coupling has performed its intended function.

(2) All individual breakaway couplings, coupling fuel feed systems, or equivalent means must be designed, tested, installed, and maintained so inadvertent fuel shutoff in flight is improbable in accordance with § 29.955(a) and must comply with the fatigue evaluation requirements of § 29.571 without leaking.

(3) Alternate, equivalent means to the use of breakaway couplings must not create a survivable impact-induced load on the fuel line to which it is installed greater than 25 to 50 percent of the ultimate load (strength) of the weakest component in the line and must comply with the fatigue requirements of § 29.571 without leaking.

(d) Frangible or deformable structural attachments. Unless hazardous relative motion of fuel tanks and fuel system components to local rotorcraft structure is demonstrated to be extremely improbable in an otherwise survivable impact, frangible or locally deformable attachments of fuel tanks and fuel system components to local rotorcraft structure must be used. The attachment of fuel tanks and fuel system components to local rotorcraft structure, whether frangible or locally deformable, must be designed such that its separation or relative local deformation will occur without rupture or local tear-out of the fuel tank or fuel system component that will cause fuel leakage. The ultimate strength of frangible or deformable attachments must be as follows:

(1) The load required to separate a frangible attachment from its support structure, or deform a locally deformable attachment relative to its support structure, must be between 25 and 50 percent of the minimum ultimate load (ultimate strength) of the weakest component in the attached system. In no case may the load be less than 300 pounds.

(2) A frangible or locally deformable attachment must separate or locally deform as intended whenever its ultimate load (as defined in paragraph (d)(1) of this section) is applied in the modes most likely to occur.

(3) All frangible or locally deformable attachments must comply with the fatigue requirements of § 29.571.

(e) Separation of fuel and ignition sources. To provide maximum crash resistance, fuel must be located as far as practicable from all occupiable areas and from all potential ignition sources.

(f) Other basic mechanical design criteria. Fuel tanks, fuel lines, electrical wires, and electrical devices must be designed, constructed, and installed, as far as practicable, to be crash resistant.

(g) Rigid or semirigid fuel tanks. Rigid or semirigid fuel tank or bladder walls must be impact and tear resistant.

§ 29.953 Fuel system independence.

(a) For category A rotorcraft—

(1) The fuel system must meet the requirements of § 29.903(b); and

(2) Unless other provisions are made to meet paragraph (a)(1) of this section, the fuel system must allow fuel to be supplied to each engine through a system independent of those parts of each system supplying fuel to other engines.

(b) Each fuel system for a multiengine category B rotorcraft must meet the requirements of paragraph (a)(2) of this section. However, separate fuel tanks need not be provided for each engine.

§ 29.954 Fuel system lightning protection.

The fuel system must be designed and arranged to prevent the ignition of fuel vapor within the system by—

(a) Direct lightning strikes to areas having a high probability of stroke attachment;

(b) Swept lightning strokes to areas where swept strokes are highly probable; and

(c) Corona and streamering at fuel vent outlets.

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§ 29.955 Fuel flow.

(a) General. The fuel system for each engine must provide the engine with at least 100 percent of the fuel required under all operating and maneuvering conditions to be approved for the rotorcraft, including, as applicable, the fuel
§ 29.957 Flow between interconnected tanks.

(a) Where tank outlets are interconnected and allow fuel to flow between them due to gravity or flight accelerations, it must be impossible for fuel to flow between tanks in quantities great enough to cause overflow from the tank vent in any sustained flight condition.

(b) If fuel can be pumped from one tank to another in flight—

(1) The design of the vents and the fuel transfer system must prevent structural damage to tanks from overfilling; and

(2) There must be means to warn the crew before overflow through the vents occurs.

§ 29.959 Unusable fuel supply.

The unusable fuel supply for each tank must be established as not less than the quantity at which the first evidence of malfunction occurs under the most adverse fuel feed condition occurring under any intended operations and flight maneuvers involving that tank.

§ 29.961 Fuel system hot weather operation.

Each suction lift fuel system and other fuel systems conducive to vapor formation must be shown to operate satisfactorily (within certification limits) when using fuel at the most critical temperature for vapor formation under critical operating conditions including, if applicable, the engine operating conditions defined by §29.927(b)(1) and (b)(2).

§ 29.963 Fuel tanks: general.

(a) Each fuel tank must be able to withstand, without failure, the vibration, inertia, fluid, and structural loads to which it may be subjected in operation.

(b) Each flexible fuel tank bladder or liner must be approved or shown to be suitable for the particular application.