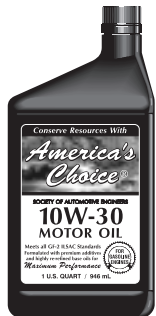

America's Choice®

*“You wouldn’t know
it was Re-Refined
unless...
we told you.”*



GLOSSARY OF TERMS

RELATING TO THE PETROLEUM INDUSTRY

VISCOSITY GRADE COMPARISONS

SUS VISCOSITY @ 100°F	KINEMATIC VISCOSITY CENTISTOKES (cSt @ 40°C)	ISO (cSt)	AGMA NUMBER	SAE CRANKCASE OIL	SAE GEAR OIL	PARAFFINIC NEUTRAL OILS (SNO)	NAPHTHENIC PALE OILS (PALE)
9000	1500	1500					
8000							
7000							
6000							
5000	1000	1000	8A		250		
4000	900						
3000	800						
2500	700	680	8				
2000	600						
1500	500				140		
1000	400	450	7			BRIGHT STOCK 150	
900							
800	300	320	6				
700							
600	200	220	5	50			
500	175				90		
400	150	150	4	40		850	N 900
300	125						
200	100	100	3	30	85W		
150	80						
100	70	68	2				
90	60				80W	320	N 300
80	50	46	1	20W -20			
70	40						
60	30	32				150	
50	20	15		10W	75W		
40	15			5W		100	N 100
30	10	22					
20	7	10					
15	5	7					N 55
10		5					
5		3					
		2					



A

AAMA

American Automobile Manufacturers Association

Absorption

The process by which one substance draws into itself another substance. Examples: a sponge picking up water; an oil recovering gasoline from wet natural gas.

ACEA

Association des Constructeurs Europeens (Association of European Automotive Manufacturers)

Acid

A member of an important and fundamental category of chemical substances characterized by having an available reactive hydrogen and requiring an alkali to neutralize them. Acid solutions usually have a sour, biting and tart taste like vinegar.

Acid Sludge

The residue left after treating petroleum oil with sulfuric acid for the removal of impurities. It is a black, viscous substance containing spent acid and impurities.

Acid Treating

A refining process in which unfinished petroleum products, such as gasoline, kerosene and lubricating oil stocks, are contacted with sulfuric acid to improve their color, odor and other properties.

Acidity

The amount of free acid in any substance.

Additive

An agent used for imparting new, or for improving existing characteristics of lubricating oils or greases.

Additive Level

The total percentage of all additives in an oil.

Adhesion

The force or forces causing two materials such as a lubricating grease and a metal, to stick together.

AFV

Alternate Fuel Vehicle

AGMA

American Gear Manufacturers Association

Air Entrainment

The incorporation of air in the form of bubbles as a dispersed phase in the bulk liquid. Air may be entrained in a liquid through mechanical means and/or by release of dissolved air due to a sudden change in environment. The presence of entrained air is usually readily apparent from the appearance of the liquid (i.e., bubbly, opaque, etc.), while dissolved air can only be determined by analysis.

Alkali

In chemistry, any substance having basic properties. The term is applied to hydroxides of ammonium, lithium, potassium, and sodium. They are soluble in water and have the power to neutralize acids and form salts. They turn red litmus blue. In a more general sense, the term is also applied to the hydroxides of the so-called alkaline earth metals- barium, calcium and strontium.

Almen EP Lubricant Tester

A journal bearing machine used for determining the load-carrying capacity or extreme pressure properties of gear lubricants.

Ambient Temperature

Temperature of the area or atmosphere around a process, (not the operating temperature of the process itself).

Anhydrous

Free of water, especially of crystallization.

Aniline Point

The minimum temperature for complete miscibility of equal volumes of aniline and the sample under test ASTM Method D 611. A product of high aniline point will be low in aromatics and naphthenes and, therefore, high in paraffins. Aniline point is often specified for spray oils, cleaning solvents, and thinners, where effectiveness depends upon aromatic content. In conjunction with API gravity, the aniline point may be used to calculate the net heat of combustion for aviation fuels.

Anti-foam Agent

An additive used to control foam.

Antifreeze Solution

A fluid, such as ethylene or propylene glycol, which is added to or used to replace the water in the cooling system of engines in order to prevent freezing.

Anti-friction Bearing

A type of bearing using rollers or balls. They are also known as rolling bearings.

Antiknock

Resistance to detonation or pinging in spark-ignition engines.

Antioxidant

A chemical added to lubrication oils to resist oxidation.

API

American Petroleum Institute

API Engine Service Classification System

Classifications and designations for lubricating oils for automotive engines developed by API in conjunction with SAE and ASTM. API Service categories: Service SJ, SH, SG, SF, SE, SD, SC, SB, CH, CG-4, CF, CF-II, CE, CD, CD-II, CC, CB, and CA.

API Gravity

An arbitrary scale expressing the gravity or density of liquid petroleum products. The measuring scale is calibrated in terms of degrees API. It may be calculated in terms of the following formula:

$$\text{Deg API} = \frac{141.5}{\text{sp gr } 60^{\circ}\text{F}/60^{\circ}\text{F}} - 131.5$$

Apparent Viscosity

The ratio of shear stress to rate of shear of a non-Newtonian fluid such as lubricating grease, calculated from Poiseuille's equation and measured in poises. The apparent viscosity changes with changing rates of shear and temperature and must, therefore, be reported as the value at a given shear rate and temperature (ASTM Method D1092).

