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An American National Standard

Standard Terminology Relating to Petroleum, Petroleum Products, and Lubricants¹

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This standard has been approved for use by agencies of the Department of Defense.

ε¹ NOTE—Terms were added editorially in October 2003.

1. Scope

1.1 This standard is the compilation of terminology developed by Committee D02 on Petroleum Products and Lubricants, except that it does not include terms/definitions specific only to the standards in which they appear.

1.1.1 The terminology, mostly definitions, is unique to petroleum, petroleum products, and lubricants. Meanings of the same terms outside of applications to petroleum, petroleum products, and lubricants can be found in other compilations and in dictionaries of general usage.

1.1.2 The terms/definitions exist in two places (1) in the standards in which they appear and (2) in this compilation.

2. Terminology

2.1 Alphabetical listing of terms with definitions for each term showing attributions as to source and subcommittee jurisdiction is in bold print following the definition. Those showing no attributes are under the jurisdiction of Subcommittee CS 95. Some abbreviations, acronyms and symbols are included in the list.

abrasion, *n*—wear by displacement of material caused by hard particles or hard protuberances. **D 4998**

abrasive wear—wear due to hard particles or hard protuberances forced against and moving along a solid surface. **D 5182**

absolute filtration rating, *n*—the diameter of the largest hard spherical particle that will pass through a filter under specified test conditions. This is an indication of the largest opening in the filter element. **D 4174**

absorbance, *A*, *n*—the molecular property of a substance that determines its ability to take up radiant power, expressed by:

$$A = \log_{10} (1/T) = -\log_{10} T$$

where *T* is the transmittance as defined in 3.1.3.

DISCUSSION—Absorbance expresses the excess absorption over that

of a specified reference or standard. It is implied that compensation has been affected for reflectance losses, solvent absorption losses, and refractive effects, if present, and that attenuation by scattering is small compared with attenuation by absorption. **D 2008**

absorptivity, *a*, *n*—the specific property of a substance to absorb radiant power per unit sample concentration and path length, expressed by:

$$a = Af/bc$$

where:

A = the absorbance defined in 3.1.4,

f = the dilution factor defined in 3.1.5,

b = sample cell path length, and

c = the quantity of absorbing substance contained in a volume of solvent. **D 2008**

acceptance limit (*AL*), *n*—a numerical value that defines the point between acceptable and unacceptable quality.

DISCUSSION—The *AL* is not necessarily the specification limit. It is the value that takes into account the specification value, the test method precision, and the confidence level desired for defining minimum acceptable quality relative to the specification value. **D 3244**

accepted reference value, *n*—a value that serves as an agreed-upon reference for comparison and that is derived as (1) a theoretical or established value, based on scientific principles, (2) an assigned value, based on experimental work of some national or international organization, such as the U.S. National Institute of Standards and Technology (NIST), or (3) a consensus value, based on collaborative experimental work under the auspices of a scientific or engineering group. **D 6299, [E11] E 456, E 177**

accuracy, *n*—the closeness of agreement between a test result and an accepted reference value. **D 6792**

acid number, *n*—the quantity of base, expressed as milligrams of potassium hydroxide per gram of sample, required to titrate a sample to a specified end point.

DISCUSSION—This test method expresses the quantity of base as milligrams of potassium hydroxide per gram of sample, that is required to titrate a sample in the solvent from its initial meter reading in millivolts to a meter reading in millivolts corresponding to a freshly prepared non-aqueous basic buffer solution or a well-defined inflection

¹ This terminology is under the jurisdiction of Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.95 on Terminology.

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point as specified in the test method.

DISCUSSION—This test method provides additional information. The quantity of base, expressed as milligrams of potassium hydroxide per gram of sample, required to titrate a sample in the solvent from its initial meter reading in millivolts to a meter reading in millivolts corresponding to a freshly prepared nonaqueous acidic buffer solution or a well-defined inflection point as specified in the test method shall be reported as the *strong acid number*.

DISCUSSION—The causes and effects of the so-called strong acids and the causes and effects of the other acids can be very significantly different. Therefore, the user of this test method shall differentiate and report the two, when they are found.

D 664

acid number, *n*—the quantity of base, expressed in milligrams of potassium hydroxide per gram of sample that is required to titrate a sample to a specified end point.

D 974,

D 3339, D 5770

DISCUSSION—In this test method, the indicator is *p*-naphtholbenzein titrated to a green/green-brown end point in a toluene-water-isopropanol solvent.

D 974

DISCUSSION—In this test method, acids or salts with dissociation constants greater than 10^{-9} , are titrated to a green end point with *p*-naphtholbenzein indicator.

D 3339

DISCUSSION—In this test method, the acid number is calculated from the number of drops required to produce a change in solution color from blue-green to orange, compared to the number of drops required to produce an identical color change using a reference standard. Because this is a direct comparison method, the acid number value can be reported in milligrams of potassium hydroxide per gram of sample.

D 5770

acidity, *n*—the quality, state or degree of being acid.

DISCUSSION—In this test method, the criterion for acidity is a pink or red color when methyl orange indicator is used.

D 1093

activated sludge, *n*—the precipitated solid matter, consisting mainly of bacteria and other aquatic microorganisms, that is produced in a domestic wastewater treatment plant; activated sludge is used primarily in secondary sewage treatment to microbially oxidized dissolved organic matter in the effluent.

D 6139

acute ecotoxicity, *n*—the propensity of a material to produce adverse behavioral, biochemical, or physiological effects in non-human organisms or populations in a short period of time, usually not constituting a substantial portion of the life span of the organism.

