

Glossary of Tribology Terms

Term	Description										
Abrasion	Mechanical wear during sliding of two surfaces against each other.										
Additives	Substances added in small amounts to lubricants to improve the performance.										
Adhesion improvers/promoters	Additives to oils and greases to improve adhesion (e.g. polyisobutene).										
Adhesive lubricants	Lubricants with adhesion-improving components, which are not thrown off by centrifugal forces.										
AF coating	Means anti-friction coating, the most common and widely used type of dry solid lubrication of today. This group includes both air-dried and heat-cured materials. These formulations usually consist of a lubricating solid called the "pigment" and a bonding agent. See "Binder".										
Ageing resistance	The resistivity against ageing which might occur due to oxidation, overheating, the presence of certain metals like copper, lead, silver etc. The resistance to ageing can be improved by certain additives (antioxidants).										
ASTM	American Society for Testing Materials.										
Base oil	Basic component of lubricating oils and greases.										
Binder	An alternative term for non-volatile medium or vehicle and refers to the material which forms the varnish film and which in a paint or bonded coating binds the particles of solids (solid lubricants) together.										
Bonded lubricant	See AF coating.										
Break away torque	Effective leverage turned into rotating movement to loosen a bolted connection.										
Chemically inert	(Lubricant) not reacting chemically with certain substances.										
Coefficient of friction	Ratio of the frictional force between two surfaces sliding across one another to the force that is perpendicular to the surfaces.										
Cold resistance	Guide values for oils are the cloud point, pour point and solidification point; for lubricating greases the Kesternich flow pressure and the low-temperature torque test.										
Colloid	Small particles (10^{-5} to 10^{-7} cm) in liquid which behave like a solution (no settling of particles).										
Complex greases	Lubricating greases with thickeners produced from metallic soaps with various acids. Particularly suitable for high temperatures and long-term applications.										
Consistency	A measure of the condition of lubricating greases. It is measured as the unworked and worked penetration and is indicated in accordance with the NLGI (National Lubricating Grease Institute). To simplify designation of the consistency of lubricating greases, the consistency range as a whole is divided into nine classes, measured as worked penetration, e.g. <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Consistency class</th> <th>Worked penetration (1/10 mm)</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>400 - 430</td> </tr> <tr> <td>0</td> <td>355 - 385</td> </tr> <tr> <td>1</td> <td>310 - 340</td> </tr> <tr> <td>2</td> <td>265 - 295</td> </tr> </tbody> </table>	Consistency class	Worked penetration (1/10 mm)	00	400 - 430	0	355 - 385	1	310 - 340	2	265 - 295
Consistency class	Worked penetration (1/10 mm)										
00	400 - 430										
0	355 - 385										
1	310 - 340										
2	265 - 295										
Density	The weight of a lubricant in grammes per cm^3 at 20 °C.										
Detergent	Agent for loosening and removing residues and deposits from sliding surfaces.										
Dispersion	Name given to two-substance systems in which one substance is contained in the other substance (liquid) in a dispersed form.										
DN value	A guide to the grease which should be used in rolling-element bearings depending upon their speed of rotation. It represents the mean bearing diameter in mm multiplied by the speed in revolutions per minute.										
Drop point	The drop point of a grease is that temperature at which grease passes from a semisolid to a liquid state. It is a qualitative indication of the heat resistance of a grease. The drop point temperature is determined when the first drop falls through the hole in the bottom of the cup during temperature increase.										
Dynamic viscosity	A measure for inner friction during flowing of a lubricating oil (e. g. flowing through pipes or clearances).										
EP additives	Chemical substances to improve the pressure absorption capacity and hence the wear resistance of oils and greases.										
Emcor	The test for corrosion protection of lubricating greases in rolling-element bearings in the presence of water: A minimum of two grease-lubricated ball bearings run in water for about one week. The corrosion value of the rings ranges from 0-5 (0 = no corrosion, 5 = severe corrosion).										
Ester oils	Compounds of acids and alcohols used for lubrication and the production of lubricating greases.										
Flash point	The flash point is the lowest temperature at which during heating inflammable vapours are formed on the surface of the oil to be tested which shortly flare up in the presence of a flame.										
Fluoro-silicones	Silicones which contain fluorine atoms in the molecule.										
Freezing point	The freezing point of an oil is the temperature in degrees Celsius at which the oil has just lost its ability to flow because of continuous cooling down. The solidifying of the oil is caused by the separation of paraffin crystals.										
Fretting corrosion	Rust which occurs on seats. Better: frictional wear which occurs at fits and seats due to oscillations with very low amplitude and high frequency. Usually, the very small iron wear particles react to rust in combination with oxygen, which finally results in seizing of the seats. Another disadvantage of fretting corrosion is the rapid material fatigue of the steel, a fact which can easily lead to breaking. (Fretting corrosion can be prevented most effectively by the separation of both metal partners, e.g. by means of solid lubricants.)										
Friction	Resistance against sliding of two surfaces against one another.										
Grease	2-phase-system: thickener with fluid, lubricating medium.										
Inhibitors	Additives for lubricants which reduce ageing and corrosion.										
Lithium	Alkalimetal, the hydroxide of which is used together with organic acids to form lithium soaps as thickener for greases.										

