Fueling Inspections

International and FAA Fuel Fire Safety
ICAO Annex 14, Chapter 9

Presented to: ICAO / FAA Regional Workshop for Aerodrome Certification Safety Inspectors
Date: November 6-8, 2012
Fueling Safety
Fueling Safety

Fire safety standards for fueling operations are required to be established to prevent fires during fueling operations. This incident was caused by an engine fire in the tanker.
Fueling Safety

Fire safety standards for fueling operations are required to be established to prevent fires during fueling operations. This incident was caused by improper bonding.
Aircraft fuel servicing tank vehicles are vehicles having a cargo tank used in the transportation and transfer of fuel into or from an aircraft.
Fueling Safety

Aircraft fuel servicing hydrant vehicles do not have tanks. These vehicles connect to a pressurized Airport Fueling System hydrant and transfer the fuel to the aircraft through a filter.
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Aircraft Fuel Servicing Cart

Aircraft fuel servicing carts are equipped with facilities to transfer fuel between a Airport Fueling System hydrant and an aircraft and are normally parked at a fixed location near a gate.
ICAO Fueling Safety

Annex 14 Section 9.6 Ground servicing of aircraft

- 9.6.1 Fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire and personnel trained in its use shall be readily available during the ground servicing of an aircraft, and there shall be a means of quickly summoning
- the rescue and fire fighting service in the event of a fire or major fuel spill.
9.6 Ground servicing of aircraft

9.6.2 When aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

- a) the use of a sufficient number of exits for expeditious evacuation; and
- b) a ready escape route from each of the exits to be used in an emergency
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- ICAO Annex 14 does not include standards for fueling operations, so this session only addresses FAA requirements and does not include a comparison of ICAO standards and practices for fueling operations.

- Other National aerodrome certification regulations may include fuel quality control in addition to fire safety standards for fueling operations, depending on how the National Civil Aviation Authority is organized.
FUELING INSPECTIONS

U. S. Aviation Fueling Requirements

FAA Part 139 only addresses fire safety standards for fueling operations. Fuel quality control is inspected by the FAA Flight Standards Division Inspectors as part of inspecting airline operations. Inspection of fuel quality control by FAA Airports Division Airport Certification Inspectors would be a duplication of FAA regulations.
U. S. Fueling Safety

U.S. Fueling Fire Codes

National Fueling Standards

NFPA® 407
Standard for
Aircraft Fuel Servicing
2012 Edition
National Fire Protection Association (NFPA) Standards

The purpose of this standard is to establish reasonable minimum fire safety requirements for procedures, equipment, and installations for the protection of persons, aircraft, and other property during ground fuel servicing of aircraft using liquid petroleum fuels. These requirements are based upon sound engineering principles, test data, and field experience.
Fueling Safety

Purpose of Fueling Inspection

• The fueling inspection is conducted for compliance to the airport fire safety standards listed in the Airport Certification Manual or the Fire Code attached to the ACM.

• The purpose of conducting inspections of fueling facilities and mobile fuelers is to check for fueling agent compliance to the airport operator’s fire safety standards.
Fueling Agents

The FAA defines “fueling agent” as “a person or company that sells fuel on the airport.”
Fueling Safety

Fueling Inspection:

• The FAA requires airport operators to conduct inspections of their fueling agents for compliance to the airport’s fire safety standards every three (3) calendar months.

• FAA inspections of fueling facilities and fuelers are basically an evaluation of the airport’s required fueling inspection program.
Fueling Safety

Conducting the Inspection
# Fuel Inspection Checklists

**FIRE SAFETY INSPECTION**

**FUEL STORAGE AREAS LOADING / UNLOADING STATIONS**

**AIRPORT:** The Eastern Iowa Airport (CID)

**FUELING AGENT:** [Name]

**DATE:** 10/30/10

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- **Fencing/locks:**
  - No Smoking Signs / No Evidence of Smoking
  - All tanks, machinery, piping is bonded or grounded
  - Emergency fuel shut off provided / Outside spill area
  - Emergency fuel shut off placards / 7 ft abv grade
  - Fuel Equipment maintained, free from leaks
  - Emergency fuel shut offs calibrated / every 6 mos

- **Procedures for prevention and control of spills:**
  - Bonding connections available
  - Deadman controls available
  - No evidence of bypassing deadman controls
  - A/C fuel hose in good condition
  - Portable fire extinguishers / inspected
  - Explosion proof electrical equipment
  - Above and fuel piping protected by barrier guard
  - Fire extinguishers on ramps/palettes

**S - SATISFACTORY**

**U - UNSATISFACTORY**

**R - REMARKS:**

Placing [OK] procedures in place

$ posted $
Fueling Safety

Parking of Aircraft Fuel Servicing Vehicles

Parking areas for unattended aircraft fuel servicing tank vehicles shall be arranged to provide the following:

- Dispersal of the vehicles in the event of an emergency.
- A minimum of 10 feet of clear space between parked vehicles for accessibility for fire control purposes.
- Prevention of any leakage from draining to an adjacent building or storm drain that is not suitably designed to handle fuel.
- A minimum of 50 feet from any parked aircraft and buildings other than maintenance facilities and garages for fuel servicing tank vehicles.
Fueling Safety

Parking of Aircraft Fuel Servicing Vehicles
This is one method of documenting that a fuel truck is out of service.
Reporting of Fuel Leaks in the U.S.

