

GUIDE SPECIFICATION FOR CONSTRUCTION

SECTION TABLE OF CONTENTS

DIVISION 15 - MECHANICAL

SECTION 15880

FILTER SEPARATOR, FUELING SYSTEM

04/99

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 PREPRODUCTION TESTING
 - 1.3.1 Preproduction Testing
 - 1.3.1.1 Inspection and Testing
 - 1.3.1.2 Deviations from API Publ 1581
 - 1.3.1.3 Data Required Prior to Tests
 - 1.3.1.4 Submittal of Test Documents
 - 1.3.1.5 Required Preproduction Tests

PART 2 PRODUCTS

- 2.1 DESIGN CONDITIONS
- 2.2 WORKMANSHIP
- 2.3 CLEANING
- 2.4 WELDING
- 2.5 MATERIALS OF CONSTRUCTION
 - 2.5.1 Housing
- 2.6 CONSTRUCTION
 - 2.6.1 Housing Vessel
 - 2.6.2 Legs
 - 2.6.3 Inlet and Outlet Connections
 - 2.6.4 Manual Drain Valve
 - 2.6.5 Sight Gauge
 - 2.6.6 Differential Pressure Gauge
 - 2.6.7 Automatic Air Eliminator and Pressure Relief Valves
 - 2.6.8 Sampling Connections
 - 2.6.9 Spider Assembly
 - 2.6.10 Coalescer and Separator Cartridges
 - 2.6.11 Control Valve Accessories
 - 2.6.11.1 Float Control Pilot and Tester
 - 2.6.12 Identification of Product
 - 2.6.13 Assembly

PART 3 EXECUTION

- 3.1 INSTALLATION
 - 3.1.1 Anchoring
 - 3.1.2 Grouting
 - 3.1.3 Leveling and Aligning
 - 3.1.4 Painting

-- End of Section Table of Contents --

DEPARTMENT OF THE ARMY CEGS-15880 (04/99)
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GUIDE SPECIFICATION FOR CONSTRUCTION

SECTION 15880

FILTER SEPARATOR, FUELING SYSTEM
04/99

NOTE: This guide specification covers the requirements for filter separators used in aircraft refueling systems as part of the Air Force Type III Standard (78-24-28-88). This guide specification is to be used in the preparation of project specifications in accordance with ER 1110-345-700 for military construction and in accordance with ER 1110-2-1201 for Civil Works construction.

PART 1 GENERAL

Waiver to Use MilStds and MilSpecs in Air Force Fuel Projects,
HQ AFCESA/CESM (01/29/96).

1.1 REFERENCES

NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest change (Notice) to this guide specification. During the reference reconciliation process, SPECSINTACT will automatically remove references from this paragraph that have been removed from the text.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API Pub 1581 (May 1989; Reaffirmed Dec 1994)
Specifications and Qualification
Procedures-Aviation Jet Fuel
Filter/Separator

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME 16 (1989; Addenda 1989, 1990, 1991) Boiler and Pressure Vessel Section VIII, Pressure Vessels Division 1

ASME B16.5 (1988; Errata) Pipe Flanges and Flanged Fittings

ASME B31.3 (1990; B 31.3a-1990; Errata; B 31.3b) Chemical Plant and Petroleum Refinery Piping

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C827 (1987) Early Volume Change of Cementitious Mixtures

FEDERAL SPECIFICATION (FS)

FS FF-S-325 (1965; Int Amd 3) Shield, Expansion; Nail Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)

MILITARY SPECIFICATIONS (MS)

MS MIL-C-4556 (Rev E) Coating Kit, Epoxy, for Interior of Steel Fuel Tanks

MS MIL-I-25017 (Rev E) Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble

MS MIL-P-5315 (Rev B; NOTICE 1) Packing Preformed, Hydrocarbon Fuel Resistant

MILITARY STANDARDS

MIL-STD-130 (Rev G; NOTICE 1) Identification Marking of U.S. Military Property

MIL-STD-831 Preparation of Test Reports

1.2 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

Indicate submittal classification in the blank space using "GA" when the submittal requires Government approval or "FIO" when the submittal is for information only.

