INCH-POUND

MIL-PRF-32148(NAVY)
25 July 2005
SUPERSEDING
MIL-PRF-15618G(IN PART)
7 January 2002

PERFORMANCE SPECIFICATION

FILTER SEPARATOR ELEMENTS, FLUID, PRESSURE, AVIATION AND DISTILLATE FUEL, NAVAL SHIPBOARD

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

1. SCOPE

1.1 Scope. The specification covers filter-separator elements for aviation and distillate fuel for use in shipboard systems in conjunction with MIL-PRF-15618 (see 6.7). The filter-separator elements described in this specification are intended for use onboard Naval ships to remove solids and water from fuel systems.

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 of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

Comments, suggestions, or questions on this document should be addressed to Commander, Naval Air Systems Command, Fuels and Lubricants Division (AIR 4.4.5), Building 2360, 22229 Elmer Road, Patuxent River, MD 20670-1534 or emailed to Douglas.Mearns@navy.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5624	-	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-PRF-16884	-	Fuel, Naval Distillate
MIL-PRF-25017	-	Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble
MIL-DTL-85470	-	Inhibitor, Icing, Fuel System, High Flash, NATO Code Number S-1745

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or http://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM-D910	-	Aviation Gasolines, Standard Specification for. (DoD Adopted)
ASTM-D1331	-	Surface and Interfacial Tension of Solutions of Surface-Active Agents, Standard Test Methods for.
ASTM-D1655	-	Aviation Turbine Fuels, Standard Specification for. (DoD Adopted)
ASTM-D2276	-	Particulate Contaminant in Aviation Fuel by Line Sampling, Standard Test Method for. (DoD Adopted)
ASTM-D3240	-	Undissolved Water in Aviation Turbine Fuels, Standard Test Method for. (DoD Adopted)
ASTM-D3948	-	Determining Water Separation Characteristics of Aviation Turbine Fuels by Portable Separometer, Standard Test Method for. (DoD Adopted)
ASTM-D5006	-	Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels, Standard Test Method for. (DoD Adopted)

(Copies of these documents are available from the American Society for Testing and Materials International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; (610) 832-9500; or through their website at http://www.astm.org.)

2.4 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.

3. REQUIREMENTS

3.1 Qualification. Elements furnished under this specification shall be products that are authorized by the qualifying activity for listing on the qualified products list before contract award (see 4.2 and 6.3).

3.1.1 Retention of qualification. Elements authorized for listing on QPL-32148 shall be qualified for a maximum period of five years from date of approval. When the 5-year qualification period has expired, requalification of the elements to the requirements of this specification is required or the elements shall be deleted from QPL-32148 (see 6.3.1).

3.2 Materials. Coalescer elements and separator elements (see 6.4.2 and 6.4.5) shall be manufactured from commercial type materials. Paper is prohibited in the construction of separator elements.

3.3. Compatibility. Materials used in shipboard coalescer elements and separator elements shall not be adversely affected by and shall have no effect on fuels and inhibitors conforming to MIL-DTL-5624, MIL-PRF-16884, MIL-DTL-85470, ASTM-D910, and ASTM-D1655. Compatibility with additional fuels and inhibitors shall be as specified in the contract (see 6.2).

3.4 Standardized elements. Coalescer elements and separator elements shall be of the sizes and configurations specified in table I.

3.4.1 Standardized test housings. Each type of filter separator shall meet the flow rate with the standard test housings specified in a and b.

a. 24 inches long by 3.75 inches Outer Diameter (O.D.) coalescer single element test (SET) housing. The SET housing for the 24 inches long by 3.75 inches O.D. element shall be the standard Navy SET housing, Velcon Filters, Inc. part number VV1033150NVY or equivalent as approved the qualifying activity (see 6.8). The SET housing utilizes two 20 inches long by 3.75 inches O.D coalescer elements and one 24 inches long by 4.25 inches O.D. separator. The total flow rate shall be 35 gallons per minute (gal/min). The housing is available on loan from NAVAIR 4.4.5 (see 6.9).

b. 20 inches long by 6 inches O.D. coalescer single element test housing. The SET housing for the 20 inches long by 6 inches O.D. element shall be the standard Navy SET housing, Aircraft Appliances and Equipment, LTD part number 740994 or equivalent as approved the qualifying activity (see 6.8). The SET housing utilizes one 20 inches by 6 inches O.D. coalescer element and one 7.7 inches by 6 inches O.D. separator. The total flow rate shall be 45.5 gal/min. The housing is available on loan from NAVAIR 4.4.5 (see 6.9).

