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MILITARY SPECIFICATION

FILTER ASSEMBLY AND FILTER ELEMENTS, FLUID, PRESSURE (FOR ENGINES WITH LIQUID FUEL INJECTION SYSTEMS)

This specification has been approved by the Department of Defense, and is mandatory for use by the Departments of the Army, the Navy and the Air Force.

1. SCOPE

1.1 Scope - This specification covers filter, assemblies and filter elements for installation on internal combustion engines to remove foreign material (contaminants) from the engine fuel.

1.2 Classification - The filter assembly and filter elements shall be of the following types and clauses as specified (see 6.2):

Type I - Filter assembly.

Class 1 - Heavy duty - small size.

Class 2 - Heavy duty - large size.

Class 3 - Light duty - small size.

Class 4 - Light duty - large size.

Type II - Filter elements.

Class 1 - Small size - rated flow 25 gallons per hour.

Class 2 - Large size - rated flow 50 gallons per hour.

2. Applicable DOCUMENTS

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

SPECIFICATIONS

FEDERAL

PPP-B-566 - Boxes, Folding, Paperboard.

PPP-B-576 - Box, Wood, Cleated, Veneer, Paper Overlaid.

PPP-B-585 - Boxes, Wood, Wirebound.

PPP-B-591 - Boxes, Fiberboard, Wood-Cleated.

PPP-B-601 - Boxes, Wood, Cleated-Plywood.

PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.

PPP-B-636 - Box, Fiberboard.

PPP-B-676 - Boxes, Set-Up Paperboard

PPP-T-76 - Tape, Pressure-Sensitive Adhesive, Paper, Water Resistant (for Carton Sealing).

PPP-T-97 - Tape; Pressure-Sensitive Adhesive, Filament, Reinforced.

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JAN-P-100 - Packaging and Packing for overseas Shipment: General Specification.

MIL-P-116 - Preservation, Methods of.

MIL-S-901 - Shockproof Equipment, Class HI (High-Impact), **Shipboard Application, Tests for.**

ML-L-10647 - Liners, Cane, Waterproof.

MIL-C-16173 - Corrosion Preventive Compound, Solvent Cutback, Cold Application.

MIL-F-16884 - Fuel oil, Diesel, Marine.

MIL-D-70327 - Drawings, Engineering and Associated Lists.

STANDARDS

MILITARY

MIL-S-105 - Sampling Procedure and Tables for inspection by Attributes.

MIL-STD-129 - Marking for Shipment and Storage.

ML-SIT)-130 - Identification Marking of U.S. Military Property.

MIL-STD-143 - Specifications and Standards, Orders of Precedence.

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

2.2 Other publications. - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

D-2 - Proposed Method of Test for Particulate Matter in Hydrocarbons.

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

OFFICIAL CLASSIFICATION COMMITTEE
Uniform Freight Classification Rules.

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York 16, New York.)

3. REQUIREMENTS

3.1 Qualification. - The filter assembly and filter element shall be a product which has been tested and passed the qualification tests specified herein, and has been listed on or approved for listing on the applicable qualified products list.

3.2 Description. -

3.2.1 Type I, filter assembly. -

3.2.1.1 Type I filter assemblies shall consist of a metal case, case cover, cover gaskets, and suitable cover fastening and mounting arrangements

3.2.1.2 **Materials.** - Type I filter assemblies for shipboard application shall be fabricated from brass or bronze which exhibits a high degree of corrosion resistance with seawater contaminated engine fuels. Specification of brass or bronze does not preclude the acceptance of other satisfactory materials as approved by the bureau or agency concerned

3.2.1.3 **Dimensions.** - Type I, filter assemblies shall conform to the dimensions for the applicable size as shown on figures 1 and 2.

3.2.1.4 **Seals.** - Seals shall be an integral part of the element or be mechanically secured to the top and bottom of the filter element. The element shall

seal suitably between the upper and lower seal plates when separated the minimum and maximum distance shown on figures 1 and 2.

3.2.1.5 **Filter case.** - The case of a type I filter assembly shall incorporate reinforced relet and outlet openings threaded to receive standard pipe thread fittings. The design shall be such as to facilitate cleaning of the case interior and to permit removal and replacement of the filter element without disconnecting any attached fuel lines or fittings. Exterior surfaces of the case and cover shall be given the manufacturer's standard commercial finish.

3.2.2 Type XI (filter elements). -

3.2.2.1 Metal standpipes. - Metal standpipes of type II elements shall be coated or plated with a metal to give an element life, without deterioration, of approximately 500 hours in the presence of seawater contaminated engine fuels. Cadmium plating has been found satisfactory, however, other material may be substituted as approved by the bureau or agency concerned.

3.2.2.2 **Dimensions.** - Type II, classes 1 and 2 shall conform to the design dimensions and arrangements shown on figure 3.

3.2.2.2.1 Both ends of the element shall be provided with a flat resilient sealing surface integral with the element or mechanically attached thereto and shall suitably seal between upper and lower seal plates as shown on figures 1 and 2.

3.2.2.2.1.1 **Class 1.** - Class 1 elements shall be designed so that two of them stacked end-to-end may be interchanged with one class 2 element.

3.3 Performance characteristics. -

3.3.1 **Media migration (type II).** - When filter elements are tested as specified in 4.5.3, there shall be no more than 0.5 milligram of media migrating from each class 1 element and one milligram from each class 2 element.

