regulations do not contain adequate or appropriate safety standards.

There are no specific regulations that address protection requirements for the airplane fuselage pressure vessel or passengers and crew, in the event of a rapid decompression, during high altitude operations. The potential adverse impact from rapid decompression at high altitudes have made it necessary to provide adequate protection.

To ensure that a level of safety is achieved equivalent to that intended by the regulations incorporated by reference, special conditions are proposed for the Gulfstream V which would require compliance with additional requirements to provide protection from the direct and indirect effects of high altitude operations.

Damage tolerance methods are proposed to be used to ensure pressure vessel integrity while operating at the higher altitudes. Crack growth data are used to prescribe an inspection program which will detect cracks before an opening in the pressure vessel would allow rapid decompression. Initial crack sizes for detection are determined under § 25.571, Amendment 25–72. The cabin altitude after failure may not exceed the limits specified in Figures 3 and 4.

In order to ensure that there is adequate fresh air to crewmembers to perform their duties, to provide reasonable passenger comfort, and to enable occupants to better withstand the effects of decompression at high altitudes, the ventilation system must be designed to provide 10 cubic feet of fresh air per minute per person during normal operations. Therefore, these special conditions require that crewmembers and passengers be provided with 10 cubic feet of fresh air per minute per person. In addition, during the development of the supersonic transport special conditions, it was noted that certain pressurization failures resulted in hot ram or bleed air being used to maintain pressurization. Such a measure can lead to cabin temperatures that exceed human tolerance. Therefore, these special conditions would require airplane interior temperature limits following probable and improbable failures.

Continuous flow passenger oxygen equipment is certificated for use up to 40,000 feet; however, for rapid decompressions above 24,000 feet, reverse diffusion leads to low oxygen partial pressure in the lungs, to the extent that a small percentage of passengers may lose useful consciousness at 35,000 feet. The percentage increases to an estimated 60 percent at 40,000 feet, even with the use of the continuous flow system. To prevent permanent physiological damage, the cabin altitude must not exceed 25,000 feet for more than two minutes. The maximum peak cabin altitude of 40,000 feet is consistent with the standards established for previous certification programs. In addition, at these altitudes the other aspects of decompression sickness have a significant detrimental effect on pilot performance (for example, a pilot can be incapacitated by internal expanding gases).

Decompression above 27,000 feet can result in cabin altitudes that approach the physiological limits of the average person; therefore, every effort must be made to provide the pilots with adequate oxygen equipment to withstand these severe decompressions. Reducing the time interval between pressurization failure and the time the pilot receives oxygen will provide a safety margin against being incapacitated and can be accomplished by the use of mask-mounted regulators. The proposed special condition therefore requires pressure demand masks with mask-mounted regulators for the flightcrew. This combination of equipment will provide the best practical protection for the failures covered by the proposed special conditions and for improbable failures not covered by the special conditions, provided the cabin altitude is limited.

As discussed above, the proposed special conditions would be applicable initially to the Model Gulfstream V. Should Gulfstream apply at a later date for a change to the type of certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well, under the provisions of § 21.101(a)(1).

Conclusion

This action affects certain design features only on the Gulfstream V airplane. It is not a rule of general applicability and affects only the manufacturer who applied to the FAA for approval of these features on the airplane.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these proposed special conditions is as follows:

Authority: 49 U.S.C. app. 1344, 1348(c), 1352, 1354(a), 1355, 1421 through 1431, 1502, 1651(b)(2), 42 U.S.C. 1857f–10, 4321 et seq.; E.O. 11514; and 49 U.S.C. 106(g).

The Proposed Special Condition

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for the Gulfstream Model Gulfstream V series airplanes.

1. Pressure Vessel Integrity

(a) The maximum extent of failure and pressure vessel opening that can be demonstrated to comply with paragraph 4 (Pressurization) of this special condition must be determined. It must be demonstrated by crack propagation and damage tolerance analysis supported by testing that a larger opening or a more severe failure than demonstrated will not occur in normal operations.

(b) Inspection schedules and procedures must be established to assure that cracks and normal fuselage leak rates will not deteriorate to the extent that an unsafe condition could exist during normal operation.

(c) With regard to the fuselage structural design for cabin pressure capability above 45,000 feet altitude, the pressure vessel structure, including doors and windows, must comply with § 25,365(d), using a factor of 1.67 instead of the 1.33 factor described.

2. *Ventilation.* In lieu of the requirements of § 25.831(a), the ventilation system must be designed to provide a sufficient amount of uncontaminated air to enable the crewmembers to perform their duties without undue discomfort or fatigue, and to provide reasonable passenger comfort during normal operating conditions and also in the event of any probable failure to any system which could adversely affect the cabin ventilating air. For normal operations, crew members must be provided with at least 10 cubic feet of fresh air per minute per person, or the equivalent in filtered, recirculated air based on the volume and composition at the corresponding cabin pressure altitude of not more than 8,000 feet.

3. *Air Conditioning.* In lieu of the requirements of § 25.831, paragraphs (b) through (e), the cabin cooling system must be designed to meet the following conditions during flight above 15,000 feet mean sea level (MSL).

(a) After any probable failure, the cabin temperature-time history may not exceed the values shown in Figure 1.

(b) After any improbable failure, the cabin temperature-time history may not exceed the values shown in Figure 2.

4. *Pressurization.* In addition to the requirements of FAR 25.841, the following apply: