

special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions are applicable to the Gulfstream model GVI airplane. Should Gulfstream apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, these special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features of the GVI. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Gulfstream GVI airplanes.

In addition to the airworthiness standards in §§ 25.562 and 25.785, the following special conditions provide injury criteria and installation/testing guidelines that represent the minimum acceptable airworthiness standard for single-occupant side-facing seats:

A. The Injury Criteria

1. *Existing Criteria:* All injury protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupant of a side-facing seat. Head injury criterion (HIC) assessments are only required for head contact with the seat and/or adjacent structures.

2. *Body-to-Wall/Furnishing Contact:* The seat must be installed aft of a structure such as an interior wall or furnishing that will support the pelvis, upper arm, chest, and head of an occupant seated next to the structure. A conservative representation of the structure and its stiffness must be included in the tests. It is recommended, but not required, that the contact surface of this structure be covered with at least two inches of energy absorbing protective padding (foam or equivalent), such as Ensolute.

3. *Thoracic Trauma:* Thoracic trauma index (TTI) injury criterion must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation.

Testing must be conducted with a side impact dummy (SID), as defined by Title 49, Code of Federal Regulations (49 CFR) part 572, subpart F, or its equivalent. TTI must be less than 85, as defined in 49 CFR part 572, subpart F. SID TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) part 571.214, section S6.13.5.

4. *Pelvis:* Pelvic lateral acceleration must be shown by dynamic test or by rational analysis based on previous test(s) of a similar seat installation not to exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS part 571.214, section S6.13.5.

5. *Shoulder Strap Loads:* Where upper torso straps (shoulder straps) are used for occupants, tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.

B. General Test Guidelines

1. One longitudinal test with the SID or its equivalent, undeformed floor, no yaw, with all lateral structural supports (armrests/walls).

Pass/fail injury assessments: TTI and pelvic acceleration.

2. One longitudinal test with the Hybrid II anthropomorphic test dummy (ATD), deformed floor, yaw at 10 degrees, with all lateral structural support (armrests/walls).

Pass/fail injury assessments: HIC; and upper torso restrain load, restraint system retention and pelvic acceleration.

3. Vertical (14g) test with modified Hybrid II ATDs using existing pass/fail criteria.

Issued in Renton, Washington, on May 20, 2011.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM445; Special Conditions No. 25-429-SC]

Special Conditions: Gulfstream Model GVI Airplane; Automatic Speed Protection for Design Dive Speed

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for the Gulfstream GVI airplane. This airplane will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. These design features include a high speed protection system. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: *Effective Date:* July 1, 2011.

FOR FURTHER INFORMATION CONTACT: Carl Niedermeyer, FAA, Airframe/Cabin Safety Branch, ANM-115, Transport Standards Staff, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, Washington 98057-3356; telephone (425) 227-2279; electronic mail Carl.Niedermeyer@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

On March 29, 2005, Gulfstream Aerospace Corporation (hereafter referred to as "Gulfstream") applied for an FAA type certificate for its new Gulfstream Model GVI passenger airplane. Gulfstream later applied for, and was granted, an extension of time for the type certificate, which changed the effective application date to September 28, 2006. The Gulfstream Model GVI airplane will be an all-new, two-engine jet transport airplane. The maximum takeoff weight will be 99,600 pounds, with a maximum passenger count of 19 passengers.

Type Certification Basis

Under provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Gulfstream must show that the Gulfstream Model GVI airplane (hereafter referred to as "the GVI") meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-119, 25-122, and 25-124. If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the GVI because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design features, the special conditions

would also apply to the other model under provisions of § 21.101.

In addition to complying with the applicable airworthiness regulations and special conditions, the GVI must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36. The FAA must also issue a finding of regulatory adequacy pursuant to section 611 of Public Law 92-574, the "Noise Control Act of 1972."

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Gulfstream Model GVI airplane is equipped with a high speed protection system that limits nose down pilot authority at speeds above V_C/M_C , and prevents the airplane from actually performing the maneuver required under § 25.335(b)(1). The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions are identical or nearly identical to those previously required for type certification of other airplane models.

