

INCH-POUND

MIL-PRF-15618H (SH)

18 January 2006

SUPERSEDING

MIL-PRF-15618G(SH)

7 January 2002

PERFORMANCE SPECIFICATION

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

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers filter-separator assembly (see 6.5.2) for use in shipboard fuel systems. The filter-separator assembly described in this specification, with filter elements qualified to MIL-PRF-32148, is intended for use onboard Naval ships to remove solids and water from fuel systems. These filter-separator assemblies are used with JP-5 fuel for aircraft, Naval Distillate or JP-5 for propulsion and auxiliary power gas turbines, Naval Distillate or JP-5 for diesel engines, and other miscellaneous internal combustion engines.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

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

DEPARTMENT OF DEFENSE SPECIFICATIONS

| | | |
|---------------|---|---|
| MIL-S-901 | - | Shock Tests, H.I. (High-Impact) Shipboard Machinery, Equipment, and Systems, Requirements For |
| MIL-DTL-5624 | - | Turbine Fuel, Aviation, Grades JP-4 and JP-5 |
| MIL-PRF-16884 | - | Fuel, Naval Distillate |
| MIL-PRF-32148 | - | Filter Separator Elements, Fluid, Pressure, Aviation and Distillate Fuel, Naval Shipboard |

DEPARTMENT OF DEFENSE STANDARDS

| | | |
|---------------|---|--|
| MIL-STD-167-1 | - | Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited) |
|---------------|---|--|

Comments, suggestions, or questions on this document should be addressed to Commander, Naval Sea Systems Command, ATTN: SEA 05Q, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to: commandstandards@navsea.navy.mil, with the subject line 'Document Comment'. 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>.

(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 PETROLEUM INSTITUTE (API)

API/IP 1581 - Specifications and Qualification Procedures for Aviation Jet Fuel Filter/Separators

(Copies of this document are available from API Publications, Global Engineering Documents, 15 Inverness Way East, M/S C303B, Englewood, CO 80112-5776 or online at www.api.org.)

ASME INTERNATIONAL

ASME Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels

ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 24 (DoD adopted)

(Copies of these documents are available from ASME International, 22 Law Drive, PO Box 2900, Fairfield, NJ 07007-2900 or online at www.asme.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 General. The filter-separator assembly shall conform to API/IP 1581 unless otherwise indicated by this specification. The filter-separator shall utilize coalescer and separator elements (see 6.5.1 and 6.5.3) qualified to MIL-PRF-32148.

3.2 First article. When specified (see 6.2), the filter-separator assembly shall be subjected to first article inspection in accordance with 4.1.1.

3.3 Materials. Materials used in the fabrication of the filter-separator assembly shall be stainless steel as specified (see 6.2) in accordance with API/IP 1581 except that copper-nickel alloys are allowed for replacement of existing units in copper-nickel piping systems.

3.3.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.3.2 Gaskets. Gasket material shall be compatible with the fuel types listed in 3.6.2.

3.4 Performance requirements.

3.4.1 Working pressure and flow rate. The filter-separator assembly maximum allowable working pressure and flow rate shall be as specified (see 6.2).

3.4.2 Hydrostatic test. The filter-separator assembly shall meet hydrostatic test requirement of 150 percent of the design pressure.

3.4.3 Effluent fuel. The filter-separator assembly shall meet the effluent fuel requirements specified in MIL-PRF-32148.

3.4.4 Solids holding capacity. The filter-separator assembly shall meet the solids holding capacity requirements specified in MIL-PRF-32148.

3.5 Physical requirements.

3.5.1 Size and weight. The size and weight of the filter-separator assembly shall meet the specified flow capacity (see 3.4.1) and all other requirements of this specification.

3.5.2 Air eliminator. When specified (see 6.2), an air eliminator meeting the requirements of API/IP 1581 shall be provided. The air eliminator shall be removable for maintenance.

3.5.3 Water-slug shutoff. The filter-separator assembly shall be provided with a means of automatically stopping fuel discharge from the vessel when water in the sump exceeds the capacity of the drain system. The device shall automatically revert to normal operation of the filter-separator during release of and after water is drained. The water-slug shutoff shall be designed to secure filter-separator effluent upon failure of the automatic device. A means of periodically testing the water-slug shutoff feature (without adding water) shall be provided.