Aromatic

Derived from, or characterized by, the presence of the benzene ring.

ASEAN

Association of South-East Asian Nations

Ash Content

The percent by weight of residue left after combustion of an oil sample (ASTM Method D 482).

ASLE

American Society of Lubrication Engineers. This society is now known as the Society of Tribologists and Lubrication Engineers (STLE). The ASLE had published standards for machine tool lubricants.

Asphalt

Black to dark-brown solid or semisolid cementitious material which gradually liquefies when heated and in which the predominating constituents are bitumens. These occur in the solid or semisolid form in nature; are obtained by refining petroleum; or are combinations with one another or with petroleum or derivatives thereof.

Asphaltic

Essentially composed of, or similar to, asphalt; frequently used to describe lubricating oils derived from crude oils which contain asphalt.

ASTM

American Society for Testing and Materials.

ASTM Colorimeter

Apparatus widely used for determining the color of lubricating oils (ASTM Method D 1500). The color so determined is known as ASTM color.

ASTM Distillation

A distillation test made on such products as gasoline and kerosene to determine the initial and final boiling points (ASTM Method D 86).

ASTM Gum Test

An analytical method for determining the amount of existing gum in a gasoline; by evaporating a sample from a glass dish on an elevated-temperature bath (ASTM Method D 381 and ASTM Method D 525).

ASTM Melting Point

The temperature at which wax first shows a minimum rate of temperature change. It is also known as the English melting point.

ASTM Viscosity Classification

A method of specifying viscosity levels for industrial lubricants. It does not denote quality.

ATC

Technical Committee of the Petroleum Additive Manufacturers

ATIEL

Association Technique de l'Industrie Europeene des Lubrifiants

Auto-ignition

The spontaneous ignition, and the resulting very rapid reaction, of a portion or all of the fuel-air mixture in an engine. The flame speed is many times greater than that which follows normal spark ignition. The noise associated with it is called knock.

Aviation Method

A method for determining the knock-limited power, under lean-mixture condition, of fuels for use in spark-ignition aircraft engines (ASTM Method D 614).

B

Barrel

A unit of liquid measure comprised of 42 gallons. It is used to measure quantities of crude oil, gasoline and fuel oils.

Batch

Any quantity of material handled or considered as a unit in processing.

Bentonite

The mineral montmorillonite, a magnesium-aluminum silicate. It is used as a treating agent, also, as a component of drilling mud, and in greases.

Benzene

Colorless liquid hydrocarbon, C_6H_6 , with one ring of carbon atoms. Made from coal tar and by catalytic reforming of naphthenes, it is used in the manufacture of phenol, styrene, nylon, detergents, aniline, phthalic anhydride, biphenyl, nitrobenzene, chlorobenzene; as a solvent; and as a component of high-octane gasoline.

Benzene Insoluble

That portion of the normal pentane insoluble in used lubricating oils which is not soluble in benzene, and which may include the insoluble contaminants from external sources, some matter produced by oxidation and thermal decomposition of the oil, the oil additives or the fuel. (ASTM Method D 893).

Blending

The process of mixing lubricants or components for the purpose of obtaining the desired physical and/or chemical properties (see compounding).

Bloom

Fluorescence is the color of an oil by reflected light which could differ from its color by transmitted light.

Boiling Point

The temperature at which a substance boils, or is converted into vapor by bubbles forming within the liquid; it varies with pressure.

Bottoms

The liquid which collects in the bottom of a vessel (tower bottoms, tank bottoms), either during a fractionating process or while in storage.

Boundary Lubrication

The state of lubrication when conditions exist that do not permit the formation of a lubricant film capable of completely separating the moving parts.

Bright Stock

Refined, high viscosity base oils usually made from residual stocks by suitable treatment, such as a combination of solvent extraction, propane asphating or catalytic dewaxing.

British Thermal Unit (BTU)

The quantity of heat required to raise, by 1°F, the temperature of one pound of water at its maximum density (39.2°F).

BS&W

The material which collects in the bottom of storage tanks, usually composed of oil, water and foreign matter. Also called bottoms, or bottom settling and water.

BTC

British Technical Council

Bunker “C” Fuel Oil

A heavy residual fuel oil used by ships and large-scale heating installations. The United States Navy calls it “Navy heavy”; in industry, it is often referred to as No. 6 fuel.

Butane

Either of two isomeric, flammable, gaseous hydrocarbons, C_4H_{10} , of the paraffin series: n-butane or isobutane.

C

CAFE

Corporate Average Fuel Economy

Calorie

1. The amount of heat required to raise the temperature of 1 g of water 1°C, at or near the temperature of maximum density. This unit is called a “small calorie”, or “gram calorie”.

2. The amount of heat required to raise the temperature of 1 kg of water 1°C. This unit is called a “large calorie” or “kilogram-calorie”.

Capillary Viscometer

A viscometer in which the oil flows through a capillary tube.

