MIL-D-81248B
30 June 1980
SUPERSEDING
MIL-D-81248A
9 August 1972

MILITARY SPECIFICATION

DETECTOR PAD, FREE WATER

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the formulation and manufacturing requirements for a urenine coated paper disc that is used with the Model No. MK II Free Water Detector, MIL-D-81227, or with MIL-D-22612 Detector, Contaminated Fuel (see 6.1).

1.2 Classification. The free water detector pads covered by this specification shall be of the following sizes (see 6.2):

Size 1 - 37 mm
Size 2 - 47 mm

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

UU-P-63	-Paper, Blotting
PPP-B-636	-Box, Shipping, Fiberboard
PPP-C-96	-Cans, Metal, 28 Gage and Lighter
PPP-T-60	-Tape, Packaging, Waterproof

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Engineering Specifications and Standards Department (Code 9321), Naval Air Engineering Center, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 6640

MILITARY

MIL-B-117	-Bag, Sleeve and Tubing, Interior Packaging
MIL-D-22612	-Detector, Contaminated Fuel
MIL-D-81227	-Detector Kit, Water, Automotive-Aviation Fuel

STANDARDS

MILITARY

MIL-STD-105	-Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	-Marking for Shipment and Storage

(Copies of specifications and standards, drawings and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Material. The detector pad shall consist of a blotting paper disc that has been surface coated on one side with uranine.

3.1.1 Blotting paper disc. The blotting paper shall conform to Grade B of UU-P-63 except for the following:

Properties	Requirements
Color	White
Texture	Smooth
Moisture	The blotting paper shall be sufficiently free of moisture to insure conformance to 3.3.

3.1.1.1 Dimensions. The thickness of the paper disc shall be 0.610 ±0.076 millimeter (0.024 ±0.003 inches); the diameter shall be 37.0 ±0.5 millimeters (0.146 ±0.002 inch) for size 1, and 47.0 ±0.5 millimeters (0.185 ±0.002 inch for size 2.

3.1.2 Uranine coating. Each blotting paper disc (3.1.1) shall be surface coated on one side with a solution of uranine, (Fluorescein Sodium) with a minimum dye content of 98.5 percent (equivalent to USP grade) in any of the following denatured ethyl alcohol formulations: 1, 2A, 2B, 3A, 12A, 28A, and 30. The requirements of USP XVIII may be used as a basis for acceptance as an alternate for the current edition of the USP. When tested as specified in 4.5.1 there shall be 0.9 ±0.1 milligrams

of uranine per 47 mm disc, and 0.56 ±0.06 milligrams per 37 mm disc. Since the method of application of uranine on the pad may affect the sensitivity of the pad, the uranine content shall be subject to change dependent upon the results of the tests.

3.2 Leakage of the immediate container. When subjected to the tests specified in 4.5.2, the sealed water-vaporproof bag shall show no sign of leakage. There shall be no evidence of water in the sealed bag after exposure to 90 to 95 percent R.H. and a temperature of 38°C (100°F) for 16 hours.

3.3 Contamination. When tested under ulta-violet light as specified in 4.5.3, the detector pad, immediately after removal from its sealed water-vaporproof bag, shall show none of the characteristic fluorescence resulting from the presence of free water.

3.4 Workmanship. When visually examined, the detector pad shall be evenly coated and free from foreign matter, holes, tears, cuts, creases, wrinkles, printing, and other imperfections that would render the pad un-suitable for its intended use.

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.

4.1.1 Inspection. Inspection, as used in this specification, is defined as both examination (such as visual or auditory investigation without the use of special laboratory appliances or procedures) and testing (determination by technical means of physical and chemical properties).

4.1.2 Records. Records of examinations and tests performed by or for the contractor or materials used in manufacturing the pads or on the finished pads shall be maintained by the contractor and made available to the Government, upon the Governments request, during the performance of the contract and for a period of three years after delivery of the supplies to which such records relate.

