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M I L I T A R Y S T A N D A R D

INTO-PLANE SERVICING OF FUELS AT COMMERCIAL AIRPORTS

AMSC N/A

FSC 91GP

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FORWARD

INTO-PLANE SERVICING OF FUELS AT COMMERCIAL AIRPORTS

1. This Military Standard is approved for use by all departments and agencies of the Department of Defense.

2. Comments to improve this document should be addressed to SA-ALC/SFSP, Bldg 1621, 1014 Andrews Rd STE 1, Kelly AFB TX 78241-5603 by letter or by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document.

3. Questions concerning technical aspects of this document should be forwarded to SA-ALC/SFTH at the above address or by phoning (210)925-4617 or DSN 945-4617.

CONTENTS

CONTENTS

1. SCOPE

1.1 Scope. This standard establishes the minimum performance and quality requirements for the servicing of fuels to aircraft on US Government Into-Plane Servicing Contracts at commercial airports.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 solicitations.

SPECIFICATIONS

MILITARY

MIL-C-83413/4	Connector and Assemblies, Electrical, Aircraft Grounding, Plugs, for Types I and Ii Grounding Assemblies
MIL-C-83413/7	Connector and Assemblies, Electrical, Aircraft Grounding: Grounding Clamp Connector for Types I and Iii Grounding Assemblies, Clip, Electrical
MIL-F-8901	Filter Separators, Liquid Fuel, and Filter Coalescer Elements, Fluid Pressure, Inspection Requirements and Test Procedures for
MIL-H-26521	Hose Assembly, Nonmetallic, Fuel, Collapsible, Low Temperature with Non-Reusable Couplings
MIL-I-27686	Inhibitor, Icing, Fuel System
MIL-I-85470	Inhibitor, Icing, Fuel System, High Flash NATO Code Number S-1745

STANDARDS

FEDERAL

FED-STD-791	Lubricant, Liquid Fuel & Related Products, Methods of Testing

MILITARY

MIL-STD-161	Identification Methods for Bulk Petroleum Products Systems Including Hydrocarbon Missile Fuels
MIL-STD-24484	Adapter, Pressure Fuel Servicing, Nominal 2.5 Inch Diameter

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg 4D NPM-DODSSP, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 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 are those listed in the issue of the DODISS cited 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2276	Particulate Contaminant In Aviation Fuel By Line Sampling
ASTM D 2624	Electrical Conductivity of Aviation and Distillate Fuels Containing a Static dissipator Additive
ASTM D 3240	Undissolved Water in Aviation Turbine Fuel
ASTM D 3241	Standard Test Method for Thermal Oxidation Stability of Aviation Turbine Fuels
ASTM D 4306	Standard Practice for Aviation Fuel Sample Containers for Test Affected by Trace Contamination
ASTM D 4171	Standard Specification for Fuel System Icing Inhibitors
ASTM D 5006	Measurements of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
ASTM D 5452	Standard Test Method for Particulate Contamination in Aviation Fuels by Laboratory Filtration

(Application for copies should be addressed to ASTM, 1916 Race St., Philadelphia, PA 19103.)

AMERICAN PETROLEUM INSTITUTE (API)

API Publication 1581	Specifications and Qualification Procedures for Aviation Jet Fuel Filter/Separators
API Bulletin No. 1529	Aviation Fueling Hose
API Bulletin No. 1542	Airport Equipment Marking for Fuel Identification

(Application for copies should be addressed to the American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.)

NATIONAL FIRE PROTECTION ASSOCIATION

NFPA 407	Aircraft Fuel Servicing

(Application for copies should be addressed to the National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101.)

AIR TRANSPORT ASSOCIATION

ATA Specification 103	Standards for Jet Fuel Quality Control at Airports

(Application for copies should be addressed to the Air Transport Association of America, 1709 New York Ave. N.W., Washington D.C. 20006.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

BS 3158	British Standard Specification for Rubber Hoses and Hose Assemblies for Aircraft Ground Fuelling and Defuelling

(Application for copies should be addressed to the British Standards Institution, No. 2 Park Street, London WIA 2BS, England, or to the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

2.3 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. DEFINITIONS

3.1 Fuel. Aviation gasoline or aviation turbine fuels.

3.2 Bulk storage systems. Bulk storage systems consist of above or below ground storage tanks equipped for receiving and transferring product to truck fillstands and/or hydrant system operating tanks.