CARB

California Air Resources Board

CCMC

Comite des Constructeurs d'Automobile du Marche Commun (Common Market Automobile Manufacturers Association)

CEC

Coordinating European Council

Centistoke (cSt)

The worldwide unit of kinematic viscosity. (See inside cover for Viscosity Grade Comparisons Chart)

Cetane Number (calculated)

The cetane number of distillate fuels as estimated from the API gravity and mid-boiling point by using a formula given in Appendix II of ASTM Method D 975. This estimate is used if a standard test engine is not available, or if the sample is too small for an engine test.

Cetane Number (test method)

The percentage by volume of normal cetane, in a blend with heptamethylnonane (HMN), which matches the ignition quality of the fuel when compared by the procedure specified in ASTM Method D 613.

Cetane Number Improver

A substance which, when added to a diesel fuel, has the effect of increasing its cetane number. In this class are nitro alkanes, nitrates, nitro carbonates and peroxides.

Cetane Index

An approximation of cetane number based on API gravity and mid-boiling point of fuel.

CFR

Coordinating Fuel and Equipment Research Committee, composed of engine-manufacturers, petroleum-refiners, petroleum-consumers, universities, government and other technical people who supervise cooperative testing and study engine fuels for the Coordinating Research Council, Inc.

Channeling

1. The phenomenon observed among gear lubricants and greases when they thicken, due to cold weather or other causes, to such an extent that a groove is formed through which the part to be lubricated moves without actually coming in full contact with the lubricant.
2. A term used in percolation filtration; may be defined as a preponderance of flow through certain portions of the clay bed.

Chromatography

A method of separation based on selective absorption. A solution of the substance is allowed to flow slowly through a column of absorbent. Different substances will pass with different speeds down the column and will eventually be separated into zones. The column core can then be pushed out and the zones of material cut apart, or the zones can be eluted

(Chromatography Continued)

by passing more solvent down the column and collecting it in small fractions.

Partition Chromatography involves the selective solution of the desired material between two solvents. The final solvent, usually water, is used to wet the solid material packed in the column, and the first solvent containing the desired material is poured into the column as described.

Paper Chromatography is a micromethod. A drop of the liquid to be investigated is placed near one end of a strip of paper. This end is immersed in solvent which travels down the paper and distributes the materials present in the original drop selectively. Comparison with known substances makes identification possible.

Gas Chromatography is an analytical technique for separating mixtures of volatile substances. The procedure consists of introducing the mixture to be examined into the chromatographic column and washing it down (eluting it) with an inert gas. The column is packed with adsorbent materials which selectively retard the components of the sample.

CID

Commercial Item Description used in many cases in lieu of military specification.

Cleveland Open-cup (COC) Tester

Apparatus used for the determination of flash and fire points of petroleum products flashing above 175°F, with the exception of fuel oils (ASTM Method D 97).

Cloud Point

The temperature at which paraffin wax or other solid substances begin to crystallize or separate from the solution, imparting a cloudy appearance to the oil when chilled (ASTM Method D 97).

CMA

Chemical Manufacturers Association

COC (See Cleveland open-cup tester)

Color

A factor in the identification, rather than in the quality rating of a petroleum product—except where staining or appearance are considerations. See specific types of color under alphabetic listing.

Complex Grease

A lubrication grease thickened by a complex soap consisting of a normal soap and a complexing agent.

Compounding

The addition of fatty oils and similar materials to lubricants to impart special properties. Lubricating oils to which such materials have been added are known as compounded oils.

CONCAWE

Conservation of Clean Air and Water in Europe

Coordination Research Council, Inc.

An organization supported jointly by the American Petroleum Institute (API) and the Society of Automotive Engineers (SAE), which administers the work of the Coordinating Fuel and Equipment Research Committee (CFR) and other committees pertaining to correlation of test work on fuels, lubricants, engines, etc.

Copper Dish Gum

The milligrams of gum found in 100 ml of gasoline when evaporated under controlled conditions in a polished copper dish; indicates the potential gum content of a material.

Copper Strip Corrosion

The gradual eating away of copper surfaces as the result of oxidation or other chemical action. It is caused by acids or other corrosive agents.

Corrosion

The gradual eating away of metallic surfaces as a result of oxidation or other chemical action. It is caused by acids or other corrosive agents.

CRC

Coordinating Research Council

CUNA

Commissione Tecnica de Unificazione nel l'Autoveicolo

D**DAP**

Detroit Advisory Panel

Degree Day

A unit of temperature. Experience has shown that, for buildings requiring an inside temperature of approximately 70°F, the amount of fuel or heat used per day is proportional to the number of degrees the average outside temperature falls below 65°F. The degree-day is based upon this principle. The number of degree-day (65°F base) for a given period is the difference between 65°F and the United States Weather Bureau daily mean temperature, when the latter is less than 65°F, multiplied by the number of days.

Degree Engler

A measure of viscosity. The ration of the time of flow of 200 ml of the liquid tested, through the viscometer devised by Engler, to the time required for the flow of the same volume of water gives the number of degrees Engler.

Density

The mass of a unit of volume of a substance.

DEO

Diesel Engine Oil

Detergent Oil

A lubricating oil possessing special sludge-dispersing properties usually conferred on the oil by the incorporation of special additives. Detergent oils hold sludge particles in suspension and thus promote cleanliness especially in internal-combustion engines.

Dielectric Strength

A measure of the insulating properties of electrical insulating oils for use in cables, transformers, circuit breakers and similar apparatus (ASTM Method D 877).