4.2 Classification of inspection. The examination and testing of detector pads shall be classified as follows:

a. Pre-award or first article inspection when required by procurment documents (see 6.2)
b. Quality conformance inspection (see 4.4)

4.3 Pre-award or first article inspection sample. The sample, when required by procurement documents shall be representative of the production item and shall be taken from a production lot (see 4.4.1)

4.4 Quality conformance inspections

4.4.1 Lot. A lot shall consist of detector pads that have been manufactured and packaged from the same batch of paper and coated with the same batch of uranine solution. A batch is defined as the end product of all raw materials blended or processed in a single operation.

4.4.2 Quality conformance samples. Samples for the applicable inspections shall be selected at random in accordance with MIL-STD-105 and Table I.

TABLE I. Quality conformance sampling.

Inspection 1/	Inspection level	A.Q.L.	Sampling unit
Uranine coating	S-4	0.15	Detector pad before packaging
Workmanship	II	0.65	Detector pad before packaging
Dimensions	S-4	0.15	Detector pad before packaging
Contamination	S-4	0.15	Immediate container
Leakage	S-4	0.15	Immediate container
Packaging	I	2.5	Immediate container. Unit package and shipping containers both prior to and after closure

1/ The lot size shall be the number of immediate containers for all inspections except Packaging; the lot size for Packaging shall be the number of unit packages.

4.4.3 Quality conformance (lot by lot) inspection. The quality conformance inspection shall include examining and testing the quality conformance samples (4.4.2) for conformance to the applicable inspection requirements listed in Table II. A sample that does not conform to all the applicable inspection requirements shall be considered defective. If the number of defectives in a sample group exceeds the acceptable quality level (A.Q.L.) specified in Table I, the lot represented by the sample group shall be rejected.

TABLE II. Quality conformance inspection.

Inspection	Requirement	Test method
Uranine coating	3.1.2	4.5.1
Workmanship	3.4	Visual examination
Dimensions	3.1.1.1	Visual examination
Leakage	3.2	4.5.2
Contamination	3.3	4.5.3
Packaging	All of Section 5	Section 5

4.5 Test methods.

4.5.1 Color and sensitivity of uranine coating. Wherever distilled water is specified for dilution or washing, tap water that has no fluorescense may be used.

4.5.1.1 Apparatus. The apparatus shall consist of a fluorometer or spectrophotometer with fluorometric attachment with a sensitivity capable of detecting .02 micrograms of uranine per milliliter of water, and standard laboratory glass volumetric flasks (1000 ml and 100 ml capacity).

4.5.1.2 Standards. Weigh exactly 0.2000 grams of uranine that has been previously dried in an oven at 110°C for 0.5 hours, and dissolve in 1 liter of distilled water. Label this solution "A". Pipet 10 mls of solution "A" and dilute to 1 liter with distilled water. Label this solution "B". Measure 1, 2, 3, 4 and 5 mls of the "B" solution respectively from a 5 ml buret and dilute to 100 ml using 100 ml volumetric flasks. These 5 solutions will contain 0.02, 0.04, 0.06, 0.08 and 0.10 micrograms of uranine per ml, respectively. Determine the fluorometer readings versus uranine concentration in micrograms per milliliter on linear graph paper. This plot is the standard against which unknown concentrations are determined.

4.5.1.3 Procedure. Random samples shall be selected as described in 4.3.2 and analyzed for uranine concentration according to the following procedure. The pad selected shall be placed coated-side down in a Buchner funnel. A Buchner funnel (56 mm in plate diameter) shall be used with the 47 mm discs and a 42 mm plate diameter funnel shall be used with the 37 mm discs. (Alternate funnels and plates may be substituted as long as suitable washing results.) The pad shall be washed with distilled water until the pad has turned completely white. After appropriate water rinses, the filtrate shall be transferred to a 1 liter volumetric flask and diluted to 1 liter. Pipet 10 mls of this solution into a 100 ml volumetric flask and dilute to the mark. Determine the fluorometer reading, and calculate the uranine content from the standard graph determined in 4.5.1.2.

