DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

PURGING, CLEANING AND COATING INTIRIOR FERROUS AND TERNE SHEET; VEHICLE FUEL TANKS

Headquarters, Department of the Army, Washington, DC, 1977
1 April 1977

1. Purpose. This bulletin is published in an effort to prevent fuel tank rust and corrosion, and is to be performed by General Support (GS) and Depot Maintenance activities. Supporting agencies will furnish additional skills and equipment, when required.

2. Scope. a. This bulletin outlines procedures for the elimination of combustible vapors and liquids, cleaning, and interior painting of fuel tanks. Using a chemical to purge gas tanks saves time, labor, and materials, as compared to other methods such as steam cleaning.

b. These procedures are to eliminate gasoline and diesel fuel from the interior of fuel tanks. Fuel tanks on tracked vehicles, and those not readily accessible, must be removed from the vehicle prior to purging, cleaning, and painting.

c. Cleaning and coating procedures are not recommended for integral-type fuel tanks or fuel servicing vehicles.

d. Efficient purging of fuel tanks, pipelines, pump housings, hoses, and distribution manifolds may be accomplished by strict adherence to procedures outlined herein.

3. Materiels Required. *a.* Adequate source of water with a large diameter hose long enough to reach the vehicle or fuel tank

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b. Compressed air sources and air hose of sufficient length to reach depth of fuel tank.

c. Sufficient quantity of gas tank purger chemical obtainable through local procurement. See table 1.

d. Clean equipment and solutions. See table 1.

e. Buna-N coating and Methyl Isobutyl Ketone (MIBK) solvent. See table 1.

f. Explosion meters. See paragraph Sc.

4. Recommendations for Maintenance Publications Improvements. You can help improve this bulletin by calling attention to errors and by recommending improvements and stating your reasons for recommendations. Your letter or DA Form 2028, Recommended Changes to Publications and Blank Forms, should be mailed direct to Commander, US Army Tank Automotive Materiel Readiness Command, ATTN: DRSTA-MTP, Warren, MI 48090. A reply will be furnished direct to you.

5. Safety Precaution.

WARNING

Prior to, and during, all operations outlined in this bulletin, all operations must be approved by local safety, medical, and fire departments to comply with safeguards contained herein and other applicable directions.

Table 1. Types of Materials

Manufacturer	Type of solvent coating or chemical	Track name
3M Co. Adhesives Coatings and Sealers Div MethylKetone (MIBK) 3M Center	EC 776 R (TARCOM) or EC 776 Coating	Buna-N Coating and Isobutyl
Products Research and Chemical Corp. Chemical Products Div 2919 Empire Ave, Burbank, CA 91505	PRC 10056 Coating	
Redin Strip Co, Inc 2528 Merced Ave S. El Monte, CA 91733	Rust removal equipment	
Product-Sol Inc 2010 Cole Ave Birmingham, MI 48008	Purging chemical No 913	Product-Sol

a. Disconnect all operations **it** an electrical storm is threatening or is in progress.

b. The tank being purged will be statically grounded prior to, and during, all operations.

c. Conduct a combustible vapor test reading-prior to purging the tank using an acceptable explosive meter, such as MSA Explosive Meter, NSN 6665-00-664-4650 or Davis Vapotester, NSN 6665-00-562-8103. To eliminate all possible causes of explosion, a combustible vapor test reading must be conducted immediately after

*This manual supersedes TB ORD 1031, 23 August 1965, including all changes.

purging. Under no circumstances will repair on fuel tank begin until declared safe by safety personnel.

d. Only competent personnel thoroughly instructed in the proper handling and reading of the vapor indicating instruments (explosion meter) will perform vapor tests.

e. Personnel engaged in purging operations will:

(1) Not wear wool, nylon, silk, rayon or other clothing having a tendency to generate static electricity.

(2) Wear clean cotton clothing with no metal buttons or fittings. Remove all contents from pockets.

(3) Wear rubber boots.

(4) Use cotton waste for cleaning purposes. Other material may generate static electricity.

