

# Proposed Rules

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This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

[Docket No. NM462; Notice No. 25-11-15-SC]

#### Special Conditions; Cessna Aircraft Company Model M680 Airplane; Lithium-ion Battery Installations

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

**ACTION:** Notice of proposed special conditions.

**SUMMARY:** This action proposes special conditions for the Cessna Aircraft Company Model 680 airplane. This airplane will have a novel or unusual design feature associated with Lithium-ion batteries. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These proposed 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:** We must receive your comments by August 12, 2011.

**ADDRESSES:** You must mail two copies of your comments to: Federal Aviation Administration, Transport Airplane Directorate, Attn: Rules Docket (ANM-113), Docket No. NM462, 1601 Lind Avenue, SW., Renton, Washington 98057-3356. You may deliver two copies to the Transport Airplane Directorate at the above address. You must mark your comments: Docket No. NM462 You can inspect comments in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

**FOR FURTHER INFORMATION CONTACT:** Nazih Khaouly, FAA, Airplane & Flight Crew Interface Branch, ANM-111, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, Washington

98057-3356; telephone (425) 227-2432; facsimile (425) 227-1149.

#### SUPPLEMENTARY INFORMATION:

##### 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 ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning these special conditions. You can inspect the docket before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this preamble between 7:30 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring expense or delay. We may change these special conditions based on the comments we receive.

If you want us to acknowledge receipt of your comments on this proposal, include with your comments a self-addressed, stamped postcard on which you have written the docket number. We will stamp the date on the postcard and mail it back to you.

##### Background

On October 3, 2006, Cessna Aircraft Company applied for a change to Type Certification No. (TC) T00012WI for installation of Lithium-ion batteries in the Model 680. The Model 680 is a twin-engine, medium-size business jet with a maximum passenger capacity of 12. This airplane has a maximum takeoff weight of 30,300 lbs and has two Pratt & Whitney 306C engines.

The regulations do not address the novel and unusual design features associated with the installation of rechargeable Lithium-ion batteries.

##### Type Certification Basis

Under the provisions of § 21.101, Cessna Aircraft Company must show that the Model 680, as changed, continues to meet the applicable provisions of the regulations

incorporated by reference in TC T00012WI or the applicable regulations in effect on the date of application for the change. The regulations incorporated by reference in the type certificate are commonly referred to as the "original type certification basis." The regulations incorporated by reference in TC T00012WI are as follows:

Title 14, Code of Federal Regulations (14 CFR) part 25, effective February 1, 1965, as amended by amendments 25-1 through 25-98. Refer to TC T00012WI, as applicable, for a complete description of the type-certification basis for this model, including special conditions and exemptions that are not relevant to these special conditions.

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 680 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 or similar novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate 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 special conditions, the Model 680 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 Features

The Model 680 will incorporate the following novel or unusual design features:

Cessna Aircraft Company proposes to use rechargeable Lithium-ion main batteries and Auxiliary Power Unit (APU) start batteries on the Model 680, and is also considering the use of this Lithium-battery technology in several

other auxiliary-battery applications in these airplanes. This type of battery possesses certain failure and operational characteristics, and maintenance requirements that differ significantly from that of the Nickel-Cadmium (Ni-Cd) and Lead-acid rechargeable batteries currently approved for installation in transport-category airplanes. Large, high-capacity, rechargeable Lithium batteries are a novel or unusual design feature, and current regulations in 14 CFR part 25 do not address installation of rechargeable Lithium batteries. The FAA is proposing these special conditions to require that:

(1) All characteristics of the Lithium batteries and its installation that could affect safe operation of the Model 680 are addressed, and

(2) Appropriate Instructions for Continued Airworthiness, which include maintenance requirements, are established to ensure the availability of electrical power from the batteries when needed.

#### Discussion

The current regulations governing the installation of batteries in transport-category airplanes were derived from Civil Air Regulation (CAR) 4b.625(d) as part of the recodification of CAR 4b that established Federal Aviation Regulations (FAR) in 14 CFR part 25 in February, 1965. The new battery requirements, 14 CFR 25.1353(c)(1) through (c)(4), basically reworded the CAR requirements.

Increased use of Ni-Cd batteries in small airplanes resulted in increased incidents of battery fires and failures, which led to additional rulemaking affecting transport-category airplanes as well as small airplanes. These regulations were incorporated into § 25.1353(c)(5) and (c)(6), which govern Ni-Cd battery installations on transport-category airplanes.

The proposed use of rechargeable Lithium batteries for equipment and systems on the Model 680 airplane has prompted the FAA to review the adequacy of existing battery regulations. Our review indicates that the existing regulations do not adequately address several failure, operational, and maintenance characteristics of Lithium batteries that could affect the safety and reliability of the battery installations on the Model 680 airplane.

The use of Lithium rechargeable batteries in applications involving commercial aviation has limited history. However, other users of this technology, ranging from wireless-telephone manufacturers to the electric-vehicle industry, have noted safety problems with Lithium batteries. These problems

include overcharging, over-discharging, and Lithium-battery cell-component flammability.

#### 1. Overcharging

In general, Lithium-ion batteries are significantly more susceptible to internal failures that can result in self-sustaining increases in temperature and pressure (*i.e.*, thermal runaway) than their Ni-Cd or Lead-acid counterparts. This is especially true for overcharging, which causes heating and destabilization of the components of the Lithium-battery cell, which can lead to the formation, by plating, of highly unstable metallic Lithium. The metallic Lithium can ignite, resulting in a self-sustaining fire or explosion. The severity of thermal runaway due to overcharging increases with increased battery capacity due to the higher amount of electrolyte in large batteries.

#### 2. Over-Discharging

Discharge of some versions of the Lithium-battery cell beyond a certain voltage (typically 2.4 volts) can cause corrosion of the electrodes in the cell, resulting in loss of battery capacity that cannot be reversed by recharging. This loss of capacity may not be detected by the simple voltage measurements commonly available to flight crewmembers as a means of checking battery status, a problem shared with Ni-Cd batteries.

#### 3. Flammability of Cell Components

Unlike Ni-Cd and Lead-acid cells, some types of Lithium-battery cells use flammable liquid electrolytes. The electrolyte can serve as a source of fuel for an external fire if the cell container is breached.

The problems that Lithium-battery users experience raise concerns about the use of these batteries in commercial aviation. The intent of these proposed special conditions is to establish appropriate airworthiness standards for Lithium-battery installations in the Model 680 airplane, and to ensure, as required by §§ 25.601 and 25.1309, that these battery installations will not result in an unsafe condition.

To address these concerns, these special conditions adopt the following requirements:

- Those sections of § 25.1353 that are applicable to Lithium batteries.
- The flammable-fluid fire-protection requirements of § 25.863. In the past, this rule was not applied to batteries in transport-category airplanes because the electrolytes in Lead-acid and Ni-Cd batteries are not considered flammable.
- New requirements to address hazards of overcharging and over-

discharging that are unique to rechargeable Lithium-ion batteries.

- Section 25.1529, Instructions for Continued Airworthiness, must include maintenance requirements to ensure that batteries used as spares are maintained in an appropriate state of charge, and installed Lithium batteries are sufficiently charged at appropriate intervals. These instructions must also describe proper repairs, if allowed, and battery part-number configuration control.

#### Applicability

As discussed above, these special conditions are applicable to the Model 680 airplane. Should Cessna Aircraft Company apply at a later date 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 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.

The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

#### The Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type-certification basis for Cessna Aircraft Company Model 680 airplanes.

In lieu of the requirements of § 25.1353(c)(1) through (c)(4) at amendment 25-42, Lithium-ion batteries and battery installations on the Cessna Model 680 airplane must be designed and installed as follows:

(1) Safe Lithium-ion battery-cell temperatures and pressures must be maintained during any charging or discharging condition, and during any failure of the battery-charging or battery-monitoring system not shown to be extremely remote. The Lithium-battery installation must preclude explosion in the event of those failures.

(2) Design of Lithium batteries must preclude the occurrence of self-sustaining, uncontrolled increases in temperature or pressure.

(3) No explosive or toxic gases emitted by any Lithium battery in normal operation, or as the result of any failure of the battery-charging or battery-monitoring system, or battery

installation which is not shown to be extremely remote, may accumulate in hazardous quantities within the airplane.

(4) Installations of Lithium batteries must meet the requirements of 14 CFR 25.863(a) through (d).

(5) No corrosive fluids or gases that may escape from any Lithium battery may damage surrounding structure or any adjacent systems, equipment, or electrical wiring of the airplane in such a way as to cause a major or more severe failure condition, as determined in accordance with 14 CFR 25.1309(b).

(6) Each Lithium-battery installation must have provisions to prevent any hazardous effect on structure or essential systems caused by the maximum amount of heat the battery can generate during a short circuit of the battery or of its individual cells.

