
DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

**USE OF ANTIFREEZE MULTI-ENGINE TYPE CLEANING
COMPOUNDS AND TEST KIT IN ENGINE COOLING SYSTEMS**

**Headquarters, Department of the Army, Washington, D.C.
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1. Purpose

This Technical Bulletin provides instructions for engine cooling system maintenance.

2. Scope

a. The instructions contained in this Technical Bulletin apply to TACOM equipment and all TACOM vehicles.

b. For vehicles under warranty, the manufacturer's instructions will prevail through the life of the warranty. When information contained in this Technical Bulletin conflicts with manufacturer's instructions and recommendations, manufacturer's instructions will take precedence during the warranty period.

* This Technical Bulletin supersedes TB 750-651, 3 January 1997.

3. General

Table I presents the classification of coolant specified in the CID A-A-52624 antifreeze specification. Table II shows National Stock Numbers and Specification pertaining to the described materials.

Table I. Classification of Coolant

| CID A-A-52624 | Ethylene Glycol (EG) | | | Propylene Glycol (PG) |
|-----------------------|-----------------------------|-----------|-----------|------------------------------|
| Type | I | | | II |
| Classification | A | B | C | A |
| Concentration | 100 | 60 | 50 | 100 |
| Color | Green | | | Purple |

Table II. National Stock Numbers and Specification

| Materials – Specification CID A-A-52624 Antifreeze | Container Size | NSN: 6850- | Application |
|---|---------------------------|-------------------|--|
| 60% Ethylene Glycol (EG) Type IB (recycled) | 1-Gal | 01-464-9266 | Arctic Condition and Multi-Engine Type |
| | 5-Gal | 01-464-9263 | |
| | 55-Gal | 01-464-9096 | |
| 50% Ethylene Glycol (EG) Type IC (recycled) | 1-Gal | 01-471-6530 | Normal Condition and Multi-Engine Type |
| | 5-Gal | 01-471-6534 | |
| | 55-Gal | 01-471-6521 | |
| 100% Ethylene Glycol (EG) Type IA (recycled) | 1-Gal | 01-464-9125 | Multi-Engine Type to be mixed with water before use. |
| | 5-Gal | 01-464-9137 | |
| | 55-Gal | 01-464-9152 | |
| 100% Propylene Glycol (PG) Type IIA (virgin) | 1-Gal | 01-383-4068 | Multi-Engine Type |
| | 5-Gal | 01-441-3257 | |
| | 55-Gal | 01-383-3918 | |

NOTE

Due to procurement preference for recycled products, the NSNs for unused antifreeze are being cancelled in favor of recycled antifreeze.

4. Safety Precautions

a. Ethylene Glycol

WARNING

Use caution when handling antifreeze. Always keep in mind the following potential health effects when using antifreeze. Follow first aid measures if

WARNING (continued)

the conditions occur and contact medical support if required. Failure to follow these precautions may result in injury to personnel.

- Can be harmful or fatal if swallowed.
- Can be harmful if inhaled or absorbed through the skin.
- Can cause allergic skin reactions and irritation to skin, eyes, and respiration system.

(1) Proper precautions must be given when handling Ethylene Glycol. Ethylene Glycol can be harmful or fatal if swallowed and is harmful if inhaled or absorbed through the skin. It may cause allergic skin reaction; irritation to skin, eyes, and respiratory tract; and could affect the central nervous system.

(2) First Aid Measures for Ethylene Glycol

(a) Ingestion: For antifreeze, induce vomiting as directed by medical personnel. Do not give anything by mouth to an unconscious person. Seek medical attention immediately.

(b) Inhalation: Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Contact medical support.

(c) Skin Contact: Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Seek medical attention if irritation develops or persists.

(d) Eye Contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes while holding eyelids apart. Seek medical attention.

b. Propylene Glycol**WARNING**

Although Propylene Glycol is less toxic and environment friendly, proper precautions must also be given when handling Propylene Glycol.

- Can cause central nervous system effects under excessive ingestion.
- If inhaled no significant adverse effects are expected under anticipated condition of normal use.
- Can cause slight flaking, tenderness, and softening of skin under repeated or prolonged exposure.
- Can cause minor eye irritation.

(1) Proper precautions must be given when handling Propylene Glycol. Propylene Glycol can be harmful if large quantity is swallowed. Prolonged exposure may cause allergic skin reaction; irritation to skin, eyes, and respiratory tract; and could affect the central nervous system.

(2) First Aid Measures for Propylene Glycol

(a) Inhalation: If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain emergency medical attention.

(b) Ingestion: If large quantity is swallowed, give a pint of luke warm water if victim is completely conscious and alert. If large quantity is consumed, induce vomiting as directed by medical personnel. Obtain emergency medical attention.

(c) Eye: Immediately rinse eyes with clean water for 20-30 minutes. Retract eyelids often. Obtain medical attention if pain, blinking, tears, or redness persist.

