



Standard Terminology for Engine Coolants and Related Fluids¹

This standard is issued under the fixed designation D4725; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This document covers terminology relating to engine coolants. It is intended to provide a reference for anyone seeking information on engine coolants, and also to provide a uniform set of definitions for use in preparing ASTM specifications, test methods and other standard documents.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- D1193 Specification for Reagent Water
- D3306 Specification for Glycol Base Engine Coolant for Automobile and Light-Duty Service
- D3585 Specification for ASTM Reference Fluid for Coolant Tests
- D4985 Specification for Low Silicate Ethylene Glycol Base Engine Coolant for Heavy Duty Engines Requiring a Pre-Charge of Supplemental Coolant Additive (SCA)
- D6210 Specification for Fully-Formulated Glycol Base Engine Coolant for Heavy-Duty Engines
- D6471 Specification for Recycled Prediluted Aqueous Glycol Base Engine Coolant (50 Volume % Minimum) for Automobile and Light-Duty Service
- D6472 Specification for Recycled Glycol Base Engine Coolant Concentrate for Automobile and Light-Duty Service
- E1177 Specification for Engine Coolant Grade Glycol

2.2 ISO Standard:

- ISO 22241 Diesel engines - NOx reduction agent AUS 32

¹ This terminology is under the jurisdiction of ASTM Committee D15 on Engine Coolants and Related Fluids and is the direct responsibility of Subcommittee D15.92 on Terminology.

Current edition approved May 1, 2015. Published May 2015. Originally approved in 1987. Last previous edition approved in 2013 as D4725 – 13. DOI: 10.1520/D4725-15.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Terminology

antifoam, *n*—a substance added to engine coolant concentrate, corrosion inhibitor packages, or supplemental coolant additives to prevent or suppress foam.

DISCUSSION—Eliminating foam improves heat transfer.

antifreeze, *n*—a term frequently used in the marketplace for engine coolant concentrate. (See **engine coolant concentrate**.)

antirust, *n*—an inhibitor package, solid or liquid, intended to be diluted with water or glycol for use in an engine cooling system to mitigate rust and corrosion.

ash content, *n*—the residue from an engine coolant concentrate, antirust, or engine coolant that remains after evaporation, charring, and ignition at strong heat.

boiling point, *n*—the temperature at which the vapor pressure of an engine coolant reaches atmospheric pressure under equilibrium boiling conditions.

cavitation corrosion, *n*—a form of localized, accelerated corrosion characterized by deep pitting and caused by high mechanical forces resulting from coolant vapor bubble collapse at the surface of the metal.

cavitation erosion corrosion, *n*—the mechanical removal of protective films on metal by the formation and collapse of vapor bubbles in a liquid, and the abrasive action of a liquid, which may contain suspended solids, moving at high velocity.

DISCUSSION—The mechanical removal of the protective films exposes fresh metal to corrosive attack.

coolant additive package, *n*—the combination of inhibitors added to an engine coolant to mitigate cooling system degradation, corrosion, scaling, and foaming, or to provide other desirable properties.

corrosion inhibitor package, *n*—the combination of inhibitors added to an engine coolant to mitigate cooling system corrosion.

corrosive water, *n*—a standard solution containing 100 ppm each of sulfate, chloride, and bicarbonate ions introduced as the sodium salts to distilled water.

diesel exhaust fluid (DEF), *n*—preparation of aqueous urea [(NH₂)₂CO], containing 32.5 % by weight of technically pure urea in high-purity water with quality characteristics defined by ISO 22241.

dye, *n*—a colorant added to an engine coolant to give it a distinctive color.

engine coolant, *n*—a fluid used to transfer heat from an engine to the radiator, usually containing specific amounts of glycols, water, corrosion inhibitors, and a foam suppressor.

DISCUSSION—Engine coolants may also contain supplemental coolant additives.

engine coolant concentrate, *n*—a formulated liquid product intended to be diluted with water for use in engine cooling systems.

DISCUSSION—Functionally, the product provides a lower freeze point and mitigates corrosion and foaming.

engine dynamometer test, *n*—a laboratory full-scale engine test designed to evaluate corrosion protection and inhibitor stability of engine coolants under simulated operational conditions.

erosion corrosion, *n*—nonuniform, accelerated corrosion characterized by a smooth appearance and caused by high velocity coolant.

DISCUSSION—The corrosive attack may be aggravated by suspended solids.

extended life coolant, *n*—an engine coolant for light-duty service vehicles with recommended change-out of the coolant after 160 000 km (100 000 miles), 5 years, or 4000 operating hours.

foaming tendencies, *n*—a laboratory test conducted in glassware to evaluate the tendency of an engine coolant to foam under standard conditions of aeration and temperature.

freezing point, *n*—the temperature at which crystallization begins in the absence of supercooling, or the maximum temperature reached immediately after initial crystal formation in the case of supercooling, or the temperature at which solid crystals, formed on cooling, disappear when the temperature of the specimen is allowed to rise.

glassware corrosion test, *n*—a laboratory screening test for evaluating the corrosion protection properties of engine coolants on metal test specimens under controlled conditions of aeration and temperature.

glycol bottoms, *n*—the residue in the still after final distillation of most of the glycol and dimers, trimers and tetramers from the output stream of a glycol reactor.

DISCUSSION—The residue may include some glycol and dimers, trimers and tetramers, aldehydes, acids, and various other oxidation products. It is generally acidic, with a strong, offensive odor and a dark color. It is regarded as unsuitable for the production of engine coolant.

glycol engine coolant concentrate, *n*—an engine coolant concentrate in which the freeze point depressant is ethylene or propylene glycol, with inhibitors to minimize foaming and corrosion.

