DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

PURGING, CLEANING, INSPECTING, AND COATING INTERIOR OF STEEL TANKS AND EQUIPMENT ON TACTICAL AND COMMERCIAL-TYPE FUEL TANK TRUCKS AND TRAILERS

Headquarters, Department of the Army, Washington, D.C.
13 October 1966

TB ORD 1031, 23 August 1965, is changed as follows:

Page 2. Paragraph 2 (1) is superseded as follows:

(1) All applicable fuel servicing and fuel transport vehicles in service or in storage will be inspected annually for condition of coating in tank interior in accordance with inspection criteria outlined herein.

Page 3. The caution note following paragraph 5*a* is superseded as follows:

***Caution*: Air should not be blown into tank interior when vapors are present in the tank. This will cause vapors to escape into the atmosphere within a building. Vapors should always be exhausted through air mover hose into a duct and out into atmosphere to preclude possibility of explosion within a building.**

Page 5. Paragraph 7*a* is superseded as follows:

a. All applicable fuel servicing and fuel transport vehicles, including those in storage, which have an interior tank coating, will be inspected annually to determine condition of coating. Inspectors will enter and inspect each section of compartment.

Page 8. Paragraph 14*a* and paragraph 14*a* (1) are superseded as follows:

a. Upon completion of every annual inspection (and coating or spot coating if necessary), accomplishment will be reported in accordance with TM 38-750 specifying the following in addition to normal data required:

(1) That annual inspection of interior of coated tank surfaces was accomplished.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General,

Distribution:

To be distributed to all DA Form 12-38 accounts, two (2) copies each.

TAGO 653A-Oct. 250-468°-66

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PURGING, CLEANING, INSPECTING, AND COATING INTERIOR OF STEEL TANKS AND EQUIPMENT ON TACTICAL AND COMMERCIAL TYPE FUEL TANK TRUCKS AND TRAILERS

Headquarters, Department of the Army, Washington, D. C.

23 August 1965

Section I. GENERAL

1.Purpose and Scope. *a.* This bulletin provides instructions, procedures, and methods for removal of combustible vapors, cleaning, inspection, preparation, coating, recoating, and spot coating of tank interiors, components and piping of fuel servicing and fuel transport vehicles. Fuel servicing vehicles having stainless steel or aluminum tank bodies are excluded in regard to coating, recoating, or spot coating procedures outlined herein. Components and piping utilizing stainless steel or aluminum are also excluded in regard to coating, recoating, or spot coating procedures.

b. Provisions in this bulletin will be applicable within the scope of direct and general support categories of maintenance. Depot maintenance

*** This bulletin supersedes TB ORD 1031, 24 February 1966.**

This copy is a reprint which includes current pages from Changed 1

and commercial facilities will be utilized when necessary if manpower, skills or equipment are not available within categories of maintenance mentioned above. When commercial facilities are used, determination of capability insofar as skill and equipment are concerned, must be ascertained prior to contract award.

c. These instructions are also applicable to all commercial type tank trucks and trailers which are the responsibility of the Directorate of Transportation, Deputy Chief of Staff for Logistics.

2. Mandatory Requirements. The instructions, procedures, and methods in this bulletin will be applied as follows:

(1) All applicable fuel servicing and fuel transport vehicles in service will be inspected every 90 days for condition of coating in tank interior in accordance with inspection criteria outlined herein. After initial inspection, vehicles in storage will be inspected every 180 days.

(2) Tank interiors that have not been previously coated will be processed and coated in accordance with instructions contained in this bulletin.

(3) Tank interiors that have been previously coated will be inspected in accordance with standards outlined in this bulletin. Recommendations as result of inspection will strictly regulate the degree of coating necessary.

(4) Prior to issue from storage to using units, inspection, processing, and coating if required in (2) and (3) above, will be applied.

(5) Inspectors will determine the degree of coating required (complete, partial, or spot coating) in accordance with specific standards outlined in this bulletin.

(6) The coating material authorized for coating, recoating, or spot coating is available as a kit, FSN 8030-5306651, Military Specification MIIC4556B, class 2 (USAF). Only coatings specifically listed on the Qualified Products List (QPL-4556) will be procured and used.