3.3 Hydrant system. A system where fuel is pumped from operating tanks through a filter separator and a manifold to lateral lines that contain one or more servicing outlets. Aircraft servicing is performed through a hydrant hose truck or hose cart that is connected to the hydrant outlet located in the ramp or aircraft parking area.

3.4 Refueling units or refuelers. Trucks, equipped with a tank, pump, filtration, and other accessories necessary to refuel aircraft.

3.5 Hydrant servicing units. Hydrant hose trucks or hose carts, equipped with filtration, used in conjunction with hydrant systems to refuel aircraft.

3.6 Refueling rate. The amount of fuel in liters per minute (l/min) or gallons per minute (gpm) at which aircraft are serviced.

3.7 Gauge pressure. Fuel pressure measured by a pressure measurement device containing a scale calibrated in pressure units, such as kilo pascals (kPa) or pounds per square inch (psi).

3.8 Filter separator vessel. A cylindrical vessel housing coalescer and separator elements designed for removing solid contaminants and coalescing and separating free water from fuel.

3.9 Micronic filter vessel. A cylindrical vessel housing pleated paper cartridge elements designed primarily for filtering solid contaminants from fuel. Micronic filters are treated to repel water, but are not designed to effectively remove free water from fuel.

3.10 Full flow monitor cartridges. Fuse-type or fuel monitor elements which remove free water and solid contaminants in the fuel. As they retain solids and water, fuel flow is restricted or shut-off.

4. GENERAL REQUIREMENTS

4.1 Safety precautions. Throughout this standard there are general safety precautions and instructions that apply to fuel handling and laboratory operations to ensure personal safety and health and the protection of government property.

a. Practices or conditions considered essential to the protection of personnel are identified by a (WARNING). Procedures essential to the protection of equipment or property are identified by a (CAUTION).

b. Occupational Safety and Health Administration, Department of Labor and standard commercial safety practices shall be observed.

5. DETAILED REQUIREMENTS

5.1 Fuel equipment.

5.1.1 Storage and handling system. Each grade of product shall be received, stored and issued in a segregated system. Systems and components used for receiving, storing and refueling aircraft shall be commercial systems designed specifically for aviation fuel use. Fuel system design guidance and restrictions on use of certain metals for components exposed to the fuel are detailed in ATA Specification 103 and NFPA 407. Metals such as zinc and copper are limited primarily to protect the thermal stability property of fuel.

5.1.1.1 Storage tanks. Storage tanks shall be inspected and cleaned as necessary when tank samples show a continuous solids build-up or when filtration elements on the downstream side of tanks show evidence of premature plugging from excessive solids. If these conditions do not occur, storage tanks shall be inspected and cleaned as necessary at the following minimum frequencies:

a. Every 4 years for uncoated steel tanks without inlet filter separator or micronic filter. Every 6 years for uncoated steel tanks with inlet filter separator or micronic filter.

b. Every 6 years for coated steel tanks and tanks constructed of materials resistant to corrosion without inlet filter separator or micronic filter. Every 8 years for coated steel tanks and tanks constructed of materials resistant to corrosion with inlet filter separator or micronic filter.

5.1.2 Refueler tank. The refueler tank shall be made of aluminum, stainless steel, or carbon steel internally lined with a fuel compatible coating such as epoxy.

5.1.3 Filtration. Aviation fuel dispensed into aircraft shall pass through two filtrations downstream of bulk storage. When operating tanks are installed in conjunction with bulk storage tanks, at least one of the filtration systems shall be located downstream of operating tanks. The initial filter may be a filter separator, micronic filter, or full flow monitor cartridge type device. The final filtration of jet fuel shall be through a filter separator or full flow monitor. One of the two filters used for aviation gasoline shall be a filter separator or fuel monitor. The filter separator shall meet the performance requirements of API Publication 1581 or MIL-F-8901. Filtration equipment shall be rated equal to or greater than the pumping capacity of the system. Filtration equipment shall be designed so that fuel bypass is not possible.

