DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2021-0891; Special Condition No. 25-825-SC]

Special Conditions: Airbus Model A321neoXLR Airplane; Passenger Protection from External Fire

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for the Airbus Model A321neoXLR airplane. This airplane will have a novel or unusual design feature when compared to the technology envisaged by the airworthiness standards for transport category airplanes. This design feature is an integral rear center tank (RCT). 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 [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

FOR FURTHER INFORMATION CONTACT: Shannon Lennon, Human Machine Interface, AIR-626, Technical Innovation Policy Branch, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 2200 South 216th Street, Des Moines, Washington 98198; telephone and fax 206-231-3209; e-mail shannon.lennon@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

On September 16, 2019, Airbus applied for an amendment to Type Certificate No. A28NM to include the new Model A321neoXLR airplane. The Model A321neoXLR airplane, which is a derivative of the Model A321neoACF airplane currently approved under

Type Certificate No. A28NM, is a twin-engine transport category aircraft that seats 244 passengers and has a maximum takeoff weight of 202,000 lbs.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.101, Airbus must show that the Model A321neoXLR airplane meets 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 A321neoXLR airplane 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 A321neoXLR 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 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 § 21.101.

Novel or Unusual Design Feature

The Airbus Model A321neoXLR airplane will incorporate the following novel or unusual design feature:

An integral RCT.

Discussion

The Airbus Model A321neoXLR incorporates an integral RCT. This tank is a "center" fuel tank, in that it is located in the airplane fuselage rather than in its wings. The tank is a "rear" tank, in that it is located aft of the wheel bay; it will be in an area of the lower fuselage that partially replaces the aft cargo compartment of the airplane from which this model is derived. The top of the tank will be directly below the floor of the passenger cabin. The fuel tank will be "integral" to the airplane, in that its walls will be part of the airplane structure. The exterior skin of the airplane fuselage will constitute part of the walls of the fuel tank, and these areas will lack the thermal/acoustic insulation that usually lines the exterior skin of an airplane fuselage.

This design was not envisaged by the FAA's regulatory requirements for insulation installations on transport category airplanes. 14 CFR 25.856(b) requires all thermal/acoustic insulation in the lower half of the airplane fuselage and their installation to comply with the flame penetration resistance test of appendix F, part VII. The FAA adopted § 25.856(b) to raise the level of post-crash fire safety on transport category airplanes. Part VII of appendix F to part 25 requires a stringent test method for all thermal/acoustic insulation proposed for installation in the lower half of the fuselage. The FAA's intent in imposing this requirement was to ensure that this insulation provides an additional barrier between the occupants and an external post-crash fire, especially a fire resulting from a pool of spilled aviation fuel.[1] This barrier extends the time available for evacuation.

While the rule applies to the thermal/acoustic insulation that an applicant proposes as part of their design, it does not require applicants to install such insulation. Since the fuselage skins of the lower half of transport category airplanes are generally insulated, and were at the time these standards were developed, the FAA considered this approach to be sufficient to ensure safety. The rule also noted, however, that if applicants began to propose designs that omitted this

[1] See pg. 2 of FAA Advisory Circular 25.856-2A, *Installation of Thermal/Acoustic Insulation for Burnthrough Protection*.

thermal/acoustic insulation, the FAA would revisit the need for a specific fuselage burnthrough standard.[2]

Thus, since this design will lack thermal/acoustic insulation under the fuselage skin in the area of the fuel tank, current FAA regulations do not ensure that it will provide a continuous flame penetration (burnthrough) resistant barrier between the passengers and an external fire, nor that it will provide enough protection, against an external post-crash fire, to allow time for passengers to evacuate.

According to Airbus, its design does not allow for compliant thermal/acoustic insulation to be placed beneath the cabin floor. This large volume of unheated liquid (fuel), directly below the floor of the passenger cabin, would, without mitigation, create a 'cold feet' effect for the passengers above it. Therefore, Airbus will install insulation panels between the fuel tank and the cabin floor, for comfort reasons. These insulation panels would normally be required to meet § 25.856(b). However, Airbus states that it is technically not feasible to install thermal/acoustic insulation that complies with § 25.856(b), due to the lack of space in this area and the need to keep nearby decompression panels free of blockages and ensure adequate ventilation.

