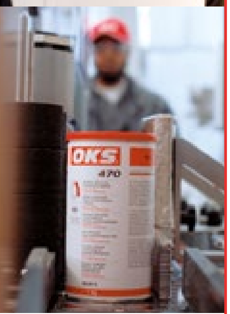
For a world in motion

TRIBOLOGY BASIC KNOWLEDGE

Speciality Lubricants
Maintenance Products

40 YEARS OF TRIBOLOGICAL EXPERTISE – MADE IN GERMANY



OKS – your professional partner for chemotechnical special products

The OKS brand stands for high-performance products for reducing friction, wear and corrosion. Our products are used in all the areas of production and maintenance technology in which the performance limits of classic lubricants are exceeded.

Quality – Made in Germany

The continued success of OKS for 40 years is decisively characterised by the high quality and reliability of our products, as well as the fast implementation of customer requirements through innovative solutions.

The products developed by OKS engineers and chemists are produced under strict quality requirements in Maisach near Munich, Germany, our company's headquarters. Worldwide distribution is carried out just-in-time from Maisach, supported by a modern logistics centre.

The long-standing certifications by the TÜV SÜD Management Service GmbH in the fields of quality (ISO 9001: 2015), environment (ISO 14001: 2015) and work protection (ISO 45001: 2018) are proof of the high OKS quality standard.

TÜV SÜD ISO 9001 | TÜV SÜD ISO 14001 | TÜV SÜD ISO 45001

www.tuev-sued.de/ms-zert

OKS – Partner to Trade

Our speciality lubricants and chemotechnical maintenance products are sold via the technical and mineral oil trades. The strategy of "sales via trade", the smooth processing of orders and our comprehensive technical service make us one of the preferred partners for demanding customers worldwide. Use our specialist's know-how. Put us to the test.

VERBAND TECHNISCHER HANDEL | *LIEFERANT DES JAHRES 2013*

A company of the Freudenberg Group

Since 2003 OKS Spezialschmierstoffe GmbH has been part of the international Freudenberg Group, with headquarters in Weinheim, Germany. We utilize the comprehensive know-how and the innovative power of the Freudenberg Chemical Specialities (FCS) division for the further development of new products and markets to ensure the continued dynamic growth of our company in the future.

Acting sustainably – to serve customers and environment

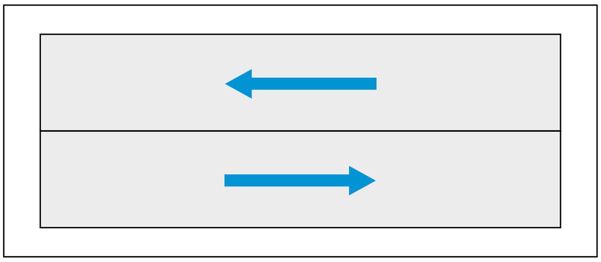
Our concept is based on the sustainability strategy of the Freudenberg Group. It defines sustainable action as part of the corporate culture with its values and principles and the relevant economic and social environment.
Our goal is to minimize our "footprint", i. e. the direct effects of our business activities on the environment and society and the active support of our customers with regard to their "handprint" i. e. their own, sustainable action.

Download:
OKS Sustainability Report

CONTENT

Reduction of friction and wear through optimal lubrication

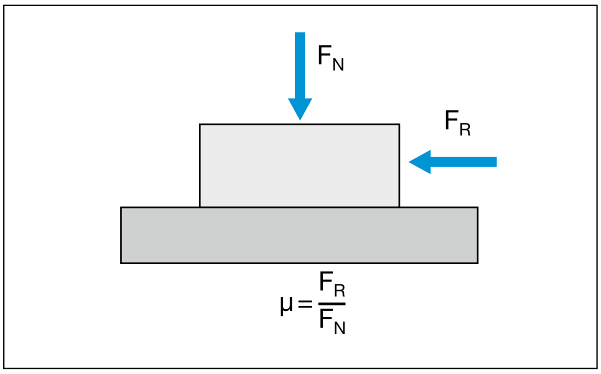
Several billion Euros of economic losses are caused every year through friction and wear. In order to reduce these cost extensive tribological basic research is carried out. On this basis, companies then occupy themselves with specific knowledge, such as OKS Spezialschmierstoffe GmbH with the development of high-performance lubricants.



Friction

What is friction?

Friction is the mechanical resistance to the relative movement of two surfaces. Friction is usually undesirable in technical systems, because it is associated with energy loss, friction heat and wear.



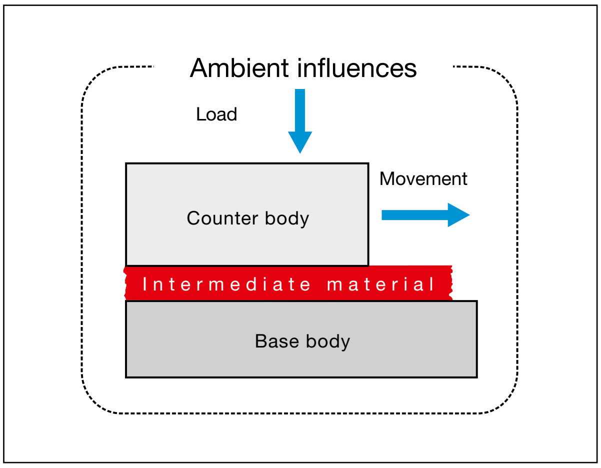
Coefficient of friction

Determining the coefficient of friction

The following equation is used to determine the friction (to Coulomb).

$$\frac{F_R \text{ (frictional force)}}{F_N \text{ (normal force)}} = \mu \text{ (coefficient of friction)}$$

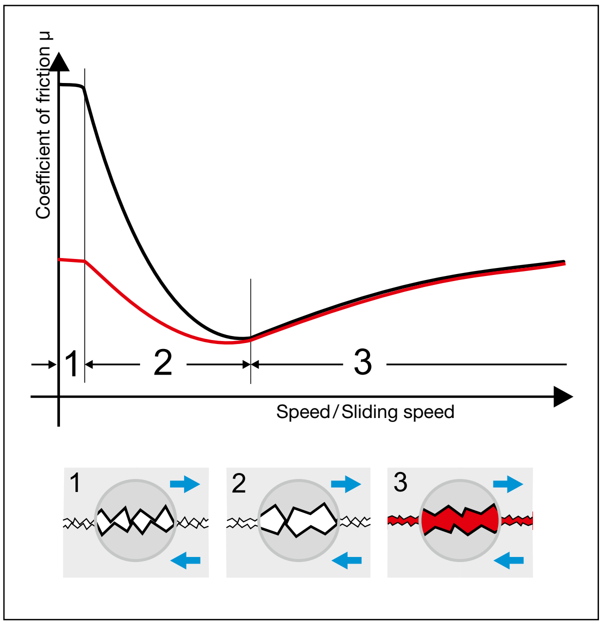
Friction can be divided into sliding friction, pivoting friction, rolling friction and rolling resistance friction.