5.1.3.1 Filtration element replacement. Replacement of elements in filtration equipment is required as follows:

a. When test results on samples taken downstream of the filtration vessel exceed 30 parts per million free water, 1.0 mg/l of solids, or color assessment is equal to or exceeds a 5 rating for any of the colors in the Aviation Turbine Fuel Contamination Standards (para 5.4.2.3.c).

b. When the pressure differential across the elements at rated flow exceeds 104 kPa (15 psi) on the aircraft servicing unit and 140 kPa (20 psi) on all other vessels.

c. When the differential pressure reading decreases 20 kPa (3 psi) or more from the previous reading when both are recorded at approximately the same flow rate.

d. When micronic filters, used downstream of bulk storage, reach 104 kPa (15 psi) differential or have been in service for 2 years.

e. When filter separator coalescer elements have been in service for three years.

f. When full flow monitor cartridges reach the differential pressure limit recommended by the manufacturer or 104 kPa (15 psi), whichever is less.

5.1.4 Differential pressure. Filtration equipment shall be equipped with differential pressure gauges. The gauge(s) shall have the capability to measure differential pressure across the vessel or across each stage of elements. The differential pressure and flow rate for each micronic filter, filter separator and full flow monitor shall be observed daily when used and recorded weekly.

5.1.5 Pressure gauges. Pressure gauges on aircraft refueling equipment shall be calibrated within one year of the contract start date and annually thereafter. Piston type differential pressure gauges require no calibration so long as they are the type where the piston returns to zero under no flow conditions. Refer to manufacturer's maintenance manual for trouble shooting and correcting problems that occur with differential gauges.

5.1.6 Meters. Meters shall be used for quantity determination of fuel delivered to aircraft. Meters shall be calibrated within one year of the contract start date and annually thereafter to an accuracy of ±0.2 percent by volume at normal flow rates.

5.1.7 Hoses and couplings. Fuel hoses and couplings shall comply with the requirements of API 1529, BS 3158 or MIL-H-26521.

5.1.8 Nozzles. Over-the-wing and single point nozzles shall be available as required. Nozzles shall be equipped with 40 mesh or finer screens that can be readily removed for inspection or cleaning. Nozzle screens shall be removed, inspected, and cleaned monthly. Single point nozzles shall mate to the standard aircraft fueling receptacle (MS24484).

5.1.9 Identification of fuel handling equipment. Fixed and mobile equipment shall be marked in accordance with API Bulletin 1542, MIL-STD-161 or with a NATO Product Identification Code.

5.1.10 Continuity resistance. The electrical continuity of bonding reel/cable assemblies on servicing units shall be checked with a voltage/ohm meter (multi meter) at the beginning of the contract period and every six months thereafter. Resistance, measured from the plug or clamp on the cable to the frame of the refueling equipment, shall be 10 ohms or less.

5.2 Operations.

5.2.1 Water bottoms. The use of fuel tanks with water bottoms is prohibited. Fuel storage tanks shall have sumps for collection and draining accumulated water. These sumps shall be checked and drained at least weekly, and more often where heavy rainfall is experienced and the storage tanks are of the open floating roof design.

5.2.2 Fuel issue control system. Where more than one grade of fuel is stored, the issue of fuel to aircraft refuelers shall be controlled by a system to ensure the proper grade of fuel is serviced to the refueler. The use of different size couplers for each grade where bottom loading is used is one acceptable method. If only one grade of product is handled, a fuel issue control system is not required.

5.2.3 Positioning equipment. Refueling equipment shall be positioned as follows:

a. Refueling equipment shall not be moved into the servicing area if a fuel spill is within 15 meters (50 feet) of the aircraft or if fuel is leaking from the aircraft.

b. Fuel servicing vehicles shall not be driven closer than 8 meters (25 feet) from aircraft unless a spotter is used to direct the vehicles movement. Under no circumstances shall the vehicles be positioned closer than 3 meters (10 feet) from the aircraft. Refuelers shall be positioned so the operator's side of the equipment is adjacent to the aircraft. Always maintain a clear path from the aircraft for rapid evacuation of vehicles in an emergency situation.

5.2.4 Bonding. Prior to making any fueling connection to the aircraft, the fueling equipment shall be bonded to the aircraft by use of a metal cable, thus providing a conductive path to equalize potential between the fueling equipment and aircraft. The bond shall be maintained until fueling connections have been removed, thus permitting the reuniting of separated charges that could be generated during the fueling operation.

