



HEAVY DUTY ANTI-FREEZE AND SUMMER COOLANT MGS-07-03

1.0 DESCRIPTION. This specification covers a universal low silicate heavy duty anti-freeze and summer coolant suitable for use in the cooling systems of liquid-cooled internal combustion engines.

2.0 MATERIALS. Heavy-duty anti-freeze shall conform to the following material requirements.

2.1 General.

2.1.1 It shall be an inhibited ethylene glycol formulation, suitable for use in the cooling systems of liquid-cooled internal combustion engines for protection against freezing in ambient temperatures as low as minus 60 F. It shall provide corrosion protection for aluminum and all car and truck engine metals.

2.1.2 It shall be compounded with suitable inhibitor ingredients to prevent foaming, gelling and corrosion when diluted with water to normal usage concentrations.

2.1.3 It shall be distinctively colored with a dye which will in no way harmfully affect the material for its intended use. The preferred color is green to blue-green.

2.1.4 It shall be a homogeneous mixture substantially free from suspended matter.

2.1.5 It shall not be adversely affected by storage, up to two years from date of delivery, under any climatic condition including exposure to temperatures below the freezing point of the material.

2.1.6 It shall be compatible with other products found satisfactory under these specifications in that a mixture of diluted or concentrated form shall neither unfavorably affect the properties, or appreciably affect the utilization of anti-freeze testers with the material.

2.1.7 Solutions of the material, in concentrations employed in cooling systems, shall not cause any corrosion or deposits that might hinder or impede the free flow of coolant and shall not be injurious to all metals, hoses, gaskets and pump seals under normal operation conditions for at least one winter's driving.

2.1.8 It shall meet all requirements of ASTM D-6210, ASTM D-4985, and ASTM 3306.

2.1.9 It shall not contain 2 Ethylhexanoate.

2.2 Physical and Chemical Requirements

Specific gravity, 60/60 F (15.5 C)	1.110 to 1.145
Freezing Point, 50 vol % in distilled water, °F (°C), max	- 34 (- 37)
Boiling Point, ^a undiluted, °F (°C), min	325 (163)
Boiling Point, 50 volume % in distilled water, °F (°C), min	226 (108)
Ash Content, mass %, max	5
pH, 50 volume % in distilled water	7.5 - 11.0
Reserve alkalinity, mL, min	10
Water, mass %, max	5
Chloride ion, ppm, max	25

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

3.0 PACKAGING.

3.1 The heavy-duty anti-freeze shall be packaged in sealed one-gallon containers that contain one U.S. Standard gallon of heavy-duty anti-freeze based on the specific gravity at 60°F/60°F.

3.1.1 All containers shall be approved by the engineer and shall be of such design and type as to insure satisfactory shelf life for periods up to two years. The containers shall have a leak-proof plastic or foil seal affixed to the opening in addition to the cap. Fiber containers will not be accepted.

3.1.2 Each container shall be durable and labeled, showing the brand name of the heavy-duty anti-freeze, the name of the manufacturer, and that the contents are a universal heavy-duty antifreeze and summer coolant that is safe for aluminum and all engine metals. Each container shall have a "Protection Table" showing the amount of heavy-duty anti-freeze required to obtain protection against freezing at temperatures down to minus 60°F in cooling systems having capacities of approximately 8 to 25 quarts.

3.2 The one-gallon containers shall be furnished in cartons of 6 containers each.

3.2.1 Each carton shall also contain six (6) tags, sized approximately 4-3/8" x 2-3/8", with reinforced eye and wire tie for attaching to radiator filler. Pressure-sensitive labels may be used in lieu of tags. The tags or labels shall have spaces labeled:

Date:

Quantity Installed:

Degree of Protection:

3.2.2 Each carton shall be labeled as to lot or batch number and filling date.

3.3 Shipment of the material may be made on pallets; however, no separate payment will be made for the pallets. Charges for the pallets will be considered as being included in the unit bid price of the heavy-duty anti-freeze.

4.0 TEST METHODS.

4.1 Testing shall be done in accordance with the prescribed methods of the ASTM Specifications, except freezing point shall be tested by cloud and pour point determination ASTM D97-85.

5.0 ACCEPTANCE.

5.1 When the low bid has been determined and prior to any award, the low bidder shall furnish the required certification and a one-gallon sample of the material on which the bid is based for test purposes. The sample shall be submitted, in a container meeting the requirements of this provision, to State Materials Engineer, Missouri Department of Transportation, 1617 Missouri Boulevard, Dock A, Jefferson City, MO 65109. Failure to submit the required material will be cause for bidder disqualification. The award will be made subsequently, based on satisfactory compliance. The one-gallon sample is in addition to any purchased quantities and shall be furnished at no cost.

5.2 Shipments of heavy-duty anti-freeze will be accepted on the basis of any tests deemed necessary, performed on samples of the material, and satisfactory compliance with this specification.

5.3 Any material that does not fully comply with specifications as supplied, or which shows evidence of being adversely affected by storage up to two years, may be rejected.

5.4 Any cartons leaking at the time of delivery will be rejected and shall be replaced with no cost to the department.

6.0 ORDERING INFORMATION.

6.1 Heavy-duty anti-freeze is to be ordered by number of gallons. The quantity is normally in multiples of 6 gallons (case).