DISCUSSION—Small amounts of other glycols may be present.

heavy-duty, *adj*—*in internal combustion engine operation*, characterized by average speeds, power output, and internal temperatures that are generally close to the potential maximums.

heavy-duty engine, *n*—*in internal combustion engine types*, one that is designed to allow operation continuously at or close to its peak output.

DISCUSSION—This type of engine is typically used in (a) Class 5 to 8 over-the-road trucks and buses, (b) off-highway machinery for agricultural, earthmoving, construction, and mining, (c) high-output stationary engine applications, and (d) locomotive and marine applications.

hydrometer-thermometer field tester, *n*—a device designed to indicate the freezing point of an engine coolant by measurement of the relative density of the coolant at a specific temperature.

inhibitor, *n*—a chemical compound added to engine coolant to mitigate cooling system degradation.

DISCUSSION—Examples of inhibitors are corrosion inhibitors, foam inhibitors, and scale inhibitors

light-duty, *adj*—*in internal combustion engine operation*, characterized by average speeds, power output, and internal temperatures that are generally much lower than the potential maximums.

light duty engine, *n*—*in internal combustion engine types*, one that is designed to be normally operated at substantially less than its peak output.

DISCUSSION—This type of engine is typically installed in (a) automobiles, (b) pickup trucks, vans, and sport utility vehicles, (c) small farm tractors, and (d) lawn maintenance equipment.

liner pitting, *n*—cavities that develop on the coolant side of cast iron cylinder liners as a result of cavitation corrosion.

DISCUSSION—This predominantly occurs on the thrust side of heavy-duty diesel cylinder walls.

low-silicate coolant concentrate, *n*—an engine coolant concentrate containing not more than 250 ppm silicon.

multiphase coolant, *n*—an engine coolant composed of immiscible liquids or undissolved solids, or both.

non-aqueous coolant, *n*—a glycol, diol, triol, or mixtures thereof, based heat transfer fluid containing less than 1.0 % water when formulated and intended for final use without dilution with water.

other glycols, *n*—*in ethylene glycol based engine coolant*, diethylene glycol, triethylene glycol, tetraethylene glycol, propylene glycol, dipropylene glycol, tripropylene glycol, and 1,3 propanediol.

other glycols, *n*—*in propylene glycol based engine coolant*, ethylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, tripropylene glycol, and 1,3 propanediol.

prediluted aqueous ethylene glycol coolant, *n*—a commercially prepared uniform solution (50 % by volume minimum) of ethylene-glycol-based engine coolant concentrate and deionized water (described in Specification **D1193**, Type IV).

DISCUSSION—The prediluted coolant is intended for direct addition to an engine cooling system.

propylene glycol, *n*—in engine coolants, 1,2 propanediol as referred to in Specifications **D3306**, **D4985**, **D6210**, **D6471**, **D6472**, and **E1177**.

recycled engine coolant, *n*—engine coolant formulated using other than virgin materials.

redistilled glycol, *n*—glycol that is reprocessed/recycled from used aqueous glycol base engine coolants or glycols produced from other sources, including industrial processes by volatilizing and condensing the glycol components within distillation equipment.

DISCUSSION—Efforts are being made within D15.15 on Recycled Coolants, to produce a specification for redistilled glycol that addresses recycling used aqueous glycol base engine coolants and glycols from other sources, including industrial processes.

reference test fluid, *n*—a standard glycol-base test fluid, described in Specification **D3585**, used by laboratories to evaluate test methods and procedures.

refractometer, *n*—an instrument used to indicate the freezing point of engine coolants by refractive index.

relative density, *n*—the ratio of the mass of a given volume of liquid to the mass of an equal volume of pure water at the same temperature.

DISCUSSION—When reporting results, explicitly state the standard reference temperature (for example, relative density 15.56/15.56°C (60/60°F)).

reserve alkalinity, *adj*—a term applied to engine coolant concentrates and antirusts to indicate the amount of alkaline inhibitors present in the product.

round-robin test, *n*—the practice of planning, conducting, analyzing, and interpreting the results of interlaboratory tests on the chemical and physical properties of engine coolants.

scale suppressant, *n*—a substance added to engine coolant concentrates, corrosion inhibitor packages, or supplemental coolant additives that helps prevent the formation of hard water mineral scale.

DISCUSSION—Scale will insulate and reduce heat transfer.

silicate gel, *n*—a jelly-like substance consisting of polymerized silicate and entrapped coolant.

simulated service corrosion test, *n*—evaluation of the effects of a circulating engine coolant on metal test specimens and automotive cooling system components under controlled, essentially isothermal laboratory conditions.

soluble oil, *n*—a combination of mineral oil base and one or more polar organic materials, such as petroleum sulfonates, sulfated vegetable oils, and fatty acids or their salts.

stop-leak additives, *n*—a compound containing particulates that is added to the cooling system for the purpose of stopping or minimizing leaks.

supercooling, *n*—an unstable state in which an engine coolant exists as a liquid below its normal freezing point.

supplemental coolant additive (SCA) maintenance dose, *n*—smaller periodic additions of SCA, subsequent to the precharge dose of SCA, required to maintain protection against general corrosion, cylinder liner pitting, and scaling in heavy-duty engines.

supplemental coolant additive (SCA) precharge dose, *n*—initial concentration of SCA in engine coolant required to enable the coolant to provide adequate protection against cylinder liner pitting and scaling in heavy-duty engines plus general corrosion protection when water only is used as a coolant.

test strip, *n*—a diagnostic tool that contains chemically treated test pads that react with the sample causing the test pad to change color. The test pad is then compared to a calibrated test key to determine the level of a target ingredient.

virgin glycol, *n*—glycol that has not been used previously.

4. Keywords

4.1 antifreeze; engine coolant; terminology

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