4.4.2 Leakage. All samples shall be conditioned at room temperature for at least 4 hours prior to the testing. The filled and sealed water-vaporproof bags shall then be placed in a humidity cabinet equivalent to the General Foods Humidity Cabinet. Condition the samples for 16 hours at 38° ±1°C (100° ±2°F) and a relative humidity (RH) of 90 to 95 percent. There shall be no moisture condensation on the test specimens or in the area of the test specimens. The air circulation over the test specimens shall be negligible. After the conditioning period, each bag shall be opened and examined for the presence of water. If moisture is not readily apparent in the bag, immediately remove the detector pad and test for the presence of free water as specified in 4.5.3.

4.5.3 Contamination. After opening the sealed water-vaporproof bag, the detector pad shall be immediately placed, coated-side up, under the ultraviolet lamp of the free water detector, MIL-D-81227 or the

MIL-D-22612 detector. The ultraviolet lamp shall be turned on for 3-5 seconds and the detector pad observed for the characteristic fluorescence of free water contaminant. Compare the test detector pad to the standards in the detector box while all are exposed to ultraviolet light. If no free water is present, the appearance of the test detector pad will be identical to that of 0 standard. area of the test specimens.

5. PACKAGING

5.1 Packaging. Packaging shall be level A.

5.1.1 Intermediate container. Each detector pad shall be packaged in a sealed waterproof bag conforming to MIL-B-117, Class E, Type II, except vacuum leakage testing shall not be necessary.

5.1.2 Unit package. The detector pads shall be packaged in multiples of 50 in a one quart can conforming to PPP-C-96, Type V round, Class 2, Plan A. Further, ten cans shall be packaged in a box conforming to PPP-B-636, Class Domestic; cans shall be one tier high, two in width and five in length.

5.2 Packing. Packing shall be level A, B or C as specified (see 6.2).

5.2.1 Level A. Unit package containers shall be packed in a close fitting shipping container constructed, closed and strapped in accordance with Class weather-resistant, compliance symbol V3c or V3s, style RSC of PPP-B-636. Net weight of contents in each shipping container shall not exceed 65 pounds. Each fiberboard shipping container shall be further sealed with 7.6 cm (3 inch) minimum width pressure sensitive tape conforming to Class 1 of PPP-T-60. The tape shall be evenly applied over the full length of all seams and closures including the manufacturer's joint and extending at least three inches on to each of the end and side panels, as applicable.

5.2.2 Level B. Unit package containers shall be packed in a close fitting container constructed in accordance with [illegible] 636, class domestic, style RSC. (For Army use, class weather resistant boxes shall be used.) Net weight of contents in each shipping container shall not exceed 143 Kg (65 pounds). All flaps of the shipping container shall be securely sealed with an adhesive used commercially for sealing fiberboard boxes by application throughout the entire area of contact between the flaps or by a combination of metal stitching the bottom flaps and sealing the top flaps with adhesive.

5.2.3 Level C. Unit packages shall be bundled or packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest cost. The packed container shall also conform to the rules or regulations applicable to the selected mode of transportation.

5.3 Marking. Each unit and exterior container, including the immediate package, shall be marked in accordance with MIL-STD-129.

5.3.1 Additional marking. Each unit and exterior container shall be marked with the following:

a. lot number

b. date of manufacture

c. CAUTION: The enclosed detector pad is highly sensitive to water and water vapor. Do not open envelope until seconds prior to use. Remove and handle the enclosed detector pad with tweezers. Do not touch with fingers.

6. NOTES

6.1 Intended use. The detector pad covered by this specification is intended for use with Model No. MK II Free Water Detector, MIL-D-81227 or Type III, Detector, Contaminated Fuel of MIL-D-22612. In the presence of free water, the detector pad will fluoresce under ultraviolet light, indicating the degree of water contaminant in aircraft fuel or a similar material.

6.2 Ordering data.

6.2.1 Procurement requirements. Procurement documents should specify the following:

a. Title and number of this specification

b. Quantity of detector pads

c. Level of packing required (see 5.2)

d. Size (see 1.2)

e. Submission of a pre-award or first article sample when required

6.3 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Navy - AS
Air Force - 11

Review activities:
Air Force - 68
DLA - DM

Preparing Activity
Navy - AS
Project No.6640-1070

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