D 6046

acute ecotoxicity, *n*—the propensity of a test material to produce adverse behavioral, biochemical or physiological effects in non-human organisms or populations in a short period, usually not constituting a substantial portion of the life span.

D 6384

acute ecotoxicity test, *n*—a comparative ecotoxicity test in which a representative subpopulation of organisms is exposed to different treat rates of a test material and is observed for a short period, usually not constituting a substantial portion of their life span.

D 6384

acute toxicity test, *n*—a comparative toxicity test in which a representative subpopulation of organisms is exposed to different treat rates of a test material and is observed for a short period usually not constituting a substantial portion of their life span.

D 6081

additive, *n*—a material added to another, usually in small amounts, to impart or enhance desirable properties or to suppress undesirable properties. **D 5862, [D02.95] D 4175**

adhesive wear (scuffing), *n*—wear due to localized bonding between contacting solid surfaces leading to material transfer between the two surfaces or loss from either surface.

D 5182

adiabaticity, *n*—the condition in which there is no significant gain or loss of heat throughout the length of the column.

DISCUSSION—When distilling a mixture of compounds as is the case of crude petroleum, there will be a normal increase in reflux ratio down the column. In the case where heat losses occur in the column, the internal reflux is abnormally greater than the reflux in the head. The opposite is true when the column gains heat, as with an overheated mantle.

D 2892

aerobe, *n*—an organism that requires oxygen to remain metabolically active.

DISCUSSION—Aerobes use oxygen as their terminal electron acceptor in their primary energy-generating metabolic pathways. Aerobes require oxygen for survival, using *aerobic* metabolic processes to generate energy for growth and survival.

D 6469

aerobic, *adj*—(1) taking place in the presence of oxygen; (2) living or active in the presence of oxygen.

D 6006,

D 6046

aggressiveness index (A.I.), *n*—the value computed from the sum of the pH + log alkalinity + log hardness of water sample where both alkalinity and hardness are reported as CaCO₃L.

DISCUSSION—As A.I. decreases, water becomes more corrosive. At A.I. ≥ 12 , water is noncorrosive. At $10 \leq \text{A.I.} < 12$, water is moderately corrosive. At A.I. < 10 , water is strongly corrosive.

D 6469

air-fuel ratio, *n*—in internal combustion engines, the mass ratio of air-to-fuel in the mixture being induced into the combustion chambers.

D 5302, D 6593

DISCUSSION—In this test method, air-fuel ratio is controlled indirectly by exhaust gas analysis for CO and O₂ contents. During Stages I and II, O₂ is the primary determinant, while CO is the primary determinant in Stage III.

D 5302

DISCUSSION—In this test method, air-fuel ratio (AFR), is controlled by the EEC IV engine control module.

D 6593

ampule, *n*—a glass vessel for the storage of liquid materials, possessing a long narrow neck for the purpose of providing a flame-sealed closure.

D 6596

anaerobe, *n*—an organism that cannot grow or proliferate in the presence of oxygen.

DISCUSSION—Anaerobes use molecules other than oxygen in their primary energy-generating metabolic pathways, such as sulfate, nitrate, ketones, and other high-energy organic molecules. Although anaerobes may survive in the presence of oxygen, anaerobic growth typically occurs only in an oxygen depleted environment.

D 6469

anaerobic, *adj*—(1) taking place in the absence of oxygen; (2) living or active in the absence of oxygen.

D 6006,

D 6046

analysis cycle time, *n*—the period of time required to complete



obtain and analyze a representative sample of the process stream material. **D 6624**

analysis of variance (ANOVA), *n*—a procedure for dividing the total variation of a set of data into two or more parts, one of which estimates the error due to selecting and testing specimens and the other part(s) possible sources of added variation. **D 6300, [D13] D 123**

analyzer lag, *n*—Deprecated term. Use the preferred term **instrument response time**.

aniline point, *n*—the minimum equilibrium solution temperature for equal volumes of aniline (aminobenzene) and sample.

aniline point, *n*—the minimum equilibrium solution temperature for equal volumes of aniline and sample. **D 611**

ANOVA, *n*—*in statistics*, acronym for analysis of variance.

anoxic, *adj*—oxygen free. **D 6469**

anti-knock index, *n*—the arithmetic average of the Research octane number (RON) and Motor octane number (MON).

antiknock index, *n*—the arithmetic average of the Research octane number (RON) and Motor octane number (MON), that is, (RON + MON)/2. **D 4814**

antimicrobial, *n*—see **biocide**. **D 6469**

API—abbreviation for American Petroleum Institute.

API gravity, *n*—a special function of relative density (specific gravity) 60/60°F (15.56/15.56°C), represented by:

$$\text{API gravity, deg} = (141.5/\text{sp gr } 60/60^\circ\text{F}) - 131.5$$

D 287

apparent viscosity, *n*—of a lubricating grease, the ratio of shear stress to shear rate calculated from Poiseuille's equation, and is measured in poises (see 10.1). **D 1092**

apparent viscosity, *n*—the determined viscosity obtained by use of this test method. **D 3829**

asphalt, *n*—a dark brown-to-black cementitious material in which the predominating constituents are bitumens.

DISCUSSION—Asphalt can be a natural product or a material obtained from petroleum processing. **D 128**

asphaltenes, *n*—wax-free organic material insoluble in heptane, but soluble in hot toluene (benzene).

