

INCH-POUND

MIL-PRF-53091A(AT)

15 February 1996

SUPERSEDING

MIL-F-53091(ME)

7 February 1990

PERFORMANCE SPECIFICATION

FILTER-SEPARATOR, LIQUID FUEL; FRAME MOUNTED, 200 GAL/MIN CAPACITY, ARCTIC SERVICE

This specification is approved for use by the U.S. Army Tank-automotive and Armaments Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a 200 gallon per minute (gal/min) capacity filter-separator for use at low temperature (-60 degrees Fahrenheit (°F)) environment in removing undissolved water and solid contaminants from petroleum fuels.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/BUE, Warren, MI 48397-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 4330

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-F-8901 - Filter-Separators, Liquid Fuel: and Filter Coalescer Elements, Fluid Pressure: Inspection Requirements and Test Procedure For

STANDARDS

FEDERAL

FED-STD-595 - Colors Used in Government Procurement

(Unless otherwise indicated, copies of the above specifications and standards are available from the Defense Printing Service Detachment Office, Bldg. 4D (Customer Service), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

DEPARTMENT OF DEFENSE

13228E1765 - Filter-Separator Assembly, Fuel, 200 Gal/Min, Arctic Service
TA13228E1770 - Filter-Separator Assembly, Fuel, 200 Gal/Min, Arctic Service

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2.3 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

ANSI/ASQC Z1.4 - Sampling Procedures and Tables for Inspections by Attributes (DoD adopted)

(Applications for copies should be addressed to the American Society for Quality Control, P.O. Box 305, 611 E. Wisconsin Ave., Milwaukee, WI 53201-4606.)

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 First article. When specified (see 6.2), a first article sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Materials. Unless specified herein, materials used shall be in accordance with the manufacturer's materials specifications for filter-separators for liquid fuels. The materials shall be capable of meeting all the operational and environmental requirements specified herein (see 4.5.1). Recovered materials shall be used to the maximum extent practicable.

3.2.1 Metals. All metals used in the construction of the filter-separators, except metal which is in constant contact with the liquid fuel, shall be of a corrosion-resistant type of shall be suitably protected to resist corrosion during the normal service life of the filter-separator. The use of dissimilar metals in intimate metal-to-metal contact, shall be avoided.

3.3 Environmental requirements. The filter-separator shall conform to the following environmental requirements.

3.3.1 Operating temperature. The filter-separator shall permit a flow rate of 200, 150, 100, and 50 gal/min at all ambient temperatures between +95 and -60°F.

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3.3.2 Storage temperature. The filter-separator shall not be damaged by storage in all ambient temperatures between +145 to -65°F.

3.4 Design and construction. The filter-separator shall be in accordance with Top Assembly TA13228E1770 and as specified herein. The filter-separator shall consist essentially of a horizontal aluminum vessel with a removable side access cover, a manually operated air vent, inlet and outlet connections, filter elements, canisters, differential pressure gage, attaching hardware, and manually operated water drain valve. The filter-separator shall be mounted within an aluminum tubular rectangular frame with a defroster shroud.

3.4.1 Mobility aids. The filter-separator shall be provided with mobility aids (see 6.4). The mobility aids shall provide the filter-separator the capability to negotiate a ramp angle of 15 degrees without any part of the filter-separator dragging.

3.4.2 Retractable/removable tires/wheels. The filter-separator shall be designed with low temperature, low ground pressure, removable/retractable wheels/tires.

3.4.3 Sled runners. Sled runners shall be welded to the skid base and designed to prevent the filter separator from diving into snow or ice.

3.4.4 Towing eyes. Towing eyes shall be welded to the front and rear of each assembly for attaching a towing cable for tandem towing.

3.5 Filter elements. Each filter-separator shall be furnished with 30 filter elements, NSN 4330-00-983-0998 (see TA13228E1770), for each filter-separator; 15 to be installed in the filter-separator and 15 as replacements.

3.6 Reliability. The specified mean-time-between-failure (MTBF) shall be 140 hours when the filter-separator is operated at rated capacity and tested as specified in 4.5.4.

3.7 Maintainability.

3.7.1 Maintenance support. Assemblages or support elements such as technical manuals, repair parts, special tools, or lubrication charts as specified (see 6.3), shall be adequate to perform the intended function of assisting or conducting maintenance operations on the filter-separator.

