



## SynMax Performance Lubricants

13759 Metric Drive, Roscoe, IL. 61073 (815) 389.9999 [www.synmaxperformancelubricants.com](http://www.synmaxperformancelubricants.com)

### **TECHNICAL BULLETIN – Standard & Common Lubrication Terms and Definitions**

#### **Standard & Common Definitions of Terms used within the Lubrication Industry:**

**ABRASIVE WEAR:** Wear between two surfaces in relative motion due to particles (three body) or surface roughness (two body)

**ADDITIVE:** Any material added to a base stock to change its properties

**ADHESIVE WEAR:** Wear caused by metal to metal contact: characterized by local welding and tearing of the surface.

**ANITFOAM AGENT:** An additive used to suppress the foaming tendency of petroleum products in service. Maybe a silicone oil to break up surface bubbles or a polymer to decrease the number of small entrained bubbles.

**ANTI-WEAR (AW) AGENT:** Additives or their reaction products, which form thin, tenacious films in highly loaded parts to prevent metal to metal contact.

**ANSI:** American National Standards Institute.

**API:** American Petroleum Institute (USA /official licensing for petroleum blending specifications)

**ASME:** American Society of Mechanical Engineers

**ASTM:** American Society for Testing and Materials

**ASH:** Metallic deposits formed in the combustion chamber and other engine parts during high operations.

**BASE STOCK (OIL):** The base fluid, usually a refined petroleum fraction or a selected synthetic material, into which additives are blended to produce finished products aka (base oils):

**Group 1** (Mineral/Petroleum) **Group II** (Mineral/Petroleum)

**Group III** (Highly Refined Petroleum/Synthetic) **Group IV** (PAO) Polyalphaolefin.

**BLOW-BY:** Passage of unburned fuel and combustion gases past the piston rings of internal combustion engines, resulting in fuel dilution and contamination of the crank case oils.

**BOUNDARY LUBRICATION:** Lubrication between two rubbing surfaces without the development of a full fluid lubricating film. It occurs under high loads and requires the use of anti-wear (AW) or extreme-pressure (EP) additives to prevent metal-to-metal contact.

**BROOKFILED VISCOSITY:** Measure of apparent viscosity as determined by the Brookfield viscometer at a controlled temperature and shear rate.



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**CAMS:** Eccentric shafts used in most internal combustion engines to open and close valves.

**CARBON RESIDUE:** Coked (extremely heated or baked) material remaining after and oil has been exposed to high temperatures under controlled conditions.

**CATALYTIC CONVERTER:** An integral part of vehicle emission control systems since 1975. Oxidizing converters remove hydrocarbons and carbon monoxide (CO) from exhaust gasses, while reducing converters control nitrogen oxide (NO) emissions. Both use noble metal (platinum, palladium or rhodium) catalysts that can be “poisoned: by lead or phosphorus compounds in the fuel or lubricant.

**CAVITATION:** The formation and subsequent collapse of vaporous cavities within a liquid (slowing fluid flow and creating small bubbles etc.); caused by movement or vibration within the liquid.

**CAVITATION DAMAGE:** An erosion process in which metal is removed by cavitations.

**CENTISTOKE:** Measurement unit of kinematic viscosity of a fluid.

**COMPRESSION RATIO:** In an internal combustion engine, the ration of the volume of combustion space at the bottom dead center to that at top at top dead center.

**CORROSION INHIBITOR:** Additive that prevents lubricated metal surfaces from chemical attack by water or other contaminates.

**CORROSIVE WEAR:** Wear caused by chemical reaction.

**CROWN:** The top of the piston in an internal combustion engine above the fire ring, exposed to the direct flame of impingement.

**DEMUSILIBILITY:** A measure or a fluid’s ability to separate from water.

**DENSITY:** Mass per unit volume.

**DETERGENT:** A substance added to a fuel or lubricant to keep engine parts clean. In motor oil formations, the most commonly used detergents are metallic soaps ( Calcium ) with a reserve to neutralize acids formed during a combustion.

**DETONATION:** Uncontrolled burning of the last portion (end gas) of the air/fuel mixture in the cylinder or a spark-ignition engine. Also known as “Knock”, Ping” or “Dieseling”.