Tribological system

The tribological system

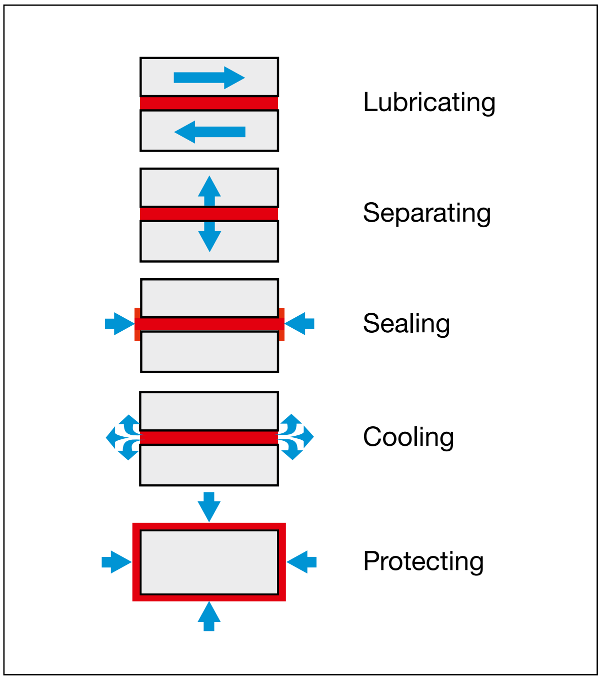
For an optimal problem solution all the influencing variables in a tribological system have to be known. Allowances have to be made for the complex interactions of these factors. Ambient influences (dust, temperature or moisture) and structural factors (material, surface or geometry of the friction bodies) play just as great a role as stress factors (speed, pressure stress or vibrations) as far as selecting the correct intermediate material (= lubricant) is concerned.



Stribeck curve

Stribeck curve

The course of the coefficient of friction of a friction bearing with oil or grease lubrication in the various friction and lubrication states can be described using the Stribeck curve as an example.
During the start-up phase the static friction is followed by the solid state friction (high coefficient of friction/high wear). As speed increases a partial separation of the sliding surfaces takes place in the mixed friction phase by the lubricating film (medium coefficient of friction/medium wear). The emergency running film that is formed by solid lubricants protects at exactly this point (see red curve).
At high speeds a hydrodynamic liquid film separates the sliding surfaces completely from each other (as at aquaplaning). In this phase of liquid friction the lowest wear and the lowest friction is achieved.



Spectrum of tasks of a lubricant

Multiple function of the lubricants

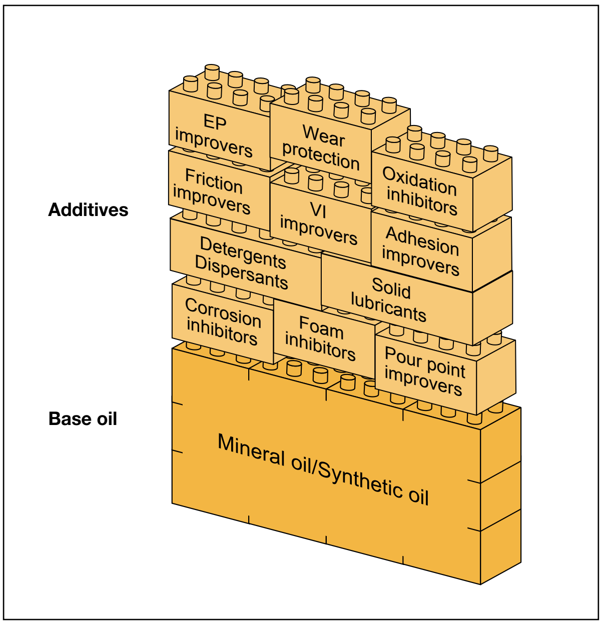
The functions of a lubricant can be varied and, depending on the particular application, can be necessary alone or in combination. Besides the primary demand placed on the lubricant – maximum power transfer combined with a minimum of friction and minimum wear – it is often necessary to fulfil various secondary properties such as water resistance, chemical resistance, compatibility with plastics or corrosion protection.

Oils with high-performance additives for reliable lubrication

Oils dissipate heat well from the lubricating point. In addition, they have an notedly good creep and wetting behaviour. Therefore oil lubrication is often used at high temperatures or high speeds of rotation. Typical fields of application are gears, chains, friction bearings, hydraulics and compressors.

Characteristics of oils

Characteristic	Standard	Description
Viscosity	DIN 51 562-1	Dimension for the inner friction of liquids
ISO VG	DIN 51 519	Classification of oils into viscosity classes based on DIN 51 561
Operating temperature		Temperature range of the optimal performance
Flashing point	DIN ISO 2592	Lowest temperature at which the vapour-air mixture catches fire through extraneous ignition
Setting point	DIN ISO 3016	The lowest temperature at which the oil is still just capable of flowing



Structure of high-performance oils

Structure of high-performance oils

The additives play an important role in the formulation of a high-performance oil in addition to the careful selection of the base oil (type, viscosity) and has considerable influence on the price-performance ratio. Modern lubricating oils are conceived so that when the oil film is breached, the active ingredients form a protective film, so that the surfaces are protected against wear.

Properties of base oils

The base oil plays a decisive role in the selection of a lubricating oil. Mineral oils, synthetic hydrocarbons (polyalphaolefines = PAO), ester, polyglycols and silicone oils differ notably in their physical properties and chemical behaviour.

Properties	Mineral oils	Synthetic hydro-carbons (PAO)	ester oils	Polyglycol oils	Silicone oils
Density 20 °C [g/ml] approx.:	0.9	0.85	0.9	0.9 – 1.1	0.9 – 1.05
Setting point [°C] approx.:	-40 → -10	-50 → -30	-70 → -35	-55 → -20	-80 → -30
Flashing point [°C] approx.:	< 250	< 200	200 → 270	150 → 300	150 → 350
Resistance to oxidation	-	+	+	+	++
Thermal stability	-	+	+	+	++
Compatible with plastics	+	+	-	type-dependent	+

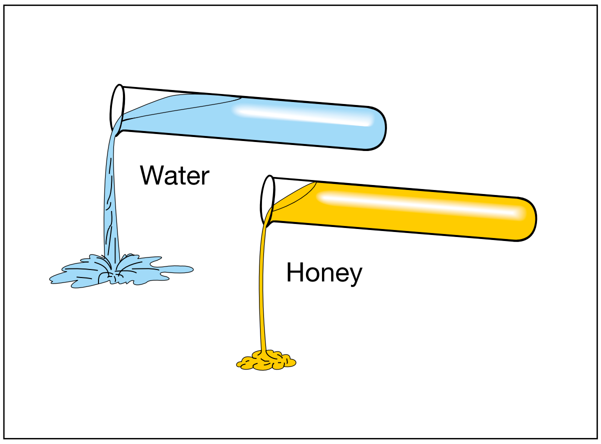
Compatibility of oils

The miscibility of different lubricating oils is influenced considerably by the base oils and has to be observed correspondingly when changing the lubricating oil, under consideration of the viscosity.