5.2.4.1 Electrical grounding. If ground support equipment is connected to the aircraft or if other operations are being conducted that require electrical grounding, then separate connections shall be made for this purpose. Electrostatic grounding points may have high resistances and therefore are unsuitable for electrical grounding.

5.2.4.2 Bonding plug. When the aircraft being serviced is equipped with grounding receptacles, a plug shall be used on the bonding cables of refueling equipment. The plug shall conform to MIL-C-83413/4.

5.2.4.3 Bonding clamp. When the aircraft being serviced is not equipped with grounding receptacles, a clamp shall be used on the bonding cables of refueling equipment. The clamp shall conform to MIL-C-83413/7. When a clamp is used, it shall be connected to a bare metal surface of the aircraft.

5.2.4.4 Overwing nozzle bonding. In addition to the above, when fueling overwing, the nozzle shall be bonded with a nozzle bond cable to a metallic component of the aircraft that is metallically connected to the tank filler port. The bond connection shall be made before the filler cap is removed and remain connected until the servicing is complete and the filler cap has been replaced.

5.2.5 Single point refueling. Underwing or single point refueling pressure shall not exceed 380 kPa (55 psi) nozzle pressure as indicated by the refueling equipment gauge.

5.3 Safety requirements. The safety requirements specified in NFPA 407 or the equivalent nation's document shall apply. Local fire and accident prevention regulations and requirements including the following shall be complied with:

must be forced through the hole. The hole shall

a. Smoking and/or open flames or sources of ignition shall be prohibited within 15 meters (50 feet) of fuel operations.

b. Areas used for servicing of aircraft shall be kept free of combustible materials. Refueling equipment compartments and surfaces shall be kept free of debris and accumulations of oil, grease and fuel. These areas shall be kept clear of objects which can be ingested by engines.

c. Servicing personnel shall be trained in the use of fire extinguishers and in the procedures to be used in the event of fire.

d. At least two serviceable charged fire extinguishers shall be available in the immediate vicinity of each servicing operation. Access to the fire extinguishers shall be unobstructed. Minimum sizes and types shall be specified and approved by the fire department but shall be designed for extinguishing flammable liquids with a minimum discharge time of not less than 25 seconds.

e. The fuel servicing operator shall remain at the fuel servicing equipment and shall continuously observe the equipment and aircraft for any fuel leakage. Servicing operations shall be stopped whenever any leaks or deficiencies of a hazardous nature are detected.

f. Servicing of aircraft with litter patients aboard requires an airport fire fighting truck to be present.

g. Aircraft shall not be serviced when its radio or radar is operating or when there are thunderstorms within a three mile radius.

h. Servicing personnel shall not wear 100% nylon outer garments and shall not remove or put on clothing during servicing.

5.4 Quality assurance requirements. The contractor is required to maintain written quality control procedures covering (1) source of fuel supply, (2) receiving, (3) storing, (4) servicing, (5) sampling and testing, (6) calibration of measuring and test equipment, (7) safety, (8) maintenance, (9) reports and (10) corrective actions.

5.4.1 Sample submission. The contractor is required to obtain, package and ship samples of each grade of aviation fuel to a testing laboratory listed in Tables I and II. The contractor shall perform the task of sampling for these required samples in the presence of the government quality assurance representative at least once every six months. The testing laboratories listed in Table I are to be used by those contractors located in the continental United States. The contractor's location (state) shall govern the laboratory to which samples are submitted. This is shown in the Area of Responsibility column. Contractors located outside the continental United States shall submit samples to a testing laboratory listed in either Table I or II. The sample size shall be a minimum of 3.8 liters (one gallon) for each grade of fuel handled. For turbine fuel, the frequency of sample submission shall be at the beginning of each contract period and once every three months thereafter. For aviation gasoline, the frequency of sample submission shall be at the beginning of each contract period and once every six months thereafter.

5.4.1.1 Sample container. Samples shall be taken in an epoxy coated can suitable for thermal stability testing as defined in ASTM D 4306. One source of supply for a one gallon can in the United States is Gammon Technical Products, P.O. Box 400, Manasquan NJ 08736. Part number is TL-2935A-1. One source of supply for a one gallon can in the Orient is Hanevel (Far East)

Filters, Blk 5071, Ang Mo Kio Industrial Park 2, 04-1555 Singapore 2056. Part number is TL-2935A-1. One source of supply for a five liter can in Europe is Air Sea Containers Ltd., Standiford Bldg., 318 New Chester Road, Birkenhead L42 1LE, Merseyside, England. Part number is CODE 112.