6. Prepare and Clean for Purging of Fuel Tanks. *a.* Completely drain each fuel tank compartment, all piping, pumps, meters, filters, and segregators, as applicable, and remove all accessory items, such as gages and floats, which might entrap fuel.

b. Close or seal all drains. (It may be necessary to locally fabricate covers for some types of drains, but do not create a vacuum.)

c. Fill fuel tank and overflow for 5 minutes with cold water. Drain fuel tank completely.

d. Close or seal drains.

e. For each 100-gallon capacity, add 40-fluid ounces of alkaline electrolytic sodium hydroxide base to the fuel tank. (This is equivalent to 8-fluid ounces of concentrate for a 20-gallon fuel tank.)

CAUTION

Insufficient amount of chemical will result in an incomplete purging. Accurate computations of amount of chemical to be added must be made prior to the purging. Once purging has begun, do not stop until process is complete.

f. Fill fuel tank to top with water-do not overflow.

g. Insert air line into fuel tank filler neck opening and agitate solution with 3 to 5 psi of air for 5 minutes. Frequently move air hose around in tanks, covering as much area as possible, especially near the bottom and around baffles. Remove air line and drain solution from fuel tank.

h. Fill fuel tank and overflow for 5 minutes with cold water or until water is clear. Drain fuel tank completely.

i. Conduct a combustible vapor test reading to determine if fuel tank is safe to repair, clean, paint, store or change material. If combustible vapor test reading indicates tank is not safe, repeat procedures as cited in *h* above.

j. Fuel tanks installed on vehicles will be processed as cited above, with exception of disconnecting and plugging the fuel line at the fuel tank. If fuel tank repairs are to be made, work must be started immediately in order to retard the process of interior oxidation.

7. Alternate Procedure for Purging. a. Drain fuel and remove fuel tank from vehicle. Exercise normal precautions in handling since tank will still contain explosive vapors.

b. Remove all fittings and fuel inlet cap. Retain for reinstallation.

c. Use alkali steam cleaning and hot water flushing for approximately 10 minutes, inserting hose end into tank openings on both sides of baffles. This is necessary to purge fuel vapors, all oil or sludge (if present), contaminants, and loose rust.

d. Conduct a combustible vapor test reading to determine if fuel tank is safe to repair, clean, paint, store or change material.

8. Rust Removal Procedure. a. Remove rust from tank, utilizing an alkaline electrolytic immersion rust removal system (see table 1). The alkaline chemical compound shall be a sodium hydroxide base and shall not contain any cyanide compound. It shall conform to Type I of Spec MIL-C- 14460 or commercial equivalent.

(1) Stack small tanks upside down in basket. Large tanks can be suspended on hooks. Position with the drain opening in uppermost position to purge all air from tank. When immersed, insure that no air pockets remain. Solution must be in contact with metal surfaces to remove rust.

(2) Immerse tank in bath until all rust is removed. This should range from 45 minutes to 1l/2 hours depending on rust stage.

(3) Remove tanks from bath and suspend basket above bath until all solution is drained. A temporary rust-inhibiting powder residue will protect the tank from rusting again until the powder is removed by water rinse. Inspect to insure all rust is removed.

b. Water rinse and air dry (preferably forced warm air) the tank interiors. Inspect to insure tank interior is dry. This operation shall be performed immediately preceding coating application.

c. Alternate methods of rust removal are acceptable, provided they receive prior approval from the Maintenance Directorate (NMP), US Army Tank-Automotive Materiel Readiness Command, Warren, MI 48090.

9. Coating Application Instructions. Prior to coating application the following precautions will be used. *Safety.* Coating contains flammable and volatile solvents. Keep away from open sparks and flame. Comply with all local safety regulations and manufacturer's instructions.