3.3.2 Flow rate and filter ability (type II). -

3.3.2.1 **Flow rate.** - Type II, class 1 and 2 elements shall be tested as specified in 4.5.4. The pressure drop across the element(s) shall not exceed 6.0 inches of mercury at a flow rate of 200 gallons per hour (gph). The average solids content of the effluent samples taken during the first 30 minutes of the test shall not exceed 1 milligram per liter when analyzed in accordance with 4.5.4.3.

3.3.2.2 Filtering ability. - The filter elements shall be tested in accordance with 4.5.4. The dirt storage capacity of one class 2 or two class 1 element(s) shall be not less than 200 grams. The pressure drop shall not exceed 15 pounds per square inch (p.s.i.) during the test. The average solids content of the effluent samples taken during the addition of the 200 grams of solid contaminant shall not exceed 10 milligrams per liter when analyzed in accordance with 4.5.4.4.2. Analysis of the samples for water content is not required.

3.3.3 Differential pressure (element). - The filter element shall show no evidence of deformation or damage when tested in accordance with 4.5.5.

3.3.4 Shock. - Filter assemblies of type I, class 1 and 2 and type II, class 1 and 2 shall be shock tested in accordance with 4.5.7. After being subjected to the shock test the assembly and element(s) shall meet the requirements of MIL-S-901. Performance after shock shall be defined as meeting the requirement of 3.3.2 for the flow rate and filter ability and 3.3.5 for pressure test. Acceptability of filter assembly and element shall be determined separately. Failure of one will not necessarily be cause for rejection of the other.

3.3.5 Pressure (case) (type I). - The filter assembly for the type I, filters shall be capable, when tested-as specified in 4.5.6, of withstanding a pressure of not less than 150 p.s.i. without showing any evidence of leakage, permanent deformation or other damage. The class 3 and 4 filter assemblies shall withstand a pressure of 100 p.s.i.

3.4 Product identification. - All filter assemblies and filter elements shall be plainly marked in accordance with MIL-STD-130. Marking shall include the following information:

Filter assembly, filter element (whichever is applicable), fluid, pressure; for engines with liquid fuel injection systems.
Class.
Federal stock No.
Manufacturer's name or trademark.

3.5 Interchangeability. - All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The drawing number requirements of MIL-D-70327 shall govern changes in the manufacturer's part number.

3.6 Parts. - Parts not specified herein shall be selected in accordance with MIL-STD-143.

3.7 Workmanship. The workmanship shall be such as to produce filter assemblies and filter elements in accordance with the design and operating characteristics specified herein and in accordance with the practices used in the manufacturing of similar items of good commercial quality.

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the Impactions set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements

4.2 Materials and equipment required for tests. - Materials and equipment required to conduct the tests specified herein shall be as follows:

- (a) Standard filter or filter element. - A standard filter or a standard filter element required shall be in accordance with the applicable provisions specified herein.
- (b) Reference test oils. - Test oils required in the test methods shall conform to the following:
 - (1) Marine Diesel fuel oil in accordance with MIL-F-16884.
 - (2) Viscous oil. - Any type of viscous oil or lubricant may be used for the differential pressure test specified in 4.5.5. A No. 6 boiler fuel has been found satisfactory.
- (c) Contaminant. - Solids contaminant shall be standardized air cleaner test dust, fine grade, package No. 1543094 (this material may be obtained from AC Spark Plug Division, General Motors Corporation, Flint, Michigan), having an approximate particle size distribution as shown in table I.

Table I - Particle size distribution

Particle size	Percent of total amount
Microns	Percent
0 to 5	30 ± 2
5 to 10	18 ± 3

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Table I - Particle size distribution (cont'd).

Particle size	Percent of total amount
Microns	Percent
10 to 20	16 ± 3
20 to 40	18 ± 3
40 to 80	9 ± 3

4.3 Qualification tests^{1/}. - Qualification tests shall be conducted at a laboratory satisfactory to

^{1/} Applicat for qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3 and 6.4).

the Bureau of Ships. Qualification tests shall consist of the tests shown in table II.

4.3.1 Samples of filter assemblies and filter elements to be submitted for qualification tests. -

4.3.1.1 Type I filter assembly. - A type I, class 2 filter assembly shall be submitted for qualification tests for filter assemblies intended for combatant applications or a class 4 filter assembly shall be submitted for qualification tests for filter assemblies intended for noncombatant applications. Classes 1 and 3 filter assemblies shall be subjected to a pressure differential test only, when the manufacturer's classes 2 and 4 filter assemblies of the same basic design and workmanship have passed the qualification tests.

Table II - Qualification tests.

Type and classes of filter assembly or filter element	Test:	Paragraph references	
		Requirement	Qualification test
Type I, classes 1, 2, 3 and 4 Type I, classes 1 and 2	Pressure test (case)	3.3.5	4.5.6
	Shock	3.3.4	4.5.7
Type II, classes 1 and 2	Flow rate and filtering ability	3.3.2	4.5.4
	Media migration	3.3.1	4.5.3
	Differential pressure	3.3.3	4.5.5
	Shock	3.3.4	4.5.7

4.3.1.2 Type II filter elements. - A type II, class 2 filter element shall be submitted for qualification tests for filter elements. Class 1 filter elements shall be subjected to a pressure differential test only, when the manufacturer's class 2 filter element of the same basic design and workmanship has passed the qualification tests.

4.4 Sampling for quality conformance inspection. -

4.4.1 Type I filter assemblies. -

4.4.1.1 Lot for filter assembly. - A lot shall consist of not more than 1,000 filter assemblies of the same type, class and size offered for delivery at one time.

