

flame for more than an average of 3 seconds after falling.

[Amdt. 23-14, 23 FR 31822, Nov. 19, 1973, as amended by Amdt. 23-23, 43 FR 50593, Oct. 30, 1978; Amdt. 23-25, 45 FR 7755, Feb. 4, 1980; Amdt. 23-34, 52 FR 1831, Jan. 15, 1987]

**§ 23.855 Cargo and baggage compartment fire protection.**

(a) Sources of heat within each cargo and baggage compartment that are capable of igniting the compartment contents must be shielded and insulated to prevent such ignition.

(b) Each cargo and baggage compartment must be constructed of materials that meet the appropriate provisions of § 23.853(d)(3).

(c) In addition, for commuter category airplanes, each cargo and baggage compartment must:

(1) Be located where the presence of a fire would be easily discovered by the pilots when seated at their duty station, or it must be equipped with a smoke or fire detector system to give a warning at the pilots' station, and provide sufficient access to enable a pilot to effectively reach any part of the compartment with the contents of a hand held fire extinguisher, or

(2) Be equipped with a smoke or fire detector system to give a warning at the pilots' station and have ceiling and sidewall liners and floor panels constructed of materials that have been subjected to and meet the 45 degree angle test of appendix F of this part. The flame may not penetrate (pass through) the material during application of the flame or subsequent to its removal. The average flame time after removal of the flame source may not exceed 15 seconds, and the average glow time may not exceed 10 seconds. The compartment must be constructed to provide fire protection that is not less than that required of its individual panels; or

(3) Be constructed and sealed to contain any fire within the compartment.

[Doc. No. 27806, 61 FR 5167, Feb. 9, 1996]

**§ 23.859 Combustion heater fire protection.**

(a) *Combustion heater fire regions.* The following combustion heater fire regions must be protected from fire in ac-

cordance with the applicable provisions of §§ 23.1182 through 23.1191 and 23.1203:

(1) The region surrounding the heater, if this region contains any flammable fluid system components (excluding the heater fuel system) that could—

(i) Be damaged by heater malfunctioning; or

(ii) Allow flammable fluids or vapors to reach the heater in case of leakage.

(2) The region surrounding the heater, if the heater fuel system has fittings that, if they leaked, would allow fuel vapor to enter this region.

(3) The part of the ventilating air passage that surrounds the combustion chamber.

(b) *Ventilating air ducts.* Each ventilating air duct passing through any fire region must be fireproof. In addition—

(1) Unless isolation is provided by fireproof valves or by equally effective means, the ventilating air duct downstream of each heater must be fireproof for a distance great enough to ensure that any fire originating in the heater can be contained in the duct; and

(2) Each part of any ventilating duct passing through any region having a flammable fluid system must be constructed or isolated from that system so that the malfunctioning of any component of that system cannot introduce flammable fluids or vapors into the ventilating airstream.

(c) *Combustion air ducts.* Each combustion air duct must be fireproof for a distance great enough to prevent damage from backfiring or reverse flame propagation. In addition—

(1) No combustion air duct may have a common opening with the ventilating airstream unless flames from backfires or reverse burning cannot enter the ventilating airstream under any operating condition, including reverse flow or malfunctioning of the heater or its associated components; and

(2) No combustion air duct may restrict the prompt relief of any backfire that, if so restricted, could cause heater failure.

(d) *Heater controls: general.* Provision must be made to prevent the hazardous accumulation of water or ice on or in any heater control component, control system tubing, or safety control.

(e) *Heater safety controls.* (1) Each combustion heater must have the following safety controls:

(i) Means independent of the components for the normal continuous control of air temperature, airflow, and fuel flow must be provided to automatically shut off the ignition and fuel supply to that heater at a point remote from that heater when any of the following occurs:

(A) The heater exchanger temperature exceeds safe limits.

(B) The ventilating air temperature exceeds safe limits.

(C) The combustion airflow becomes inadequate for safe operation.

(D) The ventilating airflow becomes inadequate for safe operation.

(ii) Means to warn the crew when any heater whose heat output is essential for safe operation has been shut off by the automatic means prescribed in paragraph (e)(1)(i) of this section.

(2) The means for complying with paragraph (e)(1)(i) of this section for any individual heater must—

(i) Be independent of components serving any other heater whose heat output is essential for safe operations; and

(ii) Keep the heater off until restarted by the crew.

(f) *Air intakes.* Each combustion and ventilating air intake must be located so that no flammable fluids or vapors can enter the heater system under any operating condition—

(1) During normal operation; or

(2) As a result of the malfunctioning of any other component.

(g) *Heater exhaust.* Heater exhaust systems must meet the provisions of §§ 23.1121 and 23.1123. In addition, there must be provisions in the design of the heater exhaust system to safely expel the products of combustion to prevent the occurrence of—

(1) Fuel leakage from the exhaust to surrounding compartments;

(2) Exhaust gas impingement on surrounding equipment or structure;

(3) Ignition of flammable fluids by the exhaust, if the exhaust is in a compartment containing flammable fluid lines; and

(4) Restrictions in the exhaust system to relieve backfires that, if so restricted, could cause heater failure.

(h) *Heater fuel systems.* Each heater fuel system must meet each powerplant fuel system requirement affecting safe heater operation. Each heater fuel system component within the ventilating airstream must be protected by shrouds so that no leakage from those components can enter the ventilating airstream.

(i) *Drains.* There must be means to safely drain fuel that might accumulate within the combustion chamber or the heater exchanger. In addition—

(1) Each part of any drain that operates at high temperatures must be protected in the same manner as heater exhausts; and

(2) Each drain must be protected from hazardous ice accumulation under any operating condition.

[Amdt. 23-27, 45 FR 70387, Oct. 23, 1980]

**§ 23.863 Flammable fluid fire protection.**

(a) In each area where flammable fluids or vapors might escape by leakage of a fluid system, there must be means to minimize the probability of ignition of the fluids and vapors, and the resultant hazard if ignition does occur.

(b) Compliance with paragraph (a) of this section must be shown by analysis or tests, and the following factors must be considered:

(1) Possible sources and paths of fluid leakage, and means of detecting leakage.

(2) Flammability characteristics of fluids, including effects of any combustible or absorbing materials.

(3) Possible ignition sources, including electrical faults, overheating of equipment, and malfunctioning of protective devices.

(4) Means available for controlling or extinguishing a fire, such as stopping flow of fluids, shutting down equipment, fireproof containment, or use of extinguishing agents.

(5) Ability of airplane components that are critical to safety of flight to withstand fire and heat.

(c) If action by the flight crew is required to prevent or counteract a fluid fire (e.g. equipment shutdown or actuation of a fire extinguisher), quick acting means must be provided to alert the crew.