DISCUSSION—Benzene is included in this definition solely on the basis of its classical references in the definition of asphaltenes. The precision of this test method when using toluene has been found to be the same as when using benzene. **D 6560**

assignable cause, *n*—a factor that contributes to variation and that is feasible to detect and identify. **D 6299, [E11]**

E 456

assigned test value (ATV), *n*—the average of all results obtained in the several laboratories which are considered acceptable based on the reproducibility of the test method. **D 3244**

ASTM color, *n*—the name of an empirical scale of expressing of the color of a petroleum liquid darker than Saybolt color based on a scale of 0.5 (lightest) to 8.0 Dil (darkest) and determined by Test Method D 1500. **D 6045**

ASTM supercharge octane number of a fuel below 100, *n*—the whole number nearest the percentage by volume of isooctane (equals 100) in a blend with *n*-heptane (equals 0) that matches the knock characteristics of the fuel when

compared by this test method. **D 909**

ASTM supercharge rating of a fuel above 100, *n*—the amount of tetraethyllead (TEL) in isooctane, expressed in millilitres per U.S. gallon. **D 909**

ATV—*in statistics*, abbreviation for assigned test value.

autoignition, *n*—the ignition of a material caused by the application of pressure, heat, or radiation, rather than by an external ignition source, such as a spark, flame, or incandescent surface.

autoignition temperature, *n*—the minimum temperature at which autoignition occurs.

automotive, *adj*—descriptive of equipment associated with self-propelled machinery, usually vehicles driven by internal combustion engines. **D 4485**

automotive wheel bearing grease, *n*—a lubricating grease specifically formulated to lubricate automotive wheel bearings at relatively high grease temperatures and bearing speeds. **D 4693**

aviation gasoline, *n*—gasoline possessing specific properties suitable for fueling aircraft powered by reciprocating spark ignition engines.

DISCUSSION—Principal properties include volatility limits, stability, detonation-free performance in the engine for which it is intended and suitability for low temperature performance. **D 910**

bacterium (pl. bacteria), *n*—a single cell microorganism characterized by the absence of defined intracellular membranes that define all higher life forms.

DISCUSSION—All bacteria are members of the biological diverse kingdoms *Prokaryota* and *Archaeobacteriota*. Individual taxa within these kingdoms are able to thrive in environments ranging from sub-zero temperatures, such as in frozen foods and polar ice, to superheated waters in deep-sea thermal vents, and over the pH range < 2.0 to > 13.0. Potential food sources range from single carbon molecules (carbon dioxide and methane) to complex polymers, including plastics. Oxygen requirements range from obligate anaerobes, which die on contact with oxygen, to obligate aerobes, which die if oxygen pressure falls below a species specific threshold. **D 6469**

base number, *n*—the quantity of an acid, expressed in terms of the equivalent number of milligrams of potassium hydroxide per gram of sample, that is required to titrate a sample dissolved in the specified solvent to a specified end point (for example, Test Method D 4739).

DISCUSSION—This method uses fixed amounts of isooctane and alcoholic hydrochloric acid as the sample solvent and the end point is defined as the amount of titrant required to reach a yellow end-point with a methyl red indicator solution. **D 5984**

base number, *n*—the quantity of acid, expressed in milligrams of potassium hydroxide per gram of sample that is required to titrate a sample to a specified end point. **D 974, D 4739**

DISCUSSION—In this test method, the indicator is *p*-naphtholbenzein titrated to an orange end point in a toluene-water-isopropanol solvent. **D 974**

DISCUSSION—In this test method, the sample is titrated to a meter reading corresponding to a freshly prepared nonaqueous acidic buffer solution. **D 4739**

base oil, *n*—a base stock or a blend of two or more base stocks



used to produce finished lubricants, usually in combination with additives. **D 6074**

base stock, *n*—a hydrocarbon lubricant component, other than an additive, that is produced by a single manufacturer to the same specifications (independent of feed source or manufacturer's location), and that is identified by a unique formula number or product identification number, or both. **D 6074**

basicity, *n*—the quality, state or degree of being basic.

DISCUSSION—In this test method, the criterion for basicity is a pink or red color when phenolphthalein indicator is used. **D 1093**

basis weight of paper, *n*—basis weight is expressed in grams per square metre. In countries where the metric system is not universal, basis weight is also expressed in pounds per ream.

DISCUSSION—For factors to convert basis weight in grams per square metre to other commercial terms, see Test Method D 646. **D 2423**

bias, *n*—the difference between the population mean of the test results and an accepted reference value. **D 6300**, [E11] **E 456**

bias, *n*—a systematic error that contributes to the difference between a population mean of the measurements or test results and an accepted reference or true value. **D 6299**, [E11] **E 177**, **E 456**

bias, relative, *n*—the difference between the population mean of the test results and an accepted reference value, which is the agreed upon value obtained using an accepted reference method for measuring the same property. **D 6300**

bioburden, *n*—the level of microbial contamination (*biomass*) in a system.

DISCUSSION—Typically, bioburden is defined in terms of either biomass or numbers of cells per unit volume or mass or surface area material tested (g biomass / mL; g biomass / g; cells / mL sample, and so forth). The specific parameter used to define bioburden depends on critical properties of the system evaluated and the investigator's preferences. **D 6469**

biocide, *n*—a poisonous substance that can kill living organisms.

DISCUSSION—Biocides are further classified as bactericides (kill bacteria), fungicides (kill fungi), and microbicides (kill both bacteria and fungi). They are also referred to as *antimicrobials*. **D 6469**

biodegradation, *n*—the process of chemical breakdown or transformation of a material caused by organisms or their enzymes.

DISCUSSION—Biodegradation is only one mechanism by which materials are removed from the environment. **D 6046**

biodegradation, *n*—the process of chemical breakdown or transformation of a substance caused by organisms or their enzymes. **D 5864**

biodegradation, *n*—the process of chemical breakdown or transformation of a substance caused by organisms or their enzymes.