The airport fire crew shall be notified if a spill covers over 10 feet (3 m) in any direction or is over 50 feet (15 m) in area, continues to flow, or is otherwise a hazard to persons or property. The spill is investigated to determine the cause, to determine whether emergency procedures were properly carried out, and to determine the necessary corrective measures.
Engine Exhaust System

Exhaust system components shall be secured and located clear of components carrying flammable liquids and separated from any combustible materials used in the construction of the vehicle.

Most fuel trucks have the muffler and exhaust pipe at the front of the vehicle where it will be clear of fuel tanks and piping in the event of a leak.
Smoking Restrictions

- Smoking equipment such as cigarette lighters and ash trays shall not be provided. If a vehicle includes such equipment when initially procured, it shall be removed or rendered inoperable.
- Cigarette lighters and ashtrays are prohibited.
- A “No Smoking” sign shall be posted prominently in the cab of every aircraft fuel service vehicle.
Placards

Each aircraft fuel servicing vehicle or cart shall have a sign on each side and the rear to identify the product. The sign shall have letters at least 3 inches (7.62 cm) high and shall be of a color contrasting sharply with the sign background for visibility. The word FLAMMABLE and the name of the product carried, such as JET A, JET B, GASOLINE, or AVGAS shall appear on the sign.
Placards

Many fuel trucks also have the Flammable and product signs on the front.
Placards

The placard Identification number for gasoline is “1203”.

Fueling Inspections
The FLAMMABLE placard Identification Number for Jet fuel is “1863”.

FLAMMABLE placards must have a red background with white symbol, class and inner border.
Electrostatic Hazards and Bonding

• A provision for bonding shall be incorporated in the design of fuel servicing vehicles or carts and systems to prevent differences in electrostatic potential in accordance with Section 5.4. (Fueling Operations)

• Bonding cables shall be constructed of conductive durable, and flexible material.

• Bonding connections shall be electrically and mechanically firm. Jacks, plugs, clamps, and connecting points shall be clean, unpainted metal to provide a positive electrical connection.
Cables shall be provided on the vehicle or cart to allow the bonding operations.
Bonding

• Prior to making any fueling connection to the aircraft, the fueling equipment shall be bonded to the aircraft by use of a cable, thus providing a conductive path to equalize the potential between the fueling equipment and the aircraft. The bond shall be maintained until fueling connections have been removed, thus allowing separated charges that could be generated during the fueling operation to reunite. Grounding during aircraft fueling shall not be permitted.

• Where fueling over wing, the nozzle shall be bonded with a nozzle bond cable having a clip or plug 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. If there is no plug receptacle or means for attaching a clip, the operator shall touch the filler cap with the nozzle spout before removing the cap in order to equalize the potential between the nozzle and the filler port. The spout shall be kept in contact with the filler neck until the fueling is completed.
Two fire extinguisher are required on fuel servicing tank vehicles, with one mounted on each side.
Deadman Controls

• The valve that controls the flow of fuel to an aircraft shall have a deadman control. The deadman control device shall be arranged to accommodate the operational requirements of Section 5.15. The fuel flow control valve shall be one of the following:
  (1) The hydrant pit valve
  (2) At the tank outlet on a tank vehicle
  (3) A separate valve on the tank vehicle
  (4) On the hose nozzle for overwing servicing

• Deadman controls shall be designed to preclude defeating their intended purpose.
Deadman Controls

A Deadman Control is a device that requires a positive continuing action of a person to allow flow of fuel.
Deadman Controls

This is an example of an overwing nozzles with the deadman controls located on the nozzle.
Brake Interlock System

Aircraft fuel servicing vehicles shall incorporate an integral brake interlock system that prevents the vehicle from being moved until the bottom loading coupler has been disconnected from the vehicle.
Inspecting Fuel Interlocks

Aircraft fuel servicing vehicles shall incorporate an integral brake interlock system that prevents the vehicle from being moved until all hoses are properly stored.
Brake Interlock System

