

Aviation Fuel System Components



Company Name: _____

Employee Name: _____

Date of Hire _____

Supervisor: _____

☐ Initial Training ☐ Recurrent Training

DATE INITIALS (Supervisor)

Viewed Aviation Fuel System Components Module

Passed Examination on Aviation Fuel System Components module

Has received hands-on training, demonstrates proficiency, and can discuss the purpose, relevant safety features, proper operation, inspection of and, if responsible, the proper maintenance and maintenance frequency for the following:

☐ **Bonding Components and Correct Techniques**

☐ Static reel

☐ Cable

☐ Clamps:

☐ Alligator style (typically copper)

☐ Heavy-duty military style

☐ Bayonet plug for the fueling nozzle (Required by NFPA 407, some commercial and military contracts)

☐ Daily visual inspection for loose connections between cable, clamp or reel, broken cable or corrosion (Knows repairs must be made prior to using equipment if deficiencies are noted)

☐ Understands the circumstances which require bonding:

☐ When receiving a transport load of fuel into storage

☐ When transferring fuel from storage to a mobile refueler

☐ When fuel is transferred from a stationary fuel cabinet to an aircraft

☐ When transferring fuel from a mobile refueler or hydrant cart to an aircraft

☐ Understands steps for bonding:

☐ Always connect to the piece of equipment fuel is being transferred to or from before approaching the aircraft with a fueling hose

☐ NFPA 407's required use of a bayonet or small clamp attached via cable to the nozzle when fueling overwing

☐ Alternatively, when there is no place to connect to the aircraft, touch the nozzle to the aircraft's fueling cap prior to removal and continue to touch the spout to the filler neck until fueling is complete

☐ When conductivity is tested during monthly inspection using a volt/ohm meter the bonding connection should not exceed 25 ohms

☐ Has been trained to use the volt/ohm meter and to properly test continuity of a system and record results

☐ **Filter Vessels and Elements**

☐ Aviation turbine fuel should be filtered at least twice before entering an aircraft

☐ Aviation gasoline should be filtered at least once before entering an aircraft

☐ Understands the importance of utilizing aviation filters meeting the most current API/EI qualification standards

☐ Understands the term "filter vessel" denotes the housing containing the filter elements and that vessels are lined with an approved epoxy that protects against corrosion, but that the epoxy can degrade over time and requires periodic inspection and repair when needed.

☐ Understands the difference between the filter elements typically used in Jet fuel and Avgas:

☐ Filter (Coalescer)/Separator (two-stage) vessels remove both solid contaminants and water and are standard equipment for turbine fuels but may also be used in avgas storage facilities

☐ First stage-Coalescer element (removes solids & water)

☐ Second stage-Separator element (removes water only)

☐ Effectively remove water below 15 PPM

☐ Require sumping the vessel under pressure to evacuate water & stray particulate

☐ Requires water defense to prevent a slug of water from passing downstream

☐ Filter Monitor element

☐ Often used as second point of filtration in Jet fuel (not recommended for filtration into or out of bulk storage)

☐ Continually removes solids & water

- ☐ Restrict fuel flow when saturated by solids & water
- ☐ Have a shorter service-life when exposed to wet/particulate laden fuel
- ☐ Act as water defense but are not failsafe
- ☐ Should not be used with blended jet fuels containing FSII
 - ☐ FSII can cause monitor elements to degrade or become incapable of absorbing water.
 - ☐ FSII can cause the monitor's super absorbent polymer to break down and form viscous substance that can end up downstream in the fuel system or in an aircraft causing damage.
- ☐ Filter vessel(s) should be equipped with the following:
 - ☐ Direct reading numerical differential pressure gauge(s)
 - ☐ Air eliminator(s)
 - ☐ Pressure relief valve(s)
 - ☐ Low-point drain and sample valve(s)
 - ☐ Sump heater(s) in cold climates (Jet- A filter vessels only)
 - ☐ Water defense float(s)/probe(s)
- ☐ Filter vessels used for Jet A should have the following QC checks performed and documented monthly:
 - ☐ Entrained water check (downstream not to exceed 15 PPM)
 - ☐ Colorimetric (Millipore) filtration test (downstream only unless contractually obligated to do both upstream & downstream)
- ☐ Filter vessels should have the following inspections performed and documented:
 - ☐ Vessel interior for rust or epoxy flaking (annually during filter change)
 - ☐ Filter change date placard current and fixed to vessel exterior
 - ☐ Manufacturer's name plate with:
 - ☐ Model number
 - ☐ Serial number
 - ☐ Maximum flow rate

☐ Pressure rating

☐ Date of manufacture

☐ Lid gasket number

☐ Part number and quantity of elements

☐ Understands how a differential pressure gauge works and what it measures

☐ Understands that differential pressure gauges are to be observed daily and the results recorded for trend analysis

☐ Can interpret the trends and what they might indicate (failure, need for change out)

☐ Understands the difference between an observed DP reading and a DP reading correction for maximum flow, the importance of corrected DP, and can accurately correct a reading and record the results (monthly)

☐ Understands that differential gauges should be checked for accuracy at least once a year and repaired/replaced as necessary, along with changing the inlet filter, if equipped

☐ **Water Defense Systems**

☐ Understands they are required on filter separator vessels because under pressure a slug of water can overcome and pass through the elements. Located in the sump area of a vessel there are primarily 2 types:

☐ **Electric** Probe or Float

☐ Mechanical Float

☐ Water defense systems on fixed storage will shut down the pumping system when they encounter a slug of water by either closing a valve or removing electrical power to the system

☐ Water defense systems on mobile refuelers will shut down the pumping system when they encounter a slug of water by turning off a downstream control valve while in most configurations it additionally triggers an indicator light to come on for visual aid.

