INCH-POUND

MIL-DTL-83054C
20 October 2003
SUPERSEDING
MIL-B-83054B (USAF)
15 August 1973

DETAILED SPECIFICATION

BAFFLE AND INERTING MATERIAL, AIRCRAFT FUEL TANK

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

1. SCOPE

1.1 Scope. This specification covers the requirements for a reticulated polyurethane foam for explosion suppression in aircraft fuel tanks and dry bay areas (cavities).

1.2 Classification. The baffle and inerting material is classified as follows:

Type I Orange, 1.8 lbs/ft^3, nominal 10 pores per inch, polyester

Type II Yellow, 1.3 lb/ft^3, nominal 15 pores per inch, polyester

Type III Red, 1.3 lbs/ft^3, nominal 25 pores per inch, polyester

Type IV Dark Blue, 1.3 lbs/ft^3, nominal 15 pores per inch, polyether

Type V Light Blue, 1.3 lbs/ft^3, nominal 25 pores per inch, polyether

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: WR-ALC/LGECC, 420 Second Street, Suite 100, Robins AFB, GA 31098-1640 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 9330

1.3 Part or Identifying Number (PIN). The PIN is as follows:

M83054 - 1

Type: 1 - Type I - Orange, 1.8 lbs/ft^3, nominal 10 pores per inch, polyester
2 - Type II - Yellow, 1.3 lb/ft^3, nominal 15 pores per inch, polyester
3 - Type III - Red, 1.3 lbs/ft^3, nominal 25 pores per inch, polyester
4 - Type IV - Dark Blue, 1.3 lbs/ft^3, nominal 15 pores per inch, polyether
5 - Type V - Light Blue, 1.3 lbs/ft^3, nominal 25 pores per inch, polyether

Specification

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications 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

DEPARTMENT OF DEFENSE

MIL-PRF-5606	Hydraulic Fluid, Petroleum Base; Aircraft, Missile And Ordnance
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4, JP-5, And JP-5/JP-8 ST
MIL-PRF-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-DTL-27686	Inhibitor, Icing, Fuel System
MIL-DTL-83133	Turbine Fuels, Aviation, Kerosene Types, NATO F-34(JP-8), NATO F-35, And JP-8 + 100

(Unless otherwise indicated, copies of the above specifications are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are 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-D2276	Fuel, Aviation, By Line Sampling, Particulate Contaminant In (DOD Adopted)
ASTM-D3574	Materials, Flexible Cellular-Slab, Bonded, And Molded Urethane Foams (DOD Adopted)
ASTM-D471	Rubber Property-Effect Of Liquids (DOD Adopted)
ASTM-D4986	Standard Test Method For Horizontal Burning Characteristics Of Cellular Polymeric Materials
ASTM-D910	Gasolines, Aviation (DOD Adopted)
ASTM-G23	Materials, Nonmetallic, Operating Light-Exposure Apparatus (Carbon-Arc Type) With And Without Water For Exposure Of (DOD Adopted)

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

Society of Automotive Engineers (SAE)

SAE-J1899	Oil, Lubricating, Aircraft Piston Engine (Ashless Dispersant) (DOD Adopted)

Metals And Alloys In The Unified Numbering System (UNS) (HS-1086) (DOD Adopted)

UNS A97075	Wrought Aluminum Alloy, Heat Treatable

(Application for copies should be addressed to the SAE, 400 Commonwealth Drive, Warrendale, PA 19103-1187.)

3. REQUIREMENTS

3.1 Qualification. The Baffle and inerting material furnished under this specification shall be products authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.1 and 6.3).

3.2 Materials. The raw materials used in processing the baffle and inerting material shall be of the highest quality and standards for commercially available products of this type and shall be of the same formulation as that used in the qualification sample. The end product shall be a flexible urethane foam which is suitable for use in aircraft fuel tanks.

3.2.1 Thermal decomposition. Product toxicological properties relating to thermal decomposition shall be kept to a minimum as to not impose any use restrictions dealing with the safety of personnel.

3.2.2 Tracer element. A tracer element shall be incorporated into the foam formulation of each vendor for identification purposes. The tracer element selected shall be unique to each vendor and shall have a test procedure to identify it.

3.3 Age. The maximum time of delivery from the manufacturer shall not exceed 1 year. If the time since manufacture exceeds 6 months, the baffle and inerting material shall be inspected, and there shall be no evidence of discoloration resulting in surface deterioration. Discoloration of urethane foams with age and exposure to ultraviolet light is a normal occurrence and does not necessarily indicate deterioration.

3.4 Coloring pigments. Coloring pigments shall not be readily extractable when the baffle and inerting material is used in contact with fuels conforming to ASTM-D910, MIL-DTL-5624, and MIL-DTL-83133.

3.5 Infrared spectrum analysis. An infrared spectrum analysis shall be performed as specified (see 4.6.22) to characterize (identify) the baffle material.

3.6 Physical properties and characteristics. The physical properties and characteristics of the baffle inerting material shall be in accordance with table 1.

3.7 Performance.

3.7.1 Fluid immersion. The fluid immersion shall be as specified (see 4.6.17). The baffle material shall not have more than 30% loss in dry tension properties after 8 weeks exposure or more than 50% loss after 24 weeks exposure to grade JP-4 turbine fuel conforming to MIL-DTL-5624 at 160°F (71.l°C). In addition, the type IV and V baffle and inerting materials shall not have more than 60% loss in wet tension properties after 24 weeks exposure at 160° ±5°F (71.1° ±2.8°C) to grade JP-5 turbine fuel. When exposed to grade JP-5 turbine fuel at 200°F (93.3°C) for a period of 4 weeks, the baffle and inerting material shall not have more than 30% loss in dry tension properties. When exposed to grade JP-4 turbine fuel at 75° ±5°F (23.9° ±2.8°C) for a period of 4 weeks, types IV and V baffle and inerting material shall not have more than 60% loss in wet tensile strength, compression load deflection, elongation, and tear resistance as specified (see 4.6.17 f.).

3.7.2 Hydrolytic stability.

3.7.2.1 200°F Temperature exposure. Types I, II, and III baffle and inerting material shall withstand exposure to a temperature of 200° ±5°F (93.3° ±2.8°C) and 95% relative humidity for a period of 4 days with no more than 75% loss in tensile strength. Type IV and V baffle and inerting material shall withstand exposure to 200°F ±5°F (93.3° ±2.8°C) and 95% relative humidity for a period of six weeks with no more than 75% loss in tensile strength (see 4.6.18.1).

3.7.2.2 160°F Temperature exposure. Types I, II and III baffle and inerting material shall withstand exposure to 160° ±5°F (71.1° ±2.8°C) and 95 ±5% relative humidity for a period of 4 weeks with a maximum loss in tensile strength of 95%. Types IV and V baffle and inerting materials shall withstand exposure to 160 ±5°F (71.1°C ±2.8°C) and 95 ±5% relative humidity for a period of 24 weeks with a maximum loss in tensile strength of 50% (see 4.6.18.2).

3.7.2.3 Immersion at 160°F. The type I, II, and III baffle and inerting material shall withstand immersion in pure distilled water at 160° ±5°F (71.l° ±2.8°C) for 4 weeks with maximum loss in tensile strength of 50% (see 4.6.18). Types IV and V baffle and inerting materials shall withstand immersion in pure distilled water at 160° ±5°F (71.1° ±2.8°C) for 24 weeks with maximum loss in tensile strength of 80% (see 4.6.18.3).

3.7.2.4 Dry heat exposure. The material shall withstand exposure to dry heat. Maximum allowable loss in tensile strength shall be 75% after 4 weeks at 250°F (121.l°C) (see 4.6.18).

3.7.3 Flame arrestor characteristics. The minimum acceptable flame arrestor characteristics criteria shall be as follows (see 4.6.19.2):

Single void ignition overpressure limit at 3 psig initial pressure for:

a. Types I, II and IV baffle material at 10 and 20% ignition void: 15 psig maximum.

b. Types III and V baffle material at 30 and 35% void: 15 psig maximum

3.7.3.1 Minimum arrestor thickness. The minimum arrestor thickness (T_m) required to prevent flame propagation for types III and V material shall be:

a. At 0 psig initial pressure and combustion volume of 16.7% shall be 3 inches maximum.

b. At 3 psig initial pressure and combustion volume of 16.7% shall be 5 inches maximum.

3.7.4 Corrosion and adhesion. The baffle material shall neither adhere to nor show any evidence of pitting, erosion, or corrosion to metal plates when exposed in contact with UNS A97075 Aluminum Alloy (7075) as specified (see 4.6.20).

3.7.5 Sunshine. The baffle material shall be exposed to sunshine as specified (see 4.6.21), to determine the loss of tensile strength due to radiation.

3.8 Dimensions and tolerances. Baffle and inerting material shall be in the following size buns:

Type I - 40x80x8 inches

Types II, III, V - 44x110x12 inches

Type IV - 44x110x8 inches

3.8.1 Optional bun sizes. Optional bun sizes of the baffle material may also be produced by the manufacturer provided the following sizes are included: 40x80x8 inch size for types II, III, IV, and V, 44x110x8 inch size for types I, II, III, and IV. Production tolerance limits on bun sizes shall be as follows:

a. Thickness ±1/8 inch

b. Length and width +1,-0 inch

3.9 Identification of product. The baffle material shall be sealed in a clean polyethylene bag as it comes off the production tine. A labeled card shall be provided inside the bag which clearly identifies the manufacturer's part number, date of manufacture, production run number, loaf, and bun number. Where applicable, the government contract or order number shall be included. There shall be no color coding or marking on the bun surface.

3.10 Workmanship. The baffle material shall be fabricated in accordance with high-grade manufacturing practices covering this type of material. The baffle material shall be suitable for its intended use and free of defects which may affect its performance. It shall be of a uniform color and free from excessive voids.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.4).

b. Conformance inspection (see 4.5).

4.3 Test conditions.

4.3.1 Temperature and humidity. Unless otherwise specified herein, all tests shall be conducted under known conditions of temperature and relative humidity. Prior to physical property testing, specimens shall be preconditioned in the test environment a minimum of 30 minutes.

4.3.2 Test fluids. Unless otherwise specified herein, the test fluids shall be of known properties and certified in accordance with the referenced military specification. The turbine fuels conforming to MIL-DTL-5624 may be obtained from the qualifying activity along with a certified test report defining, as a minimum, the specific gravity, distillation, aromatic content, existent gum, sulfur content, Reid vapor pressure (grade JP-4 turbine fuel only), and anti-icing additive level in accordance with MIL-DTL-27686.

4.3.3 Basic property testing. Unless otherwise specified herein, all basic property tests shall be in accordance with the applicable sections specified in Part 28 of ASTM-D3574. In the case where more than one specimen is tested, the average shall be determined. However, all values shall be reported for all but production testing. Unless otherwise specified, all sample specimens shall be tested in the dry condition. In the case where fuel wet testing is required (special tension, tear resistance, and compression load deflection tests) the specimen should be removed from the test fluid immediately prior to property testing, drained of excess fuel, and then tested.

4.3.4 Specimen cutting. Unless otherwise specified herein, specimen cutting shall be by die or saw cutting.

4.4 Qualification inspection (see 6.2).

4.4.1 Samples. The specific bun of material chosen for the qualification tests shall be typical of future production buns in terms of density and porosity (air pressure drop). Unless otherwise specified herein, this bun shall be selected from near the mid range in allowable porosity properties.

4.4.1.1 Specimen section location. All specimens shall be prepared from production material within the test section locations specified herein.

4.4.1.2 For qualification and process control tests. For qualification and process control tests, the test section shall consist of a full-size bun which has been sectioned to provide for all the qualification test samples and test specimens. All qualification test specimens used shall be from the same machine run of production material and from tile specified area defined under 4.6. Where practicable, the material used shall be representative of the mid range in density and pore size (air pressure drop) for the given product.

4.4.1.3 For production and lot testing. For production and lot testing, the test section shall consist of a section approximately 15 inches long by the normal bun height and width which has been processed along with normal production material. Location of the specific test samples within the test section shall be in accordance with the guidelines specified (see 4.6). Specimen measurements shall be in accordance with ASTM-D3574.

4.4.1.4 Quantity of specimens. Unless otherwise specified herein, three specimens per sample shall be tested. The value reported shall be the average of those observed. If any value deviates more than 20% from the average value, two additional specimens shall be tested and the average for all five values shall be reported.

4.4.3 Qualification inspection. The qualification inspection shall consist of all the tests specified (see 4.6).

4.5 Conformance inspections. Quality conformance inspections shall consist of the following tests:

a. Production tests (see 4.5.1)

b. Lot tests (see 4.5.2)

c. Process control tests (see 4.5.3)

d. Examination of product (see 4.6.1)

4.5.1 Production tests. Production tests shall be conducted on each run of material produced (see 6.3.1). The minimum testing frequency shall be every 300 linear feet of types I, II, and III baffle material and every 180 linear feet of types IV and V baffle material. The following production tests shall be conducted:

a. Color test (see 4.6.2)

b. Density test (see 4.6.3)

c. Porosity (air pressure drop) test (see 4.6.4)

d. Tensile strength and elongation tests (see 4.6.5)

e. Entrained solid contamination tests (see 4.6.15)

f. Steam autoclave exposure test (see 4.6.16)

The steam autoclave exposure test specified (see4.6.16) shall be conducted once for each machine run to verify the hydrolytic stability characteristics of the material.

4.5.2 Lot tests. In addition to the production tests specified (see 4.5.1), the compression load deflection test specified (see 4.6.8) and the fuel retention test interval, whichever occurs first. The test results shall be submitted to the qualifying activity for review.

4.5.2.1 Rejection and retest. Failure of any of the test specimens to conform to the applicable requirements in see 3.6 and table I shall require a retest of the property which failed on an additional set of test specimens from the same test section. Additional testing will be authorized by the qualifying activity in order to isolate the extent of defective material. In the event of failure of any of the retested specimens, the material represented by those specimens shall be rejected.

