FUEL - MAINTENANCE PRACTICES

EFFECTIVITY: ALL

1. General

A. This section gives the procedures and information related to the maintenance of the fuel system.

B. The section includes:

- Fuel System Related Terms Definitions
- Fuel System Safety Precautions.
- Preparation for an Internal Fuel Tank Maintenance Procedure.
- Internal Fuel Tank Maintenance General Procedures.

C. Fuel System Related Terms Definitions

(1) Class I, Division 1, Hazardous Locations

- Locations in which hazardous concentrations of flammable gases or vapors can exist under normal operating conditions.
- Locations in which hazardous concentrations of flammable gases or vapors can exist frequently because of repair or maintenance operations or because of leakage.
- Locations in which equipment problems or defective operation of equipment or processes can release hazardous concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

(2) Explosion-Proof Component is a component with these characteristics:

- Kept in a case resistant to an explosion of a specified gas or vapor which can occur inside it;
- Prevents the ignition of a specified gas or vapor around the enclosure by sparks, flashes, or explosion of the internal gas or vapor;
- Operates at such an external temperature that it will not ignite a surrounding flammable atmosphere

(3) Lower Explosive Limits (LEL): the lowest concentration of a gas or vapor in the air that will not ignite or explode if there is an ignition source.

(4) Fire-Safe Condition: 10% or less concentration of the lower explosive limit for fuel vapors.

(5) Permissible Exposure Level (PEL): the time-weighted-average airborne concentrations of substances to which it is thought that almost all workers can be repeatedly exposed 8 hours a day, 40 hours a week, without adverse health effects.

(6) Flammable: a fluid or gas open to ignition or explosion.

D. Fuel System Safety Precautions

WARNING:

- **WHEN YOU OPEN THE FUEL TANK, THE FUEL-AIR MIXTURE CAN BE TOO RICH TO BE EASILY IGNITED. BUT, DURING THE VENTILATION OF THE TANKS, THE FUEL-AIR MIXTURE CAN FALL TO AN EXPLOSIVE LEVEL. IT IS ALSO POSSIBLE THAT FUEL-AIR MIXTURE CAN BE KEPT IN AN AREA NOT VENTILATED OF THE TANK IN EXPLOSIVE CONCENTRATIONS.**
- **ALL JET FUEL CAUSES INJURY TO THE SKIN. DO NOT LET THESE FLUIDS TOUCH YOU.**
- **MAKE SURE THAT THE TECHNICIAN IS TRAINED AND PREPARED TO DO THE FUEL SYSTEM MAINTENANCE PROCEDURES.**
- **IF YOU MUST DO TASKS WITH A HEATING GUN, OBEY THE SAFETY PRECAUTIONS GIVEN IN WM 20-10-00. EXPLOSION CAN OCCUR IF YOU USE AN NOT QUALIFIED HEATING GUN NEAR HAZARDOUS LOCATIONS [1].**
- **DO THE FUEL SYSTEM MAINTENANCE ONLY IN AN AREA WHICH PERMITS THE FREE MOVEMENT AND ACCESS OF FIRE FIGHTING EQUIPMENT AND PERSONS. MAKE SURE THAT FIRE EXTINGUISHERS ARE AVAILABLE AND READY TO BE USED IF THERE IS AN EMERGENCY SITUATION.**
- **ELECTRICALLY GROUND THE AIRCRAFT WITH THE CORRECT CABLES (AMM MPP 20-40-02/200).**
- **STATICALLY GROUND ALL ELECTRIC EQUIPMENT (AMM MPP 20-40-02/200). THIS PREVENTS A HIGH CONCENTRATION OF STATIC ELECTRICITY WHEN THE EQUIPMENT IS USED.**
- **STOP FUEL-TANK MAINTENANCE PROCEDURES AND CLOSE THE ACCESS TO THE FUEL TANKS WHEN THUNDERSTORMS OR LIGHTNING ARE IN LESS THAN 16 KM (10 MILES) [1].**
- **MAKE SURE THAT THERE ARE NO PERSONS WITH LIT CIGARETTES OR OTHER SOURCES OF SPARKS OR OPEN FLAMES IN A RADIUS OF 15 M (50 FT) FROM THE AREA WHERE THE MAINTENANCE IS DONE.**
- **DO NOT PRESSURIZE THE AIRCRAFT WITH THE FUSELAGE FUEL SYSTEM DISASSEMBLED, EVEN IF PARTIALLY, OR DAMAGE TO THE AFT FUEL TANKS WILL OCCUR.**

CAUTION: AFTER THE REMOVAL OF COMPONENTS, DO NOT LET THE FITTINGS OR ELECTRICAL CONNECTORS STAY NOT PROTECTED. INSTALL CAPS OR PLUGS ON ALL OF THEM. DO NOT USE ADHESIVE TAPE FOR THIS, BECAUSE ITS SUBSEQUENT REMOVAL CAN CAUSE STATIC ELECTRICITY.