3. Safety Precautions.

Warning: **Prior to beginning and during all operations outlined in this bulletin, coordination with safety, medical, and fire departments will be effected to insure compliance with safeguards contained herein and in other pertinent and applicable directives.**

a. The tank being worked on will be statically grounded prior to and during all operations.

b. Combustible vapors will be removed from tank interiors and combustible vapor test will be conducted by authorized competent personnel prior to each operation within the tank. Personnel conducting test must be thoroughly instructed in the proper handling and reading of vapor indicating instruments.

c. Discontinue all operations if an electrical storm is threatening or in progress.

d. Install an authorized (explosion proof) air evacuator to continually remove toxic fumes or combustible vapors from tank interior when coating is being applied. All available outlets should be open, such as hatches and drain valve openings during coating application.

e. Eliminate all possible causes of explosion in work areas, such as faulty wiring, smoking, unauthorized equipment, or other sources of ignition.

f. Personnel entering tanks will comply with the following:

(1) Will not wear wool, nylon, silk, rayon, or other similar static electricity-generating clothing.

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

(3) Wear rubber boots with a copper rivet driven through heels. Do not use foot powder.

(4) Will wear a harness with a rope lifeline attached or with the rope lifeline secured around the body under the arms while working within the tank, with the other end being held by personnel stationed at top of the tank to assist in his removal if necessary.

(5) Fresh air masks will be worn with air supplied by a displacement air blower, with the air blower placed in a position so that blower air intake is on the windward side of the tank manhole opening. The displacement blower will operate until personnel have left the tank and removed air mask. Test air mask and blower before each entry into the tank.

(6) Canister-type masks will not be used in lieu of fresh air masks.

(7) Use lights of approved nonexplosive type only.

(8) Use nonferrous tools when removing rust, coating, sediment, or dirt.

(9) Use cotton waste for cleaning purposes. Other material may generate static electricity which could result in an explosion.

Section II. PROCEDURE

4. Preparation of Equipment. *a.* Completely drain all fuel from each compartment of the tanker, from all piping, pumps, meters, valves, fittings, and segregators.

b. Remove all manhole hatch covers, drain plugs and valve housings from the tanker.

c. Remove all meters, valves, pipes, fittings, and segregator assemblies which could be damaged during the cleaning procedures.

5. Elimination of Combustible Vapors From Tank Interior. *a.* All combustible vapors must be evacuated from tank interiors prior to any personnel entering the tank for any purpose or prior to accomplishing any welding on the vehicle. When weather permits, purging should be performed outdoors by mechanical air evacuation, otherwise precautions for indoor purging as outlined herein should be adhered to. Vapors should be exhausted by suction from the tank using an air mover, FSN 1730-331-9590, or equal, or MSA No. DP-32120 6-inch Model or equal horn type exhaust air mover with compressed air, or installed building suction exhaust system.

Caution: **Air should not be blown into tank interior when vapors are present in the tank. This will cause vapors to escape into the atmosphere within a building. Vapors should always be exhausted through air mover hose into a duct and out into atmosphere of a building to preclude possibility of explosion within a building.**

b. Air evacuation equipment suitable for vehicles should have a minimum of 1,000 cubic feet per minute rated air-moving capacity. Equipment used for evacuating air must be explosion proof and certified by authorized safety personnel.

c. To determine progress of vapor elimination, the atmosphere within the tank should be tested frequently by conducting a combustible vapor test reading with acceptable explosive meter such as MSA Explosive Meter, FSN 6665-664-4650 or Davis Vapotester, FSN 6665-562-8103. Only competent personnel thoroughly instructed in proper handling and reading of vapor indicating instruments (explosion meters) will perform vapor tests. Under no circumstances will any work be performed within tank without certification of safety from authorized safety personnel.

d. Inlet end of air mover with hose attached should be inserted into tank compartment through manhole opening to within 6 inches of the bottom of the tank interior. Metal-to-metal contact should be maintained between the air mover and the tank shell.

(1) All valves in tank outlet, piping and other openings should be closed. In some instances closures or covers can be fabricated for this purpose. Where evacuation of vapors is conducted out of doors, the manhole covers should be closed and vapors could be exhausted mechanically through valve openings in bottom of tanks into the atmosphere.

(2) Continue to exhaust vapors until all traces of combustible vapors are removed. Frequent checks with explosion meter, as outlined in c above, should be made to ascertain vapor content in the tank.

(3) In areas where vapors are determined to be present, as in inaccessible corners or under baffles, suitable piping should be installed on inlet end of air mover to extend the hose to those areas for proper evacuation of combustible vapors.

e. Steel piping, manifolds, segregator equipment, and other related components that require coating or recoating will be purged of combustible vapors in accordance with method outlined above.

f. Use of steam for cleaning or purging coated tank interiors is not authorized under any circumstances, due to harmful effect on coating.

