

Industrial Chemical Standards

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Standard Specification for Glycol Base Engine Coolant for Automobile and Light-Duty Service

1. Scope

1.1 This specification covers the requirements for ethylene glycol or propylene glycol base engine coolants used in automobiles or other light duty service cooling systems. When concentrates are used at 40 to 70 % concentration by volume in water, or when prediluted glycol base engine coolants (50 volume % minimum) are used without further dilution, they will function effectively to provide protection against freezing, boiling, and corrosion.

1.2 The coolants governed by this specification are categorized as follows:

<u>Coolant Type</u>	<u>Description</u>
I	Ethylene glycol base concentrate
II	Propylene glycol base concentrate
V	Ethylene glycol base concentrate containing glycerine
III	Ethylene glycol predilute (50 vol %)
IV	Propylene glycol predilute (50 vol %)
VI	Ethylene glycol base predilute containing glycerine (50 vol %)

Note 1—This specification is based on the knowledge of the performance of engine coolants prepared from new or virgin ingredients. This specification shall also apply to engine coolants prepared using glycol generated from recycled or reprocessed used coolant or reprocessed industrial-source glycol, provided that said glycol meets the requirements of Specification. Separate specifications exist for engine coolants prepared from recycled or reprocessed used coolant or reprocessed industrial-source glycol that does not meet the requirements established. This specification shall also apply to glycol based engine coolants prepared using fully refined glycerine provided that said glycerine meets the requirements.

1.3 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.4 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.

Note 2—This specification applies to glycol base engine coolant for automobiles and light duty service.

TABLE 1 General Requirements

Property	Specified Values	ASTM Test Method
Colour	Distinctive . . .	
Effect on non-metals	No adverse effect	Under consideration

TABLE 2 Physical and Chemical Requirements for Concentrates

Property	Type I	Type II	Type V
Relative density 15.5/15.5°C (60/60°F)	1.110 to 1.145	1.030 to 1.065	1.110 to 1.160 ^A
Freezing point ^C °C (°F), 50 vol % in DI water	−36.4 (−33.5) max	−31.0 (−23.8) max	−36.4 (−33.5) max
Boiling point, ^{B,D} °C (°F), 50 vol % in DI water	108 (226) min	104 (219)\tmin	108 (226) min
Ash content, mass %	5 max	5 max	5 max
pH, 50 vol % in DI water	7.5 to 11	7.5 to 11	7.5 to 11
Chloride, µg/g	25 max	25 max	25 max
Water, mass %	5 max	5 max	5 max
Reserve alkalinity, mL	report ^F	report ^F	report ^F
Effect on automotive finish (use clear coat thermoset urethane or acrylic urethane finish)	no effect	no effect	no effect

^A Type V engine coolant is ethylene glycol base containing glycerine. Other ingredients that do not meet Specifications shall not be substituted in this blend.

^B For purposes of determining conformance with this specification, an observed value shall be rounded “to the nearest unit” in the last right-hand digit used in expressing the specification limit.

^C Test Methods work with glycol/glycerine mixtures. Field test devices based on refractive index and density are under development.

^D Some precipitate may be observed at the end of the test. This should not be cause for rejection.

^G Currently, many vehicle manufacturers prepare test panels using the specific paint finishes employed on their actual products. Coolant suppliers and vehicle manufacturers should agree on the exact test procedures and acceptance criteria on an individual basis.

TABLE 3 Physical and Chemical Requirements for Predilute

Property	Type III	Type IV	Type VI
Relative density 15.5/15.5°C (60/60°F)	1.065 min	1.025 min	1.065 min ^A
Freezing point, ^{B, C} °C (°F), undiluted	−36.4 (−33.5) max	−31.0 (−23.8) max	−36.4 (−33.5) (max)
Boiling point, ^{B, D} °C (°F), undiluted	108 (226) min	104 (219) min	108 (226) min
Ash content, mass %	2.5 max	2.5 max	2.5 max
pH, undiluted	7.5 to 11	7.5 to 11	7.5 to 11
Chloride, µg/g	25 max	25 max	25 max
Water, mass %	not applicable	not applicable	not applicable
Reserve alkalinity, mL	report ^F	report ^F	report ^F
Effect on automotive finish (use clear coat thermoset urethane or acrylic urethane finish)	no effect	no effect	no effect

^A Type VI engine coolant is ethylene glycol base containing glycerine. Other ingredients that do not meet Specifications shall not be substituted in this blend.

^B For purposes of determining conformance with this specification, an observed value shall be rounded “to the nearest unit” in the last right-hand digit used in expressing the specification limit, in accordance with the rounding method of Practice.

^C Test Methods work with glycol/glycerine mixtures. Field test devices based on refractive index and density are under development.

^D Some precipitate may be observed at the end of the test. This should not be cause for rejection.

^G Currently, many vehicle manufacturers prepare test panels using the specific paint finishes employed on their actual products. Coolant suppliers and vehicle manufacturers should agree on the exact test procedures and acceptance criteria on an individual basis.

TABLE 4 Performance Requirements^A

Property	Specific Values	Test Solution Concentration, vol % Product
Corrosion in glassware		33
Weight loss, mg/specimen		
copper	10 max	
solder	30 max	
brass	10 max	
steel	10 max	
cast iron	10 max	
aluminium	30 max	
Simulated service test		44
Weight loss, mg/specimen		
copper	20 max	
solder	60 max	
brass	20 max	
steel	20 max	
cast iron	20 max	
aluminium	60 max	
Corrosion of Cast Aluminium Alloys at		

Heat-Rejecting Surfaces, mg/cm ² /week	1.0 max	25
Foaming		33
Volume, mL	150 max	
Break time, s	5 max	
Cavitation-Erosion	8 min	17
Rating for pitting, cavitation, and erosion of the water pump		

^A For engine coolant concentrates, test solutions shall be prepared in accordance with the directions provided in the individual ASTM test methods noted. For prediluted engine coolants, prepare test solutions using the directions provided in Footnotes B through F.

^B For prediluted coolants, prepare the test solution by mixing 67 volume % of the adjusted (see 5.6) prediluted product with 33 volume % ASTM Type IV reagent water. Add 99 mg of sodium sulphate, 110 mg of sodium chloride, and 92 mg of sodium bicarbonate per litre of test solution.

^C For prediluted coolants, prepare the test solution by mixing 88 volume % of the adjusted (see 5.6) prediluted product with 12 volume % ASTM Type IV reagent water. Add 83 mg of sodium sulphate, 92 mg of sodium chloride, and 77 mg of sodium bicarbonate per litre of test solution.

^D For prediluted coolants, prepare the test solution by mixing 50 volume % of the adjusted (see 5.6) prediluted product with 50 volume % ASTM Type IV reagent water. Add 165 mg of sodium chloride per litre of test solution.

^E For prediluted coolants, prepare the test solution by mixing 67 volume % of the adjusted (see 5.6) prediluted product with 33 volume % ASTM Type II reagent water.

^F For prediluted coolants, prepare the test solution by mixing 33 volume % of the adjusted (see 5.6) prediluted product with 67 volume % ASTM Type IV reagent water. Add 123 mg of sodium sulphate, 137 mg of sodium chloride, and 115 mg of sodium bicarbonate per litre of test solution.