	Mineral oil	Polyalpha-olefines	ester oils	Polyglycol oil	Silicone oil (methyl)	Silicone oil (phenyl)	Polyphenyl-ether oil	Perfluorpo-lyether oil
Mineral oil	■	■	■			□		
polyalphaolefines	■	■	■					
ester oils	■	■	■	■		■	■	
Polyglycol oil			■	■				
Silicone oil (methyl)					■	□		
Silicone oil (phenyl)	□		■		□	■	■	
Polyphenylether oil			■			■	■	
perfluorpolyether oil								■

■ miscible □ partially miscible

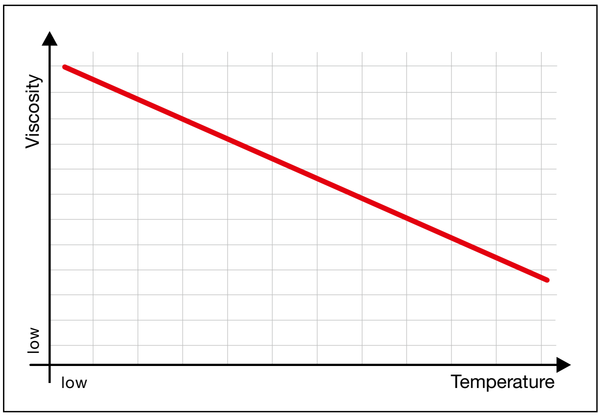
Oils with high-performance additives for reliable lubrication



Viscosity

Viscosity – the dimension for the inner friction of liquids

The choice of the viscosity of an oil depends on the area in which the lubricant is used. The following basically applies: Low viscosity for low pressure stress and high sliding speeds, high viscosity for high pressure stress, low sliding speeds and high temperatures. The viscosity can be determined with different measuring processes (see Test and measuring processes).
The kinematic viscosity in specified in mm^2/s and is used for classification. The dynamic viscosity is specified in mPa s. The two viscosities can be converted into each other under consideration of the density with the equation: Dynamic viscosity = Density x kinematic viscosity.



Temperature dependence of the viscosity

Dependency of the viscosity from the temperature

The viscosity of an oil depends on the temperature, the pressure and shear stress as well as the time in which it happens. The most important influencing factor is the temperature. As the temperature increases, the viscosity decreases and vice versa, depending on the type of oil.

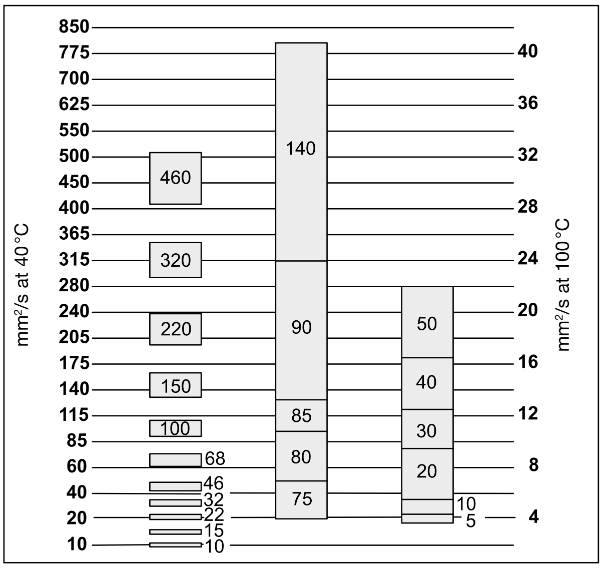
The classification of lubricating oils into viscosity classes is effected to ISO (DIN 51 519) or SAE (Society of Automotive Engineers).

Kinematic ISO-VG	**Viscosity (40 °C)** [mm²/s]
15	13.5 – 16.5
22	19.8 – 24.2
32	28.8 – 35.2
46	41.4 – 50.6
68	61.2 – 74.8
100	90 – 110
150	135 – 165
220	198 – 242
320	288 – 352
460	414 – 506
680	612 – 748
1,000	900 – 1,000
1,500	1,350 – 1,650

Viscosity classes to DIN 51 519

ISO viscosity classes to DIN 51 519

ISO-VG (Viscosity Grade) classes apply only for industrial lubricating oils. There are 18 kinematic VG classes from 2 mm²/s to 1,500 mm²/s. Determining of the viscosity is carried out at 40 °C.



Comparison of the viscosity classes to ISO-VG and SAE

Viscosity classes to SAE

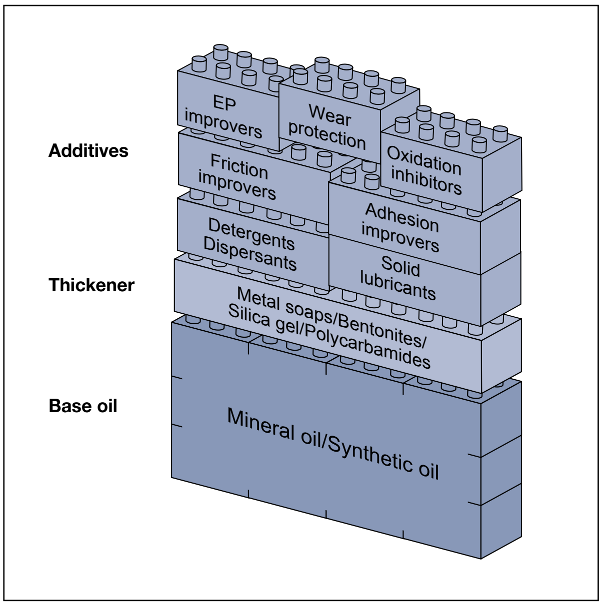
Lubricating oils for vehicle gears and motors are classified into SAE viscosity classes. These range from 0 – 60 at motor oils and from 70 – 250 at gear oils. The viscosity values are measured at 100 °C.

Greases for long-term lubrication under critical operation conditions

If, for structural reasons, no oil lubrication is possible or if a cooling function is not required, a lubricating grease is used in most cases. Greases consist of a base oil that is bound by a thickener (soap). This ensures that the lubricant remains at the lubricating point. There it ensures permanently effective protection against friction and wear and seals the lubricating point against external influences such as moisture and foreign matter. Greases are often used at rolling and friction bearings, spindles, fittings, seals, guides, but also at chains and gears.