TABLE I. Standardized elements.

Element Type	Flow Direction	Length Inches (mm)	O. D. (maximum) Inches (mm)	I. D. (minimum) Inches (mm)	JP-5 GPM Flow Rating 3/ (maximum) (LPM) 4/	Distillate GPM Flow Rating 3/ (maximum) (LPM) 4/
Coalescer	In/Out	24.0 –0.03 (610 –0.76)	3.75 (95)	1.33 (34)	21 (80)	7 (26)
Separator	Out/In	24.0 –0.03 (610 –0.76)	4.25 (108)	1.33 (34)	35 (133)	12 (45)
Coalescer 1/	In/Out	20.0 ±0.06 (508 ±1.5)	3.75 (95)	1.33 (34)	17.5 (66)	6 (23)
Separator 2/	Out/In	17.5 –0.03 (445 –0.76)	4.25 (108)	1.33 (34)	26 (99)	9 (34)
Coalescer	In/Out	20.1 ±0.05 (508 ±1.3)	6 (152)	3.5 (89)	45.5 (172)	15 (56.8)
Separator	Out/In	20.1 ±0.05 (508 ±1.3)	6 (152)	3.5 (89)	133 (503)	44.3 (168)

1/ For use in qualifying and in existing filter separators only. Shall not be used in procurements of new filter separator vessels.
2/ For use in existing filter separators only. Shall not be used in procurements of new filter separator vessels.
3/ Gallons per minute
4/ Liters per minute

3.5 Marking. Each element shall be permanently marked with the following information:

a. Manufacturer name and part number
b. Contract or order number
c. Lot number
d. National Stock Number (NSN)
e. Date of manufacture
f. Direction of flow (inside/out, outside/in)

3.5.1 Workmanship. The elements shall be free of burrs and sharp edges. They shall be uniform in quality and shall be free from irregularities or defects that could adversely affect performance or durability.

3.6 Operating requirements.

3.6.1 Differential pressure and fiber migration. The differential pressure across the element (see 6.4.3), in combination with the separator stage, using clean dry fuel (see 6.4.1), shall not exceed 6 pounds per square inch (psi)(42 kilopascals (kPa)) at 100 percent rated flow. The effluent fuel sample shall contain an average of not more than 10 fibers per liter and the number of fibers in any single sample shall be not greater than 15 fibers per liter (see 6.4.4). The method contained in Appendix B shall be used to determine the total fibers. The element shall withstand a differential pressure across the element of not less than 75 psi (520 kPa) without structural failure, bypassing, pinhole leaks, or permanent deformation for a period of 5 minutes.

3.6.2 Contaminant removal. The element in combination with the separator stage shall remove solids and water up to 3.0 percent by volume at fuel rates up to 100 percent rated flow. The average weight of solids in the effluent fuel samples shall be not greater than 0.26 milligrams per liter (mg/L), and the weight of solids in any single sample shall be not greater than 0.5 mg/L when measured in accordance with ASTM-D2276. The effluent fuel samples shall contain not more than 10 parts per million by volume (ppmv) of undissolved water when measured in accordance with ASTM-D3240.

3.6.3 Solids removal capacity. The element shall remove and retain a quantity of solids at least equal to 5.4 grams per gal/min of its rated flow capacity. The differential pressure across the element at rated flow shall be not greater than 15 psi (105 kPa) before 50 minutes, and 45 psi (315 kPa) before 75 minutes at a solids concentration in the influent test fuel of 72 mg/gal (19 mg/L).

3.7 Environmental requirements.

3.7.1 Transit drop. Each packaged element (see 5.1) shall withstand the shock of being dropped on a flat surface of solid concrete, from a height of 60 inches, by showing no evidence of cracks or deformation of the end caps, flanges, or damage to element media.

3.7.2 Temperature resistance.

3.7.2.1 High temperature. Each packaged element (see 5.1) shall show no evidence of swelling, corrosion, separation of components, dissolving of adhesives, or deformation which could cause failure during operation when stored at temperature of 160 ±5 °F (71 ± 3 °C) (see 4.6.4.2). The element also shall permit rated flow in an ambient temperature of 125 ±5 °F (52 ±3 °C).

