

Glossary of Industry Terminology & Acronyms

For additional technical terms see <http://www.oilanalysis.com/dictionary/default.asp?>

Abrasion – a general wearing away of a surface by constant scratching, usually due to the presence of foreign matter such as dirt, grit, or metallic particles in the lubricant. It may also cause a break down of the material (such as the tooth surfaces of gears). Lack of proper lubrication may result in abrasion.

Additive – a compound that enhances some property of, or imparts some new property to, the base fluid. In some hydraulic fluid formulations, the additive volume may constitute as much as 20 percent of the final composition. The more important types of additives include anti-oxidants, anti-wear additives, corrosion inhibitors, viscosity index improvers, and foam suppressants.

Additive stability – the ability of additives in the fluid to resist changes in their performance during storage or use.

Adhesion – the property of a lubricant that causes it to cling or adhere to a solid surface.

Anti-oxidants – prolong the induction period of a base oil in the presence of oxidizing conditions and catalyst metals at elevated temperatures. The additive is consumed and degradation products increase not only with increasing and sustained temperature, but also with increases in mechanical agitation or turbulence and contamination – air, water, metallic particles, and dust.

Antiwear (AW) additives – improve the service life of tribological elements operating in the boundary lubrication regime. Antiwear compounds (for example, ZDDP and TCP) start decomposing at 90° to 100°C and even at a lower temperature if water (25 to 50 ppm) is present.

API engine service categories – gasoline and diesel engine oil quality levels established jointly by API, SAE, and ASTM, and sometimes called SAE or API/SAE categories; formerly called API Engine Service Classifications.

ASTM = “American Society for Testing Materials” – a society for developing standards for materials and test methods. There are additional standards bodies recognized in Europe and Asia.

Base stock – the base fluid, usually a refined petroleum fraction or a selected synthetic material, into which additives are blended to produce finished lubricants.

Bio-based or Biobased – A term coined by the US Federal Government, derived from the necessity to provide and procure products from vegetable-, plant-, or animal-based (renewable, carbon-based) materials. Biobased does not necessarily mean 100% pure vegetable oil. Pure vegetable oils can reach “Ultimate Biodegradable” (ASTM 5864 Pw1; see below), but formulations that perform well in practice combine biobased materials with other petroleum mineral oils, polyalphaolefins (PAO's), synthetic ester base oils, polymers, and other necessary additives. The key is to achieve high levels of performance and biodegradability at a reasonable cost.

The U.S. Government defines biobased product as “*a commercial or industrial product (other than food or feed) that utilizes biological products or renewable domestic agricultural (plant, animal, and marine) or forestry materials.*” At this time, the U.S. Government is still trying to determine what percentage of bio-based material will be allowed in a product and still be classified as “bio-based” (see www.soybiobased.org/stakeholders for the [results of a Jan. 2004 USDA hearing and stakeholder meeting](#)). The USDA has established biobased content guidelines for Preferred Procurement by U.S. Federal Agencies, listed in law H.R. 2646 SEC.9001, and initially defined in the Farm Security and Rural Investment Act of 2002. Blue Angel Labeling -- The first national eco-labeling scheme, The Blue Angel, was introduced in

1977. The program grew slowly in the beginning, but now more than 3500 products in 75 categories wear the Blue Angel Labels.

Chemurgy – a branch of applied chemistry concerned with preparing industrial products from agricultural raw materials. Chemurgy is a wide-ranging discipline involving chemistry, genetics, bacteriology, and physics.

Circulating lubrication – a system of lubrication in which the lubricant, after having passed through a bearing or group of bearings, is recirculated by means of a pump.

CEC -- Coordinating European Council, an international standards body for lubricant performance, comparable to ASTM and DIN (a German standards organization; stands for Deutsches Institut für Normung)

Corrosion – the decay and loss of a metal due to a chemical reaction between the metal and its environment. It is a transformation process in which the metal passes from its elemental form to a combined (or compound) form. Corrosion is particularly common in coastal, marine environments due to salt-water exposure.

Corrosion inhibitor – additive for protecting lubricated metal surfaces against chemical attack by water or other contaminants. There are several types of corrosion inhibitors. Polar compounds wet the metal surface preferentially, protecting it with a film of oil. Other compounds may absorb water by incorporating it in a water-in-oil emulsion so that only the oil touches the metal surface. Another type of corrosion inhibitor combines chemically with the metal to present a non-reactive surface.