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**DILUTION OF ENGINE OIL:** Contamination of crankcase oil by unburned fuel (commonly from blow-by), leading to reduced viscosity and flash point. May indicate component wear or fuel system maladjustment.

**ELASTOHYDRODYNAMIC LUBRICATION (EHD):** A lubricant regime characterized by high unit loads and high speeds in rolling elements where the mating parts deform elastically due to the incompressibility of the lubricant film under very high pressure.

**EMULSIFIER:** Additive that promotes formation of a stable mixture or emulsion of oil & water.

**ENGINE DEPOSITS:** Hard or persistent accumulation of sludge, varnish. Lacquer and carbonaceous residues due to blow-by or unburned and partially burned fuel, or the partial break down of the crankcase lubricant. Water from the condensation of combustion products, carbon residues from fuel or lubricating additives, dust and metal particles also contribute.

**EP AGENT (EXTREME PRESSURE ADDITIVE):** Lubricant additive that prevents sliding metal surfaces from seizing under extreme pressures.

**EPA:** Environmental Protection Agency

**EROSION:** Wearing away of a surface by an impinging fluid or solid.

**FALSE BRINELLING:** Fretting of one bearing component against another; may appear as a dent, but original surface finish is worn away.

**FATIGUE:** raking, flaking or spalling of a surface due to stresses beyond the endurance limit of the material.

**FERROGRAPHY:** Magnetic particle analysis.

**FLASH POINT:** Minimum temperature at which a fluid will support instantaneous combustion (a flash) before it burns continuously (fire point). Flash point is an important indicator of the fire and explosion hazards associated with a petroleum product

**FLUID FRICTION:** Occurs between the molecules of a gas or liquid in motion, and is expressed as shear stress. Unlike solid friction, fluid friction varies with speed and area.

**FRETTING:** Wear resulting from small amplitude motion between two surfaces; may produce red or black oxide.



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**FRICTION:** Resistance to motion of one object over another. Friction depends on the smoothness of the contacting surfaces, as well as the force which they are pressed together.

**FROST:** Field of micro-pits; form of microadhesive wear.

**GALLING:** See adhesive wear.

**GASOLINE:** A volatile mixture of liquid hydrocarbons. containing small amounts of additives and suitable as a fuel in spark-ignition, internal combustion engines.

**HIGH TEMPERATURE HIGH SHEAR RATE VISCOSITY (HTSH):** A measure of a fluid resistance to flow under conditions resembling highly-loaded journal bearings in fired internal combustion engines typically 1 million s<sup>-1</sup> @ 150°C.

**HYDROFINISHING:** A process for treating raw extracted base stocks with hydrogen to saturate them for improved stability.

**HYDROLYTIC STABILITY:** Ability of additives and certain synthetic lubricants to resist chemical decomposition (hydrolysis) in the presence of water.

**INHIBITOR:** Additive that improves the performance of a petroleum product by controlling undesirable chemical reactions, i.e. oxidization inhibitor, rust inhibitor, etc.

**ILSAC:** International Lubricant Standardization and Approval Committee.

**ISO:** International Standards Organization

**JASO:** Japan Automobile Standards Organization

**KINEMATIC VISCOSITY:** Measure of a fluid's resistance to flow under gravity at a specific temperature (usually 40°C or 100°C) Note: ISO weights are determined at 40°C.

**LANDS:** The circumferential areas between the grooves of a piston

**LEAD:** Commonly used name for tetraethyl or tetraethyl lead (aka "Ethyl"), an additive used in gasoline to improve octane ratings.

**LUBRICATION:** Control of friction and wear by the introduction of a friction-reducing film between moving surfaces in contact. May be a fluid, Solid or plastic substance.



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**MULTIGRADE OIL:** Engine or gear oil that meets the requirements of more than one SAE viscosity grade classification and that can be used over a wider temperature range than a single grade oil.

**NITRATION:** The process whereby nitrogen oxides attack petroleum fluids at low temperature, often resulting in viscosity increases and deposit formation.

**NLGI:** National Lubricating Grease Institute (USA)

**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:** Resistance of a petroleum product to oxidation and, therefore a measure of its potential service or storage life.

**PARAFFINIC:** A type of petroleum fluid derived from paraffinic crude oil and containing a high portion of straight chain saturated hydrocarbons. Often susceptible to cold flow problems.