Diesel Index

An expression for the ignitability of a fuel relative to its aniline point:

$$\text{Diesel index} = \frac{\text{aniline pint } (^{\circ}\text{F}) \times \text{API gravity}}{100}$$

Diester Oil

A synthetic lubricating fluid made from esters; also called ester oil.

DIN

Deutsche Industrie Norm

Dispersant

A dispersing agent, which holds a very finely divided substance in a dispersed state in the carrier fluid.

Distillate

Wide range of products produced by distillation.

DKA

Deutscher Koordinierungsausschuss

Dropping Point

In general, the dropping point is the temperature at which the grease passes from a semisolid to a liquid state. This change in state is typical of greases containing conventional soap thickeners. Greases containing thickeners other than conventional soaps may, without change in state, separate oil.

Dry-film Lubricant

Solid material left between two moving surfaces to prevent metal-to-metal contact, thus reducing friction and wear. Such materials are especially useful in the region of boundary lubrication, and for lubrication under special conditions of extremely high or low temperature where usual

(Dry-film lubricant Continued)

lubricants are inadequate. They may be applied in the form of a paste or solid stick, or by spraying, dipping or brushing in an air-drying carrier which evaporates leaving a dry film. Some examples are graphite, molybdenum disulfide, boron nitride and certain plastics such as tetrafluorethylene resins.

Dual-fuel Engine

A diesel engine which may be operated as an oil diesel, a gas diesel, or a combination of both, as it is equipped with controls or parts to permit operating as one or the other.

E

EC & EC II

Energy Conserving and Energy Conserving II

EFTC

Engine Fuels Technical Committee

Elastohydrodynamic Lubrication

Lubrication modified to take into consideration the elastic properties of the bearing material and the viscosity increase of the lubricant under concentrated load.

ELTC

Engine Lubricants Technical Committee

EMA

Engine Manufacturers Association

Emulsifier

A substance used to promote or aid the emulsification of two liquids and to enhance the stability of the emulsion.

EO LCS

Engine Oil Licensing and Certification System

EPA

Environmental Protection Agency

EP Agent

An extreme pressure additive introduced into a lubricant to improve the load-carrying or anti-weld qualities.

EP Lubricant

Any of the lubricating oils or greases which contain an extreme pressure additive specifically introduced to prevent metal-to-metal contact in the operation of highly loaded gears. In some cases, this is accomplished by the additive reacting with the metal to form a protective film.

F

Fat

An animal or vegetable oil which will combine with an alkali to saponify and form a soap.

FFV

Flexible-Fuel Vehicle

Fiber Grease

A grease with a distinctly fibrous structure, which is noticeable when portions of the grease are pulled apart.

Filler (lubricants)

Any substance, such as talc, mica or various powders, which may be added to a grease to make it heavier in weight or consistency, but which serves no useful function in making the grease a better lubricant. (Editor's note: Such filler may also be added to certain lubricating oils or other lubricants).

Film Strength

The property of an oil which enables it to maintain an unbroken film on lubricated surfaces under operating conditions, where otherwise there would be scuffing or scoring of the surfaces.

Fire Point

The lowest temperature at which, under specified conditions in standardized apparatus, a petroleum product vaporizes sufficiently rapidly to form above its surface an air-vapor mixture which burns continuously when ignited by a small flame.

Fire Point Test (COC)

(see Cleveland open-cup tester)

Flash Point

The lowest temperature at which vapors arising from the oil will ignite momentarily (i.e., flash) when exposed to a flame.

Flash Point Test (COC)

(see Cleveland open-cup tester)

Flash Point Test

(Pensky-Martens closed tester)

A method of test for the determination of the flash point of liquid fuels flashing below 175°F, with the exception of fuel oils.

Flash Point (Tag closed-cup tester)

A method of test for the determination of the flash point of liquid fuels flashing below 175°F, with the exception of fuel oils.

Floc Point

The temperature at which wax or solids separate in an oil.

Foam

An agglomeration of gas bubbles separated from each other by a thin liquid film which is observed as a persistent phenomenon on the surface of a liquid.

Four-Ball Tester

This name is frequently used to describe either of two similar laboratory machines, the Four-Ball Wear Tester and the Four-Ball EP Tester. These machines are used to evaluate a lubricant's anti-wear qualities, frictional

characteristics or load carrying capabilities. It derives its name from the four ½ inch steel balls used as test specimens. Three of the balls are held together in a cup filled with lubricant while the fourth ball is rotated against them.

Fretting Corrosion

A special case of fretting in which one or more of the surfaces, or the wear particles therefrom, react with their environment. Mechanical wear initiates fretting, then chemical action or “corrosion” results from the exposure of virgin metal surface to the air.

Front-end Volatility

A term applied to the volatility of the lower boiling fractions of gasoline.

Fuel Sensitivity

The response of a motor fuel to the change in engine severity between the operating conditions of the ASTM Research Method (D 908) and ASTM Motor Method (D 357); numerically equal to the difference between the Research and Motor octane numbers.

FZG Test

A German gear test for evaluating EP properties.

G

Gasohol

Fuel mixture of gasoline and methyl alcohol (methanol).