Characteristics of greases

Characteristic	Standard	Description
Base oil viscosity	DIN 51 562-1	Influences the speed range and load capacity of a grease
Drop point	DIN ISO 2176	Exceeding of this temperature results in destruction of the grease structure
Operating temperature	DIN 51 805 – Min DIN 51 821/2 – Max	Temperature range of the optimal performance at roller bearing greases
Speed parameter (DN value)		Maximum rotating speed up to which a grease can be used in a roller bearing
Consistency	DIN ISO 2137	Dimension for the stability of a grease (worked/unworked penetration)
NLGI grade	DIN 51 818	Classification to the consistency classes to DIN ISO 2137
Four-ball test	DIN 51 350	Determining of the wear protection and of the maximum load capacity of a roller bearing grease



Structure of greases

Structure of greases

The main difference in the structure of greases compared to oil is the thickener which determines the typical performance features of a grease.
Modern lubricating greases are formulated so that their active ingredients form an emergency running lubricating film in case of critical stresses and ensure operational reliability.

Influence of the thickener on the performance features of a grease

Thickener (soap)	Operating temperature [°C]		Drop point [°C]	Water resistance	Load capacity
	Mineral oil	Synthetic oil			
Calcium	-30 → 50	n.a.	< 100	++	+
Lithium	-35 → 120	-60 → 160	170 / 200	+	-
Al-complex	-30 → 140	-60 → 160	> 230	+	-
Ba-complex	-25 → 140	-60 → 160	> 220	++	++
Ca-complex	-30 → 140	-60 → 160	> 190	++	++
Li-complex	-40 → 140	-60 → 160	> 220	+	-
bentonitee	-40 → 140	-60 → 180	without	+	-
Polycarbamide	-30 → 160	-40 → 160	250	+	-

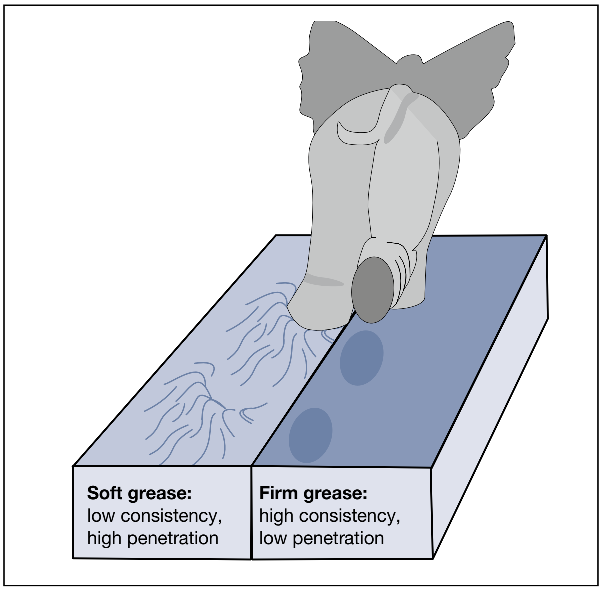
Compatibility of greases

In addition to the compatibility of the base oils, the miscibility of the thickeners has to be taken into account when changing greases. An incompatibility has a negative influence on the performance of the lubricating grease.

	Ca-soap	Ca_x-soap	Li-soap	Li_x-soap	Li/Ca-soap	Na-soap	bentonitee	Ba_x-soap	Al_x-soap	Poly-carb-amide
Ca-soap	■	■	■	■	■		■	■		■
Ca_x-soap	■	■	■	■	■		■	■		■
Li-soap	■	■	■	■	■		■	■		■
Li_x-soap	■	■	■	■	■			■	■	
Li/Ca-soap	■	■	■	■	■		■	■		■
Na-soap						■	■	■		■
bentonitee	■	■	■		■	■	■	■		■
Ba_x-soap	■	■	■	■	■	■	■	■	■	■
Al_x-soap				■				■	■	■
Polycarbamide	■	■	■		■	■	■	■	■	■

■ miscible

Greases for long-term lubrication under critical operation conditions



Consistency of a lubricating grease

Consistency of a lubricating grease

At lubricating greases the consistency is the characteristic for assessing the strength of a grease. According to DIN ISO 2137 it is measured through the penetration depth of a standardised cone.

Classification of greases to NLGI

The classification according to NLGI (DIN 51 818) ranges from very soft (Class 000) to very firm (Class 6). Standard lubricating greases usually comply with NLGI Class 2.

NLGI-class	Worked penetration [mm/10]	Gear lubrication	Friction bearings	Roller bearings	Water pumps	Block greases
000	445 – 475	■				
00	400 – 430	■				
0	355 – 385	■				
1	310 – 340	■	■	■		
2	265 – 295		■	■		
3	220 – 250		■	■		
4	175 – 205			■	■	
5	130 – 160				■	
6	85 – 115 Unworked penetration					■

Designation and classification of lubricating greases to DIN 51 502

In view of the multiple possibilities of application and different compositions, lubricating greases are classified and described according to DIN 51 502 by various aspects such as type of lubricating grease, usability, consistency classes (NLGI) and operating temperatures.

Example of a classification to DIN 51 502

K FKF 2 U -20

- -20: Lower operating temperature in °C
- U: Upper operating temperature and behaviour with water **(Table 4)**
- 2: Consistency class to NLGI
- FKF: Base oil type **(Table 2)** and additives **(Table 3)**
- K: Type of lubricating grease **(Table 1)**

Type of lubricating grease	Identifier
Lubricating greases for roller bearings, friction bearings and sliding surfaces (to DIN 51 825)	K
Lubricating greases for closed gears (to DIN 51 826)	G
Lubricating greases for open gears, toothings (adhesive lubricants without bitumen)	OG
Lubricating greases for friction bearings and seals (lower requirements than at lubricating grease K)	M

Table 1

Base oil type	Identifier
ester oils	E
Fluorinated hydrocarbons	FK
Synthetic hydrocarbons	HC
Polyglycols	PG
Phosphoric acid ester	PH
Silicone oils	Si
Other	X

Table 2

Additive	Identifier
EP additive	P
Solid lubricants (e.g. MoS_2)	F

Table 3

Identifier	Upper operating temperature [°C]	Behaviour with water to DIN 51 807 Part 1*
C	+60	0 – 40 or 1 – 40
D		2 – 40 or 3 – 40
E	+80	0 – 40 or 1 – 40
F		2 – 40 or 3 – 40
G	+100	0 – 90 or 1 – 90
H		2 – 90 or 3 – 90
K	+120	0 – 90 or 1 – 90
M		2 – 90 or 3 – 90
N	+140	to be agreed
P	+160	
R	+180	
S	+200	
T	+220	
U	above +220	