Special conditions are needed to address the assumption in the FAA's current flammability standards that proposed airplane designs would include thermal/acoustic insulation in the lower fuselage, and to ensure that this proposed design does not reduce the time available for passenger evacuation in the case of a post-crash external fire. Specifically, the FAA will require that the lower half of the airplane fuselage, spanning the longitudinal area of the tank, be resistant to fire penetration. "Resistant to fire penetration" will, for this special condition, mean that this area provides fire penetration resistance equivalent to the resistance which would be provided if the fuselage were lined with thermal/acoustic insulation that meets the flame penetration resistance test requirements of part VII of appendix F of part 25. The applicant's

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[2] *Improved Flammability Standards for Thermal/Acoustic Insulation Materials Used In Transport Category Airplanes*, 68 FR 45046, 45049 (Jul. 31, 2003).

method of compliance may, but is not required to, be based upon any inherent flame penetration resistance capability provided by the construction of the fuel tank and/or other surrounding 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.

Discussion of Comments

The FAA issued Notice of Proposed Special Conditions No. 25-21-04-SC for the Model A321neoXLR airplane, which was published in the *Federal Register* on April 6, 2022 (87 FR 19811). The FAA received four comments from the Boeing Company (Boeing).

Comment Summary: Boeing requested that the discussion section of these special conditions describe the RCT as an "auxiliary," rather than "center," fuel tank because the airplane also has a "center" wing (main) tank, and because, as described by Advisory Circular (AC) 25-8, *Auxiliary Fuel Systems Installations*, the RCT would be connected to the main tank with a fuel feed line. Boeing also requested that the discussion section describe the tank as an "aft" fuel tank rather than a "rear" tank, because it will be aft of the wheel bay.

FAA Response: No change to the terms used to describe the RCT in these special conditions is necessary. The existing terms are accurate, consistent with the applicant's nomenclature, and adequate for their purpose.

Comment Summary: Boeing requested that the discussion section of these special conditions acknowledge that AC 25.856-2A[3] provides guidance for center wing tank designs. Boeing further requested that the discussion, according to guidance provided in that AC for the wing box area, also indicate that insulation panels installed above a fuel tank are not required to meet § 25.856(b).

[3] See pg. 2 of FAA Advisory Circular 25.856-2A, *Installation of Thermal/Acoustic Insulation for Burnthrough Protection*.

FAA Response: The discussion for these special conditions acknowledges that § 25.856(b) does not adequately address designs like the RCT of the A321neoXLR. This aircraft presents a novel fuselage design that does not incorporate thermal/acoustic insulation in areas where the RCT is integral to the fuselage, nor does it include thermal/acoustic insulation above the RCT that will meet § 25.856(b). This design presents a fire penetration resistance (burnthrough) vulnerability that is addressed by these special conditions. The same vulnerability does not exist with transport airplane wing box construction due to that structure's significant mass, and large surface area that dissipates heat. Therefore, adding insulation over the wingbox, would not contribute to its fire penetration resistance. 14 CFR 25.856(b) excepts the installation of insulation in locations where it would not contribute to fire penetration resistance. However, the wing box example in AC 25.856-2A only addresses the FAA's assessment of the wing box area in consideration of thermal/acoustic insulation installations that would not contribute to fire penetration resistance. It does not suggest that all center fuel tanks do not necessitate the installation of thermal/acoustic insulation that meets § 25.856(b). For this reason, the FAA declines to change the discussion section of these special conditions.

Comment Summary: Boeing requested that the special conditions require the RCT fire penetration resistance capability to either be equivalent to the capability provided by the wing box area or meet the requirements of 14 CFR 25.963(e)(2). Boeing's rationale was that the FAA's proposed standard of fire penetration resistance equivalent to that of a fuselage lined with thermal/acoustic insulation that meets the flame penetration resistance test requirements of part VII of appendix F, does not address hazards associated with fuel tanks and is not applicable to the wing box area.

FAA Response: These special conditions are intended to ensure that the existing RCT area fuselage design establishes the same level of safety as would 14 CFR 25.856(b). When thermal/acoustic insulation is installed, either along the fuselage skin or under the passenger cabin floor, it should be fire penetration resistant and delay the onset of fire into the passenger

cabin. These special conditions are not intended to ensure the RCT is constructed to provide a fire penetration resistance capability that is similar to that of the wing box area. It is also unnecessary to require that the RCT meet rules such as 14 CFR 25.963(e)(2), which provides standards for fuel tank access covers.

The special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions are applicable to the Airbus Model A321neoXLR airplane. Should Airbus apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only a certain novel or unusual design feature on one model of airplane. 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 A321neoXLR airplanes.

Passenger Protection from External Fire

The lower half of the fuselage, spanning the longitudinal location of the rear center fuel tank, must be resistant to fire penetration.

Issued in Kansas City, Missouri, on November 30, 2022.

Patrick R. Mullen,
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