4.5.3 Process control tests. In addition to the production and lot tests, the following tests shall be conducted on production material at 12-month intervals, and the results shall be forwarded to the qualifying activity:

a. Tensile stress test (see 4.6.5)

b. Tear resistance test (see 4.6.6)

c. Fuel and water retention tests (see 4.6.10.1)

d. Flammability tests (see 4.6.11)

e. Volume swell in JP-4 for types IV and V (see 4.6.13)

f. Fluid immersion in JP-4 at 75°F (23.9°C) for 4 weeks (types IV and V) (see 4.6.17)

g. Hydrolytic stability tests for types I, II, and III at 160°F for 6 weeks (see 4.6.18)

h. Hydrolytic stability tests for type IV and V at 200°F for 6 weeks (see 4.6.18.1)

4.5.3.1 Process control samples and data. The following samples, if requested, and production data shall be forwarded to the qualifying activity along with the process control test data:

a. Retention test specimens (4.6.10) and porosity (air pressure drop) test specimens (4.6.4).

b. Samples from the process control bun, size 20x20 inches by the bun height.

c. If requested, a copy of the production test data on all baffle material produced during the previous 12 months.

4.5.3.2. Rejection and retest. Failure of any of the test specimens to conform to the process control requirements specified herein shall require a retest of one additional set of test specimens for the property that failed from the same test section. In the event of failure of any of the retested specimens, production shall be halted and no additional baffle material accepted until the reason for failure has been determined and corrective action taken. The qualifying activity shall be notified of any test failures encountered.

4.6 Test methods.

4.6.1 Examination of product. Each finished bun of material shall be visually inspected for consistency of cell structure, color, complete reticulation, obvious voids, or surface imperfections and the dimensional tolerances specified in 3.8 prior to final packaging. Criteria for rejection of buns shall be any exterior surface defects that could seriously affect the end function of the product, such as:

a. Excessive cleaves, voids, or splits.

b. Holes larger than 0.5 inch diameter and of 0.5 inch depth, not to exceed four per bun and no closer than 2 feet.

c. Level of non-reticulation not to exceed 0.43% of the total surface area or 0.07% of the total volume, based on the standard size bun.

4.6.2 Color test. Testing for color shall be by visual analysis. The baffle material shall be of a uniform bright color as specified in table I. Any unusual color variations over the foam surface shall be cause for rejection, especially distinct surface darkening due to dirt, contamination, or surface deterioration.

4.6.3 Density test. One test specimen shall be tested in accordance with ASTM-D3574 (Suffix W). Specimen size shall be 3x7x10 inches, such that the 3-inch dimension is in the direction of the width (see 6.3.3) and the 7-inch dimension is in the direction of rise (6.3.4) of the test section. The results shall be reported to the nearest 0.1 pound per cubic foot.

4.6.4 Porosity (air pressure drop) test. The pore size shall be determined by the air pressure drop technique specified herein. Two specimens for each production and lot sample shall be run. For qualification, three specimens shall be tested. The cylindrical specimen shall be 10 inches in diameter by 1 $\pm$0.02 inch thick, where the 1-inch dimension is in the height direction of the test section. For production and lot testing, the porosity test specimens shall be taken within the top and bottom three inches of the test section heist (foaming height). For qualification testing, the three specimens shall be taken from the same location but from the upper, middle, and lower portions of the bun height. Pressure drop measurements shall be made using a porosity test jig (see figure 1 for details) which has been properly calibrated. Calibration shall be conducted on a daily basis using a special pressure drop screen in order to determine the reference setting for the orifice differential manometer. Prior to sample testing, both manometers shall be adjusted to zero with no airflow. The specimen shall then be inserted into the sample holder until it is properly seated into the cutout. The blower shall be started and the

airflow set to coincide with the daily reference calibration setting on the orifice differential manometer. Next read the sample pressure drop (uncorrected) to the nearest 0.005 inch on the 4-inch manometer (designated sample differential). The value shall then be corrected for thickness (if other than 1.00 inch thickness) by dividing it by the measured sample thickness. This corrected air pressure drop shall then be compared to the porosity curve (figure 2) in order to determine the average pore size for the sample specimen. The sample pressure drop and average pore size shall be reported. Note: The porosity values shown on figure 2 are assigned and do not necessarily relate directly to the actual number of pores per lineal inch.

4.6.5 Tensile strength, tensile stress, and ultimate elongation tests. Tension tests including tensile strength, tensile stress at 200% elongation, and ultimate elongation shall be conducted in accordance with ASTM D 1564-71 entitled: "Die for Stamping Tension Specimens". The approximate size of the dry specimen shall be *5.5* by 1 by 0.5 inches thick. For all but qualification, three specimens per sample shall be tested. If any value deviates more than 20% from the average, two additional specimens shall be tested and the average of all five reported. For qualification, 10 specimens shall be tested and all values reported. In addition, a copy of the recorded traces shall be included in the test report. The tensile strength and stress shall be reported in pounds per square inch, and ultimate elongation in percent. Tension specimens shall be taken from the upper half of the test section, and the orientation shall be such that the 1/2 inch dimension is always in the direction of rise (see 6.3.4) and the largest dimension (5.5 inches) is always in the machine direction (see 6.3.5). For special fuel wet tension tests the specimens shall be identical to those for dry testing. Specimen cross sectioned areas shall be measured on the dry specimen prior to test fluid exposure and recorded for later usage. When testing the specimen should be removed from the fluid prior to tension tests, drained, and immediately tested. Do not allow the sample to air dry as it will drastically affect the test results. Original dry specimen measurements taken prior to fluid exposure shall be used for calculating the wet tensile strength.

4.6.6 Tear resistance test. Three specimens shall be tested, in accordance with ASTM-D3574 (suffix G) using a crosshead speed of 20 inches per minute. Dry specimen size shall be 6x1x1 inch where the 6-inch dimension is in the machine direction and the slit cut is parallel to the direction of rise. The tear resistance shall be reported in pounds per lineal inch of thickness. Specimens shall be cut from l-inch thick slabs of material. For fuel wet tear resistance tests the specimen shall be tested immediately after removal from the fluid. Original dry specimen measurements taken prior to fluid exposure shall be used for calculating the wet tear resistance.

4.6.7 Constant deflection compression set test. Three specimens shall be tested in accordance with method B of ASTM-D3574 at a 50% deflection. Sample size shall be 4x4x3 inches. The three specimens shall be cut from the same 3-inch-thick slab located in the middle of the test section (bun) height and adjacent to the specimens used in the compression load deflection test specified (see 4.6.8). The specimens shall be tested (compressed) in the direction of rise (3-inch dimension). Results for all specimens shall be reported in percent of original thickness.