4.4.1.2 Sampling for examination and tests. - Sample filter assemblies shall be selected in accordance with MIL-STD-105 at inspection level III for the examination of 4.5.1.1 and the tests specified in 4.5.1.2. Any filter assembly having one or more defects shall be rejected. Lots shall be accepted or rejected in accordance with acceptable quality level (AQL) of 1.5 percent defective

4.4.2 Type II filter elements. -

4.4.2.1 Lot for filter elements. - A lot shall consist of all filter elements of the same type, class and size produced in one manufacturing plant and offered for delivery at one time.

4.4.2.2 Sampling for examination. - Sample filter elements shall be selected from each lot in accordance with MIL-STD-105 at inspection level II for the examination specified in 4.5.2.1.

4.4.2.3 Sampling for tests. - Sample filter elements shall be selected from each lot in accordance with inspection level L-8 of MIL-STD-105 for the test specified in 4.5.3 and at inspection level L-5 for the test specified in 4.5.4. if any filter element fails in either test the lot represented by the sample shall be rejected.

4.4.3 Samples for comparison inspection. - Two sample elements shall be selected for the comparison inspection specified in 4.6.

4.5 Examination and tests. -

4.5.1 Type I, filter assembly. -

4.5.1.1 Examination.- Type I filter assemblies selected in accordance with 4.4.1.2 shall be examined to determine conformance to all Of the requirements of this specification not involving tests.

4.5.1.2 Hydrostatic pressure test. - Filter assemblies selected in accordance with 4.4.1.2 shall be subjected to a hydrostatic test pressure of 150 p.s.i.

4.5.2 Type II, filter elements. -

4.5.2.1 Examination. - Type II, filter elements selected in accordance with 4.4.2 shall be examined to determine conformance to the design, dimensions and details of construction and any other requirements specified herein not involving tests.

4.5.3 Media migration test. - Filter elements shall be tested for media migration in a system consisting of a reservoir, a pump, a standard fuel filter body, a metal edge strainer (Purolator type D-21 WM-20 with 0.0015 inch spacing or equal, with fabric element removed), a flow meter and a return line to the reservoir. The components shall be connected in series as enumerated above and shall be so connected as to minimize sharp corners and crevices where solids would be likely to build up. One and one-half to 5 gallons of Diesel fuel test oil shall be circulated through the metal edge strainer for a 4-hour period at rated flow for the element to be tested and with the fuel held at a temperature of $100^{\circ} \pm 10^{\circ}\text{F}$. At the end of this 4-hour period, the strainer shall be removed and placed over a clean glass beaker to collect the fuel drainage. The strainer shall be rinsed into the beaker with ASTM precipitant ion naphtha which has been filtered through a Gooch crucible (Selas No. 28-080XF or equal, fritted or sintered integral bottom) using a rubber policeman to clean all strainer surfaces. All fuel remaining in the strainer assembly shall be drained, the strainer assembly shall be rinsed with filtered naphtha and both the fuel and the washings shall be collected in the same beaker used for the washings from the strainer. The fuel and washings shall be filtered through a tared Gooch crucible (Selas No. 28-080XF or equal). The crucible shall be washed with filtered naphtha, dried in an oven at 212°F ., cooled in a desiccator and weighed.

4.5.3.1 The 4-hour circulation (without element) shall be repeated until a run shows a removal of foreign matter from the fuel not to exceed 1.0 milligram.

4.5.3.2 A sample fuel filter element shall be installed in the standard filter assembly and the test

fuel circulated through the system for a period of 8 hours at rated flow for the element being tested and with the fuel held at a temperature of $100^{\circ} \pm 10^{\circ}\text{F}$. This 8-hour circulation period shall be repeated on additional test elements until a total of four have been flowed in the same manner without a change or addition to fuel in the reservoir. Each element removed from the filter assembly shall be allowed to drain back into the filter assembly for a period of 5 minutes prior to starting a subsequent run. At the completion of the fourth 8-hour circulation period, the strainer and strainer assembly shall be cleaned as specified for the 4-hour circulation periods (without element) (see 4.5.3.1) and the amount of foreign matter determined to the nearest 0.5 milligram. The total weight of foreign matter collected shall be divided by four and the value reported as media migration.

4.5.4 Flow rate and filtering ability test. -

4.5.4.1 Apparatus. - A test apparatus shall be constructed in accordance with figure 4. It shall include suitable machinery, controls and instruments to:

- (a) Permit regulation of flow through the filter between 25 and 200 g.p.h.
- (b) Maintain a constant flow of 50 g.p.h. at 25 p.s.i. head.
- (c) Control the fuel oil temperatures between 90° and 100°F .
- (d) Add water at the rate of 0.25 g.p.h.
- (e) Add solid contaminant at the rate of 50 grams per hour.
- (f) Take inlet and effluent samples.
- (g) Measure pressure differential across the element(s).
- (h) Prevent recirculation of water and solids.

The filter case shall be modified as shown on figure 4 to permit measurement of pressure drop across the element(s) only. The capacity of the reservoir shall be such as to permit continued circulation of the fuel oil after withdrawal of samples having a total volume of 6 gallons.

4.5.4.2 Contaminant feed. - The solids contaminant shall be a fine grade standardized air cleaner test dust. It shall be added as a dry powder, at an essentially constant rate, to a funnel which is flushed with clean fuel. This mixture shall be rejected into the fuel system near the filter inlet by a suitable pump. Filtered tap water, when used as a contaminant, shall be added to the funnel and rejected with the solids-fuel mixture.

4.5.4.3 Analysis of samples. - Samples shall be analyzed for solids content as follows:

- (a) Materials. -
 - (1) Crucibles, porcelain perforated bottom Coors size 4 or equal.