Cultural Creatives – a group of more than 50 million adults in the US (higher percentage in Europe and parts of Asia, such as Japan) that are literally creating new culture. Cultural Creatives are the cultural revolutionaries in our midst. A common values system drives a new ethic and lifestyles that emphasize health, concern about the long-term viability of our planet and its precious resources, human and animal rights, and so on. Traditional demographics do not adequately describe Cultural Creatives – but their values-based actions and strong beliefs make them likely customers for any product or service that fits with their passion for health, corporate responsibility and informed, wise choices. See also: LOHAS.

Degradation – the progressive breakdown of a lubricant. See also “Ultimate Biodegradability.”

Demulsibility – the ability of a fluid that is insoluble in water to separate from water with which it may be mixed in the form of an emulsion.

Drum – a container with a capacity of 55 U.S. gallons. In contrast to a barrel of crude oil (42 gallons).

Ecotoxicology – (a) A field concerned with the toxic effects of chemical and physical agents on living organisms, especially on populations and communities within defined ecosystems: it includes the transfer pathways of those agents and their interactions with the environment. Butler, 1978; (b) investigates the effects of substances on organisms. The hazard to animal and plant populations can be determined by using survey data (retrospective) or by performing specific tests (prospective). Rudolph & Boje, 1986; (c) the science that seeks to predict the impacts of chemicals on ecosystems. Levin *et al* 1989; (d) the study of harmful effects of chemicals upon ecosystems. Walker *et al* 1996.

Emulsibility – the ability of a non-water-soluble fluid to form an emulsion with water.

Emulsifier – additive that promotes the formation of a stable mixture, or emulsion, of oil and water. Common emulsifiers are: metallic soaps, certain animal and vegetable oils, and various polar compounds.

Emulsion – intimate mixture of oil and water, generally of a milky or cloudy appearance. Emulsions may be of two types: oil-in water (where water is the continuous phase) and water-in-oil (water is the discontinuous phase).

Environmental contaminant – all material and energy present in and around an operating system, such as dust, air moisture, chemicals, and thermal energy.

EP (Extreme Pressure) lubricants – lubricants that impart to rubbing surfaces the ability to carry appreciably greater loads than would be possible with ordinary lubricants without excessive wear or damage.

Extreme pressure (EP) additive – lubricant additive that prevents sliding metal surfaces from seizing under conditions of extreme pressure. At the high local temperatures associated with metal-to-metal contact, an EP additive combines chemically with the metal to form a surface film that prevents the welding of opposing asperities, and the consequent scoring that is destructive to sliding surfaces under high loads. Reactive compounds of sulfur, chlorine, or phosphorus are used to form these inorganic films.

Fire point (Cleveland Open Cup) – the temperature to which a combustible liquid must be heated so that the released vapor will burn continuously when ignited under specified conditions.

Flash point (Cleveland Open Cup) – the temperature to which a combustible liquid must be heated to give off sufficient vapor to form momentarily a flammable mixture with air when a small flame is applied under specified conditions. (ASTM Designation D 92.)

Friction – the resisting force encountered at the common boundary between two bodies when, under the action of an external force, one body, moves or tends to move relative to the surface of the other.

Grease – a lubricant composed of an oil or oils thickened with a soap, soaps or other thickener to a semisolid or solid consistency.

Hydraulic Fluid – fluid serving as the power transmission medium in a hydraulic system. The most commonly used fluids are petroleum oils, synthetic lubricants, oil-water emulsions, and water-glycol mixtures. The principal requirements of a premium hydraulic fluid are proper viscosity, high viscosity index, anti-wear protection (if needed), good oxidation stability, adequate pour point, good demulsibility, rust inhibition, resistance to foaming, and compatibility with seal materials. Anti-wear oils are frequently used in compact, high-pressure, and capacity pumps that require extra lubrication protection.

Hydraulic Oil – an oil specially suited for use as either the specific gravity or the API gravity of a liquid.

Hydraulics – engineering science pertaining to liquid pressure and flow.

Hydrocarbons – compounds containing only carbon and hydrogen. Petroleum consists chiefly of hydrocarbons.