3.7.2 Maintenance ratio. The filter-separator shall have a maintenance ratio of not greater than 0.03. Maintenance ratio is defined as the ratio of the total active maintenance man-hours required (scheduled and unscheduled) to the total operating time. Man-hours for repair of replaced components and scheduled before- and after-operation checks are excluded. A maintenance schedule shall be established prior to the start of any testing.

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3.8 **Performance.** The filter-separator shall conform to the operating characteristics specified on drawing 13228E1765.

3.9 **Safety.** The filter-separator shall present no uncontrolled hazards to the user.

3.10 **Treatment and painting.** The exterior of the filter-separator normally painted shall be cleaned, treated, and painted for chemical agent resistance and for greater durability. Unless otherwise specified (see 6.2), the top coat shall be camouflage green 383, matching color chip 34094 of FED-STD-595.

3.11 **Cleaning and drying after tests.** After conclusion of all tests, and after removal of the canisters and elements, the filter-separators shall be wiped clean and air dried at room temperature to exhaust all traces of fuel and water.

3.12 **Workmanship.** The filter-separators shall be free from defects such as misaligned components, incomplete welds, cracks, burns, leads, and other defects that could impair the operation and serviceability of the filter-separator. All parts shall be clean and free from dirt, sand, grease, oil, and metal chips. Nonfunctional sharp edges and projecting points, which might present a hazard to personnel, shall be avoided.

4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 **First article inspection.** Unless otherwise specified (see 6.2), first article inspection shall be performed on 2 filter-separators when a first article sample is required (see 3.1). The inspection shall include the examinations of 4.4 (see table I) and the tests of 4.5.1 through 4.5.7.

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TABLE I. Classification of defects.

Category	Defect	Method of examination
<u>Major:</u>		
101	Materials not as specified (see 3.2).	Visual
102	Dissimilar metals are not effectively insulated from each other (see 3.2.1).	Visual
103	Environmental requirements not as specified (see 3.3).	SIE 1/ and Visual
104	Mobility aids not as specified (see 3.4.1).	Visual
105	Filter elements not as specified (see 3.5).	Visual
106	Any part (or component) not in accordance with the Quality Assurance Provisions (QAP) requirements as shown on the drawings.	SIE
107	Any dimensions, other than those identified on the QAP requirements shown on the drawings, not as specified.	SIE
108	Treatment and painting not as specified (see 3.10).	Visual
109	Paint color not as specified (see 3.10).	Visual
110	Filter-separators not cleaned and air dried after testing (see 3.11).	Visual
111	Workmanship not as specified (see 3.12).	SIE and Visual

1/ SIE = Standard Inspection Equipment.

4.3 Conformance inspection. Conformance inspection shall include the examinations of 4.4 and tests of 4.5.6.

4.4 Examination.

4.4.1 Sampling. Samples from an inspection lot for conformance inspection shall be selected in accordance with ANSI/ASQC Z1.4. Any redesign or modification of the contractor's standard to comply with specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements of requirements listed in table I. Noncompliance with any specified requirement or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

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4.5 Tests.

4.5.1 Materials. Conformance to 3.2 shall be determined by inspection of contractor records providing proof or certification that materials conform to requirements. Applicable records shall include drawings, specifications, design data, receiving inspection records, processing and quality control standards, vendor catalogs and certifications, industry standards, test reports, and rating data.

4.5.2 Defects. Conformance shall be determined by examination for the defects listed in table I. Examination shall be visual, tactile, or by measurement with SIE.

4.5.3 Environmental.

4.5.3.1 High temperature. The maximum ambient storage temperature shall be +145°F and the maximum ambient operating temperature shall be +95°F. The filter-separator shall be operated for a period of 2 hours at each ambient temperature of 35, 50, 70, and 95°F. The flow rate during operation at each temperature for each hour shall be varied among four flow rates with 15 minutes at each rate. The four flow rates shall be 200, 150, 100, and 50 gal/min. Nonconformance to 3.3 and 3.8 shall constitute failure of this test.

4.5.3.2 Low temperature. The minimum ambient storage temperature shall be -65°F and the minimum ambient operating temperature shall be -60°F. The filter-separator shall be operated for a period of 2 hours at each ambient temperature of -60, -50, -40, -30, -20, 0, 10, and 30°F. The flow rate during operation at each temperature for each hour shall be varied among four flow rates with 15 minutes at each rate. The four flow rates shall be 200, 150, 100, and 50 gal/min. Nonconformance to 3.3 and 3.8 shall constitute failure of this test.