5.4.1.2 Sample container preparation. Approximately 24 hours prior to sampling, fill the sample can with filtered fuel (of the same grade to be sampled). Immediately prior to sampling, empty the can, rinse the can twice with the fuel to be sampled. The total volume of rinse should be approximately 50% of the can volume. Obtain the sample and immediately seal the can.

5.4.1.3 Sampling point. The sample to be submitted for testing shall be taken during flow from a refueler or aircraft servicing unit downstream of the units filtration vessel. Servicing equipment to be sampled shall be rotated until all servicing units are sampled.

5.4.1.4 Laboratory tests required. The analyses of turbine fuel samples submitted quarterly to testing laboratories shall consist of flash point, freezing point and thermal stability. The thermal stability property shall be performed in accordance with ASTM D 3241 and have a heater tube temperature of 260°C. The analyses of aviation gasoline samples submitted semi-annually shall consist of distillation, vapor pressure, copper strip corrosion and freezing point.

5.4.2 Aircraft servicing units.

5.4.2.1 Sumps. All filtration equipment sumps shall be drained daily for sediment and water removal. In addition, refueler cargo tank sumps shall be drained and visually checked for contamination daily. Detection of excessive sediment or water is cause to conduct an investigation to correct this condition.

5.4.2.2 Visual sample. A one quart or one liter sample shall be taken daily from the outlet of filtration equipment on each aircraft servicing unit in use visually examined. The sample, taken in a clear glass bottle, shall be clear and bright and free of sediment and water.

5.4.2.3 Particulate contaminant sampling. Aircraft servicing units, (refuelers, hose carts, and hydrant hose trucks) shall be sampled monthly on the downstream side of filtration equipment and tested for particulate contaminant. One of three test methods shall be used:

a. Bottle Method. Obtain a minimum 3.8 liter (one gallon) or 4 liter sample and determine the particulate level by laboratory filtration in accordance with ASTM D 5452. Limit is 1.0 mg/l (3.8 mg/gal).

b. Matched Weight Monitor Method. Filter a minimum of 3.8 liters (one gallon) or 4 liters of fuel through a matched weight monitor using an in-line sampler. Determine the increase in weight of the upper filter compared to the lower filter after filter processing in accordance with ASTM D 2276. Limit is 1.0 mg/l (3.8 mg/gal).

c. Color and Particle Assessment Method (for turbine fuel only). Pass 3.8 liters (one gallon) of fuel through an in-line sampler containing a monitor with a single 0.8 micron membrane filter. The color of the membrane and the particles retained on the filter are rated against the Aviation Turbine Fuel Contamination Standards, Part No. XX64037385 (Millipore Filter Corporation, Bedford Mass, 01730). Operating instructions are contained in this standard. Filtered petroleum ether is satisfactory to rinse the membrane

in the monitor. Fuel with a color rating of 5 or above on any one of the three color standards and particulate in the marginal zone or above is not acceptable. If a recheck sample shows the color fails, the product is unsatisfactory and no further testing is necessary. If the color passes and the particle rating fails, a gravimetric analysis shall be made using the bottle or matched weight methods above. The fuel fails if the particulate exceeds 1.0 mg/l (3.8 mg/gal). Test failures indicate contamination is occurring upstream of filtration equipment. Corrective action shall include replacement of filtration equipment elements.

d. The membrane filter from the particle test from each refueling unit, hose cart, or hydrant hose truck shall be retained for 3 months and compared with the previous months membrane to note any increase in particulate or color designation.

5.4.2.4 Free water sampling. Aviation turbine fuels serviced to government aircraft shall not contain more than 30 parts per million free water. Fuel shall be tested with equipment capable of detecting concentrations of free water in fuel at this level. Samples shall be taken monthly from servicing equipment downstream of filter separators or full flow monitors and tested for free water.

