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MILITARY STANDARD

TANKS, PETROLEUM FUEL AND LUBRICANTS, OPERATING AND BULK
STORAGE, MINIMUM FREQUENCY FOR INSPECTION AND CLEANING

AMSC #S4564

FSC 91GP

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FOREWORD

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Fuel Supply Center, ATTN: DFSC-QSE, Defense Logistics Agency, Cameron Station, Alexandria, Virginia 22304-6160, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1. SCOPE

1.1 Purpose. This standard establishes uniform criteria for determining the need for, and frequency of, interior inspection and cleaning of operating and bulk fuel tanks utilized in storing and dispensing military petroleum fuels and lubricants.

1.2 Applicability. The criteria established by this standard shall apply to all fixed petroleum tankage at all U.S. military activities worldwide. The standard shall also apply to Government-owned/contractor-operated (GOCO) terminals and to contractor-owned/contractor-operated (COCO) tankage storing and dispensing Government-owned petroleum fuels.

1.2.1 Application limits. This standard does not cover nor apply to required interior inspections or cleaning due to needed tank repairs because of leaks, suspected internal structural failures, tank modifications, or gross fuel contamination from outside sources.

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

VV-F-800 - Fuel Oil, Diesel
 VV-G-1690 - Gasoline, Automotive, Leaded or Unleaded

MILITARY

MIL-F-16884 - Fuel, Naval Distillate
 MIL-G-3056 - Gasoline, Automotive, Combat
 MIL-G-53006 - Gasohol, Automotive, Leaded or Unleaded
 MIL-L-2104 - Lubricating Oil, Internal Combustion Engine, Tactical Service
 MIL-L-6081 - Lubricating Oil, Jet Engine
 MIL-L-9000 - Lubricating Oil, Shipboard Internal Combustion Engine, High Output Diesel
 MIL-L-17331 - Lubricating Oil, Steam Turbine and Gear, Moderate Service
 MIL-L-22851 - Lubricating Oil, Aircraft Piston Engine, (ashless dispersant)
 MIL-T-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5
 MIL-T-83133 - Turbine Fuel, Aviation, Kerosine Type, Grade JP-8

HANDBOOKS

MILITARY

MIL-HDBK-200 - Quality Surveillance Handbook for Fuels, Lubricants, and Related Products

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

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2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D 396 - Fuel Oils
- ASTM D 439 - Automotive Gasoline
- ASTM D 910 - Aviation Gasolines
- ASTM D 1655 - Aviation Turbine Fuels
- ASTM D 2276 - Particulate Contaminant in Aviation Fuels
- ASTM D 3699 - Kerosine
- ASTM D 4057 - Manual Sampling of Petroleum and Petroleum Products
- ASTM D 4177 - Automatic Sampling of Petroleum and Petroleum Products

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. DEFINITIONS

3.1 Operating tank^{1/}. A fixed tank in a system dispensing fuel directly to military using equipment.

3.2 Bulk storage tank. A fixed tank utilized to receive, store and issue fuel other than directly to military using equipment.

3.3 Physical entry inspection. The inspection of the interior of a tank by physical entry into the tank. Preparation of the tank for entry shall be that required for the protection and safety of inspection personnel in accordance with existing departmental instructions (see 4.3).

3.4 Aviation fuels. Pertains to those fuels conforming to the basic requirements of specifications MIL-T-5624, Turbine Fuel, Aviation, Grades JP-4 and JP-5; MIL-T-83133, Turbine Fuel, Kerosene Type, Grade JP-8; ASTM D 910, Aviation Gasolines; and, ASTM D 1655, Aviation Turbine Fuels. Inclusion of commercial type aircraft gasolines, turbine fuels, and unconventional fuels is optional.

3.5 Ground and marine fuels. Pertains to those fuels conforming to the basic requirements of specifications MIL-F-16884, Fuel, Naval Distillate; MIL-G-3056 Gasoline, Automotive, Combat, Types I and II; VV-F-800, Fuel Oil, Diesel, Grades DFA, DF1, and DF2; VV-G-1690, Gasoline, Automotive, Leaded or Unleaded, Grades Premium, Regular and Special; MIL-G-53006, Gasohol, Automotive, Leaded or Unleaded; ASTM D 439, Automotive Gasoline.

3.6 Burner fuels. The term applies to those fuels conforming to the basic requirements of ASTM D 396, Fuel Oils.

3.7 Lubricating oils. This term pertains to those lubricating oils listed in 2.1.1.

^{1/} For the purposes of this standard, a bulk storage tank used to receive, store and issue fuel directly to military using equipment will be considered an operating tank.

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4. GENERAL REQUIREMENTS

4.1 General considerations.

4.1.1 Fiberglass-reinforced plastic tanks. All fiberglass-reinforced plastic tanks used for storage, receipt and issue of the products covered in this standard shall adhere to the minimum frequency of inspection and cleaning requirements specified for a coated steel tank.