DISCUSSION—Biodegradation is only one mechanism by which materials are transformed in the environment. **D 6006**

biodeterioration, *n*—the loss of commercial value or performance characteristics, or both, of a product (fuel) or material

(fuel system) through biological processes. **D 6469**

biodiesel (B-100), *n*—fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats. **D 6584**

biofilm, *n*—a film or layer of microorganisms, biopolymers, water, and entrained organic and inorganic debris that forms as a result of microbial growth and proliferation at phase interfaces (liquid-liquid, liquid-solid, liquid-gas, and so forth). (Synonym—**skinnogen**.) **D 6469**

biomass, *n*—any material, excluding fossil fuels, which is or was a living organism or component of a living organism. **D 5864**

biomass, *n*—density of biological material per unit sample volume, area, or mass (g biomass / g (or / mL or / cm²) sample). **D 6469**

biosurfactant, *n*—a biologically produced molecule that acts as a soap or detergent. **D 6469**

black oil, *n*—lubricant containing asphaltic materials. Black oils are used in heavy-duty equipment applications, such as mining and quarrying, where extra adhesiveness is desired. **D 97**

blank, *n*—*in biodegradability testing*, a test system containing all system components with the exception of the test substance. **D 6006**

bleed (bleeding), *n*—*of lubricating greases*, the separation of a liquid lubricant from a lubricating grease for any cause. **D 6185**

blind reference oil, *n*—a reference oil, the identity of which is unknown by the test facility.

DISCUSSION—This is a coded reference oil which is submitted by a source independent from the test facility. **D 5844**

blowby, *n*—*in internal combustion engines*, the combustion products and unburned air-and-fuel mixture that enter the crankcase. **D 5302**, **D 5533**, **D 5844**, **D 5966**, **D 5967**

blowby, *n*—*in internal combustion engines*, that portion of the combustion products and unburned air/fuel mixture which leaks past piston rings into the engine crankcase during operation.

boilup rate, *n*—*in column distillation*, the quantity of vapor entering the column per unit of time.

boilup rate, *n*—the quantity of vapor entering the column per unit of time.

DISCUSSION—It is expressed in millilitres of liquid per hour for a given column or in millilitres per hour per square centimetre of cross-sectional area for comparative purposes. In the latter case, it refers to the test mixture of *n*-heptane and methylcyclohexane in the efficiency evaluation (see Annex A1) and is measured at the bottom of the column. The maximum boilup of the *n*-heptane-methylcyclohexane test mixture is that which the column can handle under stable conditions without flooding. In routine adiabatic operation, the boilup rate can be estimated roughly from the takeoff rate multiplied by the reflux ratio plus one. **D 2892**

bond, *v*—to connect two parts of a system electrically by means of a conductive wire to eliminate voltage differences. **D 6217**

bonded glycerin, *n*—is the glycerin portion of the mono-, di-, and triglyceride molecules. **D 6584**

borderline pumping temperature, *n*—the lowest temperature at



at which the critical yield stress or critical viscosity that allows a fluid to be pumped occurs.

break-in, *n*—*in tribology*, an initial transition process occurring in newly established wearing contacts, often accompanied by transients in coefficient of friction or wear rate, or both, that are uncharacteristic of the given tribological system's long term behavior. (Synonym—*run-in*, *wear-in*.)

D 6425, [G02] G 40

break-in, *n*—*in tribology*, an initial transition process occurring in newly established wearing contacts, often accompanied by transients in coefficient of friction or wear rate, or both, which are uncharacteristic of the given tribological system's long-term behavior.

D 5706, D 5707, [G02]
G 40

bromine index, *n*—the number of milligrams of bromine that will react with 100 g of sample under the conditions of the test.

D 2710

bromine number, *n*—the number of grams of bromine that will react with 100 g of the sample under the conditions of the test.

BTDC, *adj*—abbreviation for Before Top Dead Center; used with the degree symbol to indicate the angular position of the crankshaft relative to its position at the point of uppermost travel of the piston in the cylinder.

D 5533, D 5966

bulk sample, *n*—a large sample, either from one place or made up of several incremental samples of the same material.

D 4296

Bunsen coefficient, *n*—the solubility of a gas expressed as the volume, reduced to 273 K (32°F) and 101.3 kPa (1 atm), dissolved by one volume of liquid at the specified temperature and 101.3 kPa.

D 2779

Bunsen coefficient, *n*—the solubility of a gas, expressed as the gas volume reduced to 273 K (32°F) and 0.10 MPa (1 atm), dissolved by one volume of liquid at the specified temperature and 0.10 MPa.

D 3827

burn, *vt*—*in emission spectroscopy*, to vaporize and excite a specimen with sufficient energy to generate spectral radiation.

D 6595

burner fuel oil, *n*—any petroleum liquid suitable for the generation of heat by combustion in a furnace or firebox as a vapor or a spray, or a combination of both.

DISCUSSION—Different grades are characterized primarily by viscosity ranges.

D 6448, D 6823

calcined coke, *n*—petroleum coke that has been thermally treated to drive off the volatile matter and to develop crystalline structure.

calcined coke, *n*—raw petroleum coke that has been thermally treated to drive off the volatile matter and to develop crystalline structure.

D 5003

calcined petroleum coke, *n*—green petroleum coke which has been thermally treated to drive off the volatile matter and to develop crystalline structure.

D 2638

calcined petroleum coke, *n*—raw petroleum coke that has been thermally treated to drive off the volatile matter and to develop crystalline structure.

D 6376

calibrate, *v*—to determine the indication or output of a measuring device with respect to that of a standard.

D 5533, D 5862, D 5966, D 5967

calibrated test stand, *n*—a test stand on which the testing of reference material(s), conducted as specified in the standard, provided acceptable test results.