**PERMANENT VISCOSITY LOSS (PVL):** Irreversible reduction in lubrication viscosity due to mechanical shear in operations, engines or laboratory testing. PVL equals the difference between the fresh (new) oil viscosity and that of degraded (used) oil, both measured at the same temperature.

**PITTING:** Surface cavities: may be related to fatigue, overload or corrosion.

**PLASTIC FLOW:** Surface deformations (flexing or bending) of metal as a result of yielding under heavy load (torque or pressure).

**POISE (P):** Measurement unit of a fluid's resistance to flow. i.e. (viscosity), defined by the shear stress. This viscosity is independent of fluid density and directly related to flow resistance.

**POLISHING (BORE):** Excessive smoothing of the surface finish of the cylinder bore or cylinder liner in an engine to a mirror like appearance (normally from lack of lubrication caused by fuel delusion within the upper cylinder chamber, blow-by or natural wear), resulting in depreciation of ring sealing and oil consumption performance.



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**POUR POINT:** An indicator of the ability of an oil or distillate fuel to flow at cold operating temperatures. It is the lowest temperature at which the fluid will flow when cooled under prescribed conditions.

**PREIGNITION:** Ignition of the fuel/air mixture in the gasoline engine before the spark plug fires. Often caused by incandescent fuel or lubricant deposits (normally Zinc / ZDDP from blow-by conditions resting upon the piston crown, valve face or within or upon the spark plug) in the combustion chamber, it wastes power and may damage the engine.

**PUMPABILITY:** The low temperature, low shear stress-shear viscosity characteristics of an oil that permit satisfactory flow to and from the engine oil pump and subsequent lubrication of moving components.

**RIDGING:** In gear teeth a form of plastic flow characterized by a rippled appearance on the surface.

**RINGS:** Circular metallic elements that ride in the grooves of a piston and provide compression sealing during combustion, also used to spread oil for lubrication.

**RING STICKING:** Freezing of a piston ring in its groove in a piston engine or reciprocating compressor due to heavy deposits in the piston ring zone.

**ROLLING AND PEENING:** IN gear teeth, a form of plastic flow that gives the metal surface a hammered appearance; metal may be rolled over the teeth tips.

**SAE:** Society Automotive Engineers

**SCRATCHING:** Fine abrasive furrows in the direction of the sliding.

**SCUFFING:** Abnormal engine wear due to localized welding and fracture. It can be prevented through the use of anti-wear, extreme-pressure and friction modifier additives.

**SLUDGE:** A thick, dark residue, normally of a mayonnaise consistency, that accumulates on non-moving engine interior surfaces. Generally removable by wiping unless baked to a carbonaceous consistency, it's formation is associated with insolubles overloading the lubricant.

**SPALLING:** Severe damage characteristics by large pits, cavities and related cracks; related to overload and fatigue.

**STLE:** Society of Tribologists and Lubrication Engineers.



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**SYNTHETIC LUBRICANT:** Lubricating fluid made by chemically reacting materials of a specific chemical composition to produce a compound with planned and predictable properties.

**VALVE LIFTER:** Sometimes called a “cam follower,” a component in engine designs that use a linkage system between the cam and the valve it operates. The lifter typically translates to rotational motion of the cam to a reciprocating linear motion in the linkage system.

**VARNISH:** A thin, insoluble, non-wipeable film occurring on interior engine parts. Can cause sticking and malfunction of closed-clearance moving parts. (Called lacquer in diesel engines.)

**VISCOSITY:** A measure of a fluid’s resistance to flow.

**VISCOSITY INDEX (VI):** Relationship of viscosity to the temperature of a fluid. It is determined by measuring the kinematic viscosities of the oil at 40°C and 100°C and using the tables or formulas included in ASTM D 2270. High viscosity index fluids tend to display less change in viscosity with temperature than low viscosity index fluids.

**VISCOSITY MODIFIER:** Lubricant additive, usually a polymer, whose function is to provide beneficial rheological properties to lubricating oils, such as reducing the tendency of an oil’s viscosity to change with temperature.

**ZINC (ZDP or ZDDP):** Commonly used name for zinc diorgano dithiophosphate (or Zinc Phosphate), an anti-wear/oxidation inhibitor chemical.