The metal plate on this bottom fill coupling must be closed to depress the micro switch to release the brakes. The metal plate cannot be closed until the hose is disconnected.
Emergency Shutoffs

There shall be at least two emergency shutoff controls, one mounted on each side of the vehicle. These controls shall be quick-acting to close the tank outlet valve in case of emergency. In addition, all vehicles or carts equipped with a top deck platform shall have an emergency shutoff control operable from the deck.
Emergency Shutoffs

For pneumatic operated emergency shutoffs, fuelers must be started up and placed in pump mode in order to check the emergency shutoff system.
Aircraft fueling hose shall be inspected before use each day. The hose shall be extended as it normally would be for fueling and checked for evidence of blistering, carcass saturation or separation, cuts, nicks, or abrasions that expose reinforcement material, and for slippage, misalignment, or leaks at couplings. If coupling slippage or leaks are found, the cause of the problem shall be determined. Defective hose shall be removed from service.
Dome Covers

• Dome covers shall be provided with a forward-mounted hinge and self-latching catches and shall be fitted with watertight fuel-resistant seals or gaskets (designed to prevent spillage or leakage from overturn and to prevent water entry). Dome covers shall automatically close and latch with the forward motion of the vehicle.

• Drains from top flashing shall divert spilled fuel from possible sources of ignition, including the engine, the engine exhaust system, the electrical equipment, or an auxiliary equipment enclosure.
Dome covers should be physically inspected, especially on older trucks.

Look for signs of fuel leakage around the dome cover, indicating a problem with the dome cover seal or gasket. Physically inspect the dome cover gasket to check the condition and presence of a gasket.
An Airport Fueling System is an arrangement of aviation fuel storage tanks, pumps, piping, and associated equipment, such as filters, water separators, hydrants and station, or aircraft fuel servicing vehicles, installed at an airport and designed to service aircraft at fixed positions.
Grounding Airport Fueling Systems

- All equipment such as tanks, machinery, and piping shall be designed and operated to prevent electrostatic ignitions. All metallic equipment shall be bonded or grounded to prevent hazardous accumulation of static electricity.
- The bond or ground or both shall be physically applied or shall be inherently present by the nature of the installation. Any electrically isolated section of metallic piping or equipment shall be bonded or grounded.
Grounding Airport Fueling Systems

Underground fuel tanks and piping are grounded by the nature of the installation.
Above ground fuel tanks need to be grounded or bonded together and connected to a grounding rod.
Grounding

Check above ground fuel tanks for proper grounding.
Emergency Shutoffs

- Each fuel system shall have means for quickly and completely shutting off the flow of fuel in an emergency. This requirement shall be in addition to the requirement for deadman control of fuel flow.
- The emergency fuel shutoff system shall be designed and installed as an integral part of the airport fuel system. Operating controls for emergency fuel shutoff of the system shall be located to be accessible readily and safely in the event of an accident or spill.
- At least one emergency shutoff control station shall be conveniently accessible to each fueling position.
The emergency fuel shutoff system shall include shutoff stations located outside of probable spill areas and near the route that normally is used to leave the spill area or to reach the fire extinguishers provided for the protection of the area.
A bonding connection shall be made between the cargo tank and the loading rack before any fuel connections are made and shall remain in place throughout the loading operation.
Loading of Aircraft Fuel Servicing Tank Vehicles

The operator shall initiate fuel flow by means of a deadman control device.
Aircraft Fueling Hose

Check hoses for evidence of blistering, weather cracking, carcass saturation or separation, cuts, nicks, or abrasions that expose reinforcement material, and for slippage, misalignment, or leaks at couplings.
Portable Fire Extinguishers

During fueling operations, fire extinguishers shall be available on aircraft servicing ramps or aprons.
Portable Fire Extinguishers

For normal, single parking configurations, extinguishers specified for protection of fuel servicing operations should be located along the fence, at terminal building egress points, or at emergency remote control stations of airport fixed-fuel systems.
Before loading tank vehicles through open domes, a bonding connection shall be made to the vehicle or tank before dome covers are raised and shall remain in place until filling is completed and all dome covers have been closed and secured.
Observe fueling operations while inspecting aircraft fuel servicing vehicles to check for compliance with fire safety standards. In particular, check for proper bonding procedures and use of deadman controls.
Aircraft fuel servicing vehicles and carts shall be positioned so that a clear path of egress from the aircraft for fuel servicing vehicles shall be maintained.
Lightning Precautions

Fuel servicing operations shall be suspended where there are lightning flashes in the immediate vicinity of the airport.
In the U.S., each fueling agent supervisor must complete training at an aviation fuel training course in fire safety is acceptable to the FAA.
Fueling agent training records should be reviewed to ensure that the records are being maintained.
Fueling Questions ••••