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- (2) Filter pads, glass fiber, Number 934-AH Reeve Angel 2.4 centimeter discs to fit a Number 4 crucible similar to Fisher Scientific Company Catalogue Number 9-873.
 - (3) Tri-solvent composed of equal parts of particle free benzene, acetone and methanol.
 - (4) Standard laboratory equipment for filtering, drying and weighing.
- (b) Preparation. - Preparation shall be as follows :
- (1) Tri-solvent. - Render particle free by filtering through a crucible containing two glass fiber pads.
 - (2) Crucibles. - Wash with hot water and detergent, acid clean, rinse with tap water followed by three rinsings with distilled water and dry. Place two filter pads in the crucible and center by tapping crucible. Mount crucible on a filtering flask and wet pads with a few drops of tri-solvent. Apply slight vacuum and lightly tap down the edges of the filter pads using a stirring rod with a smooth round end (Caution-Do not tap with tweezers or sharp edged Instrument as pad is easily punctured). Using slight vacuum wash pads by filtering three portions of tri-solvent. Dry in oven for 1 hour at 220° F, place in dust free cabinet, cool for 1 hour and weigh to nearest 0.1 milligram. When a double pan balance is used a similarly prepared crucible may be used as a tare.
- (c) Procedure. - Procedure shall be as follows:
- (1) Decant the fuel sample through a prepared and weighed crucible using a vacuum of about 18-20 inches Mercury (Hg) below atmosphere. If necessary tap edges of filter pad with stirring rod after adding first few milliliter (ml) of fuel. Police sides and bottom of sample flask during recantation of last 50-100 ml of fuel Measure and record the size of sample filtered. Wash the sides and bottom of the sample flask three times with tri-solvent and filter the washings Reduce the vacuum to about 2 inches Hg below atmospheric and wash the pad three times, filling the crucible with the solvent on each washing. Dry and weigh using a tare.

4.5.4.3.1 Alternate method of sample analyses - Samples may be analyzed for solids content by filtering through an AA Millipore filter, drying and weighing when specifically approved by the bureau or agency

concerned. The method is, in general, the ASTM Committee D-2 "Proposed Method of Test for Particulate Matter in Hydrocarbons".

4.5.4.4 Test procedures. -

4.5.4.4.1 Flow rate. - Fuel shall be circulated through the test apparatus including the test filter case without elements until analysis of effluent samples shows that the system contamination is less than 1 milligram per liter. One class 2 or two class 1 elements shall be installed in the test filter case. The cleaned diesel fuel at a temperature of between 90° and 100° F. shall be circulated through the system at a constant rate of 50 g.p.h for a period of 30 minutes. One-liter effluent samples shall be taken immediately after the flow rate has been established, at 5 minutes, 10 minutes, and at 30 minutes. Circulation of the fuel shall be continued at flow rates from 25 to 200 g.p.h. in increments of approximately 25 g.p.h. and the corresponding pressure drops shall be measured and recorded

4.5.4.4.2 Filtering ability. - Two filtering ability determinations shall be made under the test conditions shown in table III. A fresh flow-rate-tested class 2 (or two class 1) element(s) shall be used for each determination.

Table III - Filtering ability determination

Run Number	Flow rate (g. p. h.)	Solids add rate (grams per hour)	Water add Rate (g.p.h.)
1	50	50	0
2	50	50	1/0.25

1/ When water is added, a volume equal to the amount of water added shall be withdrawn from the filter case each 30 minutes and discarded.

Solids addition rate shall be maintained at plus or minus 1 percent of specified rate. Fuel temperature shall be maintained between 90° and 100° F. The relet pressure to the filter case shall be maintained at 25 ± 1 p.s.i. Fuel temperature differential pressure across the element(s) and fuel flow rate shall be recorded each 10 minutes. Solids content of the fuel at the start of the test shall not exceed 1.0 milligrams per liter One-liter effluent samples shall be taken at 10 minute intervals during the first hour and at 30 minute intervals for the remainder of the test. The test shall be continued until 200 grams of solids have been added or until an element failure has occurred prior to the addition of the required amount of solids.

4.5.5 Differential pressure test (element). - One class 2 or two class 1 element(s) shall be

assembled in a filter case which has been modified as shown on figure 5 to Permit measurement of pressure drop across the element(s) only. A viscous fluid or partial restriction of the element with test contaminant may be used to obtain the required pressure differential). There shall be no evidence of permanent deformation or other damage.

4.5.6 Pressure test (case) (type I). - One sample filter assembled with the cover nut tightened to a torque of 15 to 25 pound-feet shall be subjected for a period of 5 minutes to an internal pressure of 150 p.s.i. for type I, classes 1 and 2 or 100 p.s.i. for type I, classes 3 and 4. This test shall be made with Diesel fuel oil at a temperature of 90° to 110°F. During and after the tests, the sample assembly shall be examined for any evidence of leakage, permanent deformation, or any other damage.

4.5.7 Resistance to shock. - Sample filter assembly (with and without elements) shall be assembled and the filter filled with diesel fuel oil. The inlet and the outlet shall be plugged. Sample elements shall have been subjected to a flow of clean oil at 100° F. for a period of not less than 8 hours, and may be those used in the media migration test. The assembly shall be subjected to grade I shock test as specified in MIL-S-901. When elements only are submitted for test a filter case furnished by the laboratory shall be used.

4.6 Comparison inspection. - When deemed necessary by the Bureau of Ships, sample filter assemblies and-filter elements shall be selected and forwarded to a laboratory satisfactory to the Bureau of Ships for comparison inspection. The samples shall be subjected to any or all of the tests specified in 4.5 considered necessary to determine that the sample is equal to the sample upon which qualification approval was based. If an unsatisfactory report is obtained, the laboratory shall immediately notify the Bureau of Ships.