3.7.2.2 Low temperature. Each packaged element (see 5.1) shall show no evidence of swelling, corrosion, separation of components, dissolving of adhesives, or deformation which could cause failure during operation when stored at a temperature of -50 ±5 °F (-46 ±3 °C)

(see 4.6.4.3). The element also shall permit rated flow in an ambient temperature of -25 ±5 °F (-32 ±3 °C).

3.7.3 Fuel and salt water immersion. The elements, after being immersed in storage for 24 hours at both the high and low operating temperature limits specified in 3.7.2, shall be removed from their packaging and immersed in ambient fuel having a temperature of 70 ±10 °F (21 ±6 °C) for 100 hours. After 100 hours of fuel immersion, the elements shall be immersed in salt water at a temperature of 70 ±10 °F (21 ±6 °C) for 72 hours. After each immersion, the elements shall show no evidence of swelling, corrosion, separation of components, dissolving of adhesives, or deformation, which could cause failure during operation (see 4.6.4.4).

3.7.4 Post environmental testing. After the elements have met the requirements of 3.7.2.1, 3.7.2.2 and 3.7.3, the elements shall also meet the requirements of 3.6, 3.6.1, 3.6.2 and 3.6.3 when tested as specified in 4.6.4.5.

4. VERIFICATION

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

a. Qualification inspection (see 4.2)
b. Conformance inspection (see 4.3)

4.2 Qualification inspection.

4.2.1 Coalescer element qualification. Qualification of coalescer elements shall consist of all examinations and tests of this specification.

4.2.2 Separator element qualification. Separator elements may be qualified separately to this specification. Qualification of the separator elements shall consist of all examinations and tests of this specification. Separator elements environmental tests 4.6.4 through 4.6.4.5 shall be conducted using a coalescer listed on QPL-32148.

4.3 Conformance inspection. Conformance inspection shall consist of the inspections and examinations specified in 4.4 and 4.6.1.

4.4 Inspections. All elements shall be checked visually and dimensionally for conformance to 3.4 and table I. Additionally, the separator-element screen shall be visually examined to ensure that it is completely fused and uniform, free from mud-cracks, craters, pinholes, sags, runs, heavy edges, wrinkles, beads, tears, blisters, incomplete coverage, and other surface imperfections. Mud-cracks and pinholes, which penetrate the coating thickness or any other discontinuity visible at 32X magnification, shall be cause for rejection.

4.5 Test Conditions.

4.5.1 Equipment. Equipment used for testing shall be of laboratory precision type or equivalent insofar as practicable, and shall be calibrated at intervals properly spaced to ensure laboratory accuracy. Figure 1 is a general schematic of the test system.

4.5.1.1 Water injection system. A system shall be provided to inject water into the fuel before the main pump in accordance with the volumes specified in 4.6.3.4 and 4.6.3.5. The accuracy of the water injection system shall be within five percent of the specified water addition rate.

4.5.1.2 Main circulation pump. The main circulating pump(s) shall be a centrifugal or vane pump capable of emulsifying the fuel and water mixture. A minimum pump speed of 2950 revolutions per minute (rpm) shall be maintained to ensure consistent emulsification.

4.5.1.3 Solids addition system. A continuous solids addition system shall be provided to uniformly feed test dust (see 4.5.3) downstream of main circulating pump at a rate of 72 mg/gal (19 mg/L) into the fuel upstream of the test unit.

4.5.1.4 Sampling devices. Upstream-facing, probe-type sampling devices shall be provided. One immediately before and one immediately after the test unit shall be installed for extracting in-line samples and passing them through sampling filters.

4.5.1.5 Differential pressure reading device. Differential pressure (see 6.4.3) across the test unit shall be measured with an accuracy of two percent of the scale reading of the device used, such as a differential pressure gage, selector valve and gage, etc.

4.5.1.6 Pressure relief valve. An adjustable pressure relief valve shall be installed upstream of the test unit for system protection.

4.5.1.7 Fuel flow meter. A flow meter shall be provided to measure the fuel flow with an accuracy of one percent at the specified fuel flow rate.