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL

PROCEDURES:

SD-04 Drawings

Filter Separator; GA.

Submit scaled drawings showing dimensions, tolerances, connection sizes of the vessel and accessories. Submit shop drawings for elements. Shop drawings shall include number and arrangement of elements. Shop drawings for this Section shall be submitted for Government approval. Submit technical literature on the vessel, elements, and accessories, which is the manufacturer's published literature.

SD-13 Certificates

Filter Separator; FIO.

If product has been previously tested and approved by the Government, submit certification of qualification under API Publ 1581, Group II, Class B. Include description of qualification, which contains element types and quantities, and provide details of the configurations of vessels tested. Include name of Government Agency and date of approval.

SD-19 Operation and Maintenance Manuals

Filter Separator; GA.

Operation and maintenance information shall be submitted for equipment specified herein. Refer to Section 01730 FACILITY OPERATION AND MAINTENANCE MANUAL.

1.3 PREPRODUCTION TESTING

1.3.1 Preproduction Testing

NOTE: CONTACT NAVFACENCOM OR C.O.E. FOR DIRECTION ON SELECTION. FOR COE PROJECTS, INCLUDE IN MOU SPECIFIC AIR FORCE GOVERNMENT REPRESENTATIVES TO BE NOTIFIED WHEN FACTORY FILTER SEPARATOR TEST DATES ARE SUBMITTED TO THE CONTRACTING OFFICER.

Prior to construction of filter separators (FSI-1 THROUGH FSI-5, FSR-6, AND FSR-7) for the project, preproduction tests shall have been conducted in the presence of [the Contracting Officer's designated Government representative] [a San Antonio Air Logistics Center, Directorate of Energy Management (SA-ALC/SF) representative]. The Contractor shall give the Contracting Officer [__] days notice prior to conductance of factory tests in order to schedule witnessing by representative.

1.3.1.1 Inspection and Testing

The inspection and testing of the preproduction filter separator shall be conducted on a full-scale test system in accordance with API Publ 1581 and as specified herein. The test sample shall consist of a complete filter separator with elements installed. Elements shall be

representative of a production lot. The filter separator, coalescers, and separator screens shall be identified with the manufacturer's part number.

1.3.1.2 Deviations from API Publ 1581

The following are deviations to API Publ 1581 for test requirements Group II, Class B, Test Series 1, 2, and 3.

The allowable effluent fuel contamination limit for free water shall be as follows:

(a) The average free water content in a test set shall not exceed 10 parts per million and any single sample shall not exceed 15 parts per million.

(b) Additive I shall be Stadis 450 manufactured by E.I. DuPont & Nemours Co. in lieu of ASA 3.

(c) Additive II shall be DCI-4A conforming to MS MIL-I-25017 in lieu of Hitec E-515.

1.3.1.3 Data Required Prior to Tests

Submit installation data to enable Government representative to verify that the equipment has been installed and operated correctly. Submit certification from the manufacturer that the test vessel has passed a hydrostatic pressure test, and that the design conforms to API Publ 1581, Group II, Class B. Submit two sets of assembly drawings of the test vessel and accessories for approval.

1.3.1.4 Submittal of Test Documents

NOTE: CONTACT NAVFACENCOM OR COE FOR DIRECTION ON SELECTION. FOR NAVFACENCOM PROJECTS, THE A/E MUST CONSULT WITH THE ENGINEER IN CHARGE (EIC) TO DETERMINE THE REVIEW INPUT OF THE AIR FORCE. FOR COE PROJECTS, COORDINATE WITH AIR FORCE TO DETERMINE WHICH AIR FORCE AGENCY WILL REVIEW TEST DOCUMENTS AND ENSURE THAT MOU AND SUBMITTAL REGISTER CONTAIN THESE REQUIREMENTS.