Inherently biodegradable – degrades >20% over an indefinite period of time; a less stringent standard than Readily Biodegradable or Ultimate Biodegradable (ASTM 5864).

Inhibitor – any substance that slows or prevents such chemical reactions as corrosion or oxidation.

ISO viscosity grade – a number indicating the nominal viscosity of an industrial fluid lubricant at 40°C (104°F) as defined by ASTM Standard Viscosity System for Industrial Fluid Lubricants D 2422. Essentially identical to ISO Standard 3448.

ISO – International Standards Organization, sets viscosity reference scales.

LOHAS – Lifestyles of Health and Sustainability, a set of markets as well as a type of “conscious” consumer, worker, and business leader. LOHAS is an arena of extensive behavioral research (see www.nmisolutions.com), which has gained a thorough understanding of how LOHAS consumers express their values, how they “walk the talk.” A subset of the more

than 50 million US adults are considered LOHAS leaders, a key target market for adopting and evangelizing new products, technologies and services. See also www.lohasjournal.com or (for more about the origins of LOHAS trends) the glossary entry for *Cultural Creatives*.

- Lubricant – any substance interposed between two surfaces in relative motion for the purpose of reducing the friction and/or the wear between them.
- Lubricity – ability of an oil or grease to lubricate; also called film strength.
- Mineral oil – oil derived from a mineral source, such as petroleum, as opposed to oils derived from plants and animals.
- Moly – Molybdenum disulfide, a solid lubricant and friction reducer, colloiddally dispersed in some oils and greases.
- Multigrade oil – an oil meeting the requirements of more than one SAE viscosity grade classification, and may therefore be suitable for use over a wider temperature range than a single-grade oil.
- NSF – *NSF International* was founded in 1944 as the National Sanitation Foundation, a not-for-profit, non-governmental organization, known for the development of standards, product testing and certification services in the areas of public health, safety and protection of the environment. NSF is the standards certification body for, among others, food grade lubricants classified as safe for “incidental food contact” – for use in and around food, beverage, cosmetics and healthcare product processing areas. Refer to (www.nsf.org/business/nonfood_compounds) for details.
- Oil – a greasy, unctuous liquid of vegetable, animal, mineral or synthetic origin.
- Oxidation – occurs when oxygen attacks petroleum fluids. The process is accelerated by heat, light, metal catalysts and the presence of water, acids, or solid contaminants. It leads to increased viscosity and deposit formation.
- Oxidation inhibitor – substance added in small quantities to a petroleum product to increase its oxidation resistance, thereby lengthening its service or storage life; also called anti-oxidant.
- Oxidation stability – ability of a lubricant to resist natural degradation upon contact with oxygen.
- Pour point – lowest temperature at which an oil or distillate fuel is observed to flow, when cooled under conditions prescribed by test method ASTM D 97. The pour point is 3°C (5°F) above the temperature at which the oil in a test vessel shows no movement when the container is held horizontally for five seconds.
- Pour point depressant – an additive that retards the adverse effects of wax crystallization, and lowers the pour point.
- Pumpability – the low temperature, low shear stress-shear rate viscosity characteristics of an oil that permit satisfactory flow to and from the engine oil pump and subsequent lubrication of moving components.
- Readily Biodegradable – Greater than 60% of the oil is converted to carbon dioxide within 21 days per various standard and testing methods. Not as stringent as “Ultimate” Biodegradable, ASTM D-5864, Pw1.
- Renewable Lubricants – Lubricant products derived from annually renewable agricultural base stocks.
- Rerefining – a process of reclaiming used lubricant oils and restoring them to a condition similar to that of virgin stocks by filtration, clay adsorption or more elaborate methods.
- Rheology –the science of deformation and flow of matter. See www.rheology.org; the Society of Rheology is composed of physicists, chemists, biologists, engineers, and mathematicians interested in advancing and applying *rheology*.

