



[4910-13]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 33**

[Docket No. FAA-2017-0586; Notice No. 33-17-01-SC]

**Special Conditions: Safran Aircraft Engines, Silvercrest-2 SC-2D; Rated Takeoff Thrust at High Ambient Temperature**

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

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

**SUMMARY:** This action proposes special conditions for the Safran Aircraft Engines (SAE), Silvercrest-2 SC-2D engine model. This engine will have a novel or unusual design feature associated with an additional takeoff rating that increases the exhaust gas temperature (EGT) limit to maintain takeoff thrust in certain high ambient temperature conditions for a maximum accumulated usage of 20 minutes in any one flight. 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:** Send your comments on or before July 6, 2017.

**ADDRESSES:** Send comments identified by docket number [FAA-2017-0586] 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, D.C., 20590-0001.
- *Hand Delivery of Courier:* Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, S.E., Washington, D.C., between 8 a.m., and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202-493-2251.

*Privacy:* In accordance with 5 USC 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments without edit, including any personal information the commenter provides, to <http://www.regulations.gov>, as described in the system of records notice (DOT/ALL-14 FDMS), which can be reviewed at <http://www.transportation.gov/privacy>.

*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 the Docket Operations Room in W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, D.C., between 9 a.m., and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Tara Fitzgerald, ANE-112, Engine and Propeller Directorate, Aircraft Certification Service, 1200 District Avenue, Burlington, Massachusetts, 01803-5213; telephone (781) 238-7130; facsimile (781) 238-7199; email [Tara.Fitzgerald@faa.gov](mailto:Tara.Fitzgerald@faa.gov).

**SUPPLEMENTARY INFORMATION:**

**Comments Invited**

Certification of the Silvercrest-2 SC-2D engine model is currently scheduled for August 2018. The substance of these special conditions has been subject to the notice and public comment procedure. Therefore, because a delay would significantly affect the applicant's certification of the engine, we are shortening the public comment period to end on July 6, 2017.

We invite interested persons to participate in this rulemaking by submitting written comments, data, or views. The agency also invites comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposed special conditions, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments, commenters should send only one copy of written comments, or if comments are filed electronically, commenters should submit only one time.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. Before acting on this special condition, we will consider all comments we receive on or before the closing date for comments. We will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. We may change these special conditions based on the comments we receive.

## **Background**

On April 19, 2011, SNECMA, now known as SAE, applied for a type certificate for the Silvercrest-2 SC-2D engine model. On April 30, 2014, SAE requested an extension to their original type certificate application, which the FAA granted through June 30, 2015. On

May 26, 2015, SAE requested another extension to their type certificate application, which the FAA granted through September 30, 2018.

SAE proposed an additional takeoff rating to maintain takeoff thrust in certain high ambient temperature conditions with all engines operating (AEO) for the Silvercrest-2 SC-2D engine model. Therefore, the Silvercrest-2 SC-2D engine model would have two different takeoff ratings. The first rating corresponds with the rated takeoff thrust of the engine. The second takeoff rating maintains the takeoff thrust in certain high ambient temperature conditions. This additional takeoff rating is named “Rated Takeoff Thrust at High Ambient Temperature” (Rated TOTHAAT). The Rated TOTHAAT is an approved engine thrust developed under specified altitudes and temperatures within the operating limitations established for the engine during takeoff operation for a maximum usage of 20 minutes in any one flight.

### **Type Certification Basis**

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.17, SAE must show that the Silvercrest-2 SC-2D meets the applicable provisions of 14 CFR part 33, as amended by Amendments 33-1 through 33-34 in effect on the date of application.

If the FAA finds that the applicable airworthiness regulations do not contain adequate or appropriate safety standards for the Silvercrest-2 SC-2D engine model, 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, the special conditions would also apply to the other model under § 21.101.

In addition to complying with the applicable product airworthiness regulations and the requirements of the special conditions, the Silvercrest-2 SC-2D engine model must comply with the fuel venting and exhaust emission requirements of 14 CFR part 34.

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 Silvercrest-2 SC-2D engine model will incorporate a novel or unusual design feature, referred to as “Rated TOTHAT”. This additional takeoff rating increases the EGT limit to maintain takeoff thrust in certain high ambient temperature conditions for a maximum of 20 minutes in any one flight.