4.6.8 Compression load deflection test. Three specimens shall be tested in accordance with ASTM-D3574 (suffix D) at the 25- and 65- percent deflection level after 1 minute at each deflection point. Specimen size shall be 4x4x3 inches and taken near the middle of the bun height such that the 3-inch dimension is in the direction of material rise. New material shall be aged for a minimum of 96 hours following thermal reticulation prior to compression load deflection testing. Tests shall be conducted in the direction of material rise. Prior to testing, the specimens shall be preflexed twice to 80% compression. A copy of the recorded traces for each test shall be included in the test report and results reported in pounds per square inch. For wet compression load deflection properties the test specimen shall be tested immediately after removal from the fluid. The original dry specimen measurements taken prior to fluid exposure shall be used for determining the wet compression load deflection properties.

4.6.8.1 Load deflection curve. For qualification and process control testing, load deflection curves shall be recorded for the specimens specified (see 4.6.8) during both preflexing up to 80% deflection. The recorded curves shall be submitted to the qualifying activity with the test specimens as specified herein.

4.6.9 Fuel displacement test. One sample per test shall be run using grade JP-5 turbine fuel conforming to MIL-DTL-5624, and the average reported as the fuel displacement. The test shall be conducted at standard conditions using a standard 1,000 mi capacity cylinder having l 0- to 20- mi graduations. Each specimen shall be cut into a cylindrical shape having a diameter approximately equal to that of the graduated cylinder and a length sufficient to fill the test cylinder to the 900-ml mark. Specimens shall be cut in the direction of the material rise (bun height). Fuel shall be added to the 900-mi mark in the graduated cylinder and the specimen slowly added until it is completely immersed. The specimen shall be immersed for a period of 24 hours to obtain maximum swelling effects. The new fluid level shall be noted and the increase in milliliters shall be recorded. The displacement shall be calculated as follows:

$$\text{percent Volume Displacement} = \frac{\text{milliliters increase x 100}}{\text{original fluid volume}}$$

4.6.9.1 Calculated fuel displacement. The theoretical volume replacement of the material as calculated from the following formula and based on the material density specified (see 4.6.3) shall be reported:

$$\text{percent displacement (volume)} = \frac{\text{material density (lbs/ft}^3\text{)x100}}{\text{density of polyol(s) polymer (lbs/ft}^3\text{)}}$$

4.6.10 Fuel and water retention tests.

4.6.10.1 Fuel retention tests. Fuel retention shall be determined on a 6x6x6 inch specimen using grade JP-5 turbine fuel conforming to MIL-DTL-5624 having a specific gravity of 0.788 to 0.845. Four specimens shall be cut from the center of the test section (bun) height directly adjacent to each other. These shall be identified at the top surface, and two each shall be identified for the fuel retention test specified herein and the water retention test specified (see 4.6.10.2). A porosity test specimen shall be taken directly above the type I materiel retention specimens and tested as specified (see 4.6.4) to

establish the effective porosity. For types II, III, IV and V material, porosity specimens shall be taken directly above and below the retention specimens and tested as specified (see 4.6.4). All retention and porosity (air pressure drop) specimens shall be properly labeled on the top surface and submitted to the qualifying activity if requested. One fuel retention specimen shall be tested in accordance with the following procedure, and all applicable data shall be recorded:

a. The specimen shall be preconditioned at a temperature of 75° ±5°F (23.9° ±2.8°C) for a minimum of 30 minutes, weighted to the nearest 0.1 gram, and the dimensions measured in accordance with ASTM-D3574. The grade JP-5 test fluid shall be prefiltered through a 0.8-micron filter as specified (see 4.6.15) and then adequately preconditioned at the test temperature. Just prior to use, the fluid shall be tested for specific gravity (density') and temperature.

b. The retention test apparatus shall be sized to approximately 7x7x10 inches and shall have a means of draining the fuel from the bottom at the rate of 500 ±50 cc/minute. The draining drop rate in this particular apparatus should approximate 0.5 inch per minute. The test fluid shall be charged in the container to a level which corresponds to approximately 0.5 inch above the top of the specimen.

c. Next, the specimen shall be slowly placed into the container such that the specimen is oriented in the direction of rise (bun height) and supported off the bottom of the container by two glass rods and spaced 0.5 inch from all sides of the container. Fuel shall then be drained at the prescribed rate until flow ceases and the specimen then allowed to drain in this position for an additional 2 minutes.

d. The specimen shall then be carefully removed from the container and weighed to the nearest 0.1 gram. Care should be taken not to spill the fluid from the bottom surface of the specimen when removing from the test rig. Using the specimen weights before and after fluid wetting in grams, specimen volume in cubic centimeters, and fuel density in grams per cubic centimeter, the percent volume retention shall be calculated as follows:

$$\text{percent retention} = \frac{(\text{wet specimen weight-dry specimen weight})\text{x}100}{\text{specimen volume x density of fuel}}$$

e. All values, including test fluid temperature, shall be reported.

4.6.10.2 Water retention test. Using one water retention specimen specified (see 4.6.10.1), the volume percent retention shall be determined using the same procedure. The test fluid shall be unused distilled water which has been tested for temperature and density just prior to use. CAUTION: Do no run more than two tests per batch of water.

4.6.11 Flammability test. Five specimens shall be tested in accordance with the procedures specified in ASTM D-4986. Specimen size shall be 6x2x05 inches. Flammability specimens shall be taken from the upper half of the test section, and the orientation shall be such that the 6-inch dimension is in the machine direction (length) and the 1/2 inch dimension is in the direction of rise (height). All test values shall be reported and the average flammability shall be calculated in inches per minute.

4.6.12 Extractable material test. The extractable material test shall be conducted on one test specimen. The specimen size shall be 1x1x2 inches and cut by means of a saw or die. Preconditioning of the specimen shall include drying at 90°C (194°F) for 15 minutes and then cooling the specimen in a desiccator for a minimum of 30 minutes. Immediately following the preconditioning, the specimen shall be weighed to the nearest 0.10 milligram. The specimen shall then be placed in a 60 ml volume Soxhlet extraction tube which is connected to a water-jacketed condenser. Several standard boiling stones and 0.125 ml of type III test fluid conforming to ASTM-D471 shall be added to a 250 ml florence flask and the flask attached to the extraction tube. The heating unit shall be activated and the fluid allowed to reflux for a period of 3 hours. Following reflux, the specimen shall be removed, dried at 194°F (90°C) for 15 minutes, cooled in a desiccator for 30 minutes and then weighed. The percentage of extractable material shall be calculated as follows:

$$\text{Percent extractables} = \frac{(\text{original specimen weight - final weight})\text{x}100}{\text{original specimen weight}}$$

4.6.13 Volume swell test. One specimen for each test fluid shall be tested for volume changes after immersion for 24 hours at 75±5°F (23.9°±2.8°C) in type I test fluid conforming to ASTM-D471, type III test fluid conforming to ASTM-D471 and grade JP-4 turbine fuel conforming to MIL-DTL-5624. Sample size shall be 6x6x6 inches. The samples shall be taken from the same approximate location in the test section as the retention test specimens specified (see 4.6.10). Dry and wet measurements shall be made on the test specimens in accordance with ASTM-D3574. Following immersion, the specimens shall be removed and immediately measured wet for the final volume. All values for the specimen including original and wet volumes shall be reported and the percentage volume increase from the original and wet measurements shall be calculated.

