§ 23.971 Fuel tank sump.

(a) Each fuel tank must have a drainable sump with an effective capacity, in the normal ground and flight attitudes, of 0.25 percent of the tank capacity, or 1/16 gallon, whichever is greater.

(b) Each fuel tank must allow drainage of any hazardous quantity of water from any part of the tank to its sump with the airplane in the normal ground attitude.

(c) Each reciprocating engine fuel system must have a sediment bowl or chamber that is accessible for drainage; has a capacity of 1 ounce for every 20 gallons of fuel tank capacity; and each fuel tank outlet is located so that, in the normal flight attitude, water will drain from all parts of the tank except the sump to the sediment bowl or chamber.

(d) Each sump, sediment bowl, and sediment chamber drain required by paragraphs (a), (b), and (c) of this section must comply with the drain provisions of § 23.999(b)(1) and (b)(2).

[Doc. No. 26344, 58 FR 18972, Apr. 9, 1993; 58 FR 27060, May 6, 1993]

§ 23.973 Fuel tank filler connection.

(a) Each fuel tank filler connection must be marked as prescribed in § 23.1557(c).

(b) Spilled fuel must be prevented from entering the fuel tank compartment or any part of the airplane other than the tank itself.

(c) Each filler cap must provide a fuel-tight seal for the main filler opening. However, there may be small openings in the fuel tank cap for venting purposes or for the purpose of allowing passage of a fuel gauge through the cap provided such openings comply with the requirements of § 23.975(a).

(d) Each fuel filling point, except pressure fueling connection points, must have a provision for electrically bonding the airplane to ground fueling equipment.

(e) For airplanes with engines requiring gasoline as the only permissible fuel, the inside diameter of the fuel filler opening must be no larger than 2.36 inches.

(f) For airplanes with turbine engines, the inside diameter of the fuel filler opening must be no smaller than 2.95 inches.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23–18, 42 FR 15041, Mar. 17, 1977; Amdt. 23–43, 58 FR 18972, Apr. 9, 1993; Amdt. 23–51, 61 FR 5136, Feb. 9, 1996]

§ 23.975 Fuel tank vents and carburetor vapor vents.

(a) Each fuel tank must be vented from the top part of the expansion space. In addition—

(1) Each vent outlet must be located and constructed in a manner that minimizes the possibility of its being obstructed by ice or other foreign matter;

(2) Each vent must be constructed to prevent siphoning of fuel during normal operation;

(3) The venting capacity must allow the rapid relief of excessive differences of pressure between the interior and exterior of the tank;

(4) Airspaces of tanks with interconnected outlets must be interconnected;

(5) There may be no point in any vent line where moisture can accumulate with the airplane in either the ground or level flight attitudes, unless drainage is provided. Any drain valve installed must be accessible for drainage;

(6) No vent may terminate at a point where the discharge of fuel from the vent outlet will constitute a fire hazard or from which fumes may enter personnel compartments; and

(7) Vents must be arranged to prevent the loss of fuel, except fuel discharged because of thermal expansion, when the airplane is parked in any direction on a ramp having a one-percent slope.

(b) Each carburetor with vapor elimination connections and each fuel injection engine employing vapor return provisions must have a separate vent line to lead vapors back to the top of one of the fuel tanks. If there is more than one tank and it is necessary to use these tanks in a definite sequence for any reason, the vapor vent line must lead back to the fuel tank to be used first, unless the relative capacities of the tanks are such that return to another tank is preferable.

(c) For acrobatic category airplanes, excessive loss of fuel during acrobatic

maneuvers, including short periods of inverted flight, must be prevented. It must be impossible for fuel to siphon from the vent when normal flight has been resumed after any acrobatic maneuver for which certification is requested.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964; 30 FR 258, Jan. 9, 1965, as amended by Amdt. 23–18, 42 FR 15041, Mar. 17, 1977; Amdt. 23–29, 49 FR 6847, Feb. 23, 1984; Amdt. 23–43, 58 FR 18973, Apr. 9, 1993; Amdt. 23–51, 61 FR 5136, Feb. 9, 1996]

§ 23.977 Fuel tank outlet.

(a) There must be a fuel strainer for the fuel tank outlet or for the booster pump. This strainer must—

(1) For reciprocating engine powered airplanes, have 8 to 16 meshes per inch; and

(2) For turbine engine powered airplanes, prevent the passage of any object that could restrict fuel flow or damage any fuel system component.

(b) The clear area of each fuel tank outlet strainer must be at least five times the area of the outlet line.

(c) The diameter of each strainer must be at least that of the fuel tank outlet.

(d) Each strainer must be accessible for inspection and cleaning.

[Amdt. 23–17, 41 FR 55465, Dec. 20, 1976, as amended by Amdt. 23–43, 58 FR 18973, Apr. 9, 1993]

§ 23.979 Pressure fueling systems.

For pressure fueling systems, the following apply:

(a) Each pressure fueling system fuel manifold connection must have means to prevent the escape of hazardous quantities of fuel from the system if the fuel entry valve fails.

(b) An automatic shutoff means must be provided to prevent the quantity of fuel in each tank from exceeding the maximum quantity approved for that tank. This means must—

(1) Allow checking for proper shutoff operation before each fueling of the tank; and

(2) For commuter category airplanes, indicate at each fueling station, a failure of the shutoff means to stop the fuel flow at the maximum quantity approved for that tank.

(c) A means must be provided to prevent damage to the fuel system in the event of failure of the automatic shutoff means prescribed in paragraph (b) of this section.

(d) All parts of the fuel system up to the tank which are subjected to fueling pressures must have a proof pressure of 1.33 times, and an ultimate pressure of at least 2.0 times, the surge pressure likely to occur during fueling.

[Amdt. 23–14, 38 FR 31823, Nov. 19, 1973, as amended by Amdt. 23–51, 61 FR 5137, Feb. 9, 1996]

FUEL SYSTEM COMPONENTS

§ 23.991 Fuel pumps.

(a) *Main pumps.* For main pumps, the following apply:

(1) For reciprocating engine installations having fuel pumps to supply fuel to the engine, at least one pump for each engine must be directly driven by the engine and must meet § 23.955. This pump is a main pump.

(2) For turbine engine installations, each fuel pump required for proper engine operation, or required to meet the fuel system requirements of this subpart (other than those in paragraph (b) of this section), is a main pump. In addition—

(i) There must be at least one main pump for each turbine engine;

(ii) The power supply for the main pump for each engine must be independent of the power supply for each main pump for any other engine; and

(iii) For each main pump, provision must be made to allow the bypass of each positive displacement fuel pump other than a fuel injection pump approved as part of the engine.

(b) *Emergency pumps.* There must be an emergency pump immediately available to supply fuel to the engine if any main pump (other than a fuel injection pump approved as part of an engine) fails. The power supply for each emergency pump must be independent of the power supply for each corresponding main pump.

(c) *Warning means.* If both the main pump and emergency pump operate continuously, there must be a means to indicate to the appropriate flight crewmembers a malfunction of either pump.