2

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