4.6.14 Low temperature flexibility test. Three 2x0.5xl2 inch specimens shall be preconditioned in air along with a 3-inch diameter rod to a temperature of -55°F (-48.3°C) for 1 hour. Each specimen shall be cut such that the 12-inch dimension is in the machine direction. At the end of the conditioning period and without removing the specimens from the chamber, each specimen shall be bent around the rod. Any evidence of breaking or cracking of foam strands shall be cause for failure.

4.6.15 Entrained solid contamination tests. Solid contamination tests shall be conducted on a hot-wire-cut cylindrical specimen having dimensions of 9.25 inches in diameter and 8 inches in height. The 8-inch dimension shall be cut in the direction of rise (bun height). For material having more than 8 inches in bun height, the specimen shall be taken from the lower portion of the test section. Testing shall be conducted using a U.S. Testing Company model 6523 dry cleaning machine having a tumbler rotation speed of 45 rpm. The specimen shall be positioned in the center of the tumbler. The test cycle shall be

5 minutes using a 4-liter charge of type I fluid conforming to ASTM-D471 which has been prefiltered through a 0.8 micron Millipore Filter Corporation filter. Upon completion of the test cycle, the specimen shall be positioned slightly above the fluid level and allowed to drain for 5 minutes prior to removal. The test fluid shall then be tested for level of solid contamination in accordance with Appendix A2 (laboratory filtration) of ASTM-D2276 (see 6.4.2). Following filtration of the test fluid and just prior to removal of the filter pad from the apparatus, the filter and contamination shall be neutralized of static charge with a air deionizer (see 6.5). This step should help to reduce the loss of particles from the filter pad during transfer to the drying oven. Each Millipore filter used shall be dried at 194°F (90°C) for a minimum of 15 minutes and then cooled for a minimum of 15 minutes. A minimum of one control filter shall be run for each set of samples. Test results shall be reported in milligrams per cubic foot of material.

4.6.16 Steam autoclave exposure test. Testing shall be conducted in accordance with ASTM D 1564 steam autoclave test, condition B, for types I, II, III, IV, and V materials. Types I, II, and III shall be tested for 5 hours at 250° ±5°F (121.1° ±2.8°C), and types IV and V shall be tested for 10 hours at 250° ±5°F (121.1° ±2.8°C). Tension tests as specified (see 4.7.4) shall be conducted on five control specimens and five exposed specimens. Prior to testing, exposed specimens shall be post-dried for 30 minutes at 160°F (71.l°C) and then cooled at room temperature for 30 minutes. For all but production testing the results for tensile, stress, and elongation shall be reported before and after exposure, and the average percent change in tensile strength calculated. For production, the average values for tensile strength and elongation before and after exposure shall be reported as well as the percent change in tensile strength.

4.6.17 Fluid immersion tests. Fluid immersion tests shall be conducted on the baffle material under the following conditions (see 3.7.1):

a. Grade JP-5 turbine fuel conforming to MIL-DTL-5624 for 4 weeks at 200° ±5°F (93.3° ±2.8°C).

b. Grade JP-4 turbine fuel conforming to MIL-DTL-5624 for 24 weeks at 160° ±5°F (71.1° ±2.8°C).

c. Hydraulic fluid conforming to MIL-PRF-5606 for 4 weeks at 160° ±5°F (71.1° ±2.8°C).

d. Lubricating oil conforming to MIL-PRF-7808 for 4 weeks at 160° ±5°F (71.l° ±2.8°C).

e. Grade 1100 lubricating oil con forming to SAE-J1899 for 4 weeks at 160° ±5°F (71.1° ±2.8°C).

f. Grade JP-4 turbine fuel conforming to MIL-DTL-5624 for 4 weeks at 75°F (23.9°C) (type IV and V foam only).

4.6.17.1 Fluid immersion tests. Tests in accordance with 4.6.17.a through e shall be conducted in loosely capped jars using approximately 900 ±25ml of fluid for each six specimens (types I, II, III foams) and for each nine specimens (types IV, V foam) for each sampling frequency. Specimens shall be taken from the upper half of the test section as specified (see 4.6.5). The testing frequency for each condition shall be every 4 weeks. The grade JP-4 and JP-5 turbine fuels shall include three specimens tension-tested as specified (see 4.6.5), three specimens tested in accordance with the steam autoclave exposure test as specified (see 4.6.16) and in the case of the types IV and V foams three additional specimens shall be tension-tested while fuel wetted as specified (see 4.6.5). Prior to dry tension and steam autoclave testing, the specimens shall be rinsed in petroleum ether, dried for 30 minutes at 160°F (71.l°C), and cooled at room temperature. Wet tension tests shall be run immediate/y after removal from the test fluid. Alt values for original, final (dry and wet), and percent change of tension properties shall be reported.

4.6.17.2 Fuel (JP-4) immersion. Fuel (JP-4) immersion specified (see4.6.17 f.) shall be accomplished in containers sufficient to provide complete immersion for all tension, CLD, and tear specimens. Following the 4-weeks exposure at 75°F (23.9°C) (room temperature), three each specimens shall be immediately tested for wet tension properties as specified (see 4.6.5), wet compression load deflection properties as specified (see 4.6.8) and wet tear resistance properties as specified (see4.6.6). All values and averages shall be reported and the percentage change from the original dry test properties shall be calculated.

4.6.18 Hydrolytic stability tests.

4.6.18.1 200°F Temperature exposure. The baffle material shall be exposed to 200° ±5°F (93.3° ±2.8°C) and 95 ±5% relative humidity until failure. Types I, II, and III baffle material shall be exposed for 8 days (or failure) and testing frequency shall be at 2, 4, 5, 6, 7, and 8 days; and thereafter, 1 day intervals. Types IV and V baffle material shall be exposed for 24 weeks (or failure) and testing frequency shall be at 1, 2, 3, 4, 5, 6, and 8 weeks; and thereafter, 2 week intervals. Tests shall be conducted in loosely capped glass jars using 50 mls of distilled water for each 900 mls of container volume and nine (maximum) tension specimens for each sampling jar. Specimens shall be supported above the water and the water level maintained throughout the test. A minimum of two specimens for each exposure time shall be tension tested.

4.6.18.2 160°F Temperature exposure. The baffle material shall be exposed to 160° ±5°F (71.1° ±2.8°C) and 95 ±5% relative humidity. Types I, II, and III baffle material shall be exposed for 6 weeks (or failure) and testing frequency shall be 2, 3, 4, 5, and 6 weeks, and thereafter, 1 week intervals until failure. Types IV and V baffle material shall be exposed for 24 weeks (or failure) and testing frequency shall be at 4 week intervals. Tests shall be conducted in either a humidity cabinet or loosely capped jars with 50 mls of distilled water for each 900 mls of container volume. Three tension specimens shall be tested for each sampling frequency.

