

and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36. The FAA must issue a finding of regulatory adequacy under 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, under § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Airbus Model A350-900 airplane will incorporate the following novel or unusual design features: side-stick controllers for pitch and roll control, in place of conventional wheel and column controls.

Discussion

Current FAA regulations do not specifically address the use of side-stick controllers for pitch and roll control. The unique features of the side stick must therefore be demonstrated through flight and simulator tests to have suitable handling and control characteristics when considering the following:

1. The handling-qualities tasks and requirements of the A350 Special Conditions and other 14 CFR part 25 requirements for stability, control, and maneuverability, including the effects of turbulence.

2. General ergonomics: Armrest comfort and support, local freedom of movement, displacement angle suitability, and axis harmony.

3. Inadvertent input in turbulence.

4. Inadvertent pitch-roll crosstalk.

The Handling Qualities Rating Method (HQR) of Appendix 5 of the Flight Test Guide, AC 25-7C, may be used to show compliance.

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.

Discussion of Comments

Notice of proposed special conditions no. 25-13-26-SC for Airbus Model A350-900 airplanes was published in the **Federal Register** on November 8, 2013 (78 FR 67077). No comments were received, and the special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions apply to Airbus Model A350-900 airplanes. Should Airbus apply later for a change to the type certificate to include another model incorporating the same novel or unusual

design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on Airbus Model A350-900 airplanes. 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 Airbus Model A350-900 airplanes.

Side-Stick Controllers

1. Pilot strength: In lieu of the "strength of pilots" limits shown in § 25.143(c) for pitch and roll, and in lieu of the specific pitch-force requirement of §§ 25.145(b) and 25.175(d), it must be shown that the temporary and maximum prolonged force levels for the side-stick controllers are suitable for all expected operating conditions and configurations, whether normal or non-normal.

2. Pilot-control authority: The electronic side-stick-controller coupling design must provide for corrective and/or overriding control inputs by either pilot with no unsafe characteristics. Annunciation of the controller status must be provided, and must not be confusing to the flightcrew.

3. Pilot control: It must be shown by flight tests that the use of side-stick controllers does not produce unsuitable pilot-in-the-loop control characteristics when considering precision path control/tasks and turbulence. In addition, pitch and roll control force and displacement sensitivity must be compatible, so that normal inputs on one control axis will not cause significant unintentional inputs on the other.

Issued in Renton, Washington, on July 15, 2014.

John P. Piccola, Jr.,

Acting Manager, Transport Airplane Directorate, Aircraft Certification Service.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2013-0905; Special Conditions No. 25-531-SC]

Special Conditions: Airbus Model A350-900 Airplane; Flight-Envelope Protection, Normal Load-Factor (G) Limiting

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for Airbus Model A350-900 airplanes. These airplanes will have a novel or unusual design feature associated with a flight-control system that prevents the pilot from inadvertently or intentionally exceeding the positive or negative airplane limit load factor. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. 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:* September 8, 2014.

FOR FURTHER INFORMATION CONTACT: Joe Jacobsen, FAA, Airplane and Flightcrew Interface Branch, ANM-111, 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 August 25, 2008, Airbus applied for a type certificate for their new Model A350-900 airplane. Later, Airbus requested, and the FAA approved, an extension to the application for FAA type certification to November 15, 2009. The Model A350-900 airplane has a conventional layout with twin wing-mounted Rolls-Royce Trent XWB engines. It features a twin-aisle, 9-abreast, economy-class layout, and accommodates side-by-side placement of LD-3 containers in the cargo compartment. The basic Model A350-900 airplane configuration accommodates 315 passengers in a standard two-class arrangement. The design cruise speed is Mach 0.85 with a maximum take-off weight of 602,000 lbs.