(1) During the fuel system maintenance tasks, obey the precautions above to prevent injury to persons and damage to material.

WARNING:

- **OBEY THE LOCAL "PEL" LIMITS AND THE STANDARD PROCEDURES IF THEY ARE MORE STRICT THAN THOSE SPECIFIED IN THIS MANUAL.**
- **DO NOT WEAR CLOTHING IN SYNTHETIC MATERIAL OR CLOTHING WHICH HAS METAL ZIPPERS OR BUTTONS. THERE CAN CAUSE A SPARK [1].**
- **DO NOT KEEP WITH YOU METAL OBJECTS AND EQUIPMENT THAT CAN MAKE SPARKS [1].**
- **USE ONLY EXPLOSION-PROOF VENTILATION EQUIPMENT IN HAZARDOUS LOCATIONS [1].**
- **USE ONLY EXPLOSION-PROOF LIGHTING EQUIPMENT [1].**
- **USE ONLY EXPLOSION-PROOF ELECTRICAL EQUIPMENT IN HAZARDOUS LOCATIONS [1].**
- **USE ONLY EXPLOSION-PROOF ELECTRICAL EQUIPMENT WHEN YOU DO TASKS LESS THAN 15 M (50 FT) AWAY FROM AN OPEN FUEL TANK [1].**
- **MAKE SURE THAT NO RADIO OR RADAR EQUIPMENT OPERATES IN A RADIUS OF 91 M (300 FT) FROM THE AIRCRAFT [1].**
- **FUEL-AIR MIXTURE IS TOXIC AND CAN CAUSE IRRITATION TO THE SKIN AND EYES. WEAR FILTERING MASK AND GLOVES AND DO NOT BREATHE FUEL-AIR MIXTURE. USE A AIR PURIFYING RESPIRATOR WITH AN AIR SUPPLY FROM OUT OF THE TANK IF THE OXYGEN LEVEL IS OUT OF LIMITS.**
- **THE FRESH AIR FLOW FROM THE VENTILATION EQUIPMENT MUST KEEP THE OXYGEN LEVELS INSIDE THE FUEL TANKS BETWEEN 19.5% AND 23.5% BY VOLUME.**
- **MAKE SURE THAT THERE IS AN OBSERVER TO MONITOR THE PERSON INSIDE THE TANK AND BE PREPARED TO QUICKLY HELP HIM IF NECESSARY.**
- **MAKE SURE THAT THE AIRCRAFT IS DEENERGIZED [1].**
- **USE A COMBUSTIBLE GAS INDICATOR DESIGNED FOR CLASS I, DIVISION I HAZARDOUS LOCATIONS OR EQUIVALENT STANDARD, TO MONITOR THE FUEL TANK INTERNALLY FOR A FIRE-SAFE CONDITION.**
- **OBEY THE MANUFACTURER'S INSTRUCTIONS FOR THE COMBUSTIBLE GAS INDICATOR WHEN YOU DO A JOB IN THE TANK.**
- **THE FRESH AIR FLOW FROM THE VENTILATION EQUIPMENT MUST KEEP THE FUEL-AIR MIXTURE LEVELS INSIDE THE FUEL TANKS BELOW 10% LOWER EXPLOSIVE LIMITS (LEL).**
- **COMPRESSED AIR MUST NOT BE APPLIED DIRECTLY INTO FUEL TANKS FOR VENTILATION PURPOSES.**
- **VENTILATE THE TANKS TO DECREASE THE CONCENTRATION OF FUEL-AIR MIXTURE.**

- **DO NOT USE LOCKWIRE INSIDE THE FUEL TANKS. THE ENDS OF THE LOCKWIRES CAN BE POINTS OF ELECTROSTATIC DISCHARGE.**

[1] Not applicable to clean, dry (no fuel) tanks and under fire-safe condition. Refer to Preparation for an Internal Fuel Tank Maintenance Procedure.