GATT

General Agreement on Tariffs and Trade

Gravity (See API gravity)

Grease

A lubricant composed of a lubricating fluid, thickened with soap or other material to a solid or semisolid consistency.

H

Heat Transfer Oil

A medium used for the transfer of heat.

Herschel Demulsibility Number

A number which indicates the ability of an oil to separate from water under conditions specified by the Herschel Demulsibility Test.

Humidity Cabinet Test

A test used to evaluate the rust-preventing properties of metal preservatives under conditions of high humidity (ASTM Method D 1748).

Hydrocarbon

A compound containing only hydrogen and carbon. The simplest hydrocarbons are gases at ordinary temperatures; but with increasing molecular weight, they change to the liquid form and, finally, to the solid state. They form the principal constituents of petroleum.

Hydrodynamic (fluid film) Lubrication

An oil film which provides a pressure equal to the load. This pressure enables the moving parts to float on a layer of lubricant.

Hydrogenation

The chemical addition of hydrogen to a material. In non-destructive hydrogenation, hydrogen is added to a molecule only if, and where, unsaturation with respect to hydrogen exists. In destructive hydrogenation, the operation is carried out under conditions which result in rupture of some of the hydrocarbon chains (cracking); hydrogen is added where the chain breaks have occurred.

Hypoid Gears

Gears in which the pinion axis intersects the plane of the ring gear at a point below the ring-gear axle and above the outer edge of the ring gear, or above the ring-gear axle and below the outer edge of the ring gear.

I

ILMA

Independent Lubricant Manufacturers Association

ILSAC

International Lubricants Standardization & Approval Committee

Inhibitor

A substance in a petroleum product which prevents or retards undesirable chemical changes from taking place in the product, or in the condition of the equipment in which the product is used. Commonly used inhibitors are used to prevent or retard oxidation or corrosion.

Initial Boiling Point

According to ASTM Method D 86, the recorded temperature when the first drop of liquid falls from the end of the condenser.

Ink Oil

Any of the petroleum oils used as carriers for the pigment used in making printing inks.

Insulating Oil

An oil used in circuit breakers, switches, transformers and other electrical apparatus for insulating, and/or cooling. In general, such oils are well-refined petroleum distillates of low volatility, with resistance to oxidation and sludging.

IP

Institute of Petroleum

ISO

International Standards Organization
This organization which is worldwide in scope sets standards and classifications for lubricants. An example is the ISO viscosity grade system.

ISO Viscosity Grade System

A classification for industrial lubricants based on centistoke viscosity at 40°C (see inside cover). Covers eighteen grades from 2 to 1500 centistokes.

J

JAMA

Japanese Automotive Manufacturers Association

JASO

Japanese Automobile Standards Organization

JIS

Japanese Industrial Standards

JSAE

Society of Automotive Engineers, Japan

K

Kinematic Viscosity

The ratio of the absolute viscosity to the density at the temperature of the viscosity measurement. The metric units of kinematic viscosity are the stoke and centistoke, which correspond to the poise and centipoise of absolute viscosity.

L

Lard Oil

An animal oil prepared from the fat of swine. Such oils are compounded with mineral oils to yield lubricants of special wetting properties. These are especially used in cutting oils to improve the finish on the machined parts.

Lead Naphthanate

A lead soap of naphthenic acid. Lead naphthanate were previously used in mineral lubricants to give them high film strength (EP).

Liquefied Petroleum Gas (LPG)

Light hydrocarbon material, gaseous at atmospheric temperature and pressure, held in the liquid state by pressure to facilitate storage, transport and handling. Commercial liquefied gas consists essentially of propane, butane, or mixtures thereof.

Liquefied Natural Gas (LNG)

Similar to LPG but consisting of lighter hydrocarbons, such as methane and ethane.

Liter/Litre

The primary standard of capacity in the metric system, equal to the volume of one kilogram of pure water at maximum density, at approximately 4°C, and under normal atmospheric pressure.

Load Wear Index (LWI)

See Four Ball Test; a measure of the relative ability of a lubricant to prevent wear under applied loads; calculated from the loads applied and corrected for elastic deformation of the balls under static loading and for the size of the wear scar. Formerly called Mean Hertz Load.

LRI

Lubricants Review Institute

LTMS

Lubricant Test Monitoring System

Lubricating Grease

A solid to semifluid product consisting of dispersion of a thickening agent in a liquid lubricant. Other ingredients for imparting special properties may be included

M

Mean Hertz Load

(See load wear index (LWI))

Metal Deactivator

A fuel or lubricant additive, which converts into an inactive form, the traces of metal (such as copper in fuels) and metal surfaces (such as copper in fuel lines) which, in the absence of the deactivator would catalyze gum formation and other oxidation.

Mid-Continental Crude

Petroleum oil obtained from the central regions of the United States (principally Oklahoma, Kansas, and North Texas), usually having characteristics between those of Pennsylvania and coastal oils.

Middle Distillate

One of the distillates obtained between kerosene and lubricating oil fractions in the refining processes. These include light fuel oils and diesel fuel.

MIL Spec

Military specification; a guide in determining the quality requirements of products used by the military services, published by the United States Department of Defense.