Table 4

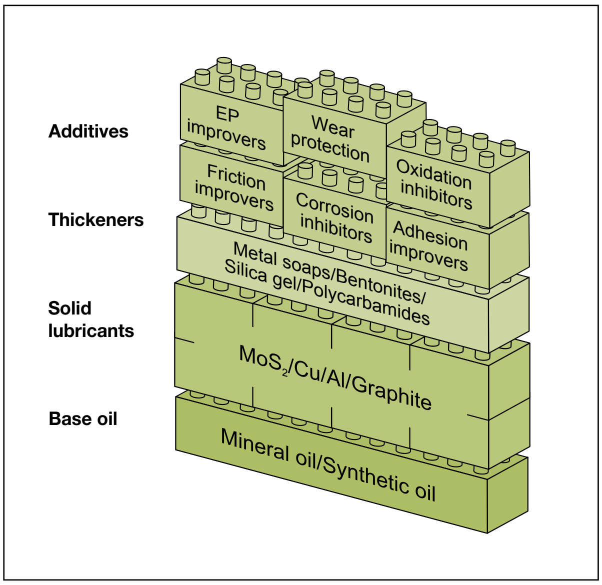
*0 = no change
1 = minor change
2 = moderate change
3 = strong change

Pastes for easy assembly and dismantling

The structure of pastes basically corresponds to that of greases. However, the share of solid lubricants is notably higher. This ensures reliable lubricating, separating and corrosion protection effects also when used under extreme temperature and pressure conditions and aggressive media. Pastes are used at screwed connections as well as when pressing in pins and bolts and furthermore at gearwheels.

Characteristics of pastes

Characteristic	Standard	Description
Press-fit test		Provides information about the lubricating effect of pastes at very high pressure and low sliding speed (relevant for assembly pastes)
Thread friction coefficient	DIN EN ISO 16047	The friction coefficient μ when screws and nuts are tightened is determined on a screw test bench (relevant for screw pastes)
Breakaway torque	DIN 267-27	Ratio of the required breakaway torque when loosening the screwed connection to the tightening torque
Operating temperature		Lubrication: Oil and solid lubricants are effective Separation: After the oil has evaporated, separating effect through solid lubricants



Structure of pastes

Structure of pastes

The structure of high-performance pastes is similar to that of greases. The main difference is the high portion of solid component that is typical of both assembly pastes (lubrication effect only) as well as for screw pastes (lubrication and separation effect).

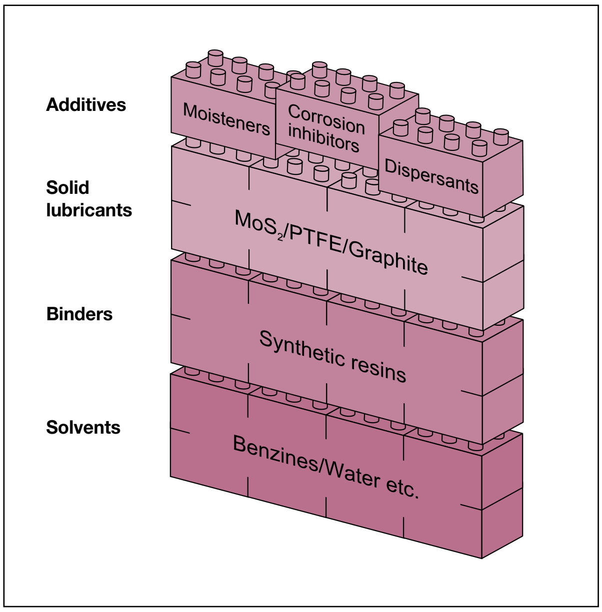
Fields of applications of pastes

The field of application of pastes is determined to a great extent by the solid lubricant contained.

Solid lubricant	Maximum operating temperature [°C]	Field of application
PTFE	< 300	Mounting, medium influence
MoS_2	< 450	Mounting, press-on processes
aluminium	< 1100	High-temperature screwed connections
Copper	< 1100	High-temperature screwed connections, “Anti-Seize” paste, el. conductivity
“Oxide” ceramics	< 1400	Extreme-temperature screwed connections, stainless steel screwed connections

Dry lubricants – the alternative for special application cases

Dry lubricants can be classified into powdery solid lubricants, ceraceous sliding films and solid-content bonded coatings.



Structure of bonded coatings

Structure of bonded coatings

Bonded coatings are solid lubricants (usually MoS_2, graphite or PTFE) that are embedded in a binder.
A solvent that evaporates during the curing or drying time is added for the distribution of the bonded coating.

Coating with a bonded coating is carried out after thorough preparation of the surface through immersion, spraying or painting. The dry bonded coating layer is between 10 and 20 µm thick. It withstands high pressure loads and extreme temperatures, does not take up soiling and is characterised by very high chemical stability and an excellent long-lasting lubrication.

Bonded coatings are used in many technical fields, e.g. for nuts, screws, bolts, washers, springs, sealing rings, gearwheels, slideways and threaded spindles.

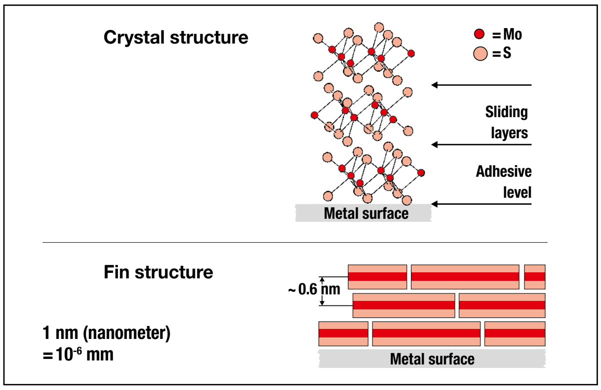
In comparison to classical lubricants bonded coatings are characterised by

- Dry lubrication without oil and grease
- Clean lubrication without dirt adhesion
- Very low friction values can be achieved
- High temperature resistance
- No evaporation losses
- Use in vacuum possible
- Chemical-physical stability
- Effectiveness also at low sliding speeds
- Long-term and lifetime lubrication
- High cost efficiency

Classification of solid lubricants

Solid lubricants are used as fine powder and can be divided by their structure, as well as into chemically and physically active substances. The most common ones are listed here.

