



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2018-0471; Special Conditions No. 25-728-SC]

Special Conditions: Textron Aviation Inc. Model 700 Series Airplanes; Installed Rechargeable Lithium Batteries

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Textron Aviation Inc. (Textron) Model 700 series airplanes. These airplanes 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 the installation of rechargeable lithium batteries.

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 Textron Aviation Inc. 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-2018-0471 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 website, 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).

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 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.

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SUPPLEMENTARY INFORMATION:

The substance of these special conditions previously has been published in the Federal Register for public comment. These special conditions have been derived without substantive change from those previously issued. It is unlikely that prior public comment would result in a significant change from the substance contained herein. Therefore, the FAA has determined that prior public notice and comment are unnecessary, and finds that, for the same reason, good cause exists for adopting these special conditions 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 November 20, 2014, Textron applied for a type certificate for their new Model 700 series airplanes. The Textron Model 700 series airplanes are transport-category, twin turbofan-powered airplanes with standard seating provisions for up to 12 passengers and 2 crewmembers, and a maximum takeoff weight of 38,514 lbs.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.17, Textron must show that the Model 700 series airplanes meet the applicable provisions of part 25 as amended by amendments 25-1 through 25-139, 25-141, and 25-143.

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 Textron Model 700 series 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, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Textron Model 700 series 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 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 Textron Model 700 series airplanes will incorporate the following novel or unusual design features:

The installation of rechargeable lithium batteries. Known uses of rechargeable and non-rechargeable lithium batteries on airplanes include:

- Flightdeck and avionics systems such as displays, global positioning systems, cockpit voice recorders, flight data recorders, underwater-locator-beacons, navigation computers, integrated avionics computers, satellite network/communication systems, communication management units, and remote monitor electronic line replaceable units;
- Cabin safety, entertainment and communications equipment including emergency locator transmitters, life rafts, escape slides, seat belt air bags, cabin management systems, Ethernet switches, routers and media servers, wireless systems, internet/in-flight entertainment systems, satellite televisions, remotes and handsets; and
- Systems in cargo areas including door controls, sensors, video surveillance equipment and security systems.

Discussion

Rechargeable lithium batteries are considered to be a novel or unusual design feature in transport category airplanes, with respect to the requirements in § 25.1353. This type of battery has certain failure, operational, and maintenance characteristics that differ significantly from those of the nickel-cadmium and lead-acid rechargeable batteries currently approved for installation on transport category airplanes. These batteries introduce higher energy levels into airplane systems through new chemical compositions in various battery-cell sizes and construction. Interconnection of these cells in battery packs introduces failure modes that require unique design considerations, such as provisions for thermal management.

Special Condition 1 requires that each individual cell within a battery be designed to maintain safe temperatures and pressures. Special Condition 2 addresses these same issues but for the entire battery. Special Condition 2 requires that the battery be designed to prevent propagation of a thermal event, such as self-sustained, uncontrolled increases in temperature or pressure from one cell to adjacent cells.

Special Conditions 1 and 2 are intended to ensure that the cells and battery are designed to eliminate the potential for uncontrollable failures. However, a certain number of failures will occur due to various factors beyond the control of the designer. Therefore, other special conditions are intended to protect the airplane and its occupants if failure occurs.

Special Conditions 3, 7, and 8 are self-explanatory, and the FAA does not provide further explanation for them at this time.

Special Condition 4 clarifies that the flammable-fluid fire-protection requirements of § 25.863 apply to rechargeable lithium battery installations. Section 25.863 is applicable to areas of the airplane that could be exposed to flammable fluid leakage from airplane systems. Rechargeable lithium batteries contain electrolyte that is a flammable fluid.

Special Condition 5 requires each rechargeable lithium battery installation to not damage surrounding structure or adjacent systems, equipment, or electrical wiring from corrosive fluids or gases that may escape in such a way as to cause a major or more severe failure condition. Special Condition 6 requires each rechargeable lithium battery installation to have provisions to prevent any hazardous effect on airplane structure or systems caused by the maximum amount of heat it can generate due to any failure of it or

its individual cells. The means of meeting special conditions 5 and 6 may be the same, but they are independent requirements addressing different hazards. Special Condition 5 addresses corrosive fluids and gases, whereas special condition 6 addresses heat.

Special Condition 9 requires rechargeable lithium batteries to have “automatic” means, for charge rate and disconnect, due to the fast acting nature of lithium battery chemical reactions. Manual intervention would not be timely or effective in mitigating the hazards associated with these batteries.

These special conditions will apply to all rechargeable lithium battery installations in lieu of § 25.1353(b)(1) through (b)(4) at Amendment 25-123. Section 25.1353(b)(1) through (b)(4) at Amendment 25-123 will remain in effect for other battery installations.

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 are applicable to the Textron Model 700 series airplane. Should Textron 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 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 Textron Aviation Inc. Model 700 series airplane:

In lieu of § 25.1353(b)(1) through (b)(4) at Amendment 25-123, each rechargeable lithium battery installation must:

1. Be designed to maintain safe cell temperatures and pressures under all foreseeable operating conditions to prevent fire and explosion.
2. Be designed to prevent the occurrence of self-sustaining, uncontrollable increases in temperature or pressure, and automatically control the charge rate of each cell to protect against adverse operating conditions, such as cell imbalance, back charging, overcharging and overheating.
3. Not emit explosive or toxic gases, either in normal operation or as a result of its failure, that may accumulate in hazardous quantities within the airplane.
4. Meet the requirements of § 25.863.
5. Not damage surrounding structure or adjacent systems, equipment, or electrical wiring from corrosive fluids or gases that may escape in such a way as to cause a major or more-severe failure condition.

6. Have provisions to prevent any hazardous effect on airplane structure or systems caused by the maximum amount of heat it can generate due to any failure of it or its individual cells.
7. Have a failure sensing and warning system to alert the flight crew if its failure affects safe operation of the airplane.
8. Have a monitoring and warning feature that alerts the flightcrew when its charge state falls below acceptable levels if its function is required for safe operation of the airplane.
9. Have a means to automatically disconnect from its charging source in the event of an over-temperature condition, cell failure or battery failure.

Issued in Des Moines, Washington, on May 23, 2018.

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Policy and Innovation Division
Aircraft Certification Service
[FR Doc. 2018-11455 Filed: 5/31/2018 8:45 am; Publication Date: 6/1/2018]