Motor Method - Motor Octane Number (MON)

A test for determining the knock rating, in terms of ASTM Motor Octane Numbers, of fuels for use in spark-ignition engines. The knocking tendency of the fuel is compared with those for blends of reference fuels of known octane number when run in the ASTM-CFR engine at 900 rpm, under standard operating conditions as prescribed in ASTM Method D 357.

MSDS

Material Safety Data Sheet

MTAC

Multiple Test Acceptance Criteria

Multigrade Oil

One of the multiviscosity number oils in which one oil combines three SAE viscosity number grades. For example, multigrade SAE 10W-40 grade may be used where SAE 10W, SAE 20W, SAE 20, SAE 30, or SAE 40 grades are specified. They have been made possible by improved refining processes and the use of polymer additives.

Multipurpose Grease

A lubricating grease suitable to meet the individual requirements for chassis lubricant, bearing lubricant, joint lubricant, water-pump lubricant and cup grease.

MVMA

Motor Vehicle Manufacturers Association

N

NAFTA

North America Free Trade Agreement

Naphthene

One of a group of cycle hydrocarbons, also termed cycloparaffins or cycloalkanes. Polycyclic members are also found in the higher boiling fractions. The general formula for naphthenes is C_nH_{2n} .

Neutralization Number

The weight, in milligrams, of potassium hydroxide needed to neutralize the acid in 1g of oil. The neutralization number of an oil is an indication of its acidity.

Neutral Oil

Light overhead cuts of lubricant stocks. Neutral oils are the basis for most commonly used automotive lubricants.

NLGI Number

One of a series of numbers classifying the consistency range of lubricating greases, based on the ASTM cone penetration number. The National Lubricating Grease Institute (NLGI) grades are in order of increasing consistency (hardness).

NMMA

National Marine Manufacturers Association

NVMA

National Vehicle Manufacturers Association

O

Octane Number

A term numerically indicating the relative antiknock value of a gasoline. For octane numbers 100 or below, it is based upon a comparison with the reference fuels isooctane (100 octane number) and n-heptane (0 octane number). The octane number of an unknown fuel is the percent by volume of isooctane with n-heptane which matches the unknown fuel in knocking tendencies under a specified set of conditions. Above 100, the octane number of a fuel is based on the engine rating, in terms of milliliters of tetraethyllead in isooctane which matches that of the unknown fuel.

OECD

Organization Economic Cooperation and Development

OEM

Original Equipment Manufacturer

Oil Groove

One of the shallow grooves cut into the rubbing faces of a bearing shell to improve the distribution of oil over the shaft and bearings. The grooves are connected with an oil supply hole or cup and act like ducts in conveying the oil to the various parts of the bearings.

Oil Ring

1. A loose ring, the inner surface of which rides a shaft or journal causing the ring to rotate. The ring dips into the reservoir of lubricant, from which it carries the lubricant to the top of the shaft for distribution to a bearing. 2. This is the ring on an internal-combustion engine piston controls the lubrication of the piston and cylinder walls, as contrasted to the compression ring.

Oiliness

1. That characteristic of a liquid which is responsible for the degree of friction between two surfaces which cannot be accounted for on the basis of viscosity alone. 2 The ability of a lubricating oil to orient itself on bearing surfaces so as to form new surfaces with a low coefficient of static friction.

OLAP

Oil Labeling Assessment Program

ORI

Octane Requirement Increase

P

Pale Oil

A base or process oil refined until its color, by transmitted light, is straw to pale yellow.

PAN

Phenyl-Alpha-Naphthylamine, a commonly used antioxidant

PAPTG

Product Approval Protocol Task Group

Paraffin Series

A homologous series of open-chain saturated hydrocarbons of the general formula $C_n H_{2n+2}$ of which methane (CH_4) is the first member; sometimes referred to as the methane series.

PCMO

Passenger Car Motor Oil

Penetration

Consistency, expressed as the distance in millimeters that a standard needle or cone penetrates vertically into a sample of the material under known conditions of loading, time and temperature.

Pentane Insolubles

Usually called normal pentane insolubles; the insoluble matter which can be separated from a solution of used lubricating oil in normal pentane and, in addition to the benzene insolubles, may include resinous bitumens produced from the oxidation of oil and fuel (ASTM Method C 893).

Pour Depressor

A lubricating oil additive which lowers the pour point of an oil by reducing the tendency of the wax to form a solid mass in the oil. Also called pour-point depressor, pour depressant.

Pour Point

The lowest temperature at which oil will pour or flow when it is chilled without disturbance under definite conditions (ASTM Method D 97)

Pour Stability

The ability of a pour depressed oil to maintain its original ASTM pour point when subjected to storage at low temperature approximating winter conditions

Precipitation Number

The number of milliliters of precipitate formed when 10 ml of lubricating oil is mixed with 90 ml of petroleum naphtha and centrifuged under definitely prescribed conditions. The precipitation number should indicate the amount of the asphaltic bodies dissolved in the lubricating oil, although a certain amount of paraffin bodies may separate with the asphaltic bodies (ASTM method D 91).

Process Oil

An oil not used for lubrication but as a component of another material, or as a carrier of other products.

Pumpability (lubricating grease)

The ability of a lubricating grease to flow under pressure through the line, nozzle and fitting of a grease-dispensing system.

Q

QPL

Qualified Product List (military listing)

R

(R+M)/2

Research Octane Number plus Motor Octane Number, divided by two. Used now as general measure of road octanes of gasoline.