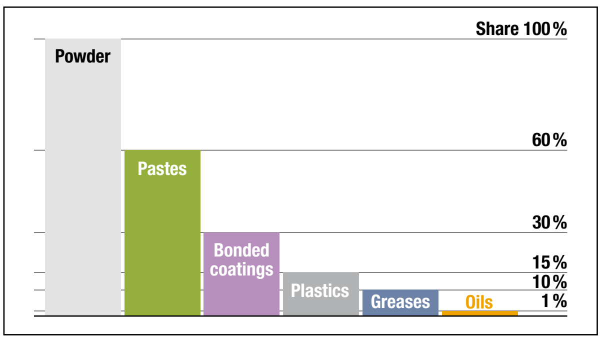
	MoS_2	Graphite	Tri-calcium-phosphate	Zinc-pyro-phosphate	Calcium hydroxide	Aluminium	Zinc sulphide	Zinc oxide	Calcium fluoride	PTFE	PE
Structure-effective with layer lattice structure	■	■									
Chemically effective with layer lattice structure	■										
Chemically effective without layer lattice structure			■	■	■						
Physically effective with layer lattice structure						■	■	■	■		
Physically effective without layer lattice structure										■	■



Lubrication by MoS_2

Molybdenum disulphide MoS_2

The best lubrication properties at metal pairs are achieved with MoS_2 (molybdenum disulphide). The layer lattice structure and the chemically effective properties on the metal surface produce low friction, high pressure absorption capacity and an excellent wear protection. Even thin films produce an extremely stable layer in which the MoS_2 fins slide to each other like a pack of cards.

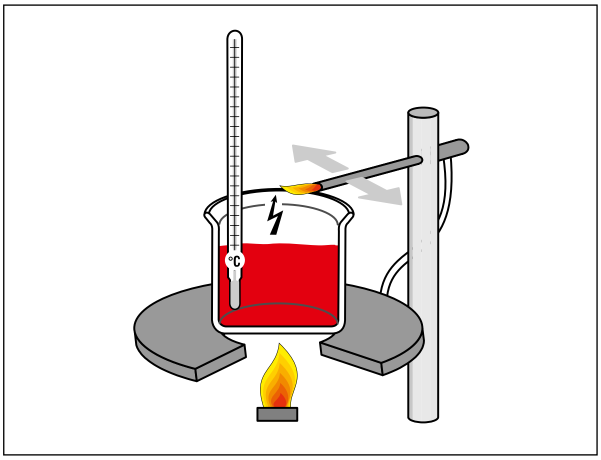


Share of solid lubricants

Maximum share of solid lubricants in lubricant systems

OKS lubricants – highest performance for maximum process reliability

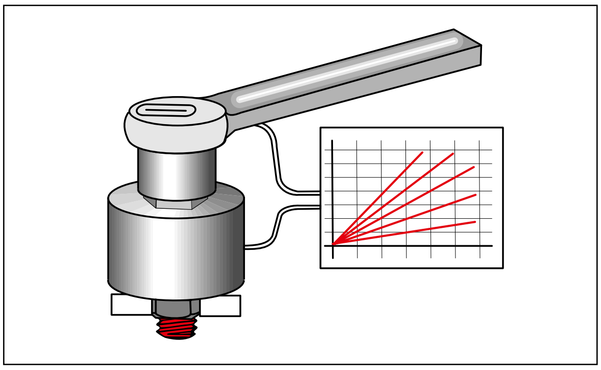
Numerous test methods are used to examine and evaluate the various influencing variables of a tribological system for the development and quality assurance of lubricants. The collected characteristics describe the chemical/physical properties of a lubricant which allow statements about its possible suitability for a specific application.



Determining the flashing point

Flashing point

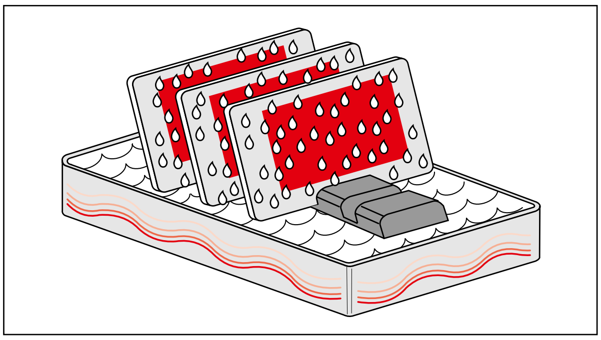
The flashing point is a measurand at combustible liquids which allows the danger of fire to be assessed. Depending on the product type and height of the flashing point to be expected the most common measuring methods are closed crucibles (to DIN 51 755) or open crucibles (to DIN ISO 2592).



Measuring the thread friction

Thread friction

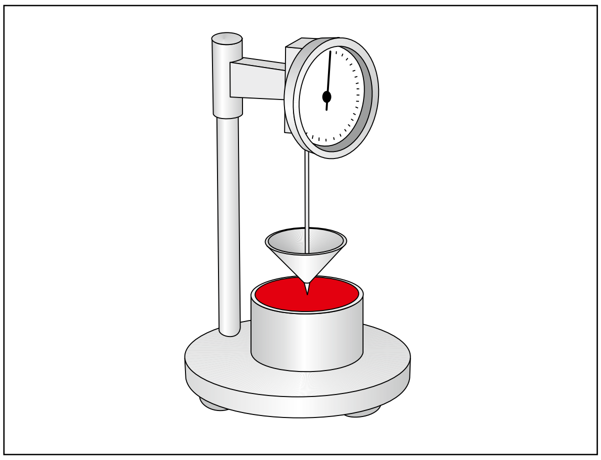
The thread friction is determined on a screw test bench. According to DIN EN ISO 16 047 the coefficient of friction μ of a screwed connection is obtained when screws and nuts are tightened. Thread dimension, materials and type of the surface have to be specified.



Condensed water test

Condensed water test

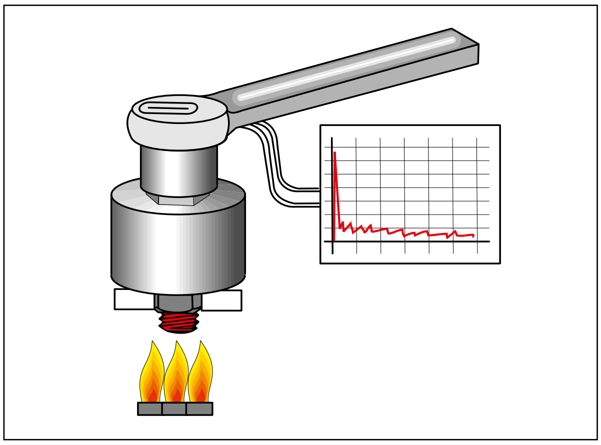
The condensed water test is one of several examinations carried out to assess a protective layer as corrosive influences (DIN 50 017 – KTW condense water temperature alternating climate) and defines the test procedure in a climatic chamber at alternating climate. The result is the number of hours until traces of rust arise.