- Rust prevention test (turbine oils) – a test for determining the ability of an oil to aid in preventing the rusting of ferrous parts in the presence of water.
- Synthetic lubricant – a lubricant produced by chemical synthesis rather than by extraction or refinement of petroleum to produce a compound with planned and predictable properties.
- Thermal stability – ability of a fuel or lubricant to resist oxidation under high temperature operating conditions.
- Total Loss Lubricants (TLL) – a class of lubricants and grease that are applied once, not recirculated or collected for recycling, and then “lost” directly to the environment after use. These lubricants are scrutinized by activist groups and environmental protection agencies because they tend to be toxic and bioaccumulate). Typical TLL applications include chain saw oils for landscape and forestry use, 2-stroke engine oils for outboard motors, leaf blowers, motor scooters, etc.; concrete mould release agents, greases, and certain railroad applications.
- Tribology – the science and technology of interacting surfaces in relative motion, including the study of lubrication, friction and wear. Tribological wear is wear that occurs as a result of relative motion at the surface.
- Ultimate Biodegradability – American Society for Testing and Materials (ASTM) standard D-5864 *Aerobic Aquatic Biodegradation of Lubricants*, for “Ultimate Biodegradability” (28 days), which is more stringent than either “readily biodegradable” or “inherently biodegradable.” Not to be confused with the US federal government standard known as “bio-based” (see definition above), which may or may not mean the composition is Ultimate or Readily Biodegradable, depending upon the base oils/additives included into the formulation. Other materials may be necessary to improve the performance to meet industry’s standards.
- ASTM definition: “Degradation achieved when a material is totally utilized by microorganisms resulting in the production of carbon dioxide (and possibly methane in the case of anaerobic biodegradation), water, inorganic compounds, and new microbial cellular constituents (biomass or secretions or both).”
- Viscosity – measurement of a fluid’s resistance to flow. The common metric unit of absolute viscosity is the *poise*, which is defined as the force in dynes required to move a surface one square centimeter in area past a parallel surface at a speed of one centimeter per second, with the surfaces separated by a fluid film one centimeter thick. Since viscosity varies in inversely with temperature, its value is meaningless until the temperature at which it is determined is reported.
- Viscosity grade – any of a number of systems that characterize lubricants according to viscosity for particular applications, such as industrial oils, gear oils, engine oils, automotive gear oils, and aircraft piston engine oils.
- Viscosity index (VI) – a commonly used measure of a fluid’s change of viscosity with temperature. The higher the viscosity index, the smaller the relative change in viscosity with temperature.
- Viscosity modifier – lubricant additive, usually a high molecular weight polymer, that reduces the tendency of an oil’s viscosity to change with temperature.

ACRONYMS

- AMfRR – Advanced Materials from Renewable Resources
- API – American Petroleum Institute
- BPCC – Biobased Products Coordination Council
- BPL – Bio-Penetrating Lubricant (a WISE product that replaces WD-40 and LPS)
- CEC -- Coordinating European Council (see glossary, above)
- ASTM – American Society for Testing Materials (see glossary, above)
- GSA – US General Service Administration

H1, H2, HT-1, h-3, 3H ... Food Grade standards certified by the NSF as safe for incidental food contact.

HDMO – Heavy Duty Motor Oil

HT – High Temperature

HOBS – High Oleic Base Stocks (also biobased or vegetable oil)

ILMA – Independent Lubricant Manufacturing Association

ILSAC GF-3 & GF-4 New Engine Oil Specifications–International Lubricant Standardization & Approval Committee

ISO – International Standards Organization

MIL – Military Specification

MRV – Mini Rotary Viscometer

NCGA – National Corn Growers Association

NPRA – National Petrochemical and Refiners Association

NPS – National Parks Services

NSF – National Sanitation Foundation (see glossary, above)

OEM – Original Equipment Manufacturer

OSHA – Occupational Safety and Health Administration

PCMO – Passenger Car Motor Oil

PTO – Patent Treaty Organization

REACH – New European legislation for Registration, Evaluation, Authorisation of Chemicals

RBOT – Rotary Bomb Oxidation Test, a measure of oxidative stability

RLI – Renewable Lubricants, Inc.

SwRI – Southwest Research Institute

TACOM – Tank-automotive & Armaments Command

TARDEC – US Army Tank-automotive Research, Development, & Engineering Center

USB – United Soybean Board

USDA-CSREES – United States Department of Agriculture-Cooperative State, Research, Education, & Education Service

USDA – United States Department of Agriculture

WISE – Our corporate tagline: Worthy Ideas for Sustaining the Earth