5.4.2.5 Fuel system icing inhibitor sampling. When required by the contract, aviation fuel serviced to aircraft shall contain a minimum concentration of 0.07 percent and not more than 0.20 percent by volume of Fuel System Icing Inhibitor (FSII), MIL-I-27686, MIL-I-85470 or ASTM D 4171. If the inhibitor is injected into or contained in bulk stocks, the concentration shall be determined monthly from a sample taken from an aircraft servicing unit. If the inhibitor is added by any other means the concentration of the inhibitor shall be verified monthly from each aircraft servicing unit. This is to be accomplished by one of the three following methods; (1) testing a representative sample taken from the refueler, (2) testing a minimum of 3.8 liters (one gallon) representative sample from the line downstream of the injector pump if blending is performed during aircraft servicing or (3) by measuring the quantity of additive injected compared to the amount of fuel dispensed.

$$\% \text{ by Volume FSII in Fuels} = \frac{\text{Vol in liters or gallons of FSII delivered} \times 100}{\text{Vol in liters or gallons of fuel delivered}}$$

The analysis for FSII content shall be performed using Federal Standard 791 Method 5327 or either of the methods contained in ASTM D 5006.

5.4.2.6 Static dissipator additive sampling. Where contracts require static dissipator additive (conductivity additive) in jet fuels, the conductivity level serviced to aircraft shall be between 50 and 700 conductivity units (CU). Sampling and testing shall be performed as follows:

a. Tests for conductivity shall be performed in accordance with ASTM Method D 2624. At those contractor sites where static dissipator additive is contained in all turbine fuel stocks, the CU level shall be determined weekly on a sample taken at the fillstand or from an aircraft servicing unit.

b. When static dissipator additive is blended into refuelers, conductivity shall be determined daily on a sample from one refueler prior to servicing aircraft. When the additive is injected into the fuel during aircraft servicing, a sample shall be obtained downstream of the injector and tested daily from one aircraft servicing unit.

5.4.2.7 Aircraft defueling. Before starting defuel of aircraft, determine the type of fuel contained in the aircraft. Sumps of aircraft shall then be drained to discard water and excess sediment. Defueled product should be returned to the aircraft if there is no reason to suspect contamination. If fuel cannot be returned to the aircraft, follow the defuel/servicing clause in the contract. When returned to aircraft, fuel shall pass through a filter separator or full flow monitor.

5.4.2.8 Change of product grade. In the event of a product change from jet fuel to aviation gasoline or vice-versa, drain the unit, including residual fuel in the filter separator assembly and hoses. Fill the unit with the new grade of fuel, circulate at least 946 l (250 gal) through each pump hose assembly. Obtain a sample from the downstream side of the filter. Sample shall be visually free of sediment and water. Change the servicing controls as necessary and the unit markings to reflect the new grade of fuel.

5.4.3 Records and quality checks required.

a. Tank inspection/cleaning in accordance with paragraph 5.1.1.1.

b. Filtration element replacement in accordance with paragraph 5.1.3.1.

c. Daily differential pressure and flow rate checks across filtration equipment and weekly recording.

d. Yearly calibration of meters and pressure gauges.

e. Monthly cleaning of nozzle screens on servicing equipment.

f. Beginning of contract period and six month continuity check of bonding reel/cable assemblies on aircraft servicing units.

g. Weekly draining of storage tank sumps.

h. Maintain written quality control procedures.

i. Beginning of contract period and every three months for submission and testing of turbine fuel from aircraft servicing units.

j. Beginning of contract period and every six months for submission and testing of aviation gasoline from aircraft servicing units.

k. Daily draining of filtration equipment sumps.

l. Daily draining of refueler tank sumps.

m. Daily visual sample from aircraft servicing units downstream of filtration equipment.

n. Monthly particulate testing on aircraft servicing unit samples.

o. Monthly water testing on aircraft servicing unit turbine fuel samples.

p. Monthly FSII content on storage tank or aircraft servicing unit samples.

q. Weekly conductivity level from bulk stocks or daily from one aircraft servicing unit when additive is blended into aircraft servicing units or injected during aircraft servicing.

5.5 Additive blending.

WARNING

Undiluted FSII is both combustible and toxic. It is harmful if inhaled or absorbed through the skin. It causes eye irritation. In laboratory animal studies, birth defects and adverse effects on pregnancy have been observed and repeated exposure has caused damage to male reproductive organs. Before handling undiluted FSII, consult appropriate safety and occupational health authorities.