R&O

Rust and oxidation-inhibited.

Reclaimed Oil

A lubricating oil which, after undergoing a period of service is collected, reprocessed and sold for reuse. *(Not to be confused with re-refined oil.)*

Red Oil

The term is now used to describe any oil of red color, regardless of refining process.

Redwood Viscometer

Standard British viscometer. The number of seconds required for 50 ml of an oil to flow out of a standard Redwood viscometer at a definite temperature (IP Method 70). Instrument is available in two sizes: Redwood No. I and No. II. When the flow time exceeds 2,000 sec, the No. II must be used.

Reid Vapor Pressure

An important test for gasolines. It is a measure of the vapor pressure of a sample at 100°F, and the test is commonly made in a bomb. The results are reported in pounds (ASTM Method D 323).

Re-Refined

Totally re-distilled base stocks made from used oils that have been fully hydrotreated to remove all contaminants. This highly re-refined base oil can then be blended with new performance additives and VI improvers to create a new oil. *Laboratory tests cannot determine any difference between the base oil produced by Safety-Kleen's unique re-refining process and virgin crude base oil.*

Research Method-Research Octane Number (RON)

A test for determining the knock rating, in terms of ASTM Research octane numbers, of fuels for use in spark-ignition engines. The knocking tendency of the fuel is compared with those for blends of reference fuels of known octane numbers when run in the ASTM-CFR engine at 600 rpm under standard operating conditions (ASTM Methods D 908 and D 1656).

Road Octane Number

A numerical value based upon the relative anti-knock performance in an automobile of a test gasoline, as compared with specified reference fuels. Road octanes are determined by operating a car over a stretch of road or on a chassis dynamometer under conditions simulating those encountered on the highway.

RSI

Registrations Systems Inc.

S

SAE

Society of Automotive Engineers

SAE EP Lubricant Tester

A machine designed to test the extreme-pressure properties of a lubricant under a combined rolling and sliding action. The revolving members are two bearing cups which rotate at different speeds.

SAE Viscosity Number

System for classifying crankcase, transmission, and differential lubricants, according to their viscosities, established by the Society of Automotive Engineers. SAE numbers are used in connection with recommendations for crankcase oils to meet various design, service and temperature requirements affecting viscosity only; they do not denote quality.

Saybolt Color

A color standard for petroleum products. The procedure for determining Saybolt color and description of the Saybolt chronometer are given in ASTM method D 156.

Saybolt Furol Viscosity

The time, in seconds, for 60 ml of fluid to flow through a capillary tube in a Saybolt Furol viscometer at specified temperatures between 70°F and 210°F. This method is appropriate for high-viscosity oils such as transmission, gear and heavy fuel oils. ASTM Method D 88 describes the equipment and procedure.

Saybolt Universal Viscosity

The time, in seconds, for 60 ml of fluid to flow through a capillary tube in a Saybolt Universal viscometer at a given temperature, as described in ASTM Method D 88.

SCL

A sulfur, chlorine and lead component extreme pressure additive package, once commonly used for automotive type gear lubricants. It has been largely replaced by sulfur/phosphorous materials.

Separate Test

A test to determine the tendency of oil to separate from a lubricating grease under conditions prescribed in ASTM Method D 1742.

Soap

A general term denoting the salt of a fatty acid. The ordinary soaps are those of sodium and potassium. The soaps of lithium, calcium, sodium and aluminum are the principal thickeners used in grease making.

Specific Gravity

The ratio of the weight (in air) of a given volume of material to the weight (in air) of an equal volume of water at a stated temperature.

Starting Fluid (diesel)

A fluid, such as diethyl ether, which has a wide flammability range and is used to start diesel engines at extremely low temperatures.

STLE

The Society of Tribologists and Lubrication Engineers

Sulfated Ash

Defined in ASTM Method D 874 as the ash which remains after a sample of new additive-containing lubricating oil has been burned, and the residue subsequently heated with sulfuric acid until constant weight is achieved.

Sulfurized Oil

A product formed from mineral oil combined with sulfur or certain sulfur compounds. It has far greater film strength and load-carrying ability than straight mineral oil and is used as cutting oil.

SUS (SSU)

Saybolt Universal Seconds. A measure of lubricating oil viscosity used in the oil industry.

Synergism

A situation when a mixture of two or more separate additive materials results in a total effect than is greater than the total sum of their individual effects.

Synthetic Oils

Oils produced by synthesis rather than by extraction or refinement.

T

Tacky

A descriptive term applied to lubricating oils and greases which appear particularly sticky or adhesive.

Tag Closed-cup Tester

An instrument used to determine the flash point of volatile flammable materials flashing below 200°F, as described in ASTM Method D 56.

TAN (Total Acid Number)

The quantity of base, expressed in terms of the equivalent number of milligrams of potassium hydroxide, that is required to titrate the strong acid constituents present in 1 g of sample (ASTM Method D 664 or D 974).

TBN (Total Base Number)

The quantity of acid, expressed in terms of the equivalent number of milligrams of potassium hydroxide, that is required to titrate the strong base constituents present in 1 g of sample (ASTM Method D 664 or D 974).

Thixotropy

The property of a grease, or some gels, to decrease in consistency when subjected to a shear stress and return to original consistency when the stress is removed.