(2) Obey the safety precautions listed above when you do maintenance procedures inside the fuel tanks.

E. Preparation for an Internal Fuel Tank Maintenance Procedure

WARNING: READ THE FUEL SYSTEM SAFETY PRECAUTIONS TO PREVENT INJURY TO PERSONS AND DAMAGE TO MATERIAL.

(1) When you do maintenance tasks for which it is necessary to open the fuel tanks, obey these instructions:

(a) Defuel (AMM MPP 12-11-02/300) and drain (AMM MPP 12-11-03/300) the tank in which you will do the task.

(b) Deenergize the aircraft (TASK 20-40-01-862-801-A). Attach a DO-NOT-SET-TO-ON tag to the GPU pushbutton.

(c) Make sure that the BATT 1 and BATT 2 switches, on the electrical panel, on the overhead panel, are set at OFF. Attach a DO-NOT-SET-TO-AUTO tag to the BATT 1 and BATT 2 switches.

(d) Remove panels as necessary to get access to the internal side of the fuel tank (AMM MPP 06-44-00/100 and AMM MPP 28-11-01/400). To remove the remaining fuel, you can absorb it with the aid of, for example, a sponge.

(e) Ventilate the fuel tank with a ventilation equipment:

1 Put the ventilation equipment in the correct area.

2 Statically ground the aircraft and the ventilation equipment (AMM MPP 20-40-02/200).

3 (c) Turn on the ventilation equipment.

WARNING: DO NOT START OR STOP THE VENTILATION EQUIPMENT AFTER ITS HOSE IS ATTACHED TO THE FUEL TANK. THERE CAN CAUSE A SPARK.

4 Attach and ground the ventilation equipment hose to the fuel tank access.

(f) Do a check for vapor fuel concentration in the fuel tank. Obey the combustible gas indicator manufacturer’s instructions. When the indication is in the permitted limits, then the tank is in a fire-safe condition.

WARNING: IF THE OXYGEN LEVELS ARE OUT OF THE RANGE FROM 19.5% TO 23.5% BY VOLUME, WEAR AN AIR PURIFYING RESPIRATOR WITH AN AIR SUPPLY FROM OUT OF THE TANK.

(g) During the task, the fuel tank must be continuously ventilated. Monitor the combustible gas indicator values every half hour or less.

F. Internal Fuel Tank Maintenance General Procedures

WARNING: READ THE FUEL SYSTEM SAFETY PRECAUTIONS TO PREVENT INJURY TO PERSONS AND DAMAGE TO MATERIAL.

(1) Before you do a maintenance procedure inside the fuel tanks, obey these precautions to prevent contamination.

(a) Wear only clean clothing of a non-synthetic material and which does not release lints.

(b) All tools and equipment used inside of the tanks must be totally clean and with no dust. This also includes the tank ventilation equipment.

(c) Close the tanks when the work is temporarily stopped to prevent contamination with dust or other unwanted material.

(d) When you disconnect the fuel system tubing and/or remove components, always cover the openings with the applicable plugs or caps to prevent contamination.

(e) When electrical connectors are disconnected, protect them correctly against fuel or other unwanted material.

(2) After you do a maintenance procedure inside the fuel tanks, do these procedures to prevent fuel contamination and keep a correct installation of the fuel tank components:

(a) When the job is done, inspect the tank internal area for foreign objects.

(b) Examine the attachment of the fuel components in the area where you work.

(c) Make sure that the tank units do not touch the tank wall.

(d) Examine the correct attachment of the in-tank harness. Make sure that all harness clamps are attached and intact, and the harness does not chafe against the tank wall, tubes or components.

(e) Examine the attachment of the boding jumpers in the area in which you work. Make sure that the bonding jumpers in the tubes and components are attached.

(f) Examine the attachment of the bonding clamps in the tubes in which you work. Make sure that the bonding clamps in the tubes and components are correctly attached and that they do not easily move along the tube. Make sure that the electrical bonding obeys the installation requirements.

NOTE: Make sure that the bonding clamps are not attached too tightly not to cause damage to the tube.

(3) When the job is completed, put the aircraft back to its usual configuration.