DISCUSSION—In several automotive lubricant standard test methods, the ASTM Test Monitoring Center provides testing guidance and determines acceptability.

D 6681

calibration, *n*—the act of determining the indication or output of a measuring device or a given engine with respect to a standard.

D 6202

calibration, *n*—the determination of the values of the significant parameters by comparison with values indicated by a set of reference standards.

D 6595

calibration curve, *n*—the graphical or mathematical representation of a relationship between the assigned (known) values of standards and the measured responses from the measurement system.

D 6595

calibration oil, *n*—an oil that is used to determine the indication or output of a measuring device or a given engine with respect to a standard.

D 6202

calibration standard, *n*—a standard having an accepted value (reference value) for use in calibrating a measurement instrument or system.

D 6595

candidate oil, *n*—an oil that is intended to have the performance characteristics necessary to satisfy a specification and is to be tested against that specification.

D 6618, D 6681

DISCUSSION—These oils are mainly submitted for testing as *candidates* to satisfy a specified performance; hence the designation of the term.

D 6681

candle pitch, *n*—a dark brown-to-black, tarry or solid, by-product residue from soap and candle stock manufacture, refining of vegetable oils, refining of wool grease, or refining of refuse animal fats.

D 128

carbon, *n*—*in manual transmissions and final drive axles*, a hard, dry, generally black or gray deposit that can be removed by solvents but not by wiping with a cloth.

D 5704

carbon residue, *n*—*in petroleum products*, the part remaining after a sample has been subjected to thermal decomposition.

DISCUSSION—The amount of residue is dependent on the test conditions of evaporation and pyrolysis. The term may be misleading here in that the residue may contain other than carbon decomposition products. However, the term is retained due to its wide common usage.

D 4530

carbon residue, *n*—the residue formed by evaporation and thermal degradation of a carbon-containing material.

DISCUSSION—The residue is not composed entirely of carbon but is a coke that can be further changed by carbon pyrolysis. The term carbon residue is retained in deference to its wide common usage.

D 189,

D 524

category, *n*—*in engine oils*, a designation such as SH, SJ, CF-4, CF, CF-2, CG-4, Energy Conserving, and so forth for a given level of performance in specified engine tests.



cetane index, *n*—an approximation of the cetane number (the ignition performance) of distillate diesel fuel, which does not contain a cetane improver additive, calculated from the density and the mid-boiling point temperature (see also **diesel index**).

cetane number, *n*—a measure of the ignition performance of a diesel fuel oil obtained by comparing it to reference fuels in a standardized engine test.

DISCUSSION—In the context of this method, ignition performance is understood to mean the ignition delay of the fuel as determined in a standard test engine under controlled conditions of fuel flow rate, injection timing and compression ratio. **D 613**

cetane number, *cn* *n*—a measure of the ignition performance of a diesel fuel obtained by comparing it to reference fuels in a standardized engine test.

Check Fuel, *n*—for quality control testing, a spark-ignition engine fuel of selected characteristics having an octane number accepted reference value (O.N._{ARV}) determined by round-robin testing under reproducibility conditions. **D 2699, D 2700**

chronic ecotoxicity test, *n*—a comparative ecotoxicity test in which a representative subpopulation of organisms is exposed to different treat rates of a test material and is observed for a period of time which constitutes a major portion of their life span. **D 6384**

chronic toxicity test, *n*—a comparative toxicity test in which a representative subpopulation of organisms are exposed to different treat rates of a test material and is observed for a period of time which constitutes a major portion of their life span. **D 6081**

CIE, *n*—the abbreviation for the French title of the International Commission on Illumination, or Commission Internationale de l'Eclairage. **D 6045, [E12] E 284**

CIE Standard Illuminant C, *n*—Colorimetric illuminant, representing daylight with a correlated color temperature of 6774 K, defined by the CIE in terms of a relative spectral power distribution. **D 6045, [E12] E 284**

CIE 1931 standard observer, *n*—ideal colorimetric observer with color matching functions $x(\lambda)$, $y(\lambda)$, $z(\lambda)$ corresponding to a field of view subtending a 2° angle on the retina; commonly called the “2° Standard Observer.” **D 6045, [E12] E 284**

C.L.A., *n*—in measuring surface finish, the arithmetic average of the absolute distances of all profile points from the mean line for a given distance. **D 6425**

classification, *n*—in engine oils, the systematic arrangement into categories in accordance with different levels of performance in specified engine tests. **D 4485**

clogging, *n*—the restriction of a flow path due to the accumulation of material along the flow path boundaries. **D 5533, D 5844**

closeness sum of squares (CSS), *n*—a statistic used to quantify the degree of agreement between the results from two test methods after bias-correction using the methodology of this practice. **D 6708**

cloud point, *n*—in petroleum products and biodiesel fuels, the temperature of a liquid specimen when the smallest observ-

able cluster of wax crystals first appears upon cooling under prescribed conditions.

DISCUSSION—The cloud point appears when the temperature of the specimen is low enough to cause wax crystals to precipitate. In homogeneous liquids, the cloud is always noted first at the location in the specimen where the specimen temperature is the lowest. This is typically at the lower portion of the test jar when using the apparatus described in Test Method D 2500. **D 5771**

cloud point, *n*—in petroleum products and biodiesel fuels, the temperature of a liquid specimen when a wax crystal structure that is similar in appearance to a cloud is formed upon cooling under prescribed conditions.