4.6.18.3 Immersion at 160°F. The baffle material shall be immersed in pure distilled water at 160° ±5°F (71.1° ±2.8°C). Types I, II, and III baffle material shall be immersed for 6 weeks (or failure) and testing frequency shall be at 2 week intervals until failure. Types IV and V baffle material shall be immersed for 24 weeks (or failure) and testing frequency shall be a 4 week intervals until failure. Three specimens shall be tested for each sampling frequency. Testing shall be conducted in loosely capped jars using 900 ±25 mls of water for each nine tension specimens.

4.6.18.4 Dry heat exposure. The baffle material shall be exposed to dry heat at 250° ±5°F (121.1° ±2.8°C). Baffle material shall be exposed for 8 weeks and testing frequency shall be at 2 week intervals. A minimum of two tension specimens shall be tested for each sampling frequency.

4.6.19 Flame arrestor tests. The flame arrestor characteristics of the baffle material shall be defined using a small scale flame tube type apparatus having a minimum total volume of 5 cubic feet and a 100 square inch cross sectional area. The following parameters shall be satisfied in all the testing:

a. Stoichiometric propane/air mixture (4.5 to 5.2 volume percent propane) verified by bomb sampling.

b. Spark ignition source having a minimum of 0.25 millijoules energy

c. Dry arrestor material

d. Minimum instrumentation shall include: pressure rise, combustion temperature indication, and visual, photographic, or photocell indication of flame penetration downstream of arrestor.

e. Combustion relief area shall be 80% of cross-sectional area or greater. The material used for the testing shall be taken from a given bun which has been sufficiently tested to establish its air pressure drop (porosity) characteristics. The material shall always be oriented in the test apparatus to permit flame penetration in the direction of porosity testing (direction of rise or bun height).

If possible, baffle material used shall be in the lower half of the air pressure drop range. For example type I: 0.190 to 0.235; type II: 0.140 to 0.185; type III: 0.250 to 0.290; type IV: 0.140 to 0.185; type V: 0.250 to 0.290 inch of water.

4.6.20 Material oversize. The material shall always be slightly oversized, 2% maximum when installed and restraints used to avoid arrestor movement during testing. The combustible mixture on each test shall be verified by bomb sampling and shall meet the minimum criteria for pressure rise, see figure 3.

4.6.21 Testing. The following testing shall be conducted and all data results shall be reported for each test condition (see figure3 for typical flame arrestor apparatus):

4.6.21.1 Single void ignitions. Single void ignitions shall be conducted at 3 psig (17.6 psia) initial pressure with percent combustion volumes (percent V_c) of:

a. Types I, II, and IV: 5, 10, 15, 20, 30, 40, and 50 volume percent

b. Types III and V: 10, 20, 30, 35, 40, 50, and 60 volume percent

A minimum of one test shall be conducted for a given condition and all data such as bomb and system pressure rise, test temperature, extent and location of arrestor damage, and any other related information shall be submitted to the qualifying activity. A plot of pressure rise versus (percent) combustion volume shall be submitted for each initial pressure condition. Repeat test may be conducted on the material provided the damaged (burned) arrestor is replace after each test. All tests shall be conducted at standard temperatures and conditions.

4.6.21.2 Arrestor volume. The amount of arrestor (thickness) required to prevent flame propagation from V_c to V_v. when the combustion volume (V_c) is set at 9.1 and 16.7 volume percent and 0 and 3 psig initial pressures shall be determined. Testing shall be conducted at 1 inch thick intervals and at the minimum required arrestor thickness (T_m), a minimum of two tests shall be conducted. Repeat tests may be run only if material is undamaged. All data including system and bomb pressure rise, test temperatures, extent and location of arrestor damage, and any other related information shall be reported. The ratio of arrestor volume to combustion volume or V_a/N_c shall be calculated for each minimum arrestor thickness (T_m).

4.6.22 Corrosion and adhesion test. One 4x3x3 inch baffle material specimen cut such that the 4 inch dimension is in the direction of material rise shall be exposed in contact with 7075 aluminum alloy in accordance with specification UNS A97075 for 14 days at 75° ±5°F (23.9° ±2.8°C) (room temperature) and 95 ±5% relative humidity.

4.6.22.1 Surface finish. Two sets of metallic plates shall be used having a surface finish of 5-15 micro-inch finish obtained by lapping. The roughness shall he determined by a profilometer or equivalent instrument. The roughness reading is the arithmetical average (AA) of the deviations in the surface expressed in micro-inches measured normal to the surface. For these tests the surface finish should be as follows:

5-15 micro-inch measure perpendicular to the lay at a roughness-width cutoff rating of 0.030 inch and a maximum roughness-width rating of 0.015 inch. One set shall be clamped together with the baffle material specimen such that the baffle material is compressed from 4 to 3 inches in thickness in contact with the polished surfaces. This set along with the extra plates (controls) shall then be exposed for 14 days at room temperature and 95 ±5% relative humidity in a sealed container or humidity cabinet. Test specimens should be oriented such that the metal plates are vertical in order

to minimize moisture condensation and pooling on the plate surfaces. At the termination of the test, there shall be no adhesion of the baffle material :o the metal plates nor shall there be any evidence of pitting, erosion, corrosion, or bad discoloration as a result of the material contact, as determined by the following procedures. The basis for the comparison shall be the exposed set of control plates.

a. The surfaces of the plates which were in contact with the material shall be inspected for such things as discoloration, deposits, and pitting. If any of these conditions exists, the surface of the plates shall be washed in precipitation naphtha. Deposits determined as urethane materials or elements there from which can be removed by this process shall be construed as adhesion.

b. If any other marks remain on the surface of the plates after being washed in precipitation naphtha as specified (see 4.6.20(a)), the surfaces shall be lightly polished with a nonabrasive cloth buff. Any pits or eroded marks remaining after this process shall be construed to be corrosion. Discoloration or staining (marks which do not physically affect the surface of the plates and which easily wash off or buff off) shall not be considered detrimental.

4.6.23 Sunshine test. The baffle material shall be tested for up to 100 hours exposure to the accelerated weathering produced by a carbon arc lamp in accordance with ASTM-G23. Five samples (slabs) of material, approximately 8x2x2 inches thick, shall be cut from the upper one-third of the test section and adjacent to or near the qualification test specimens as specified (see 4.6.5). These five samples shall be exposed for test periods of 20, 40, 80, and 100 hours of continuous spectral radiation. Sample slabs shall be positioned such that the radiation source is directed at the top surface. At the end of each test period, a sample shall be cut into four ½ inch thick slabs, identified, and each slab subjected to the tension tests specified (see 4.6.5) using as many dumbbell specimens as a sample slab will provide. All values shall be reported, and the percent loss in tensile strength for a given exposure time and depth shall be calculated. In addition, the extent and depth of visible discoloration to each sample slab shall be reported. Test specimens and any unused exposed material shall be forwarded to the qualifying activity for examination. All details relating to the test condition and equipment used shall be provided including model numbers, type of carbon arc sources, filters, distance of sample slabs from the light source, sample (drum) rotation speed, test temperature, and humidity.