4.5.1.8 Test system pressure. The pressure in the test system shall be not less than 20 psi (138 kPa) at the start of all tests when measured at the sampling point immediately downstream of the test unit.

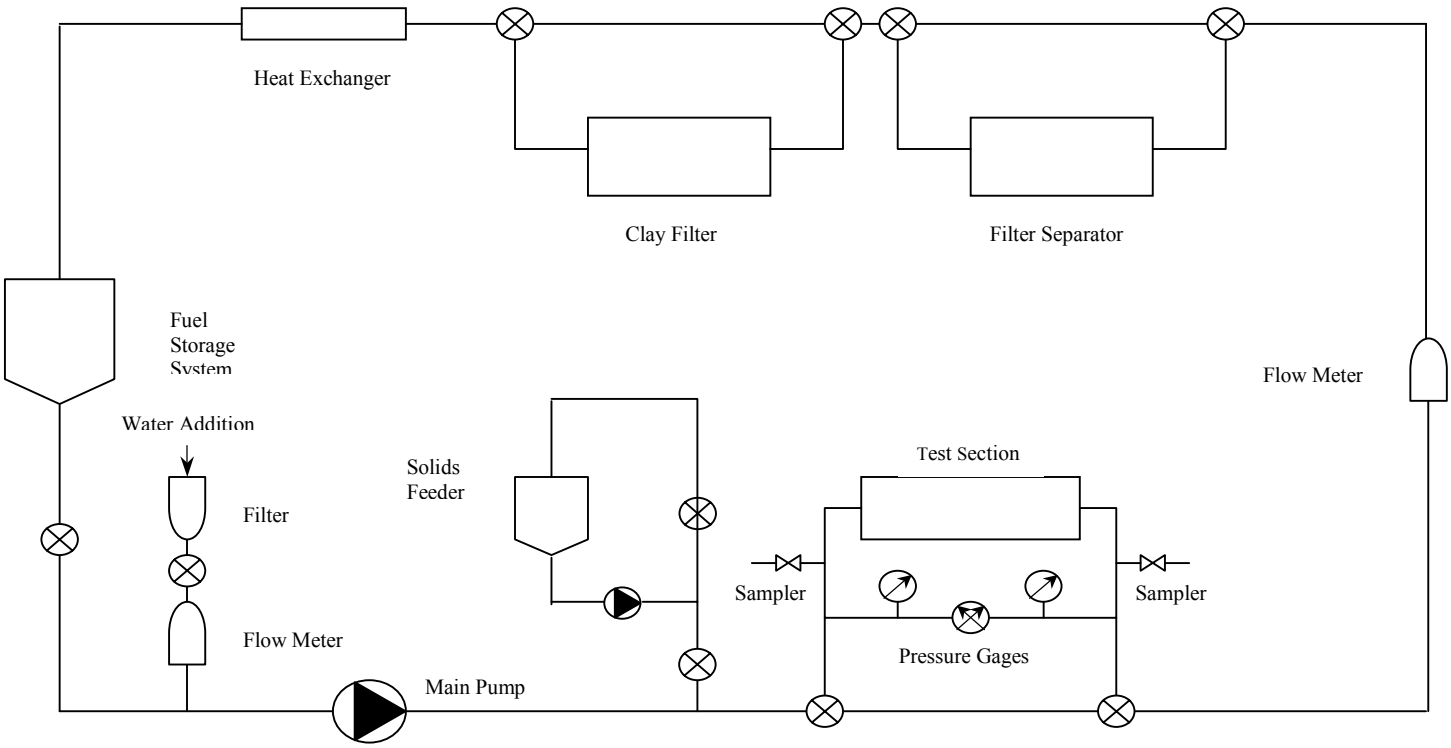

FIGURE 1. Schematic of test system.

4.5.2 Test fluid. Unless otherwise specified, the base test fluid shall be aviation fuel, which conforms to MIL-DTL-5624, MIL-PRF-16884, or ASTM-D1655.

4.5.2.1 Test fuel preliminary testing. Prior to the start of testing, the fuel shall be evaluated for conformance to the applicable specification.

4.5.2.2 Test fuel pretreatment. Before initiating any coalescer element or separator element performance testing, the fuel shall be subjected to a water wash until the level of Fuel System Icing Inhibitor (FSII) concentration is less than 0.01 percent when tested in accordance with ASTM-D5006. After water washing, the fuel shall be subjected to clay treating until a water separator index modified (WSIM) of greater than 95 is achieved when tested in accordance with ASTM-D3948.