4.5.4 Reliability. The filter-separator(s) shall be tested as specified in 4.5.3 and 4.5.6 for 435 hours. The lower test value shall be 47 hours and the upper test value shall be 140 hours. Nonconformance to 3.6 shall constitute failure of this test.

4.5.5 Maintainability.

4.5.5.1 Maintenance support evaluation. Maintenance operations required during first article testing shall be accomplished to determine conformance to 3.7.1. Failure of the support elements to maintain the filter-separator as specified shall constitute failure of this test. Errors or inadequacies in the manuals shall not be considered in accessing the maintenance ratio or the MTBF.

4.5.5.2 Maintenance ratio. The maintenance ratio shall be computed during first article testing. Nonconformance to 3.7.2 shall constitute failure of this test.

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4.5.6 Performance. The filter-separators shall be tested to the following performance requirements as specified in MIL-F-8901, table III:

- a. Hydrostatic pressure.
- b. Permanent separator stage (inside-to-outside design).
- c. Differential pressure.
- d. Water removal, 5 percent.

Nonconformance to 3.8 or to the applicable requirements of MIL-F-8901 shall constitute failure of this test.

4.5.7 Safety. The filter-separator shall be evaluated for safety requirements throughout testing as specified in 4.5. Nonconformance to 3.9 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 actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The filter-separator is intended for use at low temperature (-60°F) environment in airfield refueling systems, motor fuel servicing equipment, and military pipeline systems, for the removal of undissolved water and solid contaminants from aviation, diesel, or motor fuels.

6.2 Acquisition data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Issue of Department of Defense Index of Specifications and Standards (DoDISS) to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).

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- c. When a first article is required for inspection and approval and number units required (see 3.1).
- d. Top coat, when other than as specified (see 3.10).
- e. *Packaging requirements (see 5.1).*

6.3 Technical manuals. The requirement for technical manuals should be considered when this specification is applied on a contract. If technical manuals are required, military specifications and standards that have been cleared and listed in DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) must be listed on a separate Contract Data Requirements List (DD Form 1423), which is included as an exhibit to the contract. The technical manuals must be acquired under separate contract line item in the contract.

6.4 Mobility aids. The contracting officer should specify that complete design drawings be provided to fully describe the mobility aids and interfaces or any resulting filter separator design modifications.

6.5 Quality Assurance Provisions (QAP). The contracting officer should require the contractor to maintain records of all QAP inspections. A suggested paragraph is as follows:

“The contractor shall maintain complete records of all examinations and tests performed to verify the requirements of classified QAP characteristics. The records shall include, as a minimum, lot size, sample size, drawing requirements, actual measurements, number and type of deficiencies found, quantity approved, quantity rejected, and corrective action taken when applicable.”

A QAP is a contractual requirement that supplements section 4 of the specification. QAPs indicate the minimum requirements which must be inspected on the product drawings to verify the design objectives of the product and assure interchangeability of repair parts.

6.6 Subject term (key word) listing.

Airfield refueling systems
 Low temperature
 Military pipeline systems
 Motor fuel servicing equipment
 Petroleum fuels

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 extensiveness of the changes.

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Custodian:
Army - AT

Preparing Activity:
Army - AT
(Project 4330-0133)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. FSC 4330

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-53091A(AT)

2. DOCUMENT DATE (YYMMDD)
960215

3. DOCUMENT TITLE

Filter-Separator, Liquid Fuel; Frame Mounted, 200 Gal/Min Capacity, Arctic Service

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

5. REASON FOR RECOMMENDATION

6. SUBMITTER:

a. NAME (Last, First, Middle, Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

(1) Commercial

(2) AUTOVON

(If applicable)

7. DATE SUBMITTED
(YYMMDD)

8. PREPARING ACTIVITY

a. NAME

b. TELEPHONE (Include Area Code)

(1) Commercial

(810) 574-8745

(2) AUTOVON

786-8745

c. ADDRESS (Include Zip Code) Commander

U.S. Army Tank-automotive and Armaments

Command, ATTN: A1STA-TR-E/BLUE

Warren, MI 48397-5000

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466
Telephone (703) 756-2340 AUTOVON 289-2340