4.1.2 Newly constructed tanks. Although no differentiation between a newly constructed tank and a recently cleaned tank is made, the product sampling and testing may, at the discretion of the using Service, be accomplished at a less frequent rate than specified herein during any initial six month period.

4.2 Records.

4.2.1 History cards. The history cards shall contain all information necessary to be in compliance with all Federal environmental regulations. Each activity as defined by 1.2 shall maintain a comprehensive card history on file, applicable to each storage and operating tank, citing all actions taken as required by this standard. As a minimum, the individual tank history card (file) shall include:

- a. Date and type of construction
- b. Name of installing contractor
- c. Product service (past and present) and dates
- d. Date of last cleaning and contractor's name
- e. Structural condition based on cycle inspection at the time of cleaning or repair.
- f. Record of tank repairs
- g. Tank dimensions and capacity
- h. Inspection and tank cleaning frequency
- i. Tank coating history
- j. Tank strapping charts
- k. As-built drawings (if available)
- l. Record of product tests and trends

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4.3 Safety precautions. Proper safety precautions shall be taken using appropriate safety and test equipment in order to prevent injury or illness during the inspection.

4.3.1 Safety test for human entry. Before anyone enters a ship or shore tank that has contained fuel, the tank shall be tested adequately and certified that it is safe for human entry.

4.3.1.1 Minimum safety test. The tests must include, as a minimum the measurement of:

- a. Flammable gases/vapors (below 10% of the lower explosive limit).
- b. Oxygen content (19.5% minimum).

4.3.1.2 Toxic vapor testing. Toxic vapor testing shall be accomplished in spaces containing or having last contained bulk liquids of a toxic, corrosive, or irritant nature. Toxic vapors shall be below the minimum threshold limit value.

4.4 Physical Entry Inspection. When physical entry inspection is required as specified in this document, it is recommended that sonic testing for detection of leaks and other structural problems be performed as a standard practice.

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5. DETAILED REQUIREMENTS

5.1 Aviation fuels.5.1.1 Sampling and testing.

5.1.1.1 Operating tanks. A sample representative of the product in each operating tank shall be obtained on a monthly basis or more frequently if necessary. During normal operations, samples shall be taken downstream from the discharge side of the tank and prior to any filtration action. These samples shall be taken in accordance with ASTM D 4057 or ASTM D 4177. If this procedure is impractical, an all-level sample may be taken from the tank in accordance with ASTM D 4057. The particulate content of the sample shall be determined in accordance with ASTM D 2276.

5.1.1.2 Bulk storage tanks. An all-level sample of the product shall be obtained in accordance with ASTM D 4057 at a frequency of not less than 30 days minimum for active storage and 180 days minimum for inactive storage or after a tank is replenished with new product^{1/}. The particulate content of the sample shall be determined in accordance with ASTM D 2276.

5.1.1.3 Bottom samples. A sample drawn at the tank's lowest point taken at a frequency and in a manner prescribed by the individual Services or as specified in MIL-HDBK-200 shall be analyzed for sludge characteristics and evidence of any other contamination problems.

5.1.1.4 Interior inspection due to test results. Regardless of inspection requirements in Section 5.1.2, when an evaluation of the data gathered as prescribed above reveals that the particulate content of the specific product is approaching or exceeds the deterioration limit as specified in MIL-HDBK-200, interior inspection of the operating or bulk storage tank by physical entry shall be accomplished. This indication may occur rapidly or evolve over a number of years. Other indicators which should be considered in a decision to inspect the interior of a tank are the analyses of bottom samples taken as specified above and any abnormal operation of filter/separators. At the discretion of the responsible Agency/Service, inspection by physical entry may be made when a bottom sample indicates a developing microbial problem. Cleaning to the extent necessary shall be accomplished based on the observations resulting from interior inspections.

^{1/} Air Force bulk dormant tanks are sampled every 12 months and forwarded to an area laboratory for full specification testing.

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5.1.2 Frequency of physical entry inspection. Operating and bulk storage tanks shall be inspected by physical entry (defined in 3.3) as prescribed in TABLE I.

TABLE I. Frequency of Tank Inspections (Years)

	<u>Bulk Storage Tanks^{1/}</u>	<u>Operating Storage Tanks</u>
Uncoated without Inlet-Filter Separator	4	3
Coated or Inlet-Filter Separator	6	5
Coated with Inlet-Filter Separator	8	8
^{1/} For bulk storage tanks with direct receipt of fuel from barge or tanker, frequencies will be 3, 5, and 8 years respectively.		

5.1.3 Cleaning of operating and bulk storage tanks. When the inspection as specified above reveals a deteriorating condition of any nature within the tank which could affect product quality or result in future excessive maintenance costs if uncorrected, interior tank cleaning and maintenance shall be accomplished to the extent necessary.