Note. **Each hatch cover on all applicable fuel servicing vehicles will be marked as follows, using white, 1-inch letters "Do not steam tank interiors."**

Warning: **It is difficult to detect vapors or explosive fumes in compartments which contained diesel fuel. Vapor indicator will not register presence of explosive fumes until diesel is at a temperature of about 150° or higher. It is important after draining of diesel fuels from compartments that the following precautions be taken:**

(1) After draining, personnel equipped with external air supply mask should enter compartment and mop all interior surfaces, especially the corners and seam areas, with a hot-water and detergent-mixture of 1 ounce detergent to 8 gallons of water. Detergent specified in MIL-16791-C, type I should be used.

(2) After mixture has been thoroughly applied, it should be rinsed clean with clear water and drained.

(3) All interior surfaces should be dried by using air evacuator.

(4) Inspect all surfaces to assure that they are clean and dry.

g. When welding any portion of the tank body it is mandatory that an air evacuator be used to evacuate air fumes from tank or compartment interiors. Vapor tests should be conducted during welding to assure that a buildup of explosive fumes is not present.

6.Removal of Sludge and Rust. *a.* Remove accumulation of sludge, sediment, and other foreign materials. Thoroughly clean this residue from each compartment using cotton waste with water and detergent specified in MILD16791C, type I (water soluble) mixed in proportion of 1 ounce to 8 gallons of hot water.

b. In many instances, the bottom or sides of coated tank compartments may appear to be rusted. Frequently, this is a rust stain formed by sediment or bleeding of rust from a seam.

A soft brush or cotton waste should be used with above detergent to remove this stain, prior to inspection of coating.

c. Flush each section of compartment from which sludge, etc. was removed, with tap water and dry completely.

d. A test for combustible vapors will be conducted after removal and cleaning of sludge, etc., from a tank compartment.

WARNING

SPECIAL PRECAUTION FOR FUELS WITH TETRAETHYL LEAD

Fuels, such as aviation and automotive gasolines contain tetraethyl lead as an additive for antiknock purposes. After draining and purging tank, tetraethyl lead may remain as sludge and other residue on bottom of compartment.

Tetraethyl lead and its residue are highly toxic. Breathing of fumes or skin contact with tetraethyl lead is considered to be a health hazard.

The following special precautionary steps are additionally required:

A-In removal of sludge and other residue, safety equipment such as protective clothing and face mask with air supply, will be worn.

B-Tank interiors will be completely purged and certified by inspector prior to entry into tank. The sludge, sediment, or scale will be kept wet by use of water during the entire removal operation.

C--Air purging equipment will be operating to evacuate any fumes which could be generated during removal of deposits.

D-After deposits are removed, the complete accumulation should be buried to a depth of not less than 36 inches in an area where it will not be disturbed. An appropriate sign should be erected specifying that tetraethyl residue has been buried and should not be disturbed.

E-The interior surface of fuel tank will be washed with hot water containing a mixture of detergent specified in MIL-D-1679IC-type 1 mixed in proportion of 1 ounce to 8 gallons of hot water. After washing and cleaning all interior surfaces of tank, interior will be completely dried.

7. Inspection Procedures. a. All applicable fuel servicing vehicle which have an interior coating will be inspected every 90 days, with exception of those vehicles in storage, to determine condition of interior tank coating. After initial inspection, stored vehicles will be inspected every 180 days. Inspectors will enter and inspect each section of compartment.

Note. **They will provide suitable covering for their footwear and wear suitable clothing during inspection of coated interior tank surfaces to prevent scuffing, scraping, or other damage to coated surface.**

b. Determination of condition of interior coating will be made as follows and results will be annotated on DA Form 2407 in accordance with TM 38-750.

(1) Each compartment will be evaluated separately.

(2) Thorough inspection within the compartments will be made to ascertain if coating is cracking, peeling, flaking, or if rust is evident in seam joints, weld joints, or lap crevices.

(3) Baffles, walls, sides, top, floor, and around manholes and valve wells will be thoroughly inspected for coating deficiencies.