5.5.1 Handling precautions. The following precautions shall be observed:

a. Protective butyl rubber gloves shall be worn when handling undiluted additives. Goggles and an air purifying respirator are required when handling undiluted additives in an indoor environment, but are not required outdoors.

b. Skin contact with undiluted additives should be avoided, but in the event of exposure, wash thoroughly with soap and water.

c. In the event of eye contact, immediately wash the eye with water. Continue the wash for 15 minutes and seek medical help as soon as possible.

d. When an additive is diluted with jet fuel the health hazards are significantly reduced.

5.5.2 Methods of blending. The two basic methods for putting additives into fuel are hand doping and use of a proportional injector. The preferred method is proportional injection using a fuel driven design. This type injects additives proportionately at various flow rates. Hand doping additives at various points in the system can be accomplished by several techniques, some of which are as follows:

a. Blending additives into bulk airfield tanks can be done by pouring the required quantity of additive into the tank heel followed by receipt. The required quantity of additive may also be added to delivery tank trucks prior to unloading these trucks into the bulk system. In the case of static dissipator additive, typically an 8,000 gallon tank truck shall require approximately 30 ml of the neat additive.

b. Blending into refueling units can be performed by introducing the required amount through the top hatch using a funnel and a length of hose with one end submerged below the surface of the fuel. This is best done by pouring the additive into the refueler filled to not more than one-third of its capacity and then fill the unit. Wait approximately 10 minutes and then circulate fuel for at least three minutes before servicing to aircraft. If additives are put into a full refueler, circulate at least 150 percent of the refueler capacity prior to issue. In all cases where hand doping is performed, additive should be first diluted with the fuel. The greater the dilution, the easier it is for the additive to be mixed properly.

c. Fuel System Icing Inhibitor may be added using the 590 ml (20 ounce) aerosol can during over-wing refueling. Determine the fuel load and calculate the amount of additive required. It should be added gradually during filling to permit proper blending in the fuel. One can of aerosol additive will inhibit 680 l (180 gallons) of fuel to 0.087% by volume.

TABLE I. Laboratories Within the Continental United States.

Mailing Address	Shipping Address	Telephone Numbers	FAX Numbers	Area of Responsibility
Det 13, SA-ALC/SFTLA Bldg 70 2430 C St, STE 1 WPAFB OH 45433-7632	Det 13, SA-ALC/SFTLA Bldg 70 2430 C St, STE 1 WPAFB OH 45433-7632	DSN 785-5687 COM (513)255-5687	DSN 986-7744 COM (513)476-7744	IN & OH
Det 20, SA-ALC/SFTLB P.O. Box 408 Searsport ME 04974-0408	Det 20, SA-ALC/SFTLB Trundy Rd, Bldg 14 Searsport ME 04974-0408	COM (207)548-2451	COM (207)548-0351	CT, DC, DE, IL KY, MA, MD, ME MI, MN, NC, ND NH, NJ, NY, PA RI, SD, TN, VA WI & WV
Det 21, SA-ALC/SFTLC P.O. Box 6051 MacDill AFB FL 33621-0051	Det 21, SA-ALC/SFTLC 5311 W Boundry Rd MacDill AFB FL 33621-5005	DSN 968-3645 COM (813)830-3645	DSN 968-6706 COM (813)830-6706	AL, AR, CO, FL GA, IA, KS, LA MO, MS, NE, OK & SC
Det 35, SA-ALC/SFTLD 10 Park Ave C, #1 Mukilteo WA 98275-1618	Det 35, SA-ALC/SFTLD 10 Park Ave C, #1 Mukilteo WA 98275-1618	DSN 984-5318 COM (206)355-4122	COM (206)348-6719	CA, ID, MT, OR WA & WY
OL SA-ALC/SFTLI 1335 Tularosa Rd Holloman AFB NM 88330-7929	OL SA-ALC/SFTLI 1335 Tularosa Rd Holloman AFB NM 88330-7929	DSN 867-5053 COM (505)479-5053	DSN 867-3957 COM (505)479-3957	AZ, NM, NV, TX & UT

TABLE II. Laboratories Outside the Continental United States.