DISCUSSION—The cloud point appears when the temperature of the specimen is low enough to cause wax crystals to precipitate. In homogeneous liquids, the cloud is always noted first at the location in the specimen where the specimen temperature is the lowest. This is typically at the lower portion of the test jar when using the apparatus described in Test Method D 2500. **D 5772, D 5773**

coagulate, *v*—to cause to become viscous or thickened into a coherent mass. **D 893**

coagulated pentane insolubles, *n*—in used oil analysis, separated matter that results when a coagulant is added to a solution of used oil in pentane.

DISCUSSION—The addition of a coagulant will aid in separating finely divided materials that may have been held in suspension because of the dispersant characteristics of the oil. **D 893**

coagulated toluene insolubles, *n*—in used oil analysis, coagulated and separated matter not soluble in pentane or toluene. **D 893**

coefficient of friction, μ or f , *n*—in tribology, the dimensionless ratio of the friction force (F) between two bodies to the normal force (N) pressing these two bodies together.

$$\mu \text{ or } f = (F/N)$$

DISCUSSION—A distinction is often made between static coefficient of friction and kinetic coefficient of friction. **D 2714**

coefficient of friction μ or f , *n*—in tribology, the dimensionless ratio of the friction force (F_f) between two bodies to the normal force (F_n) pressing these bodies together.

$$\mu = (F_f/F_n)$$

D 6425, [G02] G 40

cold sticking, *n*—of piston rings, a condition in which the ring is free in its groove while the engine is running but stuck when the piston is cold, normally indicated by the absence of varnish or other deposits on the outer face of the ring and of signs of blowby on the piston skirt. **D 4857**

cold-stuck piston ring, *n*—in internal combustion engines, a piston ring that is stuck when the piston and ring are at room temperature, but inspection shows that it was free during engine operation.

DISCUSSION—A cold-stuck piston ring cannot be moved with moderate finger pressure. It is characterized by a polished face over its entire circumference, indicating essentially no blowby passed over the ring-face during engine operation. **D 6593**

combustion chamber, *n*—in reciprocating internal combustion engines, the volume bounded by the piston crown and





any portion of the cylinder walls extending above the piston crown when in the top dead center position, and the inner surface of the cylinder head including any spark plugs and other inserted components.

D 4857, D 4858

compensation line, *n*—a line of plot on log-log paper where the coordinates are scar diameter in millimetres and applied load in kilograms-force (or newtons) obtained under dynamic conditions.

DISCUSSION—Shown in Fig. 1 as line ABE.

D 2596

compensation scar diameter, *n*—the average diameter, in millimetres, of the wear scar on the stationary balls caused by the rotating ball under an applied load in the presence of a lubricant, but without causing either seizure or welding.

D 2596, [D02.L0] D 2783

composite sample—a thoroughly mixed gross sample.

D 4296

compression ratio, *n*—the ratio of the volume of the combustion chamber including the precombustion chamber with the piston at bottom dead center to the comparable volume with the piston at top dead center.

D 613

congealing point, *n*—that temperature at which molten petroleum wax ceases to flow, when allowed to cool under prescribed conditions.

congealing point, *n*—of petroleum wax, that temperature at which molten petroleum wax, when allowed to cool under prescribed conditions, ceases to flow.

D 938

consistency, *n*—of lubricating grease, the degree of resistance to movement under stress.

DISCUSSION—The term consistency is used somewhat synonymously with penetration. Generally, consistency refers to worked penetration of a grease.

D 217

consortium (pl. consortia), *n*—microbial community comprised of more than one, species that exhibits properties not shown by individual community members.

DISCUSSION—Consortia often mediate biodeterioration processes that individual taxa cannot.

D 6469

control limits, *n*—limits on a control chart that are used as criteria for signaling the need for action or for judging whether a set of data does or does not indicate a state of statistical control.

D 6299, [E11] E 456

corrected load, *n*—the load in kilograms-force (or newtons) for each run obtained by multiplying the applied load by the ratio of the Hertz scar diameter to the measured scar diameter at that load.

D 2783

corrected load, *n*—the load in kilograms-force (or newtons) obtained by multiplying the applied load by the ratio of the Hertz scar diameter to the measured scar diameter at that load.

DISCUSSION—In this test method, the corrected load is calculated for each run.

D 2596

corrosion, *n*—the chemical or electrochemical reaction between a material, usually a metal surface, and its environment that can produce a deterioration of the material and its properties.

D 5844

cracked gases, *n*—hydrocarbon gases that contain unsaturates.

D 2650

critical parts, *n*—those components used in the test that are known to affect test severity.

D 6709

cross-method reproducibility (R_{XY}), *n*—a quantitative expression of the random error associated with the difference between two results obtained by different operators using different apparatus and applying the two methods *X* and *Y*, respectively, each obtaining a single result on an identical test sample, when the methods have been assessed and an appropriate bias-correction has been applied in accordance with this practice; it is defined as the 95 % confidence limit for the difference between two such single and independent results.

DISCUSSION—A statement of cross-method reproducibility must include a description of any bias correction used in accordance with this practice.

DISCUSSION—Cross-method reproducibility is a meaningful concept only if there are no statistically observable sample-specific relative biases between the two methods, or if such biases vary from one sample to another in such a way that they may be considered random effects. (see 6.7.)

D 6708

crude oil, *n*—a naturally occurring hydrocarbon mixture, generally in a liquid state, which may also include compounds of sulfur, nitrogen, oxygen, metals, and other elements. (Synonym—*crude petroleum*, *crude*.)

cup grease, *n*—any lubricating grease having physical properties, such as consistency and texture, suitable for its use in spring-loaded or screw-type lubricating cups.

DISCUSSION—Cup greases are predominantly NLGI No. 3 or 4 calcium greases, but grease types other than calcium are also used.

