

Class C and D Cargo Compartment Regulations

FAA requirements for cargo compartment fire protection vary depending on how the cargo compartment is classified per 14 CFR part 25 §25.857. At the time of the ValuJet accident, five cargo compartment classifications were available: Classes A, B, C, D, and E. Lower lobe cargo compartments large on passenger airplanes, which would be inaccessible in flight and were used mostly for passenger baggage, could be Class C or Class D compartments. The ValuJet fire occurred in a Class D compartment.

The fire protection approaches for Classes C and D differ. Class C relies on active fire control through fire detection and suppression systems, whereas Class D relied on passive control through oxygen starvation. Class C requirements are essentially unchanged since the accident. Following the accident, 14 CFR part 25 was modified to remove Class D. Existing operators of airplanes with Class D compartments were required under 14 CFR part 121 to upgrade these compartments to the Class C standard.

Class C fire protection relies on detecting the fire early and suppressing it for the duration of the flight. The fire suppression system releases an extinguishing agent like Halon into the compartment at a concentration level that inhibits combustion. The fire resistant liner helps prevent leakage of the extinguishing agent so that an effective concentration can be maintained and protects adjacent structure and systems. Ventilation to the compartment following fire detection is also limited to maintain extinguishing agent concentrations.

Class D fire protection relied on passive oxygen starvation. Class D fire protection relied on the compartment being small and sealed enough so that a fire would quickly expend available oxygen and extinguish or remain so small that it would not threaten the airplane. This was accomplished by limiting the size of and ventilation to the compartment. Class D compartments did not require fire detection or suppression systems, so fires occurring therein were expected to stay at a non-threatening level for the duration of the flight to its destination. After the accident, the FAA removed the Class D classification.

The following are the 14 CFR part 25 regulations for Class C and D compartments at the time of the accident:

14 CFR Part 25 §25.857(c) Class C. A Class C cargo or baggage compartment is one not meeting the requirements for either a Class A or B compartment, but in which –

- (1) There is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station;
- (2) There is an approved built in fire extinguishing or suppression system controllable from the cockpit.

- (3) There are means to exclude hazardous quantities of smoke, flames, or extinguishing agent, from any compartment occupied by the crew or passengers;
- (4) There are means to control ventilation and drafts within the compartment so that the extinguishing agent used can control any fire that may start within the compartment.

14 CFR Part 25 §25.857(d) Class D. A Class D cargo or baggage compartment is one in which:

- (1) a fire occurring in it will be completely confined without endangering the safety of the airplane or the occupants.
- (2) There are means to exclude hazardous quantities of smoke, flames, or other noxious gases, from any compartment occupied by the crew or passengers.
- (3) Ventilation and drafts are controlled within each compartment so that any fire likely to occur in the compartment will not progress beyond safe limits;
- (4) There is a fire-resistant lining; and
- (5) Consideration is given to the effect of heat within the compartment on adjacent critical parts of the airplane.

For compartments of 500 cu.ft. or less, an airflow of 1500 cu. ft. per hour is acceptable.