Measuring the consistency

Consistency

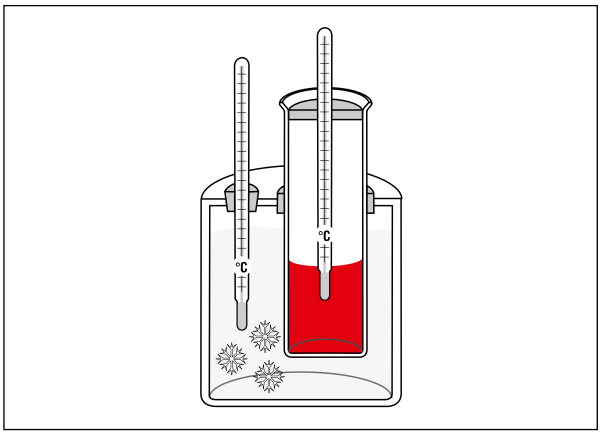
The consistency of a lubricating grease is measured with a penetrometer to DIN ISO 2137 whereby the grease is worked before measuring in order to imitate the stress in a bearing. The penetration depth of a cone allows the allocation to a consistency class to NLGI (DIN 51 818).



Determining the breakaway behaviour

Breakaway behaviour

Breakaway behaviour, the ratio of the loosening torque to tightening torque, is determined for high-temperature screw pastes after screws M10 (or M12), material A2-70, have been tightened with 40 Nm (or 70 Nm) and have been subjected to a temperature between +200 °C and +650 °C for 100 hours.



Determining the pour point

Pour point

The pour point of an oil is measured to DIN ISO 3016. It lies some °C under the recommended lowest operating temperature.

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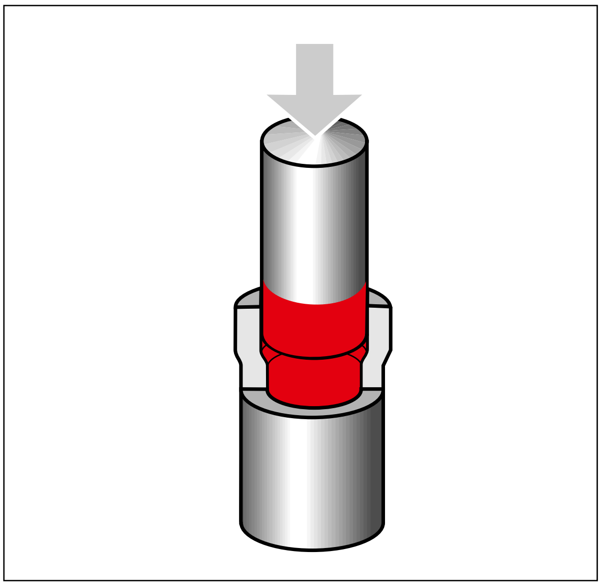
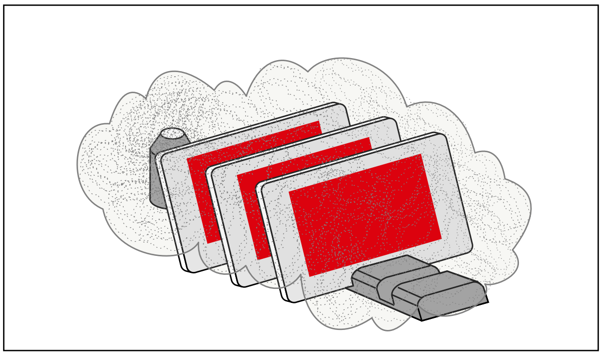

Press-fit-test

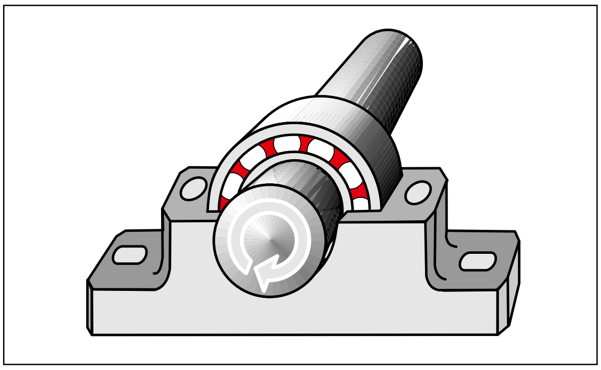
Press-fit-test

The Press-fit test provides information on the behaviour and the adhesion of solid lubricants under very high pressure and low sliding speeds. The coefficient of friction μ is measured and noted whether stick-slipping occurs. Both results are important for the applications during mounting work (e.g. press manufacture) or at slideways and guides (e.g. machine tools).


Salt spray test

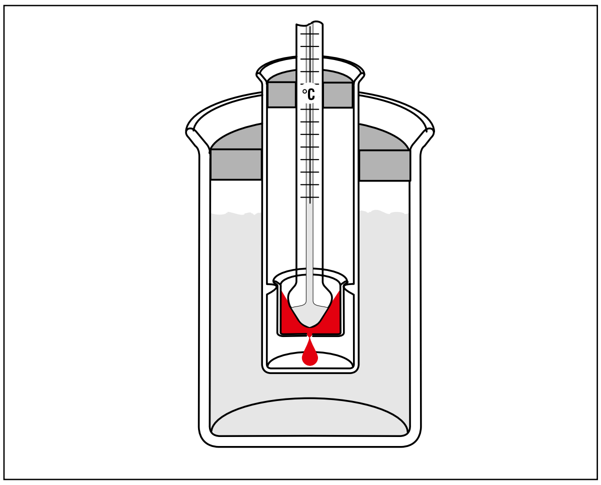
Salt spray test

The salt spray test simulates a salty climate to DIN EN ISO 9227 NSS (ex DIN 50021 SS), whereby coated plates are subjected to a defined salt spray. A check is carried out after how many hours traces of rust arise.


SKF-EMCOR process

SKF-EMCOR process

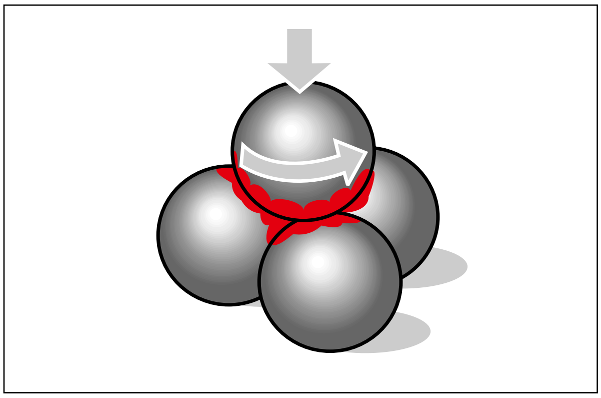
This process is used to assess corrosion-preventive properties of roller bearing lubricants. In the process water is added to the grease and examined for corrosion self-aligning ball bearings with defined running duration, speed and specified standstill periods to DIN 51802. If there is no corrosion at the visible inspection of the test rings, the degree of corrosion is 0. At very strong corrosion the maximum note is 5.



Measuring the drop point

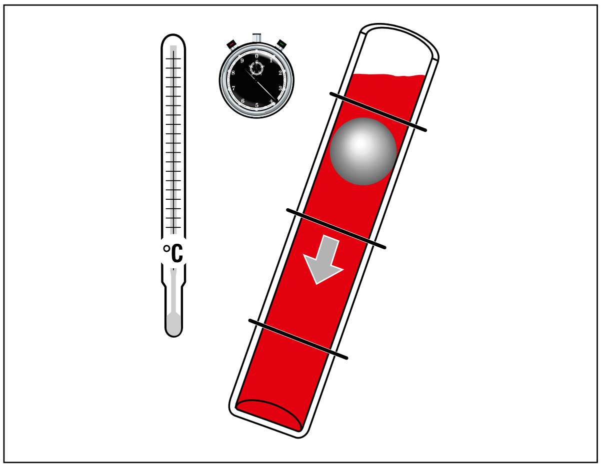
Drop point

The drop point (in °C) is the temperature of a lubricating grease at which liquefaction occurs, measured to DIN ISO 2176. The drop point lies notably over the recommended upper limit of the operating temperature. However, certain grease thickeners do not liquefy, meaning that they are without a drop point.


Four-ball test rig

Four-ball test rig

The four-ball test rig is a testing device for lubricants used at high surface pressures in the mixed friction range. According to DIN 51 350, the four-ball test rig consists of a rotating moving ball which slides on three fixed balls. During the test for the maximum load-bearing capacity of the lubricant, a test force acts on the moving ball, which is increased in steps until the four-ball system is welded together as a result of the friction heat produced. In another four-ball test method the wear value of a lubricant is determined under defined test conditions (test force, speed, time).



Measuring the viscosity

Viscosity

The viscosity of an oil is determined with different measuring instruments depending on the type of product. A falling-ball viscometer is used to fulfil the specifications to DIN 51 562-1 or similar methods. The specification of the kinematic viscosity V (ny) [mm²/s] is effected at +40 °C. The value, for example at +100 °C, is often also of interest, so that the drop in the viscosity at higher temperatures can also be assessed.

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DIN 51 502

The aim of this standard is to ensure consistent designation of standard lubricants using a system of markings consisting of code letters and simple graphical symbols. The marking identifies characteristics including: type of lubricant, viscosity, consistency and operating temperature. Speciality Lubricants can only be described partially using DIN 51502.

DN factor

The DN factor or rotating speed factor is a guide value up to which rotating speeds lubricants can be used in roller bearings.

Evaporation loss

The evaporation loss is of interest particularly at high-temperature lubricants. According to DIN 58 397 it is examined at high temperatures for a specified period. The loss of evaporated oil as a % by weight should be as low as possible.

FZG torque change test device

With the FZG torque change test device oils and greases are examined in particular with regard to their suitability as lubricants in closed gears. The wear is determined after every load level and the so-called “damage load level” specified as the result. The test method is described in DIN 51 354.

Layer thickness (corrosion protection)

The layer thickness has a decisive influence on the duration of the corrosion protection. To this purpose various measuring methods are used which specify the layer thickness in µm, depending on the type of protective layer.

Lubrimeter test

The Lubrimeter test is a test device with which the coefficient of friction, wear and operating temperature of lubricants is measured for a specific period at changing loads and sliding speeds with different materials.

NSF classification

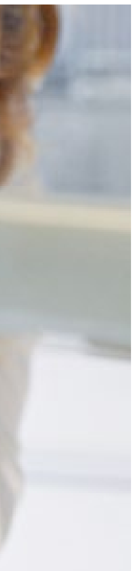
The National Sanitation Foundation issues NSF registration numbers for lubricants that have a composition in accordance with the positive list of substances from the United States Food and Drug Administration (FDA). The classification H1 indicates a lubricant that may be used in situations where it is technically impossible to exclude the possibility of contact with foodstuffs. The classification H2 indicates a lubricant that may be used in situations where there is technical means by which it could come into contact with foodstuffs.

Oil separation

The oil separation is measured to DIN 51 817 as a % by weight. In the process pressure and temperature is applied to the lubricating grease to be tested.

Resistance to oxidation

The resistance to oxidation is a measure for the resistance against reactions with pure oxygen. According to DIN 51 808 the grease is subjected to increased pressure together with the oxygen for a specific period (e.g. 100 hours) and temperature (e.g. +99 °C or +160 °C). The test result is the drop in pressure of the oxygen in Pa (Pascal) as a measure for the degree of oxidation.



Additive
Extra ingredient in lubricants, corrosion protection products and maintenance products used to achieve specific product properties

Ageing
Chemical changes to material through the influence of heat, light and oxygen across the operating time

Corrosion
Reaction of a metal with its environment which results in a change and impairment of the function of a component

DVGW
Deutscher **V**erein des **G**as- und **W**asserfaches (German Technical and Scientific Association for Gas and Water)

Emergency lubrication
Is achieved through solid lubricants when insufficient lubrication occurs at grease or oil lubricants

EP additives
Lubricants with **E**xtreme **P**ressure additives in order increase the pressure resistance and the wear protection properties

Frictional corrosion
Corrosion that occurs at fits that are subjected to vibrations with micro frictional movements.
Immediate rust formation at abrasive particles of steel

ISO
International **S**tandardization **O**rganisation

KTW
Approval for plastics in the drinking water sector

LGA
Landesgewerbeanstalt Nürnberg with its institute for food chemistry

www.oks-germany.com/en/tribology/glossary/

Silicone oils
Are produced through synthetic processes. They have particularly good viscosity temperature characteristics, are resistant at low and high temperatures and against ageing. Excellent separating properties. Outstanding lubricant for plastics and elastomers. Designations such as polydimethylsiloxane or polyphenylmethylsiloxane specify the special structure of the molecule groups

Solvent
Liquids that dissolve other materials without chemical changes

Stick-slipping
Occurs at slow movements and insufficient separating effect of the lubricant, since the initial friction is higher than the movement friction

Synthetic oils
Produced through chemical processes in contrast to oils from Nature – mineral oils, vegetable oils and animal oils. Allowing certain advantages to be achieved, such as low tendency to coking, low pour point, good resistance to chemicals and often excellent viscosity temperature characteristics. Synthetic hydrocarbons, ester, polyglycols, fluorinated oils and silicone oils are used e.g. for lubricants

VCI
Volatile **C**orrosion **I**nhibitor is an environmentally friendly corrosion protection additive

Wear
Arises when the lubricating film is breached, so that the sliding partners come into contact and rub against each other

White oil
Paraffinic mineral oil, highly refined, to remove instable components. White oils are used, for example, in lubricants for medical applications

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For your company's individual lubrication requirements please contact OKS.

Also visit the tribology section on our website
https://www.oks-germany.com/en/tribology/

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