4.6.24 Infrared spectrum analysis test. The baffle material shall be characterized (identified} by an infrared spectrometer using a frustrated multiple internal reflectance (FMIR) technique. The spectrum shall be of such detail as to clearly distinguish it from a standard polyether foam. A reference polyether spectrum shall be included for comparison. The following criteria shall be satisfied where applicable:

a. Baseline of the spectrum determined at 5 microns wavelength shall be a minimum of 95% transmittance.

b. Scan speed shall be such as to obtain optimum resolution.

c. A 45° KRS-5 prism, Perkin-Elmer Corporation part number 186-1595, or equivalent and FMIR attachment, Perkin-Elmer Corporation part number 186-0174, or equivalent shall be used to maintain the specimen for analysis. All equipment used as well as details of test procedure and instrument settings such as scan speed, slot opening shall be identified for future reference.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The baffle material covered by this specification is intended for use in aircraft fuel tanks using gasoline or kerosene type fuels at temperatures from -55° to 160°F (-48.3° to 71.1°C) for explosion and fire suppression. Types IV and V baffle material maybe used in dry bay areas (cavities) up to 160°F (71.1°C) (vapor). Temperatures greater than 160°F (71. 1°C) and high humidity conditions will shorten the service life. Use of types I, II, and III baffle material in dry bay areas is not recommended.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of the specification.

b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Type baffle material required (see 1.2) and size (see 3.8)

e. Location and conditions for testing (see 4.4)

d. Packaging requirements (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-83054, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from WR-ALC/LGEC, 420 Second Street, Suite 100, Robins AFB, GA 31098-1640.

6.4 Subject term (key word) listing.

Density test
Fluid immersions
Hydrolytic stability
Porosity
Thermal decomposition
Tracer element

6.5 Storage life. The storage life of the baffle material covered by this specification is not limited, provided it is maintained in the original sealed polyethylene bag plus opaque over wrap at temperatures below 90°F (32.2°C). Storage should be in an area out of direct sunlight and outside weather, including high humidity and temperature. The material should be inspected for evidence of discoloration or surface deterioration (loss in tensile properties) prior to use.

6.5.1 Electrostatic compatibility. The user is cautioned that due to their low electrical conductivity properties, the baffle materials covered by this specification can generate static electricity during certain aircraft fuel system operations. Electrostatic discharges can be generated when fuel or a fuel/air mixture (mist) is directly impinged upon the foam. This charging mechanism is more conducive when the fuel has a low electrical conductivity property. Special consideration should be given when designing the foam kit to ensure that direct impingement of fuel or fuel/air mixture is eliminated. Electrostatic compatibility of the foam kit design should be verified through tests using a turbine fuel with low electrical conductivity properties.

6.5.2 Entrained solid contamination tests. May also use, 5-23, 5-24, and 5-47 through 5-52 of T.O. 42B-1-1.

6.5.3 Air deionizer. An available source for the model 2U500 air deionizer is the Nuclear Products Company, 2519 N. Merced Avenue, South El Monte, CA 91733

6.6 Definitions.

6.6.1 Run of material. Any continuous batch of product or a machine run produced over any continuous time period, the maximum run time being a 12-hour period. When production is interrupted for 2 or more hours, this will constitute a new run.

6.6.2 Lot. Fifteen machine runs of product.

6.6.3 Test section width. The standard width direction on a bun (40 or 44 inches).

6.6.4 Direction of rise. The height direction relative to the standard bun (the 8- or 12-inch direction).

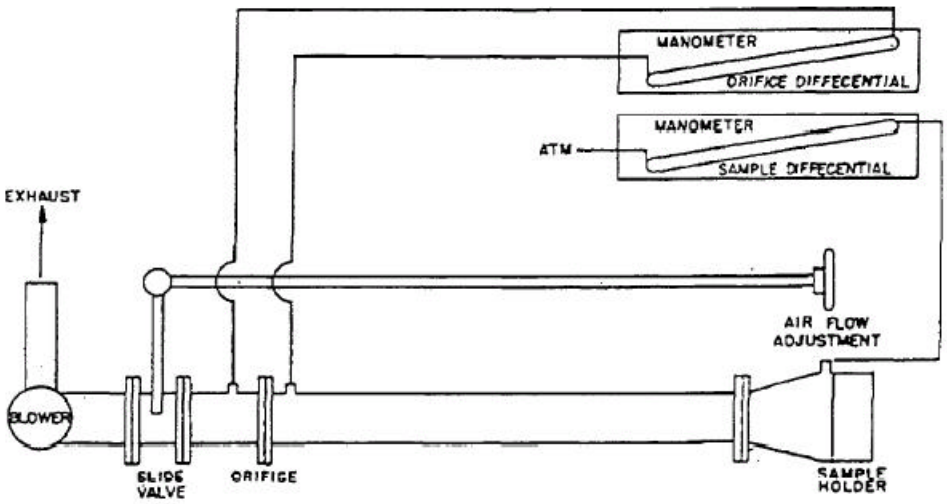
6.6.5 Machine direction. The lengthwise direction during production or the longest dimension relative to the standard bun size.

6.7 Air deionizer. An available source for the model 2U500 air deionizer specified (see 4.6.15) is the Nuclear Products Company, 2519 N. Merced Avenue, South El Monte, CA 91733.

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

TABLE I. Physical properties and characteristics.

Property	Requirements					Test
Color	Type I Orange	Type II Yellow	Type III Red	Type IV Dark Blue	Type V Light Blue	4.6.2
Density range (lb/ft^3)	1.70-2.00	1.20-1.45	1.20-1.45	1.20-1.45	1.20-1.45	4.6.3
Porosity. (Air pressure drop)	7-15	8-18	20-30	8-18	24-34	4.6.4
Air Pressure drop (inches of water	0.190-0.285	0.140-0.230	0.250-0.330	0.140-0.230	0.270-0.370	4.6.4
Tensile strength (psi)	15 (Min)	15 (Min)	15 (Min)	10 (Min)	15 (Min)	4.6.5
Tensile stress at 200 percent elongation (psi)	10 (Min)	10 (Min)'	10 (Min)	---	---	4.6.5
Ultimate elongation	220 (Min)	5 (Min)	5 (Min)	3 (Min)	3 Min)	4.6.6
Tear resistance (Pounds per inch	5 (Min)	220 (Min)	220 (Min)	100 (Min)	100 (Min)	4.6.5
Constant deflection compression set (Percent)	30 (Max)	35 (Max)	35 (Max)	30 (Max)	30 (Max)	4.6.7
Compression load deflection at 25 percent deflection (psi)	0.40 (Min)	0.30 (Min)	0.30 (Min)	0.35 (Min)	0.35 (Min)	4.6.8
65 percent deflection (psi)	0.60 (Min)	0.50 (Min)	0.50 (Min)	0.60 (Min)	0.60 (Min)	
Load deflection curve from 0 to 80 percent deflection	Report	Report	Report	Report	Report	4.6.8.1
Fuel displacement (Volume - percent)	3.0 (Max)	2.5 (Max)	2.5 (Max)	2.5 (Max)	2.5 (Max)	4.6.9
Fluid retention (Volume - percent) Fuel	2.5 (Max)	2.5 (Max)	5.0 (Max)	2.5 (Max)	5.0 (Max)	46. I0
Water	Report	Report	Report	Report	Report	4.6.10.1
Flammability (Inches/Minute)	10 (Max)	15 (Max)	15 (Max)	15 (Max)	15 (Max)	4.6.11
Extractable materials (Weight Percent)	3.0 (Max)	3.0 (Max)	3.0 (Max)	3.0 (Max)	3.0 (Max)	4.6.12
Volume increase after fluid age (Volume-percent)						
Type I fluid	0-5	0 - 5	0 - 5	0 - 15	0 - 15	4.6.13
Type III fluid	0- 12	0- 12	0- 12	0- 37	0 - 37	4.6.13
Grade JP-4 turbine fuel	0 - 10	0 - 10	0 to l 0	0 - 25	0-25	4.6.13
Low temperature flexibility	No cracking or Breaking of Strands					4.6.14
Entrained solid contamination (Milligrams/cubic foot) Steam	11.0 (Max)	11.0 (Max)	11.0 (Max)	11.0 (Max)	11.0 (Max)	4.6.15
autoclave exposure (Maximum Tensile Loss in Percent)	40 (Max)	40 (Max)	40 (Max)	30 (Max)	30 (Max)	4.6. I6