4.5.2.3 Required additives. The Appendix A procedure shall be used to inject the test fuel with the following additives at these specified concentrations:

a. Static Dissipater Additive, Stadis 450® (Octel America, Newark DE) or equivalent as approved by the qualifying activity at a concentration of 2.0 ±0.2 mg/L.
b. Fuel System Icing Inhibitor in accordance with MIL-DTL-85470 at a concentration of 0.15 percent (by volume) ±0.01 percent.

c. Corrosion Inhibitor, DCI-4A in accordance with MIL-DTL-25017 at a concentration of 15 ±1 mg/L.

4.5.2.4 Test fuel volume. Test fuel flow shall be single pass; i.e., non-recirculating for single element tests. If necessary, the test shall be stopped partially through, the fuel shall then be cleaned and readditized, then the test continued. During this evolution, the test housing shall be isolated from the system. If more than one fuel tank is used, the flow from any one tank shall not differ by more than ±10 percent of the flow from any other tank.

4.5.2.5 Test fuel temperature. The test fuel temperature shall be between 70 °F and 90 °F (21 °C and 32 °C) for the start of all tests specified herein, and shall be maintained at ±5 °F (±3 °C) of the starting temperature for the duration of the test.

4.5.3 Test contaminants. The following contaminants shall be used:

a. Solids. The solids test mixture shall consist of 90 percent A1 UltraFine ISO 1210-1 and 10 percent Copperas Red Iron Oxide R9998 (see 6.5 and 6.6).
b. Fresh water. Fresh water used for testing purposes shall be filtered and contain less than 1.0 mg/L of solids and shall have a surface tension of not less than 65 dynes per centimeter at 75 °F (24 °C) when tested in accordance with ASTM-D1331, Method A. The pH value shall be between 6.0 and 8.0.

4.5.4 Test sampling and analysis. Test sampling and measurement shall be conducted in accordance with table II for single element testing. Sample size shall be in accordance with ASTM-D3240 and ASTM-D2276 to determine properties. All samples shall be taken from the test-housing outlet. Testing shall be continued until all samples are obtained.

TABLE II. Sampling schedule for single element tests.

Test Section	Duration (minutes)	Sampling Interval	Purpose	Number of Samples	Sample Type
Conditioning, Media Migration	30	At start Continuously	MSEP 1/ Media Migration	1 1	Beaker Millipore Pad
Water Removal	30	At 5, 10, 20, and 30 minutes	Free Water Content	4	AquaGlo
Solids Injection	75	Every 15 minutes after stop/start	Solids Content	5	Matched Weight Millipore
Water Removal	150	At 2, 5, 15, 30, 45, 60, 75, 90, 105, 120, 135, and 150 minutes	Free Water Content	12	AquaGlo
Water Removal	30	At 2, 5, 10, 20, and 30 minutes	Free Water Content	5	AquaGlo

1/ MSEP: Micro-Separometer

4.6 Qualification test. The qualification tests shall be conducted in accordance with table III. Initial qualifications shall be subjected to qualification sets 1 and 3. Once qualified, all other qualifications shall be subjected to qualification sets 1 and 2.

TABLE III. Test methods.

Qualification Tests	Test Paragraph	Qualification Set 1	Qualification Set 2	Qualification Set 3
Inspection	4.4	X	X	X
Examination	4.6.1	X	X	X
Structural Strength	4.6.2	X		
Differential Pressure, Operational Performance	4.6.3		X	
Transit Drop	4.6.4.1			X
High Temperature Storage	4.6.4.2			X
Low Temperature Storage	4.6.4.3			X
Fuel and Salt Water Soak	4.6.4.4			X
Post Environmental Performance	4.6.4.5			X

4.6.1 Examination. The elements shall be examined for the defects that are specified in table IV.

TABLE IV. Visual defects.

