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## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No. FAA-2013-0858; Special Conditions No. 25-518-SC]

#### Special Conditions: Bombardier Inc., Models BD-500-1A10 and BD-500-1A11 Series Airplanes; Fuselage Post-Crash Fire Survivability

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for the Bombardier Inc. Models BD-500-1A10 and BD-500-1A11 series airplanes. These airplanes will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. These features are associated with an aluminum-lithium fuselage construction that may provide different levels of protection from post-crash fire threats than similar aircraft constructed from traditional aluminum structure. 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:* March 21, 2014.

**FOR FURTHER INFORMATION CONTACT:** Alan Sinclair, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98057-3356; telephone (425) 227-2195; facsimile (425) 227-1232.

**SUPPLEMENTARY INFORMATION:**

#### Background

On December 10, 2009, Bombardier Inc. applied for a type certificate for their new Models BD-500-1A10 and BD-500-1A11 series airplanes (hereafter collectively referred to as "C-series"). The C-series airplanes are swept-wing monoplanes with an aluminum alloy fuselage sized for 5-abreast seating. Passenger capacity is designated as 110 for the Model BD-500-1A10 and 125 for the Model BD-500-1A11. Maximum takeoff weight is 131,000 pounds for the Model BD-500-1A10 and 144,000 pounds for the Model BD-500-1A11.

The fuselage of the Bombardier C-series airplanes will be fabricated using aluminum-lithium construction. Structures fabricated from aluminum-lithium may provide different levels of protection from post-crash fuel-fed fire threats than similar aircraft with traditional aluminum structure.

There are no existing regulations that adequately ensure that aluminum-lithium structure offers passengers the same protection from a post-crash fire condition as would a conventional aluminum structure. These special conditions are necessary to ensure that the Bombardier C-series airplanes provide a level of safety equivalent to that provided by Title 14, Code of Federal Regulations (14 CFR) part 25.

#### Type Certification Basis

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Bombardier Inc. must show that the C-series airplanes meet the applicable provisions of part 25, as amended by Amendment 25-1 through 25-129 thereto.

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 C-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, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special

conditions, the C-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; and the FAA must issue a finding of regulatory adequacy under § 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 Bombardier C-series airplanes will incorporate the following novel or unusual design features: The fuselage will be fabricated using aluminum-lithium materials instead of conventional aluminum.

The performance of airplanes consisting of a conventional aluminum fuselage is understood based on service history and extensive intermediate and large-scale fire testing. The new aluminum-lithium materials must provide the same levels of protection against post-crash fuel-fed fire threats.

#### Discussion

The certification basis for the Bombardier C-series airplanes includes meeting the burn through requirements defined in § 25.856(b). The Bombardier C-series airplanes are introducing a new material from what has traditionally been shown to be survivable from a toxic standpoint. Toxicity levels from post-crash fire threats are typically more severe than threats generated from an in-flight fire with regards to the quantity level of toxins produced by off-gases from burning materials. Therefore, it is necessary to ensure that the material being used does not introduce a new hazard that would reduce the survivability of the passengers during a post-crash situation, or produce levels of toxic fumes that would be lethal or incapacitating, thus preventing evacuation of the aircraft in a crash scenario.

Bombardier Inc. will have to demonstrate that aluminum-lithium material does not produce levels of toxic fumes that will reduce the survivability of the passengers or their ability to evacuate when compared to typically constructed aluminum airplanes.

A way of showing acceptable capability is to conduct a laboratory-scale test to assess the survivability

characteristics of this non-traditional fuselage material. If negligible amounts of combustion products are produced in this test, the material can be considered acceptable with respect to post crash survivability. A test method developed by the FAA's William J. Hughes Technical Center should be used (Ref. DOT/FAA/AR-TN07/15 dated August 2008).

Related regulations, including §§ 25.853 and 25.856(a), remain valid for this airplane, but they do not reflect the potential threat generated from toxic levels of gases produced from aluminum-lithium materials.

#### Discussion of Comments

Notice of proposed special conditions No. 25-13-08-SC for the Bombardier C-series airplanes was published in the **Federal Register** on October 31, 2013 (78 FR 65233). No comments were received, and the special conditions are adopted as proposed.

#### Applicability

As discussed above, these special conditions are applicable to the Models BD-500-1A10 and BD-500-1A11 series airplanes. Should Bombardier Inc. apply at a later date for a change to the type certificate to include another model on the same type certificate 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 two 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.

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 Bombardier Inc. Models BD-500-1A10 and BD-500-1A11 (C-series) airplanes.

*Fuselage Post-Crash Fire Survivability.* The Bombardier C-series airplanes must show that any toxic levels of gases produced from the aluminum-lithium material are in no way an additional threat to the passengers and their ability to evacuate when compared to a typically

constructed aluminum airplane exposed to a post-crash fuel-fed fire.

Issued in Renton, Washington, on January 22, 2014.

**Jeffrey E. Duven,**

*Manager, Transport Airplane Directorate, Aircraft Certification Service.*

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## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No. FAA-2013-0819; Special Conditions No. 25-519-SC]

#### Special Conditions: Bombardier Inc., Models BD-500-1A10 and BD-500-1A11 Series Airplanes; Fuselage In-Flight Fire Safety and Flammability Resistance

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for the Bombardier Inc. Models BD-500-1A10 and BD-500-1A11 series airplanes. These airplanes will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. These features are associated with the materials used to fabricate the fuselage, which may affect fire propagation during an in-flight fire. 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:* March 21, 2014.

**FOR FURTHER INFORMATION CONTACT:** Alan Sinclair, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98057-3356; telephone 425-227-2195; facsimile 425-227-1232.

#### SUPPLEMENTARY INFORMATION:

##### Background

On December 10, 2009, Bombardier Inc. applied for a type certificate for their new Models BD-500-1A10 and BD-500-1A1 series airplanes (hereafter collectively referred to as "C-series"). The C-series airplanes are swept-wing

monoplanes with an aluminum alloy fuselage sized for 5-abreast seating. Passenger capacity is designated as 110 for the Model BD-500-1A10 and 125 for the Model BD-500-1A11. Maximum takeoff weight is 131,000 pounds for the Model BD-500-1A10 and 144,000 pounds for the Model BD-500-1A11.

The Bombardier C-series airplanes will be fabricated using aluminum-lithium materials. The performance of airplanes consisting of a conventional aluminum fuselage in an inaccessible in-flight fire scenario is understood based on service history and extensive intermediate and large-scale fire testing. The fuselage itself does not contribute to in-flight fire propagation. This may not be the case for an all-aluminum-lithium fuselage. Experience has shown that eliminating the fire propagation of the interior materials and insulation materials tends to increase survivability since other aspects of in-flight fire safety (e.g., toxic gas emission and smoke obscuration) are typically by-products of the propagating fire. The Bombardier C-series airplanes must provide protection against an in-flight fire propagating along the surface of the fuselage.

#### Type Certification Basis

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Bombardier Inc. must show that the C-series airplanes meet the applicable provisions of part 25, as amended by Amendment 25-1 through 25-129 thereto.

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 C-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, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the C-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; and the FAA must issue a finding of regulatory adequacy under § 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