4.7 Inspection of preservation, packaging, and packing. - Sample items and packages shall be selected and respected in accordance with MIL-P-116 to verify conformance to the requirements of section 5 herein.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging (see 6. 2). -

5.1.1 Level A.-

5.1.1.1 Filter assembly. - Interior surfaces of filter cases shall be flushed or fog-sprayed with preservative conforming to type P10, grade 2 of MIL-P-116. Exterior unpainted ferrous surfaces shall be coated with preservative conforming to grade 4 of MIL-C -16173. All openings shall be plugged or sealed to prevent entrance of dirt and moisture. Unit packaging shall be in accordance with method I of MIL-P-116.

5.1.1.2 Fiber elements. - Elements shall be individually packaged in accordance with method IA-13 of MIL-P-116. Contact preservative will not be required.

5.1.1.2.1 Intermediate packaging. - Unit quantities in an intermediate container shall be as specified. Intermediate containers shall conform to PPP-B-566 PPP-B-676 or PPP-B-636 at the option of the manufacturer. Box closure shall conform to the applicable box specification or appendix thereto. Unless otherwise specified the gross weight of paperboard boxes shall not exceed 10 pounds; fiber boxes shall not exceed 20 pounds.

5.1.2 Level C. - The filter assemblies and filter elements shall be packaged in accordance with the manufacturer's commercial practice.

5.2 Packing (see 6.2). -

5.2.1 Level A. -

5.2.1.1 Filter assemblies and filter elements of one type packaged as specified shall be packed in overseas type, wood cleated fiberboard, nailed wood, wirebound wood, wood cleated veneer paper overlaid, or wood cleated plywood boxes conforming to PPP-B-591, PPP-B-621, PPP-B-585, PPP-13-576 or PPP-B-601, respectively at the option of the contractor. Unless otherwise specified shipping containers shall have caseliners conforming to MIL-L-10547. Caseliners shall be closed and sealed in accordance with the appendix to MIL-L-10547. Boxes shall be closed and strapped in accordance with the applicable box specification or appendix thereto. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds.

5.2. 1.2 Elements of one size packaged as specified shall be packed in overseas type, wood cleated fiberboard, nailed wood, fiber, wirebound wood, wood cleated veneer paper overlaid, or wood cleated plywood boxes conforming to PPP-B-591, PPP-B-621, PPP-B-636 class 3, PPP-B-585, PPP-B-576 or PPP-B-601, respectively at the option of the contractor. Shipping containers shall have caseliners conforming to MIL-L-15047. Caseliners shall be closed and sealed in accordance with the appendix to MIL-L-15047. Caseliners for boxes conforming to PPP-B-636 may be omitted provided all joints and corners of the boxes are sealed with minimum 1-1/2 inch wide tape conforming to PPP-T-76. Boxes shall be closed and strapped in accordance with the applicable box specification or appendix thereto, except fiber boxes shall be banded with tape conforming to type III of PPP-T-97 and the appendix thereto. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds; fiber boxes shall not exceed the weight limitations of the applicable box

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specification intermediate fiber boxes conforming to ppp-B-636, closed, sealed and banded as specified herein and used as the shipping container need not be overpacked.

5.2.2 Level B. -

5.2.2.1 Filter assemblies of one type packaged as specified shall be packed in domestic type wood cleated fiberboard, nailed wood, wirebound wood, cleated plywood or wood cleated veneer paper overlaid boxes conforming to PPP-B-591, PPP-B-621, PPP-B-585, PPP-B-601 or PPP-B-576, respectively at the option of the contractor. Box closure shall be as specified in the applicable box specification or appendix thereto. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds.

5.2.2.2 Elements of one size, packaged as specified shall be packed in domestic type wood cleated fiberboard, nailed wood, wirebound wood, cleated plywood or wood cleated veneer paper overlaid boxes or class 2 fiber boxes conforming to PPP-B-591, PPP-B-621, PPP-B-585, PPP-B-601, PPP-B-576, or PPP-B-636, respectively at the option of the Contractor. Box closure shall be as specified in the applicable box specification or appendix thereto. The gross weight of wood or wood cleated boxes shall not exceed 200 pounds, fiber boxes shall not exceed the weight limitations of the applicable box specification. Intermediate fiber boxes conforming to PPP-B-636, closed as specified herein, and used as the shipping container need not be overpacked.

5.2.3 Level C. - The filter assemblies and the filter elements, packaged as specified shall be packed in containers which will insure acceptance by common carrier and safe delivery at destination at the lowest applicable rate. Shipping containers shall comply to the Uniform Freight Classification Rules or other carrier regulations as applicable to the mode of transportation.

5.3 Blocking and bracing. - Blocking and bracing within the shipping container shall be in accordance with JAN- P-100.

5.4 Marking. - In addition to any special marking required by the contract or order, interior and exterior shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. - Filter assemblies and filter elements are intended for installation on internal combustion engines.

Other applications such as hydraulic systems, and so forth shall be approved by the bureau or agency concerned.

6.2 Ordering data. - Procurement documents should specify the following.

- (a) Title, number and date of this specification.
- (b) Types and classes required (see 1.2)
- (c) Selection of applicable levels of preservation, packaging and packing required (see 5.1 and 5. 2).

6.3 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in Qualified Products List 20627 whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, 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. The activity responsible for the qualified products list is the Bureau of Ships, Department of the Navy, Washington 25, D. C. , and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6. 4).