NOTE: FOR DETAILS, SEE SCOTT PAPER COMPANY DRAWING YH102-067X 54, EQUIVALENT.

FIGURE 1. Porosity test jig.

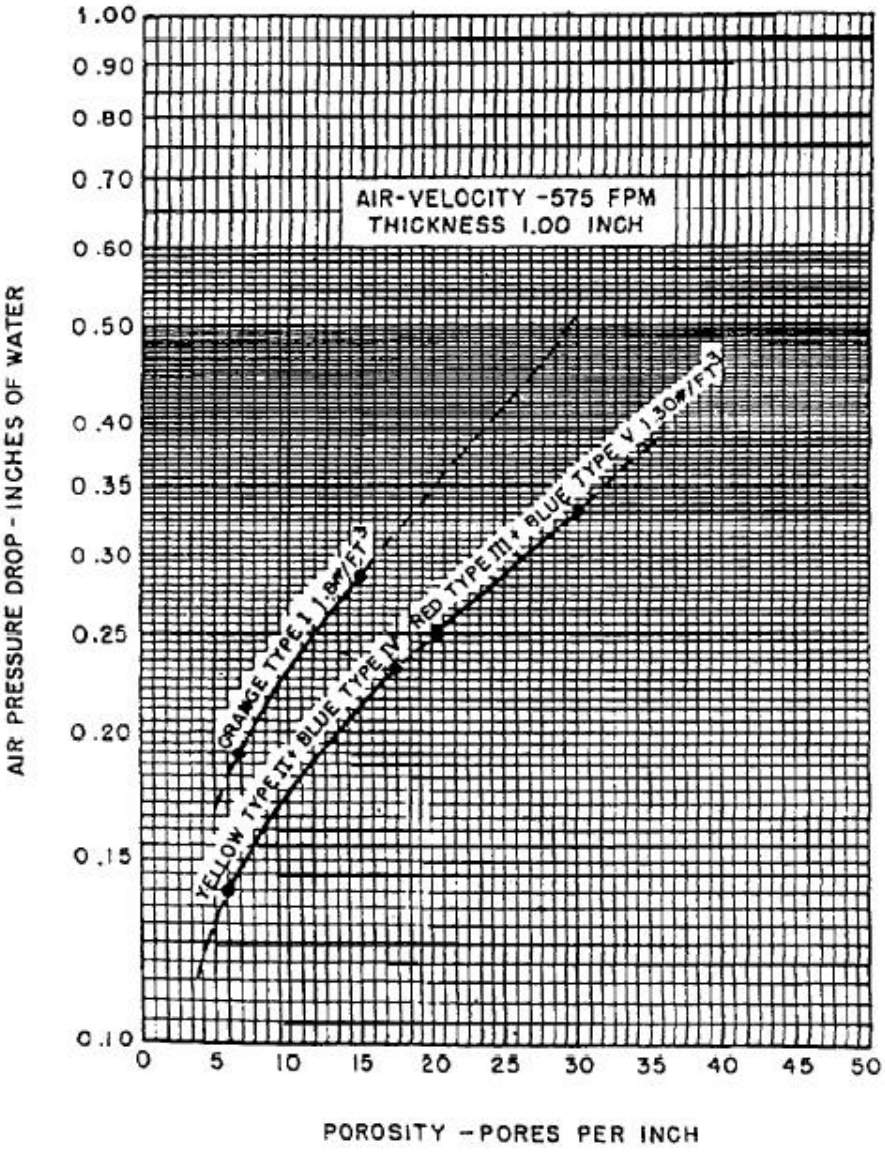


FIGURE 2. Porosity curve.

$P_{(min)} = (8xP_0)$ 0.7 where P_o = initial pressure of system in psia. The following definition shall apply (see figure 3):

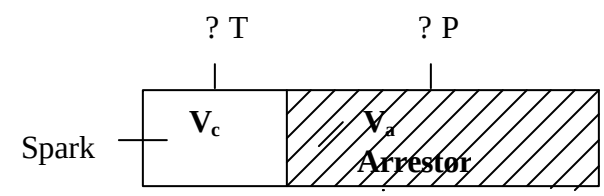
V_c = combustion (ignition) volume

V_a= arrestor volume

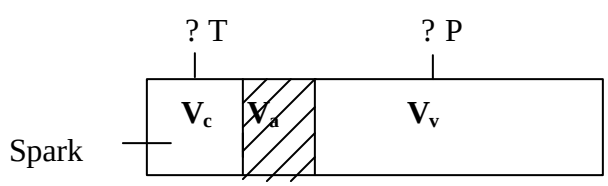
V_V = void volume downstream of arrestor

V_r = relief volume = V_a+ V_v
V_t = total volume of apparatus = V_c+ V_r

T_m = minimum arrestor thickness required to prevent flame propagation from V_a to V_v



(a) Typical set-up for single void ignitions



(b) Typical set-up for arrestor thickness tests

FIGURE 3. Flame arrestor apparatus

Custodian:
Air Force - 99
DLA - IS

Preparing Activity
Air Force - 84

Agent:
Air Force - 99

(Project 9330-0174)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-DTL-83054C	2. DOCUMENT DATE *(YYYYMMDD)* 20031020

3. DOCUMENT TITLE
BAFFLE AND INERTING MATERIAL, AIRCRAFT FUEL TANK

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include ZIP Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) DSN *(If applicable)*	**7. DATE SUBMITTED** *(YYYYMMDD)*

8. PREPARING ACTIVITY

a. NAME WR-ALC/TILCC	b. TELEPHONE *(Include Area Code)* (1) Commercial 478-926-1183 (2) DSN 468-1183
c. ADDRESS *(Include ZIP Code)* 420 Second Street, Suite 100 Robins AFB, GA 31098-1640	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703) 767-6888 DSN 427-6888