D 128

cylinder height, *n*—for the CFR engine, the relative vertical position of the engine cylinder with respect to the piston at top dead center (tdc) or the top machined surface of the crankcase.

D 2699, D 2700

cylinder stock, *n*—lubricant for independently lubricated engine cylinders, such as those of steam engines and air compressors. Cylinder stock are also used for lubrication of valves and other elements in the cylinder area.

D 97

debris, *n*—in internal combustion engines, solid contaminant materials unintentionally introduced into the engine or resulting from wear.

D 5302, D 5862, D 6593

DISCUSSION—Examples include such things as gasket material, sili-cone sealer, towel threads, and metal particles.

D 5302, D 6593

debutanization, *n*—of crude petroleum, the removal of the light hydrocarbons up to and including *n*-butane, and retention of the heavier hydrocarbons.

DISCUSSION—In practice, a crude petroleum is regarded as debutanized if the light hydrocarbon cut collected in the cold trap contains more than 95 % of the C₂ to C₄ hydrocarbons and less than 5 % of the C₅ hydrocarbons initially present in the sample.

D 2892

degras (wool fat, wool grease, wool wax), *n*—a fat-like material comprised primarily of sterols, other higher alcohols, and fatty acids, obtained from the solvent extraction of sheep's wool.

D 128

degree of thickening (DT), *n*—the ratio of the oil's viscosity





with an additive to that oil's viscosity without the additive. A measure of the amount by which an additive increases the base fluid viscosity. **D 6022**

degrees of freedom, *n*—the divisor used in the calculation of variance.

DISCUSSION—This definition applies strictly only in the simplest cases. Complete definitions are beyond the scope of this practice.

D 6300, [ISO/TC 28] ISO 4259

demulsibility, *n*—in petroleum products, the ability of a mixture of liquids (usually hydrocarbons and water) to separate into its components after the mixture has been vigorously agitated.

denaturants, *n*—natural gasoline, gasoline components, unleaded gasoline, or toxic or noxious materials added to fuel ethanol to make it unsuitable for beverage use but not unsuitable for automotive fuel use. **D 6423**

denatured fuel ethanol, *n*—fuel ethanol made unfit for beverage use by the addition of denaturants. **D 6423**

density, *n*—mass per unit volume at a specified temperature. **D 4052**

density—the weight in vacuo, (that is, the mass) of a unit volume of the material at any given temperature. **D 1217**

depacifying, *adj*—the process of removing hydrogen ions (protons) from the cathodic surface of an electrolytic cell, thereby promoting continued electrolytic corrosion. **D 6469**

deplasticize, *v*—the process of breaking down polymers in plastics and similar materials, resulting in loss of the material's structural integrity. **D 6469**

determinability, *n*—a quantitative measure of the variability associated with the same operator in a given laboratory obtaining successive determined values using the same apparatus for a series of operations leading to a single result; it is defined as that difference between two such single determined values as would be exceeded in the long run in only one case in 20 in the normal and correct operation of the test method.

DISCUSSION—This definition implies that two determined values, obtained under determinability conditions, which differ by more than the determinability value should be considered suspect. If an operator obtains more than two determinations, then it would usually be satisfactory to check the most discordant determination against the mean of the remainder, using determinability as the critical difference.

D 6300

determination, *n*—the process of carrying out the series of operations specified in the test method whereby a single value is obtained. **D 3244**

detonation meter, *n*—for knock testing, the signal conditioning instrumentation that accepts the electrical signal from the detonation pickup and provides an output signal for display. **D 2699, D 2700**

detonation pickup, *n*—for knock testing, a magnetostrictive-type transducer that threads into the engine cylinder and is exposed to combustion chamber pressure to provide an electrical signal that is proportional to the rate-of-change of cylinder pressure. **D 2699, D 2700**

developer, *n*—of an ASTM test method, the assigned ASTM group, working under the supervision of its governing subcommittee and main committee, that formats the test method in accordance with the Form and Style for ASTM Standards, and continually refines the test method. **D 6594**

developer, *n*—of a test procedure, an individual or organization that selects the test apparatus and operating conditions. **D 6594**

dial indicator reading, *n*—for the CFR engine, a numerical indication of cylinder height, in thousandths of an inch, indexed to a basic setting at a prescribed compression pressure when the engine is motored. **D 2699, D 2700**

diesel fuel oil, *n*—any petroleum liquid suitable for the generation of power by combustion in compression ignition (diesel) engines.

DISCUSSION—Different grades are characterized primarily by viscosity ranges and by minimum cetane numbers.

diesel index, *n*—an approximation of the cetane number (the ignition performance) of diesel fuel, calculated from the density and the aniline point. (No longer widely used for distillate fuels but applicable to some blended distillate residual fuels (see also **cetane index**).)

diffuser, *n*—for gas, a device for dispersing gas into a fluid.

DISCUSSION—In this test method the diffuser may be made of either metallic or non-metallic materials. **D 892**

diffuser, *n*—for gas, a device for dispersing gas into a liquid. (Test Method D 892).