5.1.4 Change of product. When storage tanks are changed from one grade product to another, the tank shall be inspected for contamination (such as rust, sludge, and moisture) and cleaned if necessary prior to tank conversion to the other product.

5.2 Ground and marine fuels.

5.2.1 Sampling and testing. The minimum sampling frequency for all ground and marine fuels in bulk storage and operating tanks shall be as specified in Chapter 4, of MIL-HDBK-200. The frequency may be increased to cover product replenishment and to provide for increased sampling of products. All samples shall be obtained as specified in ASTM D 4057. Bottom samples of all product tanks, particularly in the case of residual fuels, shall be obtained at a frequency specified by each Service or as specified in MIL-HDBK-200. Samples shall be tested for those product characteristics which will indicate an unsatisfactory interior tank condition. For example, excessive rust and sludge indicate a deteriorating tank lining.

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5.2.2 Physical entry. Where feasible, physical entry into operating tanks and bulk storage tanks to determine the need for and extent of cleaning necessary shall be accomplished when product characteristics on samples obtained and tested as specified above approach or exceed the deterioration limits. This inspection should take place whenever a tank's condition is suspect, such as evidence of excessive interior rusting or liner deterioration, possible microbial problems, and whenever the amount or type of bottom sludge creates a reasonable doubt as to the ability of the tank to maintain the quality integrity of the product being stored or issued.

5.3 Lubricating oils. Lubricating oil tanks, especially underground tanks, shall be bottom sampled and tested for moisture and sediment at ninety (90) day intervals to detect deterioration trends in the stored products. A moisture build-up which subsequently causes rusting of the interior of the tank will signify the need to empty and clean the tank. The limitations listed in TABLE II are suggested as a guide for when to empty and clean the tanks. These limitations are for use in determining the frequency for emptying and cleaning tanks and do not take precedence over those use limits specified in MIL-HDBK-200.

TABLE II. Guide for Inspecting & Cleaning Lubricating Tanks

Water and Sediment Content % by vol., max	Deterioration Limit
MIL-L-2104	0.2
MIL-L-6081	0.5
MIL-L-17331	0.1
MIL-L-22851	0.5
Water content, % Max.	
MIL-L-9000	0.1

5.4 Particulate matter in fuels. The fuel particulate matter limitations in TABLE III are suggested as a guide for when to empty and clean tanks at Defense Fuel Support Points; however, specific Military Service requirements applicable to Army, Navy or Air Force installations shall be strictly enforced.

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TABLE III. Fuel Particulate Matter Limitations

Turbine Fuel	1.0 mg/L Spec Limit 1.0 mg/L ^{1/} ^{2/} Aircraft Servicing 1.5 mg/L Deterioration Limit 2.0 mg/L ^{3/} Intragovernmental Transfer
AVGAS	No Spec Limit 1.0 mg/L ^{1/} Aircraft Servicing 2.0 mg/L ^{3/} Intragovernmental Transfer
Diesel Fuel	10 mg/L Spec Limit 20 mg/L Deterioration Limit

^{1/} Particulate matter of 2.0 mg/L is acceptable for servicing Navy Aircraft.

^{2/} The particulate matter limit for servicing Air Force Aircraft is 0.5 mg/L.

^{3/} The maximum permissible solids in Intragovernment transfers is 1.6 mg/L for Air Force Aircraft.

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6. NOTES

(This section contains information of a general or explanatory nature which is helpful, but is not mandatory.)

6.1 Intended use. This military standard is authorized for use by all Departments and Agencies of the Department of Defense to establish uniform criteria for determining the need for and frequency of interior inspection and cleaning of operating and bulk fuel tanks utilized in storing bulk fuel and dispensing military petroleum fuels.

6.2 Issue of DODISS. When this standard is used in acquisition, the applicable issue of the DODISS must be cited in the solicitation (see 2.1.1 and 2.2).

6.3 Subject term (key word) listing.

DF2
F76
Fuel, Automotive
Fuel, Aviation
Fuel, Burner
Fuel, Diesel
Fuel, Ground
Fuel, Marine
Fuel, Naval Distillate
Gasohol
Gasoline, Automotive
Gasoline, Aviation
JP4
JP5
JP8
Oil, Fuel
Oil, Heating
Oil, Lubricating

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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CONCLUDING MATERIAL

Custodians:

Army - ME
Navy - SA
Air Force - 50

Preparing Activity:

DLA - PS
(Project 91GP-0115)

Review Activities:

Army - MR
Navy - AS
Air Force - 68

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-STD-457B		2. DOCUMENT TITLE Tank, Petroleum Fuel and Lubricants, Operating and Bulk Storage, Minimum Frequency for Inspection and Cleaning	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
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