Defect	Paragraph
Material not as specified.	3.2
Material not resistant to corrosion and deterioration or not treated to be made resistant to corrosion and deterioration.	3.3
Dimensions, element configuration and flow rate not as shown in table I.	3.4
Identification marking incorrect, missing, or illegible.	3.5
Workmanship.	3.5.1

4.6.2 Structural strength. Up to three coalescer elements of the size to be qualified shall be subjected to a structural test. The category of test fuel, for this test only, shall be as specified in 4.5.2, with the exception that the required additives in 4.5.2.3 are optional. Fuel shall be circulated through the test element at rated flow. R9998 contaminant (see 6.6) shall be added until the differential pressure across the element reaches 75 psi (520 kPa). This pressure shall be held for 5 minutes. Samples for media migration shall be taken during the entire test and analyzed in accordance with Appendix B. Nonconformance to 3.6.1 shall constitute failure of this test.

4.6.3 Differential pressure, operational performance. The differential pressure and operational performance tests shall be conducted in the following order using the same elements. Test sampling schedule and procedures are specified in table II for single element testing. Nonconformance to 3.6, 3.6.1, 3.6.2, or 3.6.3 shall constitute failure of this test.

4.6.3.1 Element conditioning. The element(s) to be conditioned shall be placed in the test housing. Fuel conforming to 4.5.2.3 shall be circulated through the housing for 30 minutes. Nonconformance to 3.6.1 shall constitute failure of this test.

4.6.3.2 Water coalescence (low flow). The fuel flow shall be stabilized at 100 percent rated flow. The element(s) shall then be subjected to a continuous water injection of 0.01 percent (volume) of rated flow for 30 minutes. At 10-minute intervals, a stop/start procedure shall be performed. The stop/start procedure is achieved by shutting and then immediately opening a downstream valve from the test housing within 4 seconds. After 30 minutes, the water injection is stopped. Any water that may have accumulated shall be drained from the sump. Nonconformance to 3.6.2 shall constitute failure of this test.

4.6.3.3 Solids holding and removal. The fuel flow shall be stabilized at 100 percent rated flow. Solids conforming to 4.5.3 shall now be injected at the rate of 72 mg/gal (19 mg/L) for a period of 75 minutes. At 15-minute intervals, a stop/start procedure shall be performed. The

stop/start procedure is achieved by shutting and then immediately opening a downstream valve from the test housing within 4 seconds. After 75 minutes, the solids injection is stopped. Nonconformance to 3.6.2 and 3.6.3 shall constitute failure of this test.

4.6.3.4 Water coalescence (low flow). The fuel flow shall be stabilized at 100 percent rated flow. The element(s) shall then be subjected to a continuous water injection of 0.01 percent (volume) of rated flow for 150 minutes. At 30-minute intervals, a stop/start procedure shall be performed. The stop/start procedure is achieved by shutting and then immediately opening a downstream valve from the test housing within 4 seconds. The sump drain shall remain in the closed position during the entire water injection period. After 150 minutes, the water injection is stopped. Any water that may have accumulated shall now be drained from the sump. Nonconformance to 3.6.2 shall constitute failure of this test.

4.6.3.5 Water coalescence (high flow). The fuel flow shall be stabilized at 100 percent rated flow. The element(s) shall then be subjected to a continuous water injection of 3.0 percent (volume) of rated flow for 30 minutes. At 10-minute intervals during single element testing, a stop/start procedure shall be performed. The stop/start procedure is achieved by shutting and then immediately opening a downstream valve from the test housing within 4 seconds. The sump may be opened during this portion of testing. Nonconformance to 3.6.2 shall constitute failure of this test.

4.6.4 Environmental testing. The environmental tests shall be conducted in the following order. The same set of elements shall be used for each environmental test.

4.6.4.1 Transit drop. Conformance to 3.7.1 shall be determined in the following manner. Each packaged element shall be dropped onto a flat surface of solid concrete from a height of 60 inches. The element shall be dropped six times; 3 on each end of the unit package. All drops shall be made so the element falls freely through the entire distance specified. Nonconformance to 3.7.1 shall constitute failure of this test. The element shall then be tested as specified in 4.6.4.2.

4.6.4.2 High temperature storage. The elements shall be placed in an oven for a minimum of 24 hours at an ambient temperature of 160 ±5 °F (71 ±3 °C), and then examined for defects. Nonconformance to 3.7.2.1 shall constitute failure of this test. The elements shall then be tested as specified in 4.6.4.3 (see 6.10).