Health Precautions. Use adequate ventilation and avoid repeated or prolonged breathing of vapors and prolonged contact with skin. When using solvents for / cleanup, use proper precautionary measures, as re-

quired, by local safety regulations.

a. Install temporary plugs or other closures to cover all openings except fuel inlet. Do not coat fuel inlet caps or threads in fitting openings.

b. Apply Buna-N coating (table I and para 10) by fill-and-drain or by slush coating. If fill-and-drain method is used, invert tank or agitate to assure coating of top interior surfaces. In slush coating, fill about 20 percent of tank capacity and manipulate tank for a sufficient time to wet all surfaces. Assure that enough coating flows to both sides of baffles before slushing. This procedure is not recommended for large capacity tanks which cannot be removed from the vehicle.

c. Remove temporary plugs and other closures and drain excess coating material which may be reused (see para 10). When coating stream becomes broken during draining, begin passing compressed air at about 10 psi through tank. Continue passing air for approximately 3-5 minutes after coating flow slows to occasional drops. The air flow rate (cfm) should approximate one air change per minute during this operation, and also during the curing operation.

d. Inspect to insure complete coverage. Recoat, if necessary. The coating contains a red dye to aid inspection.

e. Move tank to curing location with a minimum of delay. If the curing location is remote from coating location, temporarily cover tank openings to avoid escape of solvent vapors into uncontrolled areas while transporting.

f. Cure coating by one of the following optional methods with minimum delay after coating:

(1) Oven cure by baking tank at 250'F. **:** 5'F. for 1 hour, passing dry air through tank continuously at approximately 10 psi.

WARNING

Ovens shall comply with NFPA No. 86A, Standard for Ovens and Furnaces.

(2) Air cure at 70'F.-120'F. for 16-24 hours, passing dry air through tank continuously at approximately 10 psi.

g. Upon completion of curing, check tank interior atmosphere with an explosimeter (para Sc). Reading should indicate 10 percent (or less) of Lower Explosive Limit (LEL). Cap all tank openings and repeat explosimeter readings after 12-24 hours. Meter reading should be below 10 percent LEL.

h. Reinstall fittings or plugs to cap all tank openings.

i. Clean application equipment with methyl isobutyl ketone before coating has set up or cured.

10. Explanation of Manufacturers Coatings (table 1).

a. The 3M Co. EC 776 R (TARCOM) and EC 776 SR coatings are almost identical. EC 776 R (TARCOM) coating is being specially manufactured for Army fuel tank application. It contains a permanent dye and the solids content is controlled in the range of 17-19 percent.

b. The EC *776* SR contains a dye which is soluble in fuel and fades out after vehicle operation. It also allows a broader solids content range of 17-22 percent. The EC 776 SR coating can be used until stock is exhausted or if the EC 776 R (TARCOM) coating is unavailable. As the solids content increases, and the material is more viscous, coating application and thickness are affected.

c. The PRC 1005 L coating is generally similar to the specified 3M Company coatings. The solids content is controlled in the 19-20 percent range and has soluble red dye.

d. When the coating material is reused, the solids content increases as a result of solvent evaporation. The original viscosity can be restored by adding Methyl Isobutyl Ketone (MIBK) to readjust the solids content to the original range.

e. Procedures are outlined in paragraph 11 for measuring the solids content and calculating the amount of solvent to add to restore the desired solids content and viscosity. Be sure to add solvent slowly to coating while mixing.

11. Measurements for Controlling Coating Solids Content. *a.* Measurement of solids content:

(1). Weigh container with cover (2 oz. ointment can or similar lightweight container) to nearest milligram (0.001 gram) (w,) and record weight. It is preferred to run three samples and average.

(2). Spread a few grams of coating material over bottom and side interior surfaces of container, *close cover* immediately, and weight to nearest milligram (W2).

(3). Remove cover and place both container and cover in air circulating oven at about 200'F.-225'F. After approximately 10 minutes, remove from oven, replace cover, and cool. Weigh to nearest milligram (W3).

(4). Compute the solids content using the following: formula:

$$\% \text{ solids} = \frac{W_3 - W_1}{W_2 - W_1} \times 100$$

where:

W_1 **=** weight of container

W_2**=** weight of container and wet coating

W_3 **=** weight of container and dry coating

b. Calculation of solvent to be added to restore desired solids content:

$$\text{Gals of coating} \times \frac{KS}{DS} - \text{gals of coating} - \text{gals of solvent to add}$$

where:

KS = KNOWN % solids

DS = Desired % solids

By Order of the Secretary of the Army:

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