(4) Particular attention should be given to dents on tank shell which may have locally cracked the interior coating.

c. Good judgment should be used in estimating whether the defective area is more or less than the specified standards for spot repair. It normally will not be necessary to actually measure the total surface area in a compartment. Make a reasonable estimate of defective areas and total compartment area for comparison to the specified standards.

(1) Spot repair will be performed when the defective area in a compartment is less than any of the following:

(a) One area less than about 20 percent of compartment surface area.

(b) Scattered areas totaling less than about 10 percent of compartment surface area.

(c) Coating failure or rust in or at seams extending less than 6 inches away from the seam, regardless of length.

(2) Completely recoat a compartment that exceeds any of the conditions specified in paragraphs 1a, 1b, or 1c. Spotrepair other compartments, as necessary, using same factors for determination.

(3) When more than one compartment in an M49-series or more than two compartments in a M131-series vehicle exceeds the conditions specified in paragraphs 1a, 1b, or 1c, completely recoat all compartments.

d. Instructions for inspection during and after coating application are contained in paragraph 11 of this bulletin.

e. DA Form 2407 will be prepared listing required repairs or coating as necessary in accordance with TM 38-750.

8. Cleaning Procedure before Coating. *a.* Tank interiors or comparements which require complete coating as recommended by inspector will be cleaned as follows:

(1) Tank interiors that have not been previously coated or which require complete recoating, will be thoroughly cleaned by abrasive blasting. Interior surfaces of tank must be thoroughly dry before abrasive blasting is started.

(2) All interior surfaces of tank, in each compartment, including baffles, baffle

plate, lap joints, weld seams, open lap seams, crevices, and corners will be thoroughly abrasive blasted down to "white" metal. Blast cleaning to "white" metal is a method of preparing metal surfaces for painting by removing all mill scale, rust, rust scale, previous paint, or foreign matter by the use of abrasives, etc. "White" metal is defined to mean a surface with a gray-white, uniform metallic color, slightly roughened, etc.

(3) Sharp edges, weldments which have protruding tits or rough edges, and any other area within interior tank surfaces which will not provide a good bonding surface for coating will be filed, ground smooth with grinder or chiseled if necessary.

(4) After abrasive blasting and other surface preparations outlined in paragraph above have been completely, all dust, abrasive materials, sediment and dirt will be completely removed by using air pressure, vacuum cleaners or other suitable equipment. All interior surfaces will then be thoroughly wiped clean with cotton waste prior to application of coating material.

b. Tank interiors which require spot coating as recommended by inspector will be cleaned in the following manner:

(1) The deficient coating area will be cleaned by removing defective coating in designated area and also any sediment, rust, or dirt by using wire brushes, sandpaper, scrapers, or other suitable material by hand or power tools.

Note. **Do not use any chemical paint remover.**

(2) The area within the compartment will then be thoroughly cleaned using vacuum cleaner or other suitable equipment and wiped clean and dry.

Note. **Coating application will begin immediately after tank interiors have been cleaned and prepared for coating. Delay in apply coating can result in rust formation** within tank interior surfaces and additional cleaning will be required.

c. Piping, manifolds, segregator tank, and other related equipment which are susceptible to corrosion will be abrasive blasted, cleaned, and prepared as outlined above, and coated according to procedures outlined herein. Aluminum and stainless steel components will not be coated.

9. Test for Leaks Procedure. Whenever required, and always after abrasive blasting, a leak test should be conducted in the following manner

(1) Covers should be fabricated for tank openings such as valve wells, and manholes should be closed securely.

(2) Introduce air into the tank until an air pressure of approximately 3 pounds per square inch is built up in the tank.

(3) Soapy water will be applied on the external body of the tank.

(4) Leaks will be repaired by welding in accordance with existing directives and acceptable shop procedures.

(5) If any repairs are necessary, the interior of the tank should be inspected at the repair points and cleaning of these areas in accordance with methods described herein should be accomplished prior to application of any coating material.

10. Coating, Recoating, and Spot Coating Procedures. *a.* Application of coating, recoating, or spot coating will be accomplished by authorized personnel skilled in the performance of this task, within the applicable category of maintenance.

b. Before coating, interior surfaces of each tank compartment will be visually inspected to insure that all areas are thoroughly clean and that all foreign material has been removed. Temperature of metal should not be below 60°F.

c. Preparation and application of authorized coating obtainable under Kit, FSN 8030-530-6651, will

be in accordance with manufacturer's instructions contained in the kit.