Discussion

Gulfstream proposes to reduce the speed margin between V_C and V_D required by § 25.335(b), based on the incorporation of a high speed protection system in the GVI flight control laws. The GVI is equipped with a high speed protection system that limits nose down pilot authority at speeds above V_C/M_C and prevents the airplane from actually performing the maneuver required under § 25.335(b)(1).

Section 25.335(b)(1) is an analytical envelope condition which was originally adopted in Part 4b of the Civil Air Regulations to provide an acceptable speed margin between design cruise speed and design dive speed. Freedom from flutter and the airframe design loads are affected by the design dive speed. While the initial condition for the upset specified in the rule is 1g level flight, protection is afforded for other inadvertent overspeed conditions as well. Section 25.335(b)(1) is intended as a conservative enveloping condition for all potential overspeed conditions, including non-symmetric ones.

To establish that all potential overspeed conditions are enveloped, the applicant would demonstrate that the dive speed will not be exceeded during pilot-induced or gust-induced upsets in non-symmetric attitudes.

In addition, the high speed protection system in the GVI must have a high level of reliability.

Discussion of Comments

Notice of proposed special conditions No. 25-11-04-SC for Gulfstream GVI airplanes was published in the **Federal Register** on February 16, 2011 (76 FR 8917). One supportive comment was received.

On March 29, 2011, Advisory Circular (AC) 25-7B, *Flight Test Guide for Certification of Transport Category Airplanes*, was issued. This revision supersedes the reference to AC 25-7A, Change 1, in special condition 2 of the proposed special conditions. Therefore, the reference to AC 25-7A, Change 1, section 32, paragraphs c.(3)(i) and (iii) has been updated to AC 25-7B, section 32, paragraph c.3(a) and (c), and the title of the AC has been included. Except for the updated AC reference in special condition 2, these special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions are applicable to the Gulfstream Model GVI airplane. Should Gulfstream apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, these special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features of the GVI. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Gulfstream GVI airplanes.

1. In lieu of compliance with § 25.335(b)(1), if the flight control system includes functions that act automatically to initiate recovery before the end of the 20 second period specified in § 25.335(b)(1), V_D/M_D must be determined from the greater of the speeds resulting from conditions (a) and (b) below. The speed increase occurring in these maneuvers may be calculated if

reliable or conservative aerodynamic data are used.

(a) From an initial condition of stabilized flight at V_C/M_C , the airplane is upset so as to take up a new flight path 7.5 degrees below the initial path. Control application, up to full authority, is made to try to maintain this new flight path. Twenty seconds after initiating the upset, manual recovery is made at a load factor of 1.5 g (0.5 acceleration increment), or a greater load factor that is automatically applied by the system with the pilot's pitch control neutral. Power, as specified in § 25.175(b)(1)(iv), is assumed until recovery is initiated, at which time power reduction and the use of pilot controlled drag devices may be used.

(b) From a speed below V_C/M_C , with power to maintain stabilized level flight at this speed, the airplane is upset so as to accelerate through V_C/M_C at a flight path 15 degrees below the initial path (or at the steepest nose down attitude that the system will permit with full control authority if less than 15 degrees). The pilot's controls may be in the neutral position after reaching V_C/M_C and before recovery is initiated. Recovery may be initiated three seconds after operation of high speed warning system by application of a load factor of 1.5g (0.5 acceleration increment), or such greater load factor that is automatically applied by the system with the pilot's pitch control neutral. Power may be reduced simultaneously. All other means of decelerating the airplane, the use of which are authorized up to the highest speed reached in the maneuver, may be used. The interval between successive pilot actions must not be less than one second.

2. The applicant must also demonstrate that the speed margin, established as above, will not be exceeded in inadvertent or gust induced upsets resulting in initiation of the dive from non-symmetric attitudes, unless the airplane is protected by the flight control laws from getting into non-symmetric upset conditions. The upset maneuvers described in AC 25-7B, *Flight Test Guide for Certification of Transport Category Airplanes*, section 32, paragraphs c.3(a) and (c) may be used to comply with this requirement.

3. Any failure of the high speed protection system that would affect the speed margin determined by paragraphs 1. and 2. must be improbable (occur at a rate less than 10^{-5} per flight hour).