Glossary of Tribology Terms

Term	Description
Lubricant	Medium to reduce friction and wear between two surfaces sliding against one another.
Measurement of viscosity	Viscosities can be measured in various viscosimeters. The dimension is mm ² /s. An important factor for the measurement of the viscosity is the temperature, because the viscosity does significantly depend on the temperature. (Cold oils are more viscous, warm oils are less viscous.)
Molybdenum disulphide (MoS₂)	A solid lubricant.
Oil separation	The "bleeding" of oil from lubricating greases during storage or as a result of mechanical/dynamic or temperature stress.
O.K. load	Indication of the pressure resistance of a lubricant. It is the very maximum load at which just no breakthrough of the lubricating film, and thus no welding of the test specimens, occurs (Newton).
Oxidation resistance	Resistance of hydrocarbones against a reaction with oxygen.
Pastes	Combination of solid lubricants with oil for easy application of thin lubricating film.
Penetration	Indicates the softness or hardness of a grease. The depth of penetration of a standardized cone in a grease sample is measured. (The higher the penetration, the softer is the grease.)
Pitting	Crater-like metal cavities in the pitch circle of gear wheels, caused by material fatigue.
Polyalpha-olefin	Synthetic hydrocarbon with a defined molecular structure. Low-temperature, high-temperature and viscosity/temperature characteristics are better than with mineral oil.
Pour point	Lowest temperature at which a lubricating oil remains free-flowing.
Running-in	Surface asperities of new sliding surfaces are modified during the running-in period.
Salt-water spray test	The corrosion of steel is measured under the influence of saline fog. Sheet steel is coated with a lubricant and exposed to saline fog in a closed chamber. After the test, the number of hours are measured which have passed until a certain grade of corrosion was reached.
Scoring	Trench-shaped marks in metal, caused by machining or by scuffing.
Scuffing	Damage to material surface through inadequate supply of lubricant, or as a result of overloading. The lubricating film is broken.
Self-ignition point	The temperature at which an oil ignites by itself, i.e. without the presence of a flame.
Service temperature range	The range in which the lubricant meets requirements and an acceptable lubrication interval is achieved.
Silicones	Polymers with good temperature and oxidation resistance. Also used as high and low temperature lubricants.
Soap in lubricating grease	Combination of a fatty acid and a metal hydroxide. Through the proper selection of the fatty acid and the metal hydroxide (calcium, lithium, aluminium) the properties of the soap can be changed as to water resistance and temperature resistance.
Solid lubricants	Solid substances which are applied between sliding surfaces to reduce friction and wear and prevent scoring.
Solvent	A liquid which will dissolve a material and yield a homogeneous product.
Specialty lubricants	Lubricants with particular properties/characteristics for special applications.
Specific weight	See density.
Stick-slip	Jerky relative movements of two bearing surfaces, caused by the difference in coefficient of friction between hydrodynamic and boundary lubrication.
Stress cracks	Cracks in materials caused by corrosive changes of the surface structure after penetration of undesirable elements.
Suspension	A uniform dispersion of the fine particles of a solid in a liquid which does not dissolve them.
Swelling	Under the action of lubricants, vapours or gases, sealing materials made from rubber, elastomer, etc., can be negatively affected by swelling.
Synthetic oils	In contrast to mineral oils, these are artificially produced oils. Synthetic oils usually have a good viscosity temperature behaviour, low tendency to carbonize, deep freezing point, high temperature stability, and good chemical resistance.
Thickeners	Thickeners usually are metal soaps (soap-thickened) but also organic or inorganic thickening agents (not soap-thickened as e. g. silica, bentone, urea, PTFE etc.).
Tightening torque	Effective leverage turned into rotating movement to tighten a screw connection.
Tribology	Science of scientific research and technical application of the relation between friction, wear and lubrication, including lubricants.
Unworked penetration	The consistency of a grease or paste in the state of rest, i.e. in the state of material as supplied.
Viscosity	The viscosity of a liquid is the resistance of molecules against pressure from outside. This resistance is described as inner friction.
Water resistance of a grease	The behaviour of lubricating greases in the presence of water is of great importance for their applicability as antifriction bearing greases. For this application, either a water-repellent (water resistant) or a water-absorbent (emulsifiable) lubricating grease is required.
Wear	Caused by friction and contact between bearing surfaces after break-through of the lubricating film.
Weld load	The ability of a lubricant to absorb pressure, measured in Newton (N), the load at which the lubricating film breaks, during sliding of test specimens against each other, and at which both test specimens weld together.
Worked penetration	Under mechanical shear, lubricating greases often change their consistency. Therefore, it is more reasonable to indicate the worked penetration. It is the consistency of a worked grease.