

AEROSPACE MATERIAL SPECIFICATION

Detergent, External Removable Fuel Tanks

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1. SCOPE:**1.1 Scope:**

This specification covers a water soluble, oil dispersing nonionic detergent used for cleaning aircraft removable fuel tanks.

2. APPLICABLE DOCUMENTS:

The following publications, of the issues in effect on date of invitation for bids or request for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

QQ-A-200/16 Aluminum Alloy Structural Shapes, Extruded 6061
PPP-P-704 Pails, Metal (Shipping, Steel 1 Through 12 Gallon)

MIL-T-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-D-16791 Detergent, General Purpose (Liquid, Nonionic)

FED-STD-313 Material Safety Data Sheets, Preparation and Submission of
FED-STD-791 Lubricants, Liquid Fuels, and Related Products; Methods of Testing

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-290 Packaging, Packing, and Marking of Petroleum and Related Products

3. REQUIREMENTS:**3.1 Qualification:**

The detergents furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.4 and 6.4).

3.2 Material:

3.2.1 Biodegradability: The detergent shall be a biodegradable liquid nonionic surface active agent. (See 4.7.1).

3.2.2 Active ingredient concentration: The detergent shall contain up to 55% water and up to 0.5% corrosion inhibitor, with the balance of the cleaner being the active ingredient (see 4.7.2).

3.2.3 Structure of active ingredient: The detergent active ingredient shall be a fatty alkylolamide with a short to intermediate alcohol chain. (See 4.7.3)

3.3 Effectiveness:

When the detergent is tested as specified in 4.7.4, the reading obtained after the tank is cleaned shall be less than 10 parts per million (ppm).

3.4 Corrosion:

When the detergent is tested as specified in 4.7.5 it shall cause no visible corrosion to the aluminum alloy, and any weight change shall not be greater than ± 0.2 milligrams per square inch of panel surface.

3.5 Effects on seal and gasket material:

When the detergent is tested as specified in 4.7.6 it shall not produce a change in volume of seal and gasket material that is greater than ± 5 percent.

3.6 Storage stability:

After storage for one year, the detergent shall meet the requirements of 3.3, 3.4 and 3.5. (See 4.7.7)

3.7 Toxicity:

The detergent shall have no adverse effect on the health of personnel when used for its intended purpose. The fluid shall contain no components which produce noxious vapors in such concentrations as to be an annoyance to personnel during formulation or use under conditions of adequate ventilation while exercising caution to avoid prolonged contact with the skin and while observing Occupational Safety and Health Administration (OSHA) guidelines. Questions pertaining to the toxic effects shall be referred by the procuring activity to the appropriate departmental-medical service who will act as an advisor to the procuring activity (see 4.4).

3.8 Workmanship:

The detergent shall be a clear homogeneous liquid at 25°C (77°F). (See 4.7.8)

4. QUALITY ASSURANCE PROVISIONS:**4.1 Responsibility for inspection:**

Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections:

The inspection requirements specified herein are classified as follows:

1. Qualification inspection (4.4)
2. Quality conformance inspection (4.6)

4.3 Sampling:

4.3.1 Qualification inspection sample: The qualification inspection sample shall consist of at least two 1 gallon containers of detergent. The manufacturer shall supply the qualifying laboratory with certified statements of prior tests showing that the sample being submitted conforms with all the requirements of this specification, except for storage stability test (3.6). Qualification samples shall be accompanied by a certified statement giving the complete formula for the detergent submitted and the chemical composition and source of materials used therein. All information furnished will be held as commercial confidential. Approval granted on a detergent shall not apply if any of the components have been changed in type, grade, quantity, or source of supplier. The samples and reports shall be forwarded to the Aircraft and Crew Systems Technology Directorate, Naval Air Development Center, (Code 60622), Warminster, Pennsylvania, 18974 (qualifying laboratory). The samples shall be plainly identified by securely attached durable tags or labels marked with the following information:

Sample for qualification inspection

Detergent, External Removable Fuel Tanks

MIL-D-81956A

Name of manufacturer

Product code number

Date of manufacture

Submitted by (name) (date) for qualification inspection in accordance with the requirements of MIL-D-81956A under authorization of (reference) authorizing letter (see 6.4)

4.3.1.1 Formulation sheet: An example of a satisfactory form for the formulation sheet, indicating the percentage and nature of each ingredient, is as follows:

Component A	percent
Component B	percent
Component C	percent

4.3.2 Quality conformance inspection samples: The quality conformance inspection samples shall consist of a sample for tests (4.3.2.3) and samples for examination of filled containers (4.3.2.4). Samples shall be labeled completely with information identifying the purposes of the sample, name of product, specification number, lot and batch number, date of sampling, and contract number.

- 4.3.2.1 Bulk lot: A bulk lot (batch) is an indefinite quantity of a homogeneous mixture of material offered for acceptance in a single isolated container; or manufactured in a single plant run (not exceeding 24 hours) through the same processing equipment, with no change in ingredient material.
- 4.3.2.2 Packaged lot: A packaged lot is an indefinite number of unit containers of identical size and type, offered for acceptance, and filled with homogeneous mixture of material from one isolated container; or filled with a homogeneous mixture of material manufactured in a single plant run (not exceeding 24 hours) through the same processing equipment, with no change in ingredient material.
- 4.3.2.3 Sample for tests: A 1 gallon sample for tests shall be taken at random from each lot of detergent to be offered for delivery under a contract or order. The sample shall be subjected to all the applicable quality conformance inspections. If the sample for tests fail any of the quality conformance inspections, the inspection lot shall be rejected.
- 4.3.2.4 Samples for examination of filled containers: Random samples of filled unit containers and a sample of shipping containers fully prepared for delivery shall be selected from each lot of lubricant in accordance with MIL-STD-105 at inspection level I and acceptable quality level (AQL) = 2.5 percent defective.
- 4.4 Qualification inspection:

Qualification inspection shall consist of a review for approval of the submitted manufacturer's report and subjecting the qualification samples (4.3.1) to examination and testing in accordance with Table I. Material and Safety Data Sheets (3.7) shall be prepared and submitted to the Qualifying Laboratory (4.3.1) in accordance with FED-STD-313.

TABLE I. Qualification inspection

Inspection	Requirement paragraph	Test method paragraph
Biodegradability	3.2.1	4.7.1
Active Ingredient Concentration	3.2.2	4.7.2
Structure of Active Ingredient	3.2.3	4.7.3
Effectiveness	3.3	4.7.4
Corrosion	3.4	4.7.5
Effects of Seal and Gasket Materials	3.5	4.7.6
Storage Stability	3.6	4.7.7
Toxicity	3.7	4.4
Workmanship	3.8	4.7.8

4.5 Retention of qualification:

In order to retain qualification of a product approved for listing on the Qualified Products List (QPL), the manufacturer shall verify by certification to the qualifying activity that the manufacturer's product complies with the requirements of this specification. The time of periodic verification by certification shall be in two-year intervals from the date of original qualification. The Government reserves the right to re-examine the qualified product whenever deemed necessary to determine that the product continues to meet any or all of the specification requirements.

4.6 Quality conformance inspection:

Quality conformance inspection shall consist of testing the sample for test (4.3.2.3) for all the requirements specified in Section 3 except biodegradability (3.2.1) and storage stability (3.6), and examination of the samples of filled containers (4.3.2.4) for conformance with 5.1.

4.7 Inspection methods:

Inspection shall be in accordance with Method 9601 of FED-STD-791.

4.7.1 Biodegradability: The supplier shall submit a certificate of compliance to the requirements for biodegradability. The certificate shall be accompanied by actual test data (field or laboratory) including the test procedure utilized in making the biodegradability determination.

4.7.2 Active ingredient concentration: Certification of the concentration of the active ingredient, including the percentage by weight and the method of determination, shall be made available by the supplier.

4.7.3 Structure of active ingredient: The structure of the detergent shall be confirmed by utilizing a suitable infra-red spectrophotometer.

