



NTSB ***SAFETY ALERT***

National Transportation Safety Board



Line Personnel: Fueling Matters



Prevent misfueling through standardized procedures for every aircraft

The problem

Misfueling can occur for a variety of reasons and typically results in a complete loss of engine power, which may lead to serious injuries and/or death.

- While fuel nozzles and fuel fillers are designed to prevent misfueling, our investigations have found numerous modifications that can allow misfueling to occur. For example, aviation gasoline (avgas) nozzles are small and round and fit into smaller opening fuel filler ports while jet fuel nozzles are larger and flattened like a duck's bill, requiring a larger fuel filler port (see figures 1 and 2). However, our investigations have shown that some fixed base operators (FBOs) are modifying their jet fuel nozzles with the smaller avgas nozzles or other smaller type nozzle, such as the round jet spout nozzle, to more easily fuel smaller turbine helicopters. These non-standard jet fuel nozzles can easily fit into the smaller filler ports of aircraft that require avgas and allow for misfueling to occur.
- When an aircraft is modified from using a reciprocating engine (avgas) to a turbine engine (jet fuel), some supplemental type certificates (STCs) have not required that the fuel filler port size be changed accordingly. As a result, line personnel have had to make accommodations such as installing an avgas fuel nozzle or round jet nozzle on a jet fuel truck to allow jet fuel into the smaller avgas fuel filler port.



Figure 1. Photograph of an avgas nozzle.



Figure 2. Photograph of Jet A fuel nozzle.

- These STC modifications can lead to fueling confusion because the same model or similar looking aircraft may now have different fuel requirements.
- Once the wrong fuel is pumped into an aircraft, identifying that misfueling has occurred can be difficult, if not impossible, to detect.

Related accidents and incidents

The NTSB has investigated accidents involving misfueling, and they show the importance of pilots and line personnel maintaining vigilance when aircraft are fueled. The following accident summaries² help to highlight the issues involved:

- During takeoff, both engines of a Cessna 421C lost power. The airline transport pilot and two passengers sustained minor injuries in the forced landing. The pilot had landed the previous night and requested that 40 gallons of fuel be added to each tank. Line personnel incorrectly fueled the airplane with Jet A fuel by rotating the jet fuel nozzle and dispensing at a reduced pressure so that the fuel would go into the avgas fuel port because they had used this procedure on two other airplanes that had been modified with turbine engines and were based at the airport. However, the STC for the modification did not require that the airplanes' fuel filler openings be modified to the standard Jet A nozzle. ([CEN09LA145](#))
- During climbout, a Cessna 421B's engines lost power. The pilot was seriously injured and two passengers sustained minor injuries during a forced landing. The pilot had requested that the airplane's tip tanks be topped off with fuel the day before. The fuel tanks were placarded for avgas. However, line personnel mistook the airplane for a similar airplane that required Jet A fuel and refueled it from a Jet A fuel truck that had been permanently modified with a round nozzle to provide easier access for other aircraft serviced at the airport. The round nozzle also fit the avgas filler port opening of the Cessna. Before departure, the pilot sumped the fuel and it appeared that the airplane had been correctly fueled; however, he signed a receipt indicating that the airplane had been refueled with Jet A. ([CEN15LA199](#))
- During climbout, the engine of a Canadian-registered Piper PA 46-350P requiring avgas lost power, and the pilot was fatally injured during the attempted emergency landing. A fuel log showed that the airplane had been incorrectly refueled with Jet A before takeoff. ([WPR15LA111](#)) (This accident is still under investigation.)
- During the initial climb, both engines of a Cessna 421C lost power. The pilot, two medical crewmembers, and one patient were fatally injured following impact with terrain. The pilot had requested that the airplane be refueled with 40 gallons of fuel. Because the airport also serviced helicopters with smaller opening fuel filler ports that actually required Jet A fuel, one of the nozzles on the Jet A fuel truck had been permanently modified with a round nozzle to provide easier access for these aircraft.

² The accident reports for each accident referenced in this safety alert are accessible by NTSB accident number from the NTSB's [Accident Database & Synopses](#) web page. For those accidents that have been released, the accident's public docket is accessible from the NTSB's [Docket Management System](#) web page at <http://dms.nts.gov/pubdms/>.

The pilot was present when the line service person incorrectly fueled the Cessna with Jet A fuel instead of the required avgas. The pilot signed the machine-printed fuel ticket that showed the airplane had been fueled with Jet A fuel. ([CEN14FA462](#)) (This accident is still under investigation.)

What can line personnel do?

- Ensure that pilots tell you what type of fuel and the quantity are required by their aircraft then verify that the correct fuel and quantity are being provided.
- Read and verify that fuel placards are correct. If there is a discrepancy between what the pilot asks for and what is indicated on the placard, ASK! In addition, you can also use a fuel grade verification form signed by the pilot.
- Identify aircraft through the registration number rather than the aircraft make/model. Due to STC modifications of piston engines to turbines, be aware that even though you have fueled an aircraft with Jet A, a similar aircraft may require avgas. Additionally, if your airport services smaller turbine helicopters, the fuel nozzles may have been modified so that the Jet A fuel dispenser is equipped with an avgas nozzle or round jet spout.
- Many pilots who have had misfueled aircraft have signed receipts that show the wrong fuel was used. Use the receipt as an added safety check in verifying with the pilot that you provided the appropriate fuel.

Interested in more information?

- The National Air Transportation Association provides training through its [Safety 1st General Aviation Misfueling Prevention Program](#) for pilots, line personnel, FBO general managers, and customer service representatives.
- The Twin Cessna Flyer organization wrote an article, "[Misfueling Epidemic](#)," in the August 2015 issue of its magazine that discusses misfueling prevention methods.
- The FAA published Advisory Circular 20-122A, "[Anti-misfueling Devices: Their Availability and Use](#)."
- The NTSB made a series of safety recommendations in the 1980s (A-82-140, A-82-141, and A-86-135) to prevent aircraft misfueling. The letters related to this issue can be found on our [website](#).
- This NTSB safety alert and others can be accessed from the NTSB's Safety Alerts web page at <http://www.nts.gov/safety/safety-alerts/Pages/default.aspx>.