Mailing Address	Local Shipping Address	Telephone Numbers	Fax Numbers
OL SA-ALC/SFTLF Unit 5025 APO AE 09459	OL SA-ALC/SFTLF RAF Mildenhall, Bldg 725 Bury ST Edmunds Suffolk, England IP28 8NF	DSN 238-2043 COM 44-638-542043	DSN 238-3626 COM 44-638-543626
OL SA-ALC/SFTLJ Unit 6106 APO AE 09601-6106	OL SA-ALC/SFTLJ Bldg 505 Via Pordenone 46 Aviano AB 33081 Aviano Italy (PN)	DSN 632-7550 COM 39-434-667550	DSN 632-7550 COM 39-434-667550
Det 44, SA-ALC/SFTLG Unit 5161 APO AP 96368-5161	Det 44, SA-ALC/SFTLG Unit 5161, Bldg 854 Kadena AB Okinawa, Japan	DSN 634-3394/1602 COM 81-611-734-1602	DSN 634-0584
505th QM Battalion APAJ-GO-QL Unit 35130 APO AP 96376-5130	505th QM Bn Petrol Lab Bldg 53130 Kadena AFB, Okinawa	DSN 632-4059	COM 81-989-393043

TABLE II. Laboratories Outside the Continental United States. - Continued

Mailing Address	Local Shipping Address	Telephone Numbers	Fax Numbers
FISC Tsurumi Hakozaki Laboratory PSC 471 FPO AP 96347-2000	FISC Tsurumi Hakozaki Laboratory PSC 471 FPO AP 96347-2000	DSN 244-2733 COM 81-311-734-2733	COM 81-311-734-7050
NAVSTA Panama Canal POL Laboratory Code 42 FPO AA 34061-1000	NAVSTA Panama Canal POL Laboratory Code 42 FPO AA 34061-1000	DSN 283-6319 COM 507-83-6319	DSN 283-4453 COM 507-83-4453
FISC Pearl Harbor POL Laboratory Code 704 Code 700 Box 300 Pearl Harbor HI 96860-5300	FISC Pearl Harbor POL Laboratory Code 704 Bldg 427, Kuahua Avenue Pearl Harbor HI 96860-5300	DSN 471-9344 COM (808)471-9344	DSN 474-5805 COM (808)474-5805
FISC Guam POL Laboratory, Code 700 PSC 455, Box 190 FPO AP 96540-1500	FISC Guam POL Laboratory, Code 700 PSC 455, Box 190 FPO AP 96540-1500	DSN 339-7106 COM (671)339-7106	DSN 333-2001 COM (671)333-2001
FISC Yokosuka, Det Sasebo POL Laboratory PSC 476, Box 7 FPO AP 96322-1504	FISC Yokosuka, Det Sasebo POL Laboratory PSC 476, Box 7 FPO AP 96322-1504	DSN 252-4136 COM 84-956-24-6111 Ext 4136	DSN 252-4139 COM 84-956-24-6111 Ext 4139
DFO-A Attn: Laboratory 6-920 12th Street Elmendorf AFB AK 99506	Fuels Laboratory Bldg 986 Ft Richardson AK 99505	DSN 384-7180 COM (907)384-7180	DSN 384-7180 COM (907)384-7180
DLA Petroleum Products Lab Unit 23135 Box 28 APO AE 09227	DFR-E, Petroleum Lab Rhein Ordanence Barracks Kaiserslautern-Vogelweh 6750	DSN 489-7326 COM 49-6331-536-7326	DSN 489-7084 COM 49-6331-536-7084

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 purpose of this standard is to ensure government aircraft are provided specification fuel at commercial facilities where a US Government Into-Plane Servicing Contract is in force.

6.2 Subject term (key word) listing.

Additive blending
Fuel equipment
Quality assurance requirements

6.3 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.

CONCLUDING MATERIAL

Custodian:
Air Force - 68

Preparing activity:
Air Force - 68

Review activities:
Army - AV, CD
Navy - AS, SA
DLA - PS

(Project 91GP-1018)

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.
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3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-STD-1548C	940111

3. DOCUMENT TITLE
INTO-PLANE SERVICING OF FUELS AT COMMERCIAL AIRPORTS

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)	
SA-ALC/SFSP	(1) Commercial (210)925-7847	(2) AUTOVON 945-7847
c. ADDRESS (Include Zip Code) SA-ALC/SFSP 1014 Andrews Rd, STE 1 Kelly AFB TX 78241-5603	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	