4.6.4.3 Low temperature storage. The elements shall be placed in a freezer for a minimum of 24 hours at an ambient temperature of -50 ±5 °F (-46 ±3 °C), and then examined for defects. Nonconformance to 3.7.2.2 shall constitute failure of this test. The elements shall then be tested as specified in 4.6.4.4 (see 6.10).

4.6.4.4 Fuel and salt water immersion. The elements shall be placed in test fuel conditioned with additives listed in 4.5.2.3 at 70 ±10 °F (21 ±6 °C) for a minimum of 24 hours. Then the

elements shall be placed in a solution consisting of 4 percent sodium chloride (NaCl) and 96 percent distilled water by weight at a temperature of 70 ±10 °F (21 ±6 °C) for a period of 72 hours and examined for defects. Nonconformance to 3.7.3 shall constitute failure of this test. The elements shall then be tested as specified in 4.6.4.5.

4.6.4.5 Post-environmental performance. The elements shall be tested in accordance with 4.6.3 thru 4.6.3.5. Nonconformance to 3.6 thru 3.6.3 shall constitute failure of this test.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. 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 that may be helpful, but is not mandatory.)

6.1 Intended use. The filter-separator elements specified in this specification are intended for use in shipboard filter-separator housings to remove solids and water from fuel systems. These filter-separator elements are used in JP-5 and naval distillate fuel systems for aircraft, propulsion and auxiliary power gas turbines, diesel engines, and other miscellaneous internal combustion engines. New ships being designed will utilize stainless steel filter-separator housings and fuel systems. Current ships utilize copper-nickel filter-separator housings and fuel systems. Therefore, the filter-separator elements procured to this specification must be compatible with system materials and requirements.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Materials for filter separator elements (see 3.3).
c. Element type and dimensions (see 3.4).
d. Identification markings (see 3.5).
e. 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-32148, 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 orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Naval Air Systems Command, Fuels and Lubricants Division (AIR 4.4.5), Building 2360, 22229 Elmer Road, Patuxent River, MD 20670-1534.

6.3.1 Retention. Manufacturer may request a waiver from QPL-32148 elimination by providing justification for requalification exemption. Requests should be submitted to and reviewed by Naval Air Systems Command. Element requalification is also required when any change or substitution is made to the materials or manufacture of the element. Elements should be qualified at the government test facility located at the Naval Air Systems Command, Fuels and Lubricants Division (AIR 4.4.5), Building 2360, 22229 Elmer Road, Patuxent River, MD 20670-1534 or a commercial test facility acceptable to both the government and manufacturer. Manufacturer should provide the government adequate notice to witness element qualification testing.

6.4. Definitions.

6.4.1 Clean fuel. Clean fuel (test fluid) is defined by API 1581, Table I. It is also defined as fuel containing less than 0.26 mg/L of solids and less than 5 ppm free water.

6.4.2 Coalescer element. The coalescer element forms the first stage of filtration and is designed to remove solids and to coalesce free or emulsified water in the fuel.

6.4.3 Differential pressure. The differential pressure across the element is defined as the pressure drop measured from the fuel inlet connection to the fuel outlet connection.

6.4.4 Fiber. A fiber is defined as any particle with a length-to-diameter ratio of ten to one, or more, and a length of 100 microns or more.

6.4.5 Separator element. The separator element forms the second stage of filtration and is designed to repel or prevent coalesced water from being discharged with the fuel.

6.5 A1 UltraFine ISO 1210-1 test dust. A1 UltraFine ISO 1210-1 test dust is available from Powder Technology Inc. PO Box 1464, Burnsville, Minnesota 55337 USA.

6.6 Copperas Red Iron Oxide R9998. Copperas Red Iron Oxide R9998 is available from Elementis Pigments, Inc. 11 Executive Drive, Suite 1, Fairview Heights, Il 62208 USA.

6.7 Supersession information. MIL-PRF-32148 covers requirements and testing of filter separator elements which were previously covered by MIL-PRF-15618. Specifically, General requirements (3.1), Inspections (4.2.1), Tests (4.2.2) and Coalescer Elements and Separator Elements (Appendix A) of MIL-PRF-15618 are superseded and are now covered by MIL-PRF-32148. MIL-PRF-15618 covers only filter separator housings.