The normal load-factor limit on Airbus Model A350-900 airplanes is

unique in that traditional airplanes with conventional flight-control systems (mechanical linkages) are limited in the pitch axis only by the elevator surface area and deflection limit. The elevator-control power is normally derived for adequate controllability and maneuverability at the most critical longitudinal pitching moment. The result is that traditional airplanes have a significant portion of the flight envelope wherein maneuverability in excess of limit structural-design values is possible.

Title 14, Code of Federal Regulations (14 CFR) part 25 does not specify requirements or policy for demonstrating maneuver controls that impose any handling-qualities requirements beyond the design limit structural loads. Nevertheless, some pilots have become accustomed to the availability of this excess maneuver capacity in case of extreme emergency, such as upset recoveries or collision avoidance.

These special conditions are needed to ensure adequate maneuverability and controllability for the Model A350-900 airplane using the Airbus flight-control system.

Type Certification Basis

Under 14 CFR 21.17, Airbus must show that the Model A350-900 airplane meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-129.

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 Model A350-900 airplane because of a novel or unusual design feature, special conditions are prescribed under § 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 or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and final special conditions, the Model A350-900 airplane 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 issue a finding of regulatory adequacy under 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, under § 11.38,

and they become part of the type-certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The Airbus Model A350-900 airplane will incorporate the following novel or unusual design features: An electronic flight-control system (EFCS), that when operating in its normal mode, will prevent airplane pitch attitudes greater than +30 degrees and less than -15 degrees, and roll angles greater than plus or minus 67 degrees. In addition, positive spiral stability is introduced for roll angles greater than 33 degrees at speeds below V_{MO}/M_{MO} . At speeds greater than V_{MO} and up to V_{DF} , maximum aileron-control force is limited to only 45 degrees maximum bank angle.

Discussion

Flight-envelope protection that limits normal load-factor (g) limiting is considered novel and unusual because the current regulations do not provide standards for maneuverability and controllability evaluations for such systems. Special conditions are needed to ensure adequate maneuverability and controllability when using this design feature.

As with previous fly-by-wire airplanes, the FAA has no regulatory or safety reason to inhibit the design concept of the Airbus A350 flight-control system with load-factor limiting. Pilots accustomed to this control feature may feel more freedom in commanding full stick-displacement maneuvers because of the following:

- Knowledge that the limit system will protect the structure,
- Low stick-force/displacement gradients, and
- Smooth transition from pilot elevator control to limit control.

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.

Discussion of Comments

Notice of proposed special conditions no. 25-13-28-SC for Airbus Model A350-900 airplanes was published in the **Federal Register** on December 17, 2013 (78 FR 76249). No comments were received, and the special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions apply to Airbus Model A350-900 airplanes. Should Airbus apply later for a change to the type certificate to include another model

incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on the Airbus Model A350-900 airplanes. 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, to meet the intent of adequate maneuverability and controllability required by § 25.143(a), and in the absence of other limiting factors, the following special conditions are issued as part of the type-certification basis for Airbus Model A350-900 airplanes.

(1) The positive limiting load factor must not be less than:

(a) 2.5g for the EFCS normal state with the high-lift devices retracted up to V_{MO}/M_{MO} . The positive limiting load factor may be gradually reduced down to 2.25g above V_{MO}/M_{MO} .

(b) 2.0g for the EFCS normal state with the high-lift devices extended.

(2) The negative limiting load factor must be equal to or more negative than:

(a) Minus 1.0g for the EFCS normal state with the high-lift devices retracted.

(b) 0.0g for the EFCS normal state with high-lift devices extended.

(3) Maximum reachable positive load-factor wings level may be limited by flight-control system characteristics or flight-envelope protections (other than load-factor protection) provided that:

(a) The required values are readily achievable in turns, and

(b) wings-level pitch-up responsiveness is satisfactory.