(7) Lithium-battery installations must have a system to control automatically the charging rate of the battery to prevent battery overheating or overcharging, and

(i) A battery-temperature-sensing and over-temperature-warning system with a means to automatically disconnect the battery from its charging source in the event of an over-temperature condition or,

(ii) A battery-failure sensing-and-warning system with a means to automatically disconnect the battery from its charging source in the event of battery failure.

(8) Any Lithium-battery installation, the function of which is required for safe operation of the airplane, must incorporate a monitoring-and-warning feature that will provide an indication to the appropriate flight crewmembers whenever the state-of-charge of the batteries has fallen below levels considered acceptable for dispatch of the airplane.

(9) The instructions for continued airworthiness required by § 25.1529 (and § 26.11) must contain maintenance steps to assure that the Lithium batteries are sufficiently charged at appropriate intervals specified by the battery manufacturer. The instructions for continued airworthiness must also contain procedures to ensure the integrity of Lithium batteries in spares storage to prevent the replacement of batteries, the function of which are required for safe operation of the airplane, with batteries that have experienced degraded charge-retention ability or other damage due to prolonged storage at a low state-of-charge. Precautions should be included in the continued-airworthiness maintenance instructions to prevent mishandling of Lithium batteries, which

could result in short-circuit or other unintentional damage that could result in personal injury or property damage.

**Note 1:** The term “sufficiently charged” means that the battery will retain enough of a charge, expressed in ampere-hours, to ensure that the battery cells will not be damaged. A battery cell may be damaged by lowering the charge below a point where there is a reduction in the ability to charge and retain a full charge. This reduction would be greater than the reduction that may result from normal operational degradation.

**Note 2:** These special conditions are not intended to replace § 25.1353(c) in the certification basis of the Cessna Model 680 airplane. These special conditions apply only to Lithium-ion batteries and rechargeable Lithium-battery-system installations. The requirements of § 25.1353(c) remain in effect for batteries and battery installations on the Cessna Model 680 airplane that do not use Lithium-ion batteries.

Issued in Renton, Washington, on July 1, 2011.

**Jeffrey E. Duven,**

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

[FR Doc. 2011-17535 Filed 7-12-11; 8:45 am]

**BILLING CODE 4910-13-P**

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 39

[Docket No. FAA-2011-0731; Directorate Identifier 2010-NE-39-AD

RIN 2120-AA64

#### **Airworthiness Directives; Pratt & Whitney Corp. (PW) JT9D-7R4H1 Turbofan Engines**

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

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** We propose to adopt a new airworthiness directive (AD) for all PW JT9D-7R4H1 turbofan engines. This proposed AD would require removing certain high-pressure compressor (HPC) shafts before their certified life limits, and establishes a new, lower life-limit for these parts. This proposed AD was prompted by reports of cracks in five HPC shafts. We are proposing this AD to correct the unsafe condition on these products.

**DATES:** We must receive comments on this proposed AD by August 29, 2011.

**ADDRESSES:** You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- **Federal eRulemaking Portal:** Go to <http://www.regulations.gov>. Follow the instructions for submitting comments.

- **Fax:** 202-493-2251.

- **Mail:** U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE., Washington, DC 20590.

- **Hand Delivery:** Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

#### **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov>; or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this proposed AD, the regulatory evaluation, any comments received, and other information. The street address for the Docket Office (phone: 800-647-5527) is in the **ADDRESSES** section. Comments will be available in the AD docket shortly after receipt.

**FOR FURTHER INFORMATION CONTACT:** Ian Dargin, Aerospace Engineer, Engine Certification Office, FAA, 12 New England Executive Park, Burlington, MA 01803; phone: 781-238-7178; fax: 781-238-7199; e-mail: [ian.dargin@faa.gov](mailto:ian.dargin@faa.gov).

#### **SUPPLEMENTARY INFORMATION:**

##### **Comments Invited**

We invite you to send any written relevant data, views, or arguments about this proposal. Send your comments to an address listed under the **ADDRESSES** section. Include “Docket No. FAA-2011-0731; Directorate Identifier 2010-NE-39-AD” at the beginning of your comments. We specifically invite comments on the overall regulatory, economic, environmental, and energy aspects of this proposed AD. We will consider all comments received by the closing date and may amend this proposed AD because of those comments.

We will post all comments we receive, without change, to <http://www.regulations.gov>, including any personal information you provide. We will also post a report summarizing each substantive verbal contact we receive about this proposed AD.

##### **Discussion**

We received reports of five JT9D-7R4H1 engines containing an HPC shaft with cracks in the thread grooves of the rear shaft. These engines have the highest-thrust rating of the JT9D models, and were operating in hot environments. Higher operating metal