6.8 Alternate SET housing. The Naval Air Systems Command, Fuels and Lubricants Division (AIR 4.4.5), Building 2360, 22229 Elmer Road, Patuxent River, MD 20670-1534 is responsible for alternate SET housing approval.

6.9 Government-loaned property. Contact the Naval Air Systems Command, Fuels and Lubricants Division (AIR 4.4.5), Building 2360, 22229 Elmer Road, Patuxent River, MD 20670-1534 for loan availability of the SET housing.

6.10 High and low temperature storage testing. Manufacturers test results for high and low temperature testing data will be requested for qualification approval.

6.11 Subject term (key word) listing.

Coalescer
Fiber migration
Fuel component
Housings
Inhibitors
Water removal

METHOD FOR INJECTING FUEL ADDITIVES TO THE TEST FLUID

A.1 SCOPE

A.1.1 Scope. This appendix details the method to be used for injecting the test fluid with the required additives. This appendix is a mandatory part of this specification. The information contained herein is intended for compliance.

A.2 PROCEDURE

A.2.1 Test fuel cleanup. The test fluid shall be filtered until an AquaGlo reading of 5 parts per million or less is obtained when tested in accordance with ASTM-D3240. The test fluid shall then be clay filtered until a Micro-Separometer (MSEP) Surfactants value of 95 or greater is obtained when tested in accordance with ASTM-D3948. All filtration equipment shall be bypassed before adding the additives.

A.2.2 Additive injection. The test fuel shall be inhibited according to the amounts specified in 4.5.2.3. To determine the duration of recirculation needed to achieve a homogenous mixture of fuel and inhibitors, the following procedure shall be used. Inject additive A upstream of the main pump. The conductivity shall be measured at 5-minute intervals after the additive is introduced to the fuel. The elapsed time from the initial addition of the additive to the time when three successive conductivity measurements at 5-minute intervals are within ±20 pico Siemens/meter (pS/m) shall be noted as the mixing time. Additive B shall then be added in the same manner allowing the same mixing time between B and C. Additive C shall then be added in the same manner allowing the same mixing time before beginning the test.

A.3 CAUTION

A.3.1 Handling of additives. Refer to manufacturer's safety data sheets for precautions to be taken while handling fuel inhibitors.

FIBER DETERMINATION METHOD (MEDIA MIGRATION)

B.1 SCOPE

B.1.1 Scope. This appendix details the method to be used for determining the number of fibers present in a 1000 milliliter (ml) sample of test fuel. The number of fibers present needs to be known in order to determine if a test item is functioning in accordance with this specification. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

B.2 EQUIPMENT

B.2.1 Required equipment. The following equipment is required:

a. Millipore Fluid Sample Kit, Cat. No. XX64 037 00 or equal
b. Millipore Field Monitors, Particle Size Analysis, Cat. No. MAWG037P0 or equal
c. Vacuum pump
d. Oven for obtaining 90 °C
e. Calibrated microscope capable of examining fibers

B.3 PROCEDURE.

B.3.1 Sampling. A 1000 ml sample shall be withdrawn through a precounted monitor (see B.3.1.1) in accordance with fluid sampling kit operating instructions. Sample shall be taken at the sampling site immediately after the solid feeder pump and shall be called the upstream monitor sample. Another 1000 ml sample shall be withdrawn through a precounted monitor at the sampling site immediately after the test vessel. This sample shall be called the downstream monitor sample (see 4.5.1 and figure 1).

B.3.1.1 Monitor precount. A precount shall be taken from the monitor to obtain a background fiber count blank. The background fiber count blank shall be subtracted from each monitor used. If Millipore monitors are used, average background counts are indicated on each carton of assembled Contamination Analysis Monitors. The average background fiber count can be used as a substitute for precounting.

B.3.2 Monitor pad evaluation. Excess fuel shall be removed from monitors with a vacuum pump. Monitors shall then be dried intact in an oven for one hour (avoid heat above 90 °C) with the inlet/outlet plugs removed. The monitors shall then be cooled. The fibers on each monitor filter pad shall be counted with a calibrated microscope capable of examining fibers. The upstream monitor sample shall then be subtracted from the downstream monitor sample to obtain a net fiber count.

Custodian :
Navy - AS

Preparing activity:
Navy - AS
(Project 4330-0186)

Review activities:
Navy - SH, YD

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://assist.daps.dla.mil.