3.5.4 Manual sump drain. A manually operated drain shall be installed at the low point of the filter-separator sump. The sump shall be fitted with an anti-vortex device to inhibit discharge of fuel with the water.

3.5.5 Automatic sump drain (optional). When specified (see 6.2), an automatic drain shall be installed in the sump drain line to automatically drain water during normal filter-separator operation. The automatic sump drain shall be designed to secure drain line flow upon failure of the automatic device. A means of isolation shall be provided upstream of the automatic drain device to permit maintenance. A visual flow indicator shall be provided downstream of the automatic drain device and shall be removable for maintenance.

3.5.6 Sampling connections. Sample connections shall be provided at the filter-separator inlet, outlet, and sump to permit taking of fuel samples under flow conditions.

3.5.7 Level indication. A level indicating device shall be provided for observing water accumulation in the sump. The range of indication shall extend as close as possible to or below the bottom of the sump and shall provide indication of the cleavage line between the fuel and water. A means of isolation and draining shall be provided.

3.5.8 Pressure indication. Pressure indicating devices shall be provided for observing the filter-separator inlet and outlet pressures. A differential pressure gage shall be installed with an audible alarm to alert operator when pressure has reached prescribed limits across each stage of filtration, and display the pressure drop across each stage. A means of isolation shall be provided for maintenance of gages.

3.5.9 Accessibility and location. All components requiring manual operation or periodic maintenance shall be easily accessible. Indicators shall be located within view of components requiring operation.

3.5.10 Fabrication. The filter-separator assembly shall be fabricated in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels. Pipe thread connections shall not be used. Silver braze and solder joints shall not be used. Permanent joints shall be welded. Mechanical joints required for disassembly shall be flanged (2-inch NPS and larger) or union (below 2-inch NPS).

3.6 Interface requirements.

3.6.1 Inlet and outlet connections. Filter-separator assemblies shall have horizontal, flanged inlet and outlet connections in accordance with ASME B16.5. Inlet and outlet connections shall be permanently marked. End connection size and type, shall be specified by the purchaser (see 6.2k).

3.6.2 Fuel types. The filter-separator assembly shall meet the requirements of this specification when operated with the following fuels:

| Type | NATO code no. | Specification |
|------------------|---------------|---------------|
| JP-5 | F-44 | MIL-DTL-5624 |
| Naval distillate | F-76 | MIL-PRF-16884 |

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3.6.3 Element spacing. Element spacing shall meet the requirements of API/IP 1581.

3.6.4 Element mounting. Element mounts shall be installed such that removal and installation of elements does not cause mount to rotate or loosen and a tight seal to the mounting plate is maintained. Element mounts shall have a blunted V-type knife edge for sealing to a flat gasket on the filter-coalescer or separator. The height of the V section shall be 0.125 inch (3 mm) +10 percent. Torque requirements for installation of elements shall be provided as specified (see 6.2). Element mounts shall be designed to withstand 150 percent of recommended assembly torque without permanent distortion, cracking, or failure.

3.7 Maintainability.

3.7.1 Access. Components that require regular maintenance or servicing shall be readily accessible and not require personnel to enter the filter-separator vessel. For very large filter-separator assemblies, this may be unavoidable. If personnel entry is required, at least two equally spaced access openings shall be provided for safe personnel access and temporary ventilation. Filter-separators with access covers heavier than 50 pounds shall have an integral lifting device for removal.

3.7.2 Special tools. Special tools, if required for maintenance and servicing, shall be provided with the filter-separator assembly.

3.7.3 Case drainage. The filter design shall permit the casing to be completely drained of all fluids before servicing and maintenance.

3.8 Environmental requirements.

3.8.1 Shock. When first article inspection is required, the filter-separator assembly shall withstand Grade A shock requirements of MIL-S-901, without any leakage (see 4.1.1).

3.8.2 Vibration. When first article inspection is required, the filter-separator assembly shall withstand vibration in accordance with MIL-STD-167-1, Type I Environmentally Excited (see 4.1.1).

3.8.3 Temperature variation. The filter-separator assembly shall meet the temperature variation requirements of API/IP 1581.