6.4 Copies of "Provisions Governing Qualification" may be obtained upon application to Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia 20, Pennsylvania.

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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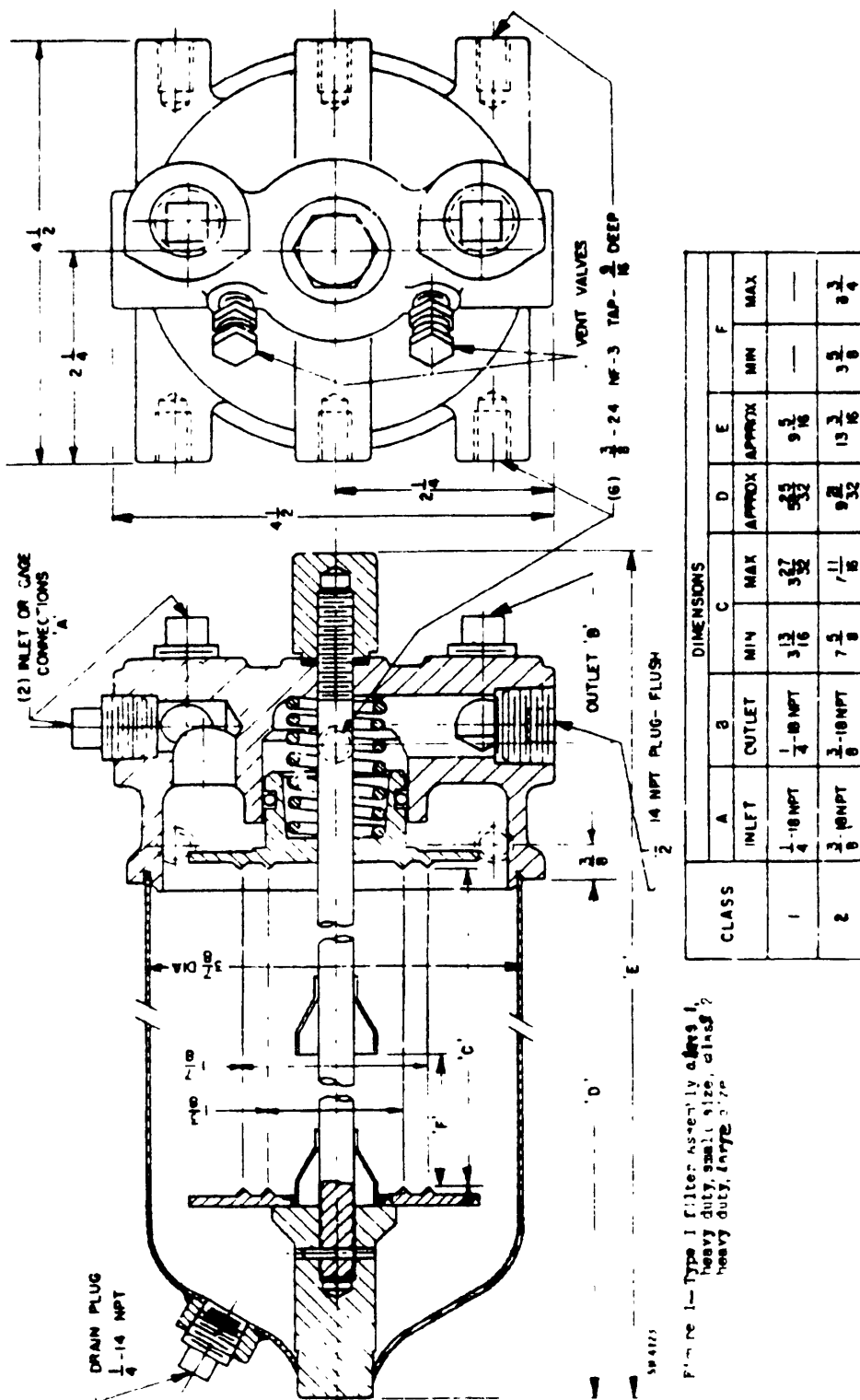


Figure 1—Type I filter Assembly class 1, heavy duty, small size, class 2, heavy duty, large size