The test report shall be submitted to the [Contracting Officer's Government representative] [Command Fuel Facilities Engineer or SA ALC/SF representative] for Government approval. Prepare report in accordance with MIL-STD-831. In addition to results, the report shall contain complete records of the tests including data sheets, performance curves, chronological test records, photographs, sample calculations, test procedures, and a description of the test apparatus. Submit color photographs of the sample elements before and after tests. Submit one new coalescer element and one new separator element.

1.3.1.5 Required Preproduction Tests

a. Examination. A visual examination of the filter separator housing and each element shall be performed to ensure compliance with the drawings and verify workmanship requirements.

b. Hydrostatic Pressure Tests. The filter separator shall be subjected to a hydrostatic pressure of 338 pounds per square inch gage (PSIG) per requirements of the ASME 16. In addition, the inlet manifold or chamber (after installation) shall be blanked off and tested to 115 PSIG.

c. Full Scale Performance Test. The filter separator with a full set of coalescer and separator elements shall be tested to the API Publ 1581 Group II, Class B at 600 GPM in accordance with API Publ 1581 Test Method Group II, Test Series No. 2, except as otherwise specified.

d. Single Element Test. Test series 1 and 3 shall be run in an appropriate scale single element test vessel per API Publ 1581, as modified by paragraph "Deviations from API Publ 1581."

e. Coalescer Structural Test. A minimum of two coalescer elements, after being subjected to the full scale test described in paragraph entitled "Full Scale Performance Test", above, shall be subjected to a differential pressure test until rupture to determine structural strength. Each element shall be capable of withstanding a differential pressure of at least 75 PSI without rupture or bypassing of seals.

f. Disassembly Inspection. Upon completion of the tests specified above, the filter separator shall be disassembled and inspected to determine the condition of the coalescer and separator elements. Defects in the element such as swelling of the elements, or damaged gaskets shall be noted. Swelling of or damage to the elements or other parts shall be cause for rejection.

PART 2 PRODUCTS

2.1 DESIGN CONDITIONS

Design conditions shall be as specified in Section 15050 MECHANICAL EQUIPMENT, FUELING and as modified herein.

2.2 WORKMANSHIP

Each filter separator, including all parts and accessories, shall be free from blemishes, defects, burrs and sharp edges. The vessel shall exhibit accuracy of dimensions, accurate radii of fillets and complete marking of parts and assemblies.

2.3 CLEANING

Components of the filter separators shall be cleaned to remove dirt; excess soldering; brazing, and welding flux; welding slag; loose, spattered, or excess solder; metal chips; and other foreign materials before, during and after assembly.

2.4 WELDING

Welding shall be in accordance with ASME B31.3.

2.5 MATERIALS OF CONSTRUCTION

2.5.1 Housing

- a. Carbon steel with internal epoxy coating.
- b. FLOAT ASSEMBLY. Stainless steel.
- c. MANUAL DRAIN VALVE. Stainless steel.
- d. SIGHT GLASS. Armored clear pyrex with nickel-copper alloy ball checks.
- e. DIFFERENTIAL GAUGE. Corrosion resistant piston with stainless steel valves.
- f. SEPARATORS. 200 mesh stainless steel, coated on both sides with Teflon.

2.6 CONSTRUCTION

2.6.1 Housing Vessel

Each filter separator housing shall be fabricated from carbon steel and shall be internally coated with an epoxy coating in accord with MS MIL-C-4556. Coat the exterior with alkalyd resin primer (universal metal primer). Each unit shall be constructed and labeled in accordance with ASME 16. The housing shall be designed for a working pressure of 225 PSIG. Each unit shall be horizontal, end-opening type with coalescers and separators mounted side-by-side (coalescers at the bottom of the vessel and separators at the top). The head opening shall be equipped with a hinged or pivoting device to facilitate swinging the head to one side for servicing. The hinges or pivots shall support the head during servicing without distortion or misalignment. Swing-type bolts shall be used on all main closures. Unit shall be provided with 3-inch inside diameter lifting eyes spaced to support a weight of 2-1/2 times the gross weight of the filter separator. The configuration of the pressure vessel shall be as shown on the drawings. The housing shall be provided with a 3/4-inch inlet compartment fuel drain plug. A hand hole access plate shall be provided in the inlet compartment. The head shall be sealed to the body by means of an O-ring, meeting requirements of MS MIL-P-5315, mounted in a circular groove at the point of closure. Threaded base mounting adapters shall be provided for the coalescers. The separators shall be mounted on adapters with blunted Vee-type knife edges. Height of Vee section to be 0.06 inches, plus or minus 10 percent. The filter separator vessel shall be able to withstand a force of 2,400 pounds and a moment of 2,400 foot-pounds at the flanges.