4.7.4 Effectiveness:

4.7.4.1 Safety check equipment: For checking the flammable vapors inside the tank, a Portable Gas Detection and Alarm System, Catalog No. 0023-7350, manufactured by Bacharach Instrument Co., a division of Ambac Industries, or equivalent shall be used.

4.7.4.2 Simulated fuel tank: A five gallon storage drum conforming to PPP-P-704 shall be used. A 1-1/2 to 2 inch drain hole shall be placed in the bottom of the tank and a rubber stopper inserted into the opening.

- 4.7.4.3 Calibration of the gas indicator: The gas indicator shall be calibrated in a combustible-vapor free atmosphere. The reading shall be set at zero parts per million of combustible vapors. The interior of the simulated fuel tank shall be tested for combustible vapors. If the reading is other than zero, the can shall be washed with a 1 percent solution of detergent conforming to MIL-D-16791, Type I, thoroughly rinsed with fresh water, and dried with oil-free air until the reading is zero. Five hundred and twenty five milliliters of tap water shall be poured into the drum and the cap shall be closed. The can shall be agitated so that all surfaces are coated with water. The drum shall be opened and drained by removing the drain plug. A meter reading shall be taken and recorded.
- 4.7.4.4 Soiling: One pint of JP-5 fuel conforming to MIL-T-5624 shall be placed in the drum. The cap shall be closed and the drum rotated so that the fuel contacts all surfaces and crevices. The cap shall be opened and the drain plug removed. All liquid fuel shall be drained from the drum. The interior of the drum shall be tested for combustible vapors. There must be a positive indication of the presence of combustible vapors, or else the drum must be resoiled or moved to a warmer area.
- 4.7.4.5 Cleaning: The drain plug shall be inserted. Five hundred and twenty five ml. of cleaning solution (25 ml. of cleaner and 500 ml. of water) shall be poured into the drum and the cap shall be closed. The can shall be shaken and rotated so that all surfaces are coated with solution. The solution shall be allowed to remain in contact for a minimum of two minutes, then the drum shall be opened by removing the drain plug. After all the cleaner has drained thoroughly, the drum shall be filled three times with clear, warm water at approximately 29 to 35°C (85 to 95°F), and be allowed to drain thoroughly each time. A check shall be made for the presence of combustible vapors and a meter reading shall be taken. The reading obtained in 4.7.4.3 shall be subtracted from this value. The final value obtained after subtraction shall not be greater than 10 ppm.
- 4.7.5 Corrosion: Three specimen panels shall be used for this test. They shall conform to QQ-A-200/16 and be 6 inches by 1 inch by 0.050 inch thick. The panels shall be wiped with reagent grade acetone using bleached cotton cheesecloth or cloth in accordance with CCC-C-46, Class 7, then dipped in distilled water and acetone, and dried for 1 hour at 100° ± 3°C (212° ± 5°F). Each panel shall then be weighed to the nearest tenth of a milligram (0.1 mg) and the weight shall be recorded. The panels shall then be processed in the following manner. One panel shall be totally immersed in a 1:5 solution of the detergent in water. Another panel shall be immersed in a 1:10 solution and the third panel immersed in a 1:20 solution. Immersion time shall be 4 hours at 25° ± 1°C (77° ± 2°F). After this time, each panel shall be removed, rinsed in deionized or distilled water, rinsed again with acetone, and dried for 1 hour at 100° ± 3°C (212° ± 5°F). The panels shall then be cooled to room temperature and reweighed to the nearest 0.1 mg. The weight shall be recorded.
- 4.7.6 Effects on seal and gasket material: This test shall be conducted in accordance with Method 3603 of FED-STD-791 except immersion shall be 4 hours at 24° ± 3°C (75° ± 5°F). The test specimen shall be standard "L" type rubber (see 6.3).
- 4.7.7 Storage stability: One filled unit container shall be stored for one year then tested for effectiveness (3.3), corrosion (3.4) and effect on seal and gasket materials (3.5) in accordance with 4.7.4, 4.7.5, and 4.7.6 respectively.