4. Failures of the system must be annunciated to the pilots, and flight manual instructions must be provided to reduce the maximum operating speeds, V_{MO}/M_{MO} . The operating speed

must be reduced to a value that maintains a speed margin between V_{MO}/M_{MO} and V_D/M_D that is consistent with showing compliance with § 25.335(b) without the benefit of the high speed protection system.

5. Master minimum equipment list (MMEL) relief for the high speed protection system may be considered by the FAA Flight Operations Evaluation Board (FOEB) provided that the flight manual instructions indicate reduced maximum operating speeds as described in paragraph 4., and that no additional hazards are introduced with the high speed protection system inoperative. In addition, the cockpit display of the reduced operating speeds, as well as the overspeed warning for exceeding those speeds, must be equivalent to that of the normal airplane with the high speed protection system operative.

Issued in Renton, Washington, on May 24, 2011.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM446; Special Conditions No. 25-427-SC]

Special Conditions: Gulfstream Model GVI Airplane; Electronic Flight Control System: Control Surface Position Awareness

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for the Gulfstream GVI airplane. This airplane will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. These design features include an electronic flight control system. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for these design features. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: *Effective Date:* July 1, 2011.

FOR FURTHER INFORMATION CONTACT: Joe Jacobsen, FAA, Airplane and Flightcrew

Interface Branch, ANM-111, Transport Standards Staff, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, Washington, 98057-3356; telephone (425) 227-2011; facsimile (425) 227-1320.

SUPPLEMENTARY INFORMATION:

Background

On March 29, 2005, Gulfstream Aerospace Corporation (hereafter referred to as “Gulfstream”) applied for an FAA type certificate for its new Gulfstream Model GVI passenger airplane. Gulfstream later applied for, and was granted, an extension of time for the type certificate, which changed the effective application date to September 28, 2006. The Gulfstream Model GVI airplane will be an all-new, two-engine jet transport airplane with an executive cabin interior. The maximum takeoff weight will be 99,600 pounds, with a maximum passenger count of 19 passengers.

Type Certification Basis

Under provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Gulfstream must show that the Gulfstream Model GVI airplane (hereafter referred to as “the GVI”) meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-119, 25-122, and 25-124. If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the GVI because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

In addition to complying with the applicable airworthiness regulations and special conditions, the GVI must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36. The FAA must also issue a finding of regulatory adequacy pursuant to section 611 of Public Law 92-574, the “Noise Control Act of 1972.”

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design features, the special conditions would also apply to the other model under provisions of § 21.101.

Novel or Unusual Design Features

The Gulfstream Model GVI airplane has an electronic flight control system and no direct coupling from the cockpit controller to the control surface, so the pilot may not be aware of the actual surface position utilized to fulfill the requested command. Some unusual flight conditions, such as those arising from atmospheric conditions, aircraft malfunctions, or engine failures, may result in full or near-full control surface deflection. Unless the flightcrew is made aware of excessive deflection or impending control surface limiting, piloted or auto-flight system control of the airplane might be inadvertently continued to a point that could cause a loss of aircraft control or other unsafe stability or performance characteristic. Because electronic flight control system technology has outpaced existing regulations, a special condition is proposed to ensure control surface position awareness by the flightcrew.

Discussion

This special condition requires that suitable flight control position annunciation be provided to the flightcrew when a flight condition exists in which near-full surface authority (not crew-commanded) is being utilized. The suitability of such an annunciation must take into account that some pilot-demanded maneuvers, such as a rapid roll, are necessarily associated with intended full performance, and which may saturate the control surface. Simple alerting systems which would annunciate either intended or unexpected control-limiting situations must be properly balanced between providing necessary crew awareness and avoiding undesirable nuisance warnings.

This special condition establishes a level of safety equivalent to that provided by a conventional flight control system and that contemplated in existing regulations.

Discussion of Comments

Notice of proposed special conditions No. 25-11-05-SC for Gulfstream GVI airplanes was published in the **Federal Register** on February 17, 2011 (76 FR 9265). One supportive comment was received and these special conditions are adopted as proposed.

Applicability

As discussed above, this special condition is applicable to the Gulfstream Model GVI airplane. Should Gulfstream apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, this