3.8.4 Materials. Filter-separator materials shall meet the environmental requirements of API/IP 1581 for fuel types in this specification (see 3.6.2).

3.9 Identification plate. Identification plates shall be provided and comply with the requirements of API/IP 1581. Identification plates shall be visible from the location where gages are normally viewed. The permanent identification plate shall also include the following information: MIL-PRF-15618, revision, amendment, and date.

4. VERIFICATION

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

- a. First article inspection (see 4.1.1).
- b. Conformance inspection (see 4.1.2).

4.1.1 First article inspection. When first article inspection is required (see 6.2), one complete filter-separator assembly (see 3.1) shall undergo the tests and inspections outlined in Table I.

4.1.2 Conformance inspection. Each filter-separator assembly shall be inspected for conformance according to the requirements specified in Table I.

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TABLE I. Inspection and test requirements.

| Attribute | Requirement | Verification | First article | Conformance |
|--|-----------------------------------|-------------------|---------------|-------------|
| INSPECTIONS | | | | |
| Elements | 3.1 | 4.2.1 | X | X |
| Materials | 3.3 | 4.2.1 | X | X |
| Gaskets | 3.3.2 | 4.2.1 | X | X |
| Air eliminator | 3.5.2 | 4.2.1 | X | X |
| Water-slug shutoff | 3.5.3 | 4.2.1 | X | X |
| Manual sump drain | 3.5.4 | 4.2.1 | X | X |
| Automatic sump drain (if installed) | 3.5.5 | 4.2.1 | X | X |
| Sampling connection | 3.5.6 | 4.2.1 | X | X |
| Level indication | 3.5.7 | 4.2.1 | X | X |
| Pressure indication | 3.5.8 | 4.2.1 | X | X |
| Accessibility and location | 3.5.9 | 4.2.1 | X | X |
| Fabrication | 3.5.10 | 4.2.1 | X | X |
| Inlet and outlet connections | 3.6.1 | 4.2.1 | X | X |
| Element spacing | 3.6.3 | 4.2.1 | X | X |
| Element mounting | 3.6.4 | 4.2.1 | X | X |
| Access | 3.7.1 | 4.2.1 | X | X |
| Identification plate | 3.9 | 4.2.1 | X | X |
| TESTS | | | | |
| Hydrostatic | 3.4.2 | 4.2.2 and 4.2.2.1 | X | X |
| Full scale | 3.4.1, 3.4.3, 3.4.4, and 3.5.1 | 4.2.2 and 4.2.2.2 | X | |
| Water defense system | 3.5.3 and 3.5.5 | 4.2.2 and 4.2.2.3 | X | |
| Shock | 3.8.1 | 4.2.2 and 4.2.2.4 | X | |
| Vibration | 3.8.2 | 4.2.2 and 4.2.2.5 | X | |
| Temperature variation | 3.8.3 | 4.2.2 and 4.2.2.6 | X | |
| Materials | 3.8.4 | 4.2.2 and 4.2.2.7 | X | |

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4.2 Inspections and tests.

4.2.1 Inspections. The filter-separator assembly, containing elements qualified to MIL-PRF-32148 shall be examined visually and checked dimensionally for conformance to drawings and the applicable requirements of Section 3 of this specification.

4.2.2 Tests. The filter-separator assembly, containing elements qualified to MIL-PRF-32148, shall be subjected to the full-scale test method in accordance with API/IP 1581. The test facility shall be in accordance with API/IP 1581. The test fluid shall be in accordance with API/IP 1581, Category M fuel.

4.2.2.1 Hydrostatic. The filter-separator assembly shall be hydrostatically tested in accordance with API/IP 1581.

4.2.2.2 Full-scale test series. The full-scale test series consists of a media migration test, a 0.01 percent water coalescence test, a solids addition test, and a water addition-solids contaminated system test. The filter-separator assembly shall be tested in accordance with the procedures specified in API/IP 1581. The filter-separator shall meet the requirements for API/IP 1581 Category M, Type S, two stage units except that undissolved water in the effluent fuel shall meet the effluent fuel requirements specified in MIL-PRF-32148.

4.2.2.3 Water defense system test. Proper operation of the water defense system, consisting of the water-slug shutoff device and automatic sump drain (when equipped), shall be verified. Test shall be conducted by injecting water into the test fluid until the water-slug shutoff device and automatic sump drain (when equipped) demonstrate proper actuation. Testing shall not require removal or disassembly of any pressure boundary components. At the conclusion of the Water Defense System Test, residual water shall be drained from the unit and the water-slug shutoff test mechanism equipped on the filter-separator (see 3.5.3) shall be tested for operability.

4.2.2.4 Shock. The filter-separator assembly shall be shock tested while filled with fresh water or test fluid and with all elements and appurtenances installed. Where the filter-separator unit weight exceeds the capacity of the medium weight shock machine, critical components (such as elements and mounts) shall be tested utilizing the light weight shock machine. A cluster of at least four elements and mounts, and a typical section of a mounting plate shall be used. Test of the filter shall be Shock Grade A, Equipment Class I, Shock Test Type A, Hull Mounting Location, Base Mounting Plane, and Unrestricted Mounting Orientation. Test of the element and mount cluster shall be Type B in accordance with MIL-S-901. After shock testing, filter-separator shall be inspected for damage and then hydrostatically tested in accordance with 4.2.2.1.

4.2.2.5 Vibration. The filter-separator assembly shall be vibration tested in accordance with MIL-STD-167-1, Type I Environmentally Excited while filled with fresh water or test fluid and with all elements and appurtenances installed. After vibration testing, filter-separator shall be inspected for damage and then hydrostatically tested in accordance with 4.2.2.1.

4.2.2.6 Temperature variation. The filter-separator shall be certified to meet the requirements of 3.8.3 as specified (see 6.2).

4.2.2.7 Materials. The filter-separator shall be certified to meet the requirements of 3.8.4 as specified (see 6.2).

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 assembly described in this specification is intended for use onboard Naval ships to remove solids and water from fuel systems. These filter-separator assemblies 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 with stainless steel fuel systems will utilize stainless steel filter-separators. This specification is also applicable to existing ships with copper-nickel fuel systems. Therefore, the purchaser must ensure the filter-separator assembly ordered to this specification is compatible with system materials and requirements.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. If required, the specific issue of individual documents referenced (see 2.2 and 2.3).
- c. Coalescer and separator elements (see 3.1).
- d. When first article is required (see 3.2).
- e. Material (see 3.3).
- f. Flow rate (see 3.4.1).
- g. Maximum allowable working pressure (see 3.4.1).
- h. Size and/or weight requirements (see 3.5.1).
- i. Air eliminator required (see 3.5.2).
- j. Automatic drain required (see 3.5.5).
- k. End connections size and type (see 3.6.1).
- l. Manufacturer's torque requirements for installation of elements (see 3.6.4).
- m. Manufacturer's proof of certification of temperature variation (see 4.2.2.6).
- n. Manufacturer's proof of certification of materials (see 4.2.2.7).
- o. Packaging requirements (see 5.1).
- p. Technical manuals and drawings (see 6.4).

6.3 Conformance inspection. Affordable conformance inspection with confidence varies depending upon a number of procurement risk factors. Some of these factors include contractor past performance, government schedule and budget, product material and design maturity, manufacturing capital investment and processes applied, the controlled uniformity of those processes, labor skill and training, and the uniformity of measuring processes and techniques. During the solicitation, contracting documents should indicate those tests desired from Table I and their designated frequency based on risk assessment for the procurement.

6.4 Technical manuals and drawings. The requirement for technical manuals and drawings should be considered when this specification is applied on a contract. The technical manuals and drawings must be acquired under separate contract line item in the contract (see 6.2).

6.5 Definitions.

6.5.1 Coalescer element. Coalescer elements form the first stage of filtration in a filter-separator and are designed to remove solids and to coalesce free or emulsified water in the fuel.

6.5.2 Filter-separator. A filter-separator is a vessel containing elements designed to continuously remove dirt and water from fuel to an acceptable level during fuel transfer or end user servicing.

6.5.3 Separator element. Separator elements form the second stage in a filter-separator and are designed to repel or prevent coalesced water from being discharged with the fuel.

6.6 Subject term (key word) listing.

Coalescer

Fuel component

Water removal

6.7 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.

Preparing Activity:

Navy - SH

Project 4330-0187-000

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>.