DISCUSSION—Although diffusers can be made of either metallic or non-metallic materials, in this test method the diffuser is sintered stainless steel. **D 6082**

digital counter reading, *n*—for the CFR engine, a numerical indication of cylinder height, indexed to a basic setting at a prescribed compression pressure when the engine is motored. **D 2699, D 2700**

dilution factor, *f*, *n*—the proportion of solvent increase made to reduce the concentration and thus the absorbance of a solute, expressed by the ratio of the volume of the diluted solution to the volume of original solution containing the same quantity of solute as the diluted solution. **D 2008**

DIN—abbreviation for Deutsches Institut für Normung (the German Standards Body).

dispersant, *n*—in engine oil, an additive that reduces deposits on oil-wetted engine surfaces primarily through suspension of particles.

dispute, *n*—when there is a question as to product quality because a test value obtained falls outside the acceptance limit. **D 3244**

distillation pressure, *n*—the pressure measured as close as possible to the point where the vapor temperature is taken, normally at the top of the condenser. **D 2892**

distillation residue, *n*—that portion of the sample remaining after distillation using specified procedures. **D 1093**

distillation temperature, *n*—in column distillation, the temperature of the saturated vapor measured just above the top



of the fractionating column. (Synonym—*head temperature, vapor temperature.*)

drain and dry mode, *n*—the effect from being sprayed, dipped, or brushed with a fluid lubricant and the excess material draining from the surface leaving behind a thin film that remains wet and must act as a lubricant on its own, without benefit of recirculation or continuous supply.

D 5620

drop melting point of petroleum wax, *n*—the temperature at which material becomes sufficiently fluid to drop from the thermometer used in making the determination under definite prescribed conditions.

D 127

dropping point, *n*—a numerical value assigned to a grease composition representing the corrected temperature at which the first drop of material falls from the test cup and reaches the bottom of the test tube.

DISCUSSION—In the normal and proper operation of this test method, the observed dropping point is corrected by adding to it a value representing one third of the difference between the oven block temperature and the observed dropping point temperature. This corrected value is recorded as the dropping point of the grease.

D 2265

dry point, *n*—*in batch distillation*, the temperature observed at the instant the last drop of liquid evaporates from the lowest point in the flask.

dry solid film lubricants, *n*—dry coatings consisting of lubricating powders in a solid matrix bonded to one or both surfaces to be lubricated.

D 2510

DT—*in viscometry*, abbreviation for degree of thickening.

dynamic, *adj*—*in petroleum products*—the condition where the vapor above the test specimen and the test specimen are not in temperature equilibrium at the time that the ignition source is applied.

DISCUSSION—This is primarily caused by the heating of the test specimen at the constant prescribed rate with the vapor temperature lagging behind the test specimen temperature.

D 92, D 93

dynamic fuel level, *n*—*for knock testing*, test procedure in which the fuel-air ratio for maximum knock intensity for sample and reference fuels is determined using the falling level technique that changes carburetor fuel level from a high or rich mixture condition to a low or lean mixture condition, at a constant rate, causing knock intensity to rise to a maximum and then decrease, thus permitting observation of the maximum knockmeter reading.

D 2699,

D 2700

dynamic hold-up, *n*—*in column distillation*, the quantity of liquid held up in the column under normal operating conditions.

dynamic hold-up, *n*—the quantity of liquid held up in the column under normal operating conditions.

DISCUSSION—It is expressed as a percentage of the packed volume for packed columns so that the data can be compared. For real plate columns, it is expressed in millilitres per plate. The data can only be compared with others of the same diameter because of different tray spacing. Data for packed columns cannot be compared with those of real plate columns except in absolute units of millilitres per theoretical plate (see Table 1). Dynamic hold-up increases with increasing distillation rate up to the flood point and varies from one kind of fractionator

to another.

D 2892

ecotoxicity, *n*—the propensity of a material to produce adverse behavioral, biochemical, or physiological effects in non-human organisms or populations.

D 6046

effect load XX (ELXX), *n*—a statistically or graphically estimated loading rate of test material that is expected to cause one or more specified effects in XX % of a group of organisms under specified conditions for a specified time.

DISCUSSION—This terminology should be used for hydraulic fluids instead of the standard effect concentration (ECXX) when the hydraulic fluid is not completely soluble under test conditions.

D 6046

effect load XX (ELXX), *n*—a statistically or graphically estimated loading rate of test material that is expected to cause one or more specified effects in XX % of a representative subpopulation of organisms under specified conditions.

DISCUSSION—This terminology should be used instead of the standard ECXX when the test material is not completely soluble at the test treat rates.

D 6081

elastomer, *n*—a natural or synthetic polymer having the property of substantially recovering its size and shape after removal of a deforming force.

elastomer, *n*—a natural or synthetic polymer having the rubber-like property of substantially recovering its size and shape after removal of a deforming force.

D 4289

electrical resistivity, *n*—the electrical resistance offered by a material to the flow of current, times the cross-sectional area of current flow and per unit length of current path, the reciprocal of conductivity. It is also known as resistivity, or specific resistance.

D 6120

emission spectroscopy, *n*—measurement of energy spectrum emitted by or from an object under some form of energetic stimulation; for example, light, electrical discharge, and so forth.

D 6595

emulsion, *n*—a suspension of fine particles or globules, or both, of one or more liquids in another liquid.

D 5761

engine motor octane requirement, *n*—one full motor octane number greater than the maximum motor octane number that results in knock (graphic knock level descriptions can be seen in Annex A1). For example, a test engine knocks on primary reference fuels with 96 and 97 motor octane numbers. The test engine does not knock on a primary reference fuel with a 98 motor octane number. The maximum motor octane number that results in knock is 97, so the motor octane requirement is 98.

D 6424

engine oil, *n*—a liquid that reduces friction or wear, or both, between the moving parts within an engine; removes heat, particularly from the underside of pistons; and serves as a combustion gas sealant for piston rings.

DISCUSSION—It may contain additives to enhance certain properties. Inhibition of engine rusting, deposit formation, valve train wear, oil oxidation, and foaming are examples.

D 5862, D 5966

entrained air (or gas), *n*—*in liquids*, a two-phase mixture of air (or gas) dispersed in a liquid in which the liquid is the major component on a volumetric basis.