2.6.2 Legs

Four 3 x 3 x 1/4 inch angle-shaped legs shall be welded to the housing. Each leg shall be fitted with a 4 x 4 x 1/2-inch base plate drilled through with a 3/4-inch hole.

2.6.3 Inlet and Outlet Connections

The inlet and outlet connections shall be 6 inch nominal pipe size and shall be located parallel to each other as shown on the drawings. Inlet connection shall be provided with raised face flanges, faced and drilled in compliance with ASME B16.5, Class 150. Outlet connection flange face shall match Filter Separator Control Valve (FSCV).

2.6.4 Manual Drain Valve

Each filter separator shall be equipped with a 1-inch stainless steel manual ball valve water and fuel drain. The valve shall be capable of

draining all water, fuel and sediment from the filter separator by gravity. The valve shall be installed below the sump of the housing as shown on the drawings.

2.6.5 Sight Gauge

A 1/2-inch armored, clear pyrex liquid level gauge shall be provided for observing the water accumulation in the sump. The gauge shall be equipped with stainless steel or nickel-copper alloy ball checks in both the upper and lower fittings, an upper and lower shutoff valve, and a bottom blowoff cock. The gauge will contain a colored density sensitive ball.

2.6.6 Differential Pressure Gauge

**NOTE: COORDINATE SELECTION OF THIS FEATURE WITH
THE COMMAND FUEL FACILITIES ENGINEER.**

The housing shall be equipped with a direct-reading, piston type differential pressure gauge that measures the differential pressure across both coalescers and separators. The gauge shall consist of a spring-supported, corrosion resistant piston moving inside a glass cylinder, with high pressure applied on top of the piston and low pressure applied below it. Under a differential pressure of 30 PSI, leakage past the piston shall not exceed 120 drops per minute. The cylinder shall have stainless steel and flanges with Viton O-ring seals.

The high pressure inlet of the gauge shall have a 10-micron pleated paper filter and the low pressure connection shall have a fine mesh stainless steel strainer. The gauge shall have an operating pressure of 300 PSI. Differential pressure range of the gauge through approximately 3 inches of piston movement shall be 0-30 PSI with an accuracy of ± 0.5 PSI, calibrated linearly with one PSI scale graduations. High and low pressure connections shall be 1/4 inch NPT female with a stainless steel bar stock valve at each connection. Construction of the gauge shall be such that a 3-valve manifold is not necessary. If only one bar stock valve is closed, the gauge shall not be damaged by up to 300 PSI differential pressure in either direction. The differential pressure gauge shall be attached to the filter separator by a gauge panel. [Differential pressure gauge shall control the filter separator control valve (FSCV) to automatically shut down flow when 20 PSI differential pressure is exceeded.] A pressure gauge shall be attached to the differential pressure gauge to indicate the high pressure and have a range of 300 psi.

2.6.7 Automatic Air Eliminator and Pressure Relief Valves

A 1-inch angle pattern pressure relief valve shall be provided on top of each vessel. An automatic air eliminator shall be installed on the highest point of the vessel and shall have check valve feature. The air eliminator shall release at pressures up to 150 psi with no fuel leakage allowed.

2.6.8 Sampling Connections

Sampling connections shall be provided at the inlet and outlet connections to the housing. Each sampling connection shall consist of a 1/4-inch sampling probe where the probe faces upstream, ball valve, a

quick disconnect coupling and aluminum dust cap. The sampling connections shall be capable of accepting a sampling kit for drawing the samples required to assure fuel quality.