☐ Water defense systems must be tested to ensure functionality following manufacturer's guidelines by a qualified person at these minimum frequencies:

☐ Float operated with a mechanical test feature- quarterly with testing by water injection at least once per year (typically just prior to annual filter element changeout)

☐ Probe and Float operated (without mechanical test feature)-annually by water injection (typically just prior to annual filter element changeout) unless contractually required at greater frequency

☐ Water defense checks are never performed on monitor elements

☐ Pressure Gauges

- ☐ Understands and can identify other gauges found on a pumping system
 - ☐ Nozzle Pressure Gauge (Turbine fuel)-used to monitor pressure of the fuel flowing into an aircraft during single point refueling
 - ☐ Primary nozzle pressure not to exceed 40PSI to protect aircraft
 - ☐ Pump Pressure (Turbine and aviation gasoline)
- ☐ Gauges to have an accuracy of 2% of the gauges range
- ☐ Gauge accuracy checked annually via certified gauge
 - ☐ Defective gauges to be repaired or replaced immediately

☐ Pumps

- ☐ Understands the 2 types of pumps used fuel storage systems and mobile refuelers:
 - ☐ Centrifugal Pump-have a gear box and use gear oil (found on above ground tanks and most refuelers)
 - ☐ Have mechanical seals that if damaged allow fuel into the gear box but does not allow gear oil into the fuel
 - ☐ Follows manufacturer recommendations for gear oil type, amount required and gear oil change interval
 - ☐ Positive Displacement Pump-mostly lubricated by the product it is pumping and if run dry can burn or damage itself (commonly found on underground storage tanks because of its efficiency, and on many avgas refuelers)
 - ☐ Mechanical seals and bearings may require periodic lubrication (**never** use graphite-based lubrication)
- ☐ Understands caution must be used when lubricating mechanical seals, type and amount of lubricant is critical, as improper application of grease could results in contaminated fuel (important to always follow manufacturer's recommendations)

☐ Hoses

- ☐ Understands that hoses must be manufactured to meet current standards
- ☐ Understands that hoses must have accompanying certificates to be kept on file for the service life of the hose (required by NFPA 407)
- ☐ Understands aviation fuel hoses vary by length and diameter depending on application and desired flow rate

☐ Understands hoses must be examined daily for the following defects:

☐ Cracking

☐ Abrasions

☐ Cuts

☐ Soft spots

☐ Leaks

☐ Understands hoses must be checked monthly, extended to their full length, while under pressure for the following:

☐ Cracking

☐ Abrasions

☐ Cuts

☐ Soft spots

☐ Blisters

☐ Chaffing

☐ Twisting

☐ Sharp ends

☐ Coupling indicator for slippage

☐ Leaks

☐ Understands defective hoses must be report and replaced immediately

☐ **Nozzles**

☐ Understands the design differences between Jet-A and 100LL nozzles to prevent cross contamination of product and can identify the following:

☐ Swivel (if equipped)

☐ Dust cover

☐ Grounding clip/bayonet

☐ 100 micron mesh screen

☐ 100LL bottom load adapter

☐ Flared spout helps prevent static buildup/discharge and cross contamination

- ☐ Understands straight spouts for helicopter use should be considered 1 time use and replaced with flared spout after fueling is complete
- ☐ Understands single point nozzles can be used for underwing pressure refueling or for bottom loading the refueler
- ☐ Understands that automotive style nozzles are never to be used per NFPA 407 as hold open devices can lead to spills and they are not equipped with 100 micron mesh screens

☐ **Meters**

- ☐ Understands meters are typically found on refueling equipment, bulk storage facilities and cabinets. They calculate the fuel that has flowed through a given hose and are used to track inventory and sales
- ☐ Jet-A meters typically read in whole gallons (or liters outside the U.S.)
- ☐ Avgas meters typically read to 1/10th of a gallon
- ☐ Meters can be mechanical or digital and be equipped with the following:
 - ☐ Register head
 - ☐ Totalizer
 - ☐ Meter printer (optional)
- ☐ Need to check meter seals monthly to ensure no tampering and that annual calibration tag/seal is current and intact
- ☐ Annual meter calibration records need to be kept on file

☐ **Deadman**

- ☐ Deadman is used during bottom loading of the refueler, offloading of a transport or during underwing (single point) refueling
- ☐ Deadman cable is approximately the same length as the fueling hose and is used in conjunction with a deadman control valve
- ☐ Deadman is required to shut off within 5% of the refueler's maximum flow when released
- ☐ Deadman must never be blocked open per NFPA 407

☐ **FSII Injection Systems**

- ☐ Knows the most common names/terminology used for fuel system ice inhibitor:
 - ☐ FSII
 - ☐ Prist®

Aviation Fuel System Components



☐ DICE Flash 190™

☐ FIZZY®

☐ The 2 most common injection systems are the Hammonds and the Gammon Viper

☐ Injectors must be checked daily to ensure they are dispensing the proper amount of additive

☐ FSII amounts can be monitored for accuracy by use of a meter or by precise record keeping

☐ Daily-ensure that additive tanks have an adequate supply of FSII product (Avfuel recommends checking product tank after each fueling)

☐ All FSII storage tanks/barrels/totes must be equipped with a working desiccant dryer which should be checked daily and replaced as needed to prevent moisture from entering

☐ Monthly- FSII injectors should be checked and calibrated as needed to ensure an additive rate between 13-19 oz. per 100 gallons (16 oz. per 100 gallons is the ideal ratio) . Additional verification should be conducted by sampling injected product and performing a B-2 test.

Remarks: _____