(d) Skin: Product is not expected to present a significant skin hazard under anticipated conditions of normal use.

c. Cleaning Compounds

WARNING

Always keep in mind the following potential health effects when using cleaning compounds. Follow first aid measures if the conditions occur and contact medical support if required. Failure to follow these precautions may result in injury to personnel.

- Can be harmful or fatal if swallowed.
- Can cause violent pain in the throat.
- Can cause abdominal pain.
- Can cause vomiting.
- Can cause lung damage.
- Can cause damage to the eyes, skin, and mucous membrane.

(1) Proper precautions must be given when handling cleaning compounds. These cleaning compounds are very corrosive and ingestion can be fatal. Ingestion may cause violent pain in the throat, abdominal pain, and vomiting. Inhalation of mist or spray can cause lung damage. These cleaning compounds are corrosive to the skin, eyes, and mucous membrane.

(2) First Aid Measures for Cleaning Compounds

(a) Ingestion: Toxic by ingestion. Do not induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention immediately.

(b) Inhalation: Remove effected person to fresh air. If symptoms occur, consult physician.

(c) Skin Contact: Immediately wash skin with soap and plenty of water. Get medical attention if irritation develops or persists. Remove and discard contaminated clothing and shoes.

(d) Eye Contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes while holding eyelids apart. Get medical attention.

(3) First Aid Measures for Handling and Storage of Cleaning Compounds

(a) Handling: Wash thoroughly after handling. Wear protective clothes, gloves, and eye protection. Avoid breathing vapors. Avoid breathing mist. Remove contaminated clothing and wash before reuse.

(b) Storage: Store drums closed and away from extreme temperatures. Do not freeze. Keep Alkaline cleaner away from strong acids and acid cleaner from strong bases.

5. Requirements

a. Retain antifreeze (CID A-A-52624) and water mixture in engine cooling systems for as long as the coolant meets the freeze point and the Nitrite concentration requirement. Use 50/50 antifreeze concentration for normal environment and 60/40 antifreeze concentration for Arctic environment.

(1) Drain, clean, and flush any cooling system that is contaminated regardless of coolant installation date. Section 8 contains information on cooling system cleaning compounds. Detailed instructions for draining, cleaning, and flushing cooling systems are given in TM 750-254 (Cooling Systems: Tactical Vehicles).

(2) For items that are under warranty, follow the manufacturer's recommendations until the warranty has been expired. Do not use any antifreeze that does not conform to CID A-A-52624 in Army vehicles past the warranty period. When switching over to CID A-A-52624 antifreeze, flush the cooling system to remove all old antifreeze and contaminants.

(3) Periodically test CID A-A-52624 coolant (all types) for Nitrite concentration and freeze point protection using Test Kit CID A-A-51461 Type II or any commercial test strips that test the freeze point and Nitrite level.

b. Replace Arctic type antifreeze on an annual basis, preferably at the beginning of the cold weather season.

6. Antifreeze Low Temperature Protection

a. Do not add 100% antifreeze directly to radiator.

b. Use 50/50 Ethylene Glycol antifreeze to protect cooling system for temperatures down to -34° F (-37° C). Use 50/50 Propylene Glycol antifreeze to protect cooling system for temperatures down to -27° F (-33° C). Use 50/50 antifreeze to top off or to refill a cooling system that requires the additional coolant for any reason.

c. Use type 60/40 blend antifreeze to protect cooling system for arctic temperatures.

CAUTION

Never mix Arctic type antifreeze with water or inhibitor. Always use Arctic type antifreeze full strength. Water can not be mixed with Arctic type antifreeze because water will freeze at 32° F or 0° degrees C.

d. A mixture of 60/40 Arctic type Ethylene Glycol antifreeze will provide freeze protection down to -62° F (-52° C). A mixture of 60/40 Arctic type Propylene Glycol will provide freeze protection down to -56° F (-49° C). Use 60/40 antifreeze to top off or to refill a cooling system that requires the additional coolant for any reason. If antifreeze does not meet the freeze point for Ethylene Glycol or Propylene Glycol, users should replace it with new coolant.

7. Preventive Maintenance

During scheduled maintenance services or during climatic change service, test and inspect the cooling system.

a. Use the combination antifreeze and Battery Tester (NSN 6630-00-105-1418) to test for freeze protection down to -50° F (-46° C). Use this only for 50/50 blend antifreeze.

b. Test strips that meet CID A-A-51461 Type II (NSN 6630-01-011-5039) can be used to test for freeze protection down to -60° F (-51° C). The test strips can be used for both the 50/50 and 60/40 blends.

c. Test for Nitrite (corrosion protection). Use the test kit CID A-A-51461 Type II (NSN: 6850-01-154-3653) or 3-way Commercial Engine coolant test strip that tests for Nitrite concentration. Ideal Nitrite concentration for 50/50 antifreeze/water solution is between 1200 and 1400 ppm. If some coolants have combination of Nitrite and Molybdate as corrosion protection additives, a minimum combined concentration of Nitrite plus Molybdate in the prediluted coolant shall be 780 ppm. Less than 300 ppm of Nitrite or Molybdate in the CID coolant is not acceptable. Use 3-way commercial test strips for measuring Molybdate in the coolant.

d. Inspect for coolant cleanliness by withdrawing a small amount of coolant into a clean and clear container. Look for rust, foreign particles, and/or sediment. Drain, clean, and flush any cooling system that is contaminated. Look inside the radiator to see if the flow tubes are clean. If not clean, use cleaning compounds listed in Table III.