2.6.9 Spider Assembly

Each filter separator shall contain a spider assembly to hold the coalescers and separators in position, to support them firmly against vibration. The method of stabilization shall assure an electrical bond between the spider and the vessel.

2.6.10 Coalescer and Separator Cartridges

Each filter separator shall be provided with coalescers and separators that have been qualified to the performance requirements of API Publ 1581, Group II, Class B. Coalescers shall have a minimum capacity of 2.27 gpm per inch of length, and separators shall have a minimum capacity of 8.33 gpm per inch of length.

2.6.11 Control Valve Accessories

Provide each filter separator with a control valve (FSCV), manual water drain valve, and float control valve (FC) with manual tester as specified in Section entitled "Control Valves" and shall be of the same manufacturer.

2.6.11.1 Float Control Pilot and Tester

Each housing sump shall be fitted with a float control pilot and tester specified in Section 15101 CONTROL VALVES and shall be of the same manufacturer as the control valves.

2.6.12 Identification of Product

Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130. The main equipment nameplate shall be mounted on the housing, and in addition to the usual MIL-STD-130 requirements, shall include the following markings in letters 3/32 inch high or larger:

Filter Separator, Liquid Fuel_____

Design Flow-Rate_____

Design Pressure_____

Elements_____

First Stage _____ Mfg. Part No. *_____

Second Stage _____ Mfg. Part No. *_____

Contract No. *_____

Manufacturer *_____

Specification*_____

- *Applicable information shall be entered by the Contractor.
- *Applicable information shall be stenciled by LFM personnel.

2.6.13 Assembly

Each filter separator shall come assembled with all accessories and shall be ready for use. The functions of all components shall be tested prior to shipment and no assembly or field adjustment of valves or components shall be required.

PART 3 EXECUTION

3.1 INSTALLATION

Install equipment and components in position, true to line, level and plumb and measured from established benchmarks or reference points. Follow manufacturer's recommended practices for equipment installation. Provide required clearance between equipment components. Equipment apparatus, and accessories requiring normal servicing or maintenance to be accessible.

3.1.1 Anchoring

Anchor equipment in place. Check alignment of anchor bolts before installing equipment and cleanout associated sleeves. Do not cut bolts because of misalignment. Notify Contracting Officer of errors and obtain the Contracting Officer's acceptance before proceeding with corrections. Cut anchor bolts of excess length to the appropriate length without damage to threads. Where anchor bolts or like devices have not been installed, provide appropriate self-drilling type anchors for construction condition. Expansion bolt anchors provided shall be in accordance with FS FF-S-325, Group II Type 4, Class One, half-inch size.

3.1.2 Grouting

Equipment, which is anchored to a pad, shall be grouted in place where applicable. Before setting equipment in place and before placing grout, clean surfaces to be in contact with grout, including fasteners and sleeves. Remove standing water, debris, oil, rust, coatings and other materials which impair bond. Clean contaminated concrete by grinding or other acceptable means. Provide necessary formwork for placing and retaining grout. Grout to be nonmetallic, nonshrink, fluid precision grout of a hydraulic cementitious system with graded and processed silica aggregate, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents; free of aluminum power agents, oxidizing agents and inorganic accelerators, including chlorides; proportioned, premixed and packaged at factory with only the addition of water required at the project site. Grouting to meeting requirements of ASTM C827. Perform grouting in accord with ACI, equipment manufacturer's, and grout manufacturer's published specifications and recommendations.

3.1.3 Leveling and Aligning

Level and align equipment in accordance with respective manufacturer's published data. Do not use anchor bolts, jack-nuts or wedges to support, level or align equipment. Install only flat shims for leveling equipment. Place shims to fully support equipment. Wedging is not permitted. Shims to be fabricated flat carbon steel units of surface

configuration and area not less than equipment bearing surface. Shims to provide for full equipment support. Shims to have smooth surfaces and edges, free from burrs and slivers. Flame or electrode cut edges not acceptable.

3.1.4 Painting

Equipment painting shall be specified in Section 15060 PIPE, MANUAL VALVES, AND FITTINGS, FUELING SYSTEM.

-- End of Section --