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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2021-1035; Special Conditions No. 25-819-SC]

Special Conditions: Airbus Model A321neo XLR Airplane; Side-Stick Controller – Controllability and Maneuverability

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Airbus Model A321neo XLR airplanes. The airplane will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is side-stick controllers for pitch and roll control. 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: This action is effective on Airbus on [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Send comments on or before [INSERT DATE 45 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Send comments identified by Docket No. FAA-2021-1035 using any of the following methods:

- *Federal eRegulations Portal:* Go to <https://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: Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in title 14, Code of Federal Regulations (14 CFR) 11.35, the FAA will post all comments received without change to <https://www.regulations.gov/>, including any personal information you provide. The FAA will also post a report summarizing each substantive verbal contact received about these special conditions.

Confidential Business Information: Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to these special conditions contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to these special conditions, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and the indicated comments will not be placed in the public docket of these special conditions. Send submissions containing CBI to Troy Brown, Performance and Environment Unit, AIR-621A, Technical Policy Branch, Policy and Standards Division, Aircraft Certification Service, Federal Aviation Administration, 1801 S. Airport Rd., Wichita, KS 67209-2190; telephone and fax 405-666-1050;

e-mail troy.a.brown@faa.gov. Comments the FAA receives, which are not specifically designated as CBI, will be placed in the public docket for these special conditions.

Docket: Background documents or comments received may be read at <https://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go 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.

FOR FURTHER INFORMATION CONTACT: Troy Brown, Performance and Environment Unit, AIR-621A, Technical Policy Branch, Policy and Standards Division, Aircraft Certification Service, Federal Aviation Administration, 1801 S. Airport Rd., Wichita, KS 67209-2190; telephone and fax 405-666-1050; e-mail troy.a.brown@faa.gov.

SUPPLEMENTARY INFORMATION:

The substance of these special conditions has been published in the *Federal Register* for public comment in several prior instances with no substantive comments received. Therefore, the FAA finds, pursuant to § 11.38(b), that new comments are unlikely, and notice and comment prior to this publication are unnecessary.

Comments Invited

The FAA invites 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.

The FAA will consider all comments received by the closing date for comments. The FAA may change these special conditions based on the comments received.

Background

On September 16, 2019, Airbus applied for an amendment to Type Certificate No. A28NM to include the new Model A321neo XLR airplanes, which include the Model

A321-271NY and -253NY airplanes. These airplanes are twin-engine, transport-category airplanes with seating for 244 passengers and a maximum takeoff weight of 222,000 pounds.

Type Certification Basis

Under the provisions of 14 CFR 21.101, Airbus must show that the Model A321neo XLR airplanes meet the applicable provisions of the regulations listed in Type Certificate No. A28NM, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations (e.g., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Airbus Model A321neo XLR airplanes 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 feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Airbus Model A321neo XLR airplanes 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 issues special conditions, as defined in § 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.101.

Novel or Unusual Design Features

The Airbus Model A321neo XLR airplanes will incorporate the following novel or unusual design feature: Side-stick controllers for pitch and roll control.

Discussion

These proposed special conditions for the Airbus A321neo XLR airplane address the novel features of the side-stick controllers. The A321neo XLR will incorporate side-stick controllers controlling a fly-by-wire (FBW) electronic flight control system (EFCS). This system provides an electronic interface between the pilot's flight controls and the flight control surfaces for both normal and failure states, and it generates the actual surface commands that provide for stability augmentation and control about all three airplane axes. In addition, pilot control authority may be uncertain, because the side-stick controllers are not mechanically interconnected as with conventional wheel and column controls.

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 Airbus Model A321neo XLR airplane 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 FAA Handling Qualities Rating Method (HQRМ) of Appendix E of the *Flight Test Guide for Certification of Transport Category Airplanes*, AC 25-7D, may be, but is not required to 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.

Applicability

As discussed above, these special conditions apply to Airbus Model A321neo XLR 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 one model series of airplanes. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

Authority Citation

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(f), 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 A321neo XLR airplanes.

- (a) Pilot Strength. In lieu of the “strength of pilots” limits of § 25.143(d) for pitch and roll, and in lieu of the specific pitch force requirements of §§ 25.145(b) and 25.175(d), the following applies:

The applicant must show 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.

- (b) Controller Coupling. 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 controller status must be provided and must not be confusing to the flightcrew.

- (c) Pilot control. The applicant must show 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 sensitivity 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 Kansas City, Missouri, on July 17, 2023.

Patrick R. Mullen,
Manager, Technical Policy Branch,
Policy and Standards Division,
Aircraft Certification Service.

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