Note. **Contents will cover 100 square feet of area by application, unless otherwise noted by manufacturer. Coating will not be applied In temperature below 60°F.**

Caution: **There are several manufacturers from whom the above kit is purchased. Each of these manufacturers provide coating material in accordance with applicable specification. They may differ in formulation, color, and materials; therefore, intermixing of kits with each other, such as, mixing one manufacturer's coating materials with another manufacturer's coating materials during preparation of coating material is prohibited. However, if one manufacturer's coating has been originally applied, and spot repairs are required, another manufacturer's coating can be used over the original dry coating regardless of color combination involved.**

d. Each successive coat applied must be of a color contrasting with the preceding coat to permit general visual inspection and assure complete coverage of the entire surfaces.

e. All interior surfaces of piping system, manhole covers, segregator tank, manifold piping that are subject to corrosion will be coated.

f. A minimum of 8 hours is required for proper curing after each successive coat at a temperature not lower than 60cF. During this period, air evacuator should be utilized to remove solvent vapor from tank interiors to insure proper curing and lessen danger of explosion. Air evacuator should be utilized in same manner as prescribed in paragraph 5. A vapor test must be conducted before releasing vehicle for service. Continue drying until no evidence of solvent odor or vapors are present.

11. Inspection of Coating Application. *a*. Coating application will be inspected at time of application, during and after application, to assure thorough coverage and proper thickness of coating. Thickness of total coating after curing will be a minimum of 5 mils throughout all interior coated surfaces. If the manufacturer's kit instructions specify more than 5 mils dry film thickness, compliance with manufacturer's required thickness is mandatory. Appearance of coating should be relatively smooth and free of runs and sags.

Note. **Inspectors will provide suitable covering for their footwear during inspection of coated interior tank surfaces to prevent scuffing, scraping, or other damage to coated surface.**

b. Thickness of applied coating will be determined by use of Gage, General Electric Type B, General Electric Co., West Lynn, Mass., or equal.

c. Thickness of coating on tank surfaces should be measured in a pattern which will assure that required minimum thickness of coating has been applied to all interior surfaces.

d. Where thickness of coating does not meet minimum requirements, those areas affected will be additionally coated to attain specified thickness.

e. Inspect filter separator tank, meters, pump, and valves, replacing if necessary.

f. Clean rust and scale from all piping. Replace piping which cannot be cleaned.

12. Installation of Processing Plate. After a vehicle is completely coated or recoated as outlined in this bulletin, the following information will be stamped on 1/8-by 2-by 3-inch aluminum plate and attached adjacent to the vehicle nameplate on exterior of vehicle frame.

Date Tank Interior was Coated .....
Processed by Manufacturer of Coating.....
Manufacturer's Identification of Coating.....
Military Coating Specification .....

Note. This nameplate will be replaced each time complete coating is applied. Partial or spot coating does not require replacing the nameplate.

13. Assembly. *a.* Install all parts and assemblies, using new gaskets as listed in applicable supply manuals.

b. Check all pumping system components to insure proper operation.

Caution: **Pumps should be primed and not be operated more than 60 seconds unless fluid is being pumped through them.**

c. If vehicle is not returned to service within 30 days following compliance with this bulletin, all internal segregator parts will be treated with oil, engine preservative FSN 91502929693 (PE-2) (MIL-L-21260). This will be accomplished by pouring 5 gallons of oil into

the tank, operating segregator for 5 minutes, and draining the oil on M49C vehicle and 100 gallons on M131C-series vehicles.

14. Report of Coating Accomplishment. *a*. Upon completion of every 90 day inspection and/or 180 days for stored vehicles (and coating or spot coating if necessary) accomplishment will be reported in accordance with TM 38-750 specifying the following in addition to normal data required:

(1) That 90- or 180-day inspection of interior of coated tank surfaces was accomplished.
(2) Date of inspection.
(3) Vehicle registration or serial number.
(4) Condition of coated surfaces (explain in detail).
(5) Inspectors recommendations for repairs (in detail).
(6) Date of repairs (coating, spot coating, etc.).
(7) Manufacturer's name of coating applied.
(8) Type of vehicle and Army registration number.
(9) Name of installation or facility applying coating or repairs.

b. When a vehicle interior is completely coated or recoated, the same information as specified on processing plate (para 12) will be entered in appropriate section of vehicle log-book.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

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NG: State AG (3); units-same as active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

*U.S. GOVERNMENT PRINTING OFFICE: 1995-388-421/43110

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