(4) Maximum achievable negative load factor may be limited by flight-control system characteristics or flight-envelope protections (other than load-factor protection) provided that:

(a) Pitch-down responsiveness is satisfactory

(b) from level flight, 0g is readily achievable or alternatively, a satisfactory trajectory change is readily achievable at operational speeds (from V_{LS} to maximum speed—10 knots). V_{LS} is the lowest speed at which the crew may fly with auto-thrust or auto-pilot engaged. It is displayed on primary flight displays as the top of the low-

speed amber band, and is the lower end of the normal flight envelope. The formula (maximum speed—10 knots) is to cover typical margin from V_{MO}/M_{MO} to cruise speeds, and typical margin from V_{FE} to standard speed in high lift configurations.

Note: For the FAA to consider a trajectory change as satisfactory, the applicant should propose and justify a pitch rate that provides sufficient maneuvering capability in the most critical scenarios. Compliance demonstration with the above requirements may be performed without ice accretion on the airframe.

Issued in Renton, Washington, on July 15, 2014.

John P. Piccola, Jr.,

Acting Manager, Transport Airplane Directorate, Aircraft Certification Service.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2014-0303; Special Conditions No. 25-561-SC]

Special Conditions: Airbus Model A350-900 Airplane; Operation Without Normal Electrical Power

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special condition; request for comments.

SUMMARY: These special conditions are issued for the Airbus Model A350-900 airplane. This airplane will have a novel or unusual design feature associated with operation without normal electrical power. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. 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: The effective date of these special conditions is August 7, 2014. We must receive your comments by September 22, 2014.

ADDRESSES: Send comments identified by docket number FAA-2014-0303 using any of the following methods:

- *Federal eRegulations Portal:* Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.

Mail: Send comments to Docket Operations, M-30, U.S. Department of

Transportation (DOT), 1200 New Jersey Avenue SE., Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.

Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

Fax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

FOR FURTHER INFORMATION CONTACT: Nazih Khaouly, FAA, Airframe and Flightcrew Interface Branch, ANM-111, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057-3356; telephone (425) 227-2432; facsimile (425) 227-1320.

SUPPLEMENTARY INFORMATION: The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions is impracticable because these procedures would significantly delay issuance of the design approval and thus delivery of the affected aircraft. In addition, the substance of these special conditions has been subject to the public-comment process in several prior instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon publication in the **Federal Register**.

Comments Invited

We invite interested people to take part in this rulemaking by sending

written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On August 25, 2008, Airbus applied for a type certificate for their new Model A350-900 airplane. Later, Airbus requested, and the FAA approved, an extension to the application for FAA type certification to November 15, 2009. The Model A350-900 airplane has a conventional layout with twin wing-mounted Rolls-Royce Trent XWB engines. It features a twin-aisle, 9-abreast, economy-class layout, and accommodates side-by-side placement of LD-3 containers in the cargo compartment. The basic Airbus Model A350-900 airplane configuration will accommodate 315 passengers in a standard two-class arrangement. The design cruise speed is Mach 0.85 with a maximum take-off weight of 602,000 lbs.

The Airbus Model A350-900 airplane fly-by-wire control system requires a continuous source of electrical power to maintain an operable flight-control system. The current rule, Title 14, Code of Federal Regulations (14 CFR) 25.1351(d), Amendment 25-72, requires safe operation under visual flight rules (VFR) conditions for at least five minutes after loss of all normal electrical power. This rule was structured around a traditional design utilizing mechanical control cables for flight control while the crew took time to sort out the electrical failure, start engine(s) if necessary, and re-establish some of the electrical-power-generation capability.

To maintain the same level of safety associated with traditional designs, Airbus Model A350-900 airplanes must be designed for operation with the normal sources of engine- or Auxiliary Power Unit (APU)-generated electrical power inoperative. Service experience has shown that loss of all electrical power from the airplane's engine and APU-driven generators is not extremely improbable. Therefore, it must be shown that the airplane is capable of recovering adequate primary electrical-power generation for safe flight and landing with the use of its emergency electrical-power systems. These emergency electrical-power systems must be able to