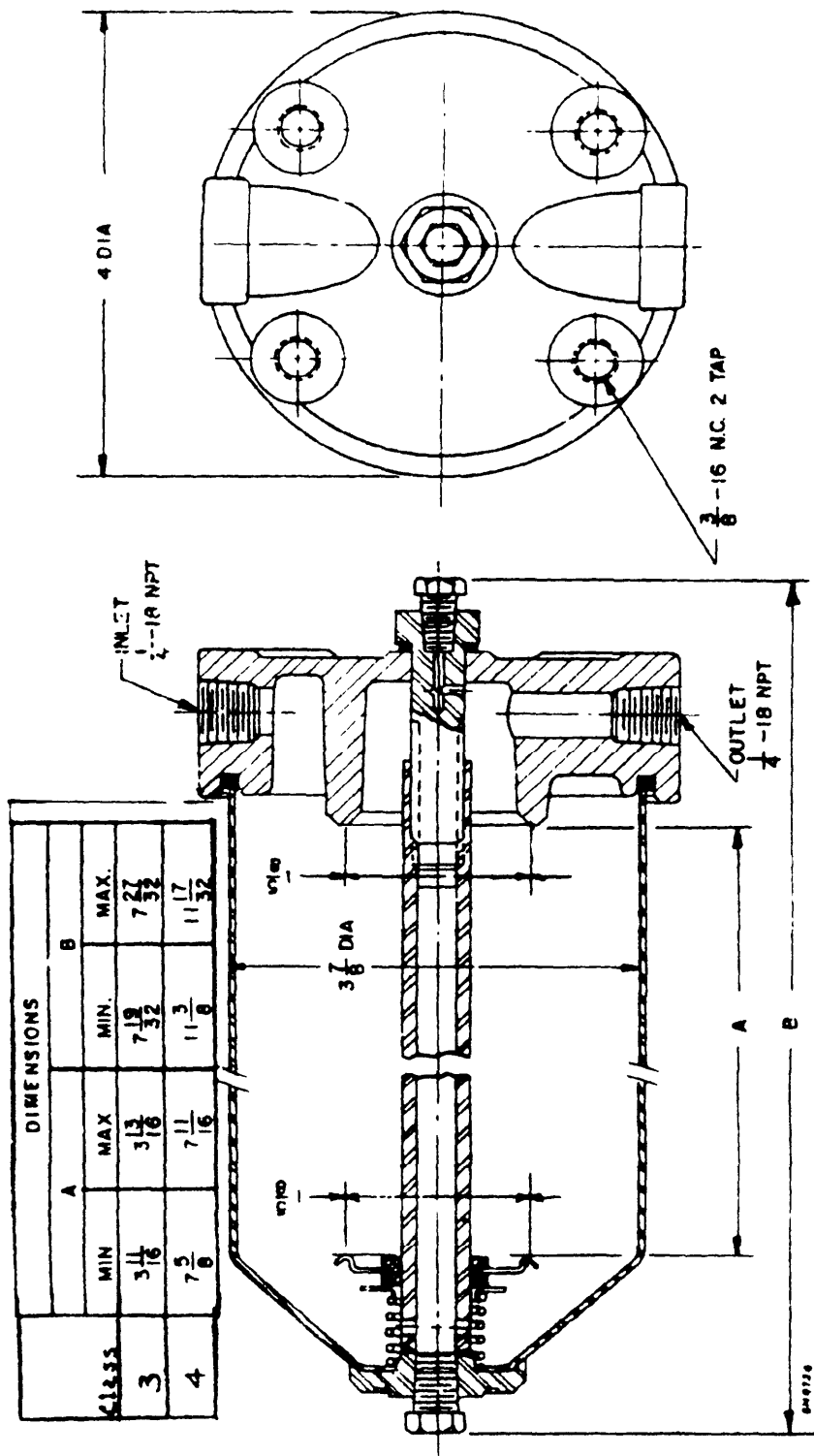


Figure 2- Type 1 filter assembly class 3 light duty, small size; class 4 light duty, large size

Dimensions

Type II	A		B		C		D		E	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Class 1	2-3/4	3	3-7/8	4	1	1-1/8	2-1/4	2-3/8	1	1-1/16
Class 2	2-3/4	3	7-3/4	8	1	1-1/8	2-1/4	2-3/8	1	1-1/16

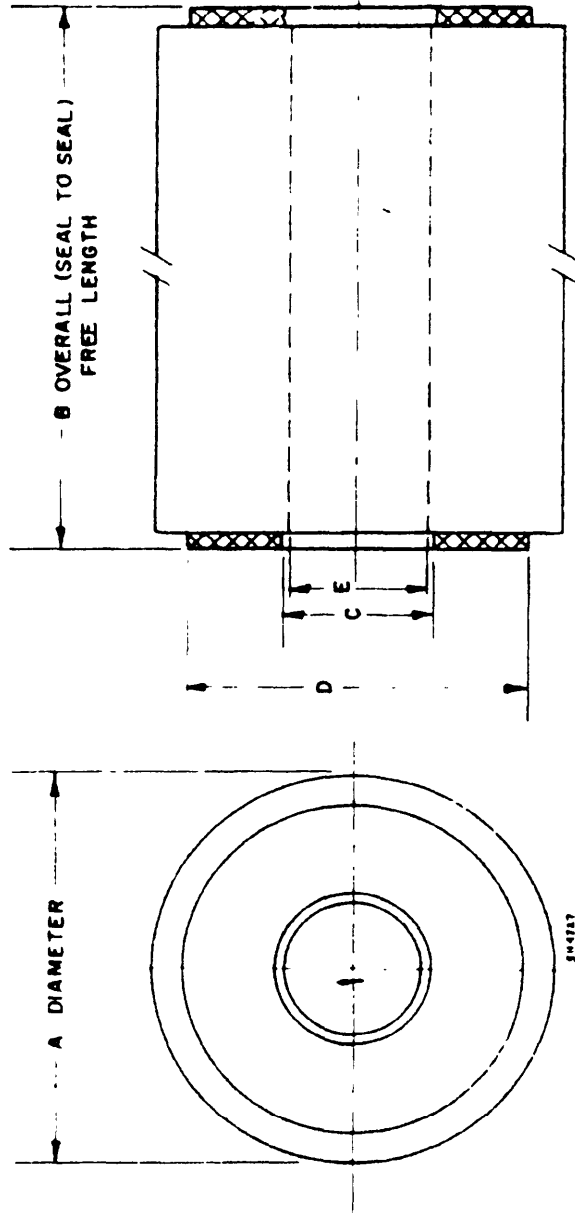


Figure 3 - Type II filter elements, class 1 small size; class 2, large size.