Timken EP Test

The Timken Extreme Pressure Test is one of many laboratory machines used in determining the load carrying capacities of oils and greases. In this test, a Timken bearing cup is rotated against a steel block. The highest load under which a lubricant prevents scoring of the steel block by the rotating cup is the reported value.

V

VI (Viscosity Index)

Viscosity Index is an arbitrary scale used to show the magnitude of viscosity changes in lubricating oils with changes in temperature, the tables found in ASTM Method D 2270 are widely used.

Viscosity

The measure of the internal friction or the resistance to flow of a liquid.

Viscosity Index

See VI

W

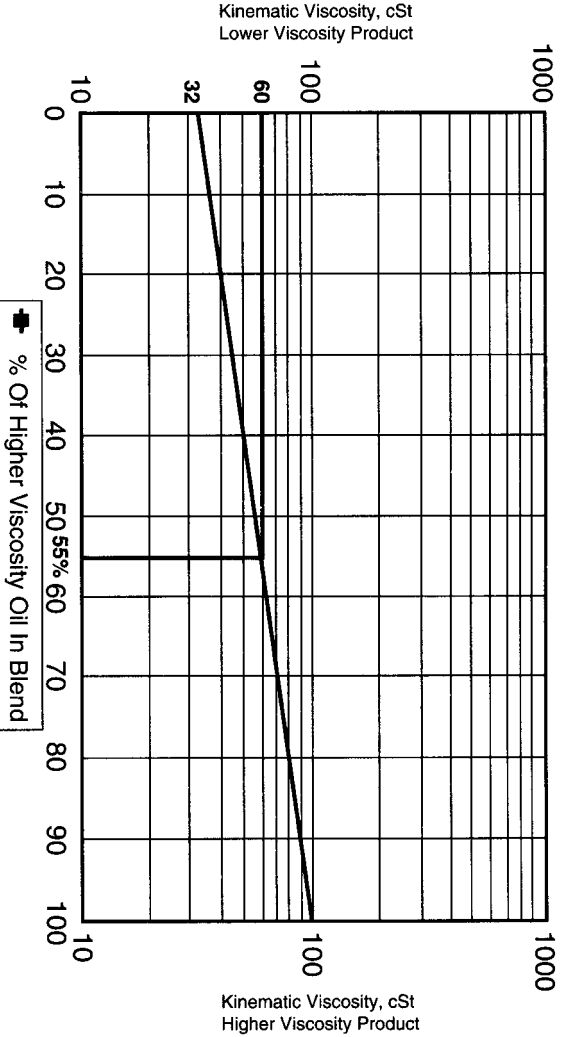
Worked Penetration

The penetration of a sample of lubricating grease immediately after it has been brought to 77°F and then subjected to 60 strokes in a standard grease worker. This procedure and the standard grease worker are described in ASTM Method D 217.



Printed On Recycled Paper

VISCOSITY BLENDING CHART



Draw a line between the viscosity values of the two components. A vertical line is then drawn to indicate the percentage of the Higher Viscosity component to intersect this line. At the intersection, draw a horizontal line to the viscosity scale. This will indicate the viscosity of the combination of the two components.

In the example shown, the lighter product is an ISO 32 grade while the higher viscosity product is an ISO 100. 55% of the ISO 100 grade with 45% of the ISO 32 grade would give a product with 60 cSt.

America's Choice[®]

This country generates 1.4 billion gallons of recoverable used oil every year, five gallons for every man, woman and child. Federal reports indicate that used motor oil accounts for more than 40 percent of the total oil pollution of our nation's harbors and waterways. Used oil can contain such contaminants as lead, magnesium, copper, zinc, chromium, arsenic, chlorides, cadmium and polychlorinated biphenyls. Oil poured down drains or in our landfills can work its way into our ground and surface waters and cause serious pollution problems. One gallon of used oil can foul a million gallons of drinking water, the equivalent of a year's supply for 50 families.

Re-refining motor oil reduces the need to tap limited virgin crude resources and allows environmentally conscious motorists the opportunity to 'close the loop' by recycling used motor oil and purchase re-refined oil. *Safety-Kleen's* modern re-refining processes turns used motor oil to a like-new condition by removing dirt and contaminants before blending sophisticated lubricating additives to protect engines. All major car manufacturers have approved the use of American Petroleum Institute (API) certified re-refined oil in their vehicles. **America's Choice[®]** Motor Oil is certified by API.

You can join the **WE CARE[®]** Program. Only consumer demand can influence whether more retailers start stocking environmentally friendly lubricants. That's why you should always look for the **WE CARE[®]** logo. The **WE CARE[®]** symbol lets you rest easy knowing that fluid wastes are being properly handled and recycled. Every drop of used oil picked up by *Safety-Kleen* is re-refined into motor oil or recycled for other uses. *Safety-Kleen* is the worldwide leader in the recycling of contaminated fluids including used antifreeze, transmission fluids, cleaning solvents, paint thinner, auto paint, dry-cleaning fluid and much more. When you see the *Safety-Kleen* **WE CARE[®]** logo you know the environment is being protected by people who care.



SAFETY-KLEEN Corporation
6325 Joliet Road
Countryside, IL 60525
1-800-525-5739