8. Use of Engine Cooling System Cleaning Compounds

Table III shows accepted cleaning compounds and their National Stock Numbers (NSNs).

Table III. Cleaning Compounds

| Cleaning Compound | Part Number | Container Size | NSN |
|--------------------------|--------------------|-----------------------|------------------|
| Alkaline | CC2610 | 1 Gal | 6850-01-506-1738 |
| Alkaline | CC2611 | 5 Gal | 6850-01-506-1739 |
| Alkaline | CC2612 | 55 Gal | 6850-01-506-1740 |
| Acid | CC2638 | 1 Gal | 6850-01-506-1744 |
| Acid | CC2637 | 55 Gal | 6850-01-506-1742 |

NOTE

Do not use acid cleaner and Alkaline cleaner together. Mixing acid cleaner and Alkaline cleaners will lose effectiveness to clean radiator. Use acid cleaner first for removal of scale, corrosion, and oil fouling. Use Alkaline cleaner for removal of silicate gelation. Removal of silicate gelation is the primary use of Alkaline cleaner. All other uses provide marginal results.

Use cleaning compounds listed in Table III when necessary to clean heavily rusted or partially clogged cooling systems. A 10% solution is suitable for most requirements (1 Gal of cleaner mixed with 9 Gal of water). A 20% solution may be used for heavy corrosion and scale deposits (2 Gal of cleaner mixed with 8 Gal of water).

9. Recycling of CID A-A-52624 Antifreeze

a. Recycling of used antifreeze conserves resources, reduces the cost of new antifreeze purchases, and reduces the cost and problems of used antifreeze disposal.

b. An Antifreeze Recycling User's Guide is available from the U.S. Army TARDEC/RDECOM (POLhelp@tacom.army.mil). The User's Guide provides product recommendations, operating procedures, and precautions.

c. Currently, two antifreeze recycler units are approved for Army use. Their features are in Table IV. You should base your selection of an antifreeze recycler system on your organization's needs and resources.

Table IV. Commercial Antifreeze Recyclers

| Model | KFM Coolant Purification System (CPS) | BE-series Engine Coolant Recyclers |
|------------------------------------|--|---|
| Manufacturer | KFM, LLC 506 Camson Road Anderson, SC 29625 Phone: 800-736-1404 | Finish Thompson, Inc. 921 Green Garden Road Erie, PA 16501 Phone: 800-888-3743 |
| Process Type | Ion-Exchange | Vacuum Distillation |
| Process Rate | 180 Gal/hr | 3.06-3.44 Gal/hr |
| Replacement Filter Required | Yes. 1 & 5 micron | None |
| Filter Replacement Interval | Every 200-500 gallons | N/A |
| Additive Required | 570 P & 570 K | J104016 (5 Gal) or J103447 (55 Gal) |
| Ease of Operation | Moderately Difficult | Moderately Difficult |
| Hazardous Waste Remaining | Used filters | Liquid waste (EG/PG) broken down corrosion inhibitors, dye, dirt, heavy metals, etc. |

d. Other type of recyclers may not adequately recycle CID A-A-52624 antifreeze or may create incompatibility with CID A-A-52624 antifreeze. These incompatibilities will lead to increased cooling system maintenance and possibly premature failure of water pumps, heater cores, and other cooling system components. These recyclers need to be evaluated using the testing protocol provided in the Army’s Antifreeze Recycling User’s Guide mentioned in Section 9.b.

10. Recording

a. When cooling systems have CID A-A-52624 or original antifreeze comes with the vehicle (when the equipment is still under warranty) users must verify that the freeze protection and corrosion protection are correct to ensure the engine’s coolant protection. Record the date and the degree of protection in the “remarks” block of DD Form 314.

b. When cooling systems are serviced with fully formulated CID A-A-52624 antifreeze, record the degree of protection and the condition of the cooling system. Drain and replace with fresh coolant if and when necessary.

11. References

- a. Forms
 - DD form 314 Preventive Maintenance Schedule and Record
 - DA Form 2028 Recommended Changes to Publications and Blank
- b. Technical Manuals
 - TM 750-254 Cooling Systems: Tactical Vehicles

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:



JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army

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