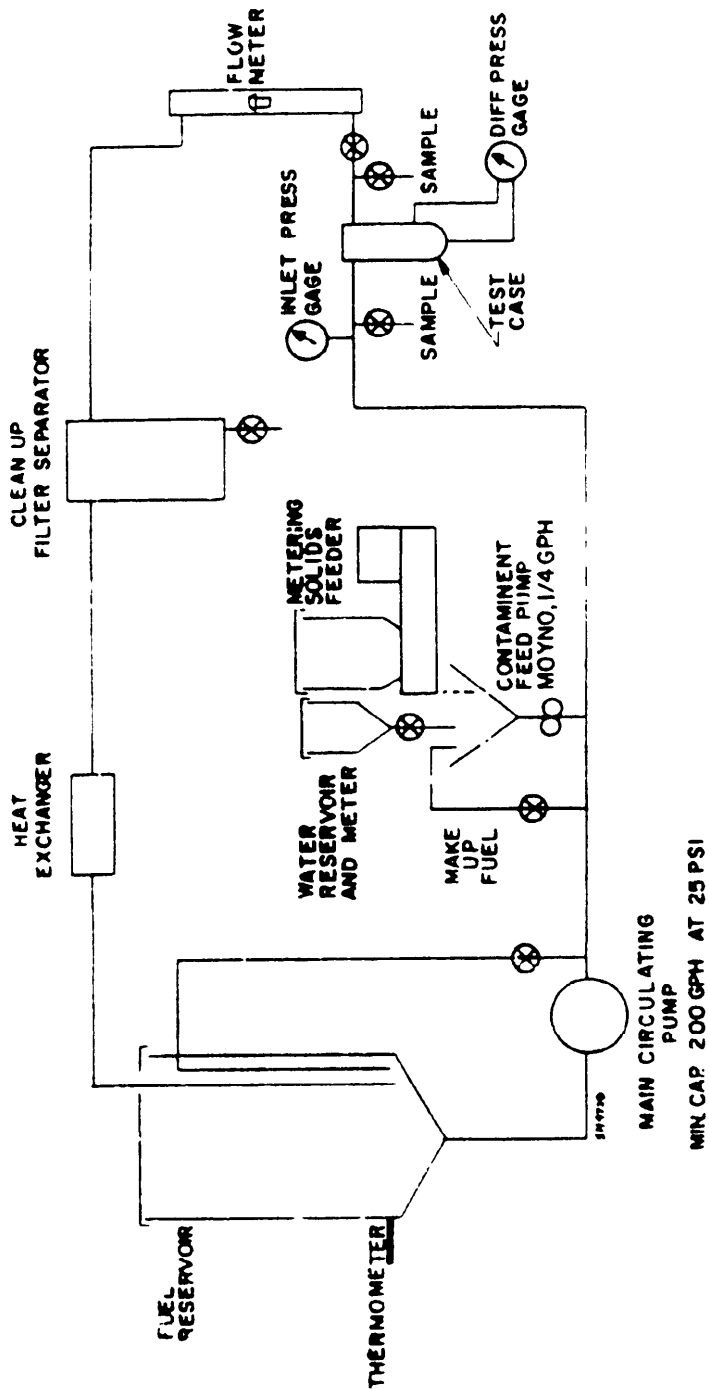


Figure 4 - Test apparatus for filtering ability test.

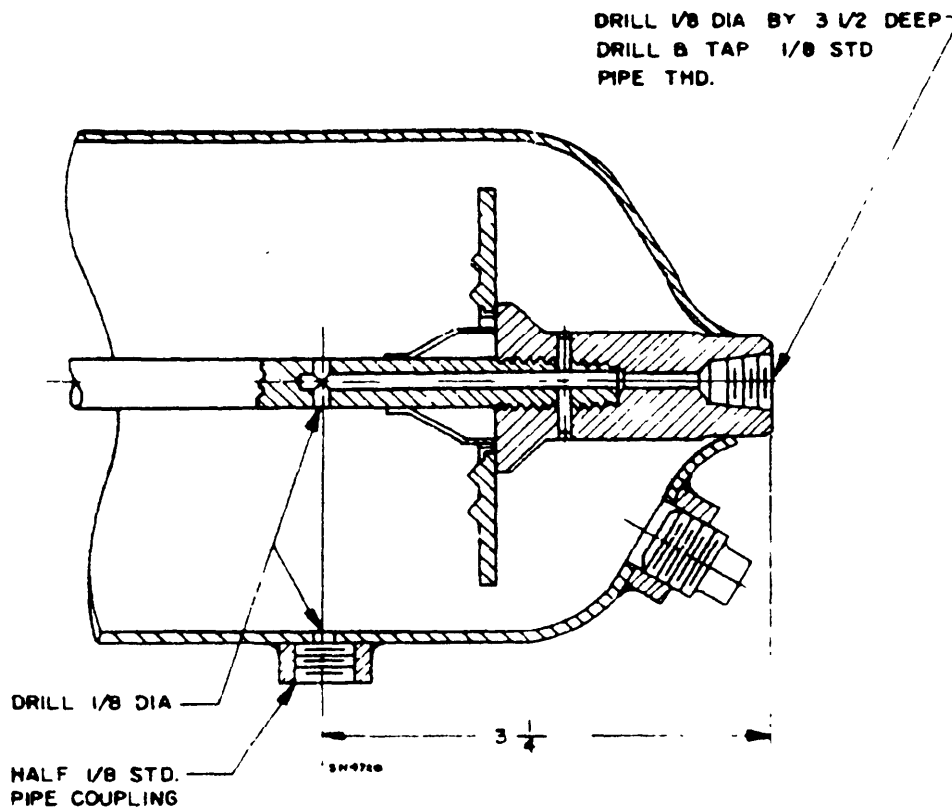


Figure 5 - Modified fuel filter case.

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