### **Discussion**

The Rated TOTHAT is designed for use during takeoff in specified high altitudes and high ambient temperature conditions to maintain thrust during takeoff for a maximum of 20 minutes in any one flight. These proposed special conditions contain additional mandatory post-flight inspection and maintenance action requirements associated with any use of the Rated TOTHAT. These requirements add a rating definition in part 1.1 and mandate mandatory inspections in the instructions for continued airworthiness (ICA); instructions for installing and operating the engine; engine rating and operating limitations; instrument connection; and endurance testing.

The current requirements of the endurance test under § 33.87 represent a typical airplane flight profile and the severity of the takeoff rating. Therefore, the endurance test

under § 33.87 covers normal, all-engines-operating takeoff conditions for which the engine control system limits the engine to the takeoff thrust rating. It is intended to represent the airplane flight profile during takeoff under specified ambient temperatures for a time until the mandatory inspection and maintenance actions can be performed.

These proposed special conditions require additional test cycles that include at least a 150 hours of engine operation as specified in § 33.87(a), to demonstrate the engine is capable of performing the Rated TOTHAT rating during AEO conditions without disassembly or modification.

The associated engine deterioration, after use of the Rated TOTHAT, is not known without the intervening mandatory inspections in these special conditions. These mandatory inspections ensure the engine will continue to comply with its certification basis, which includes these proposed special conditions, after any use of the Rated TOTHAT. The applicant is expected to assess the deterioration from use of the Rated TOTHAT. The airworthiness limitations section (ALS) must prescribe the mandatory post-flight inspections and maintenance actions associated with any use of the Rated TOTHAT.

These requirements maintain a level of safety equivalent to the level intended by the applicable airworthiness standards in effect on the date of application.

### **Applicability**

As discussed above, these proposed special conditions are applicable to the Silvercrest-2 SC-2D engine model. Should SAE 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 the Rated TOTHAT features on the Silvercrest-2 SC-2D engine model. It is not a rule of general applicability and applies only to SAE, who requested FAA approval of this engine feature.

## **List of Subjects in 14 CFR Part 33**

Aircraft, Engines, 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, and 44704.

## **The Proposed Special Conditions**

Accordingly, the FAA proposes, the following special conditions as part of the type certification basis for SAE, Silvercrest-2 SC-2D engine model.

### **1. Part 1 Definition.**

“Rated Take-off Thrust at High Ambient Temperature” (Rated TOTHAT) means the approved engine thrust developed under specified altitudes and temperatures within the operating limitations established for the engine during takeoff operation. Use is limited to two periods, no longer than 10 minutes each under one engine inoperative (OEI) conditions or 5 minutes each under AEO conditions in any one flight for a maximum accumulated usage of 20 minutes in any one flight. Each flight where the Rated TOTHAT is used must be followed by mandatory inspection and maintenance actions.

### **2. Part 33 Requirements.**

In addition to the airworthiness standards in 14 CFR part 33, effective February 1, 1965, amendments 33-1 through 33-34 applicable to the engine and the Rated TOTHAT, the following special conditions apply:

(a) Section 33.4, Instructions for Continued Airworthiness.

(1) The ALS must prescribe the mandatory post-flight inspections and maintenance actions associated with any use of the Rated TOTHAT.

(2) The applicant must validate the adequacy of the inspections and maintenance actions required under paragraph 2(a)(1) of these special conditions.

(3) The applicant must establish an in-service engine evaluation program to ensure the continued adequacy of the instructions for mandatory post-flight inspections and maintenance actions prescribed under paragraph 2(a)(1) of these special conditions, and of the data for thrust assurance procedures required by paragraph 2(b)(2) of these special conditions. The program must include service engine tests or equivalent service engine test experience on engines of similar design and evaluations of service usage of the Rated TOTHAT.

(b) Section 33.5, Instruction manual for installing and operating the engine.

(1) Installation Instructions:

(i) The applicant must identify the means, or provisions for means, provided in compliance with the requirements of paragraph 2(e) of these special conditions.

(ii) The applicant must specify that the engine thrust control system automatically resets the thrust on the operating engine to the Rated TOTHAT level when one engine fails during takeoff at specified altitudes and temperatures.

(iii) The applicant must specify that the Rated TOTHAT is available by manual crew selection at specified altitudes and temperatures in AEO conditions.

(2) Operating Instructions: The applicant must provide data on engine performance characteristics and variability to enable the airplane manufacturer to establish airplane thrust assurance procedures.

(c) Section 33.7, Engine ratings and operating limitations.

(1) Rated TOTHAT and the associated operating limitations are established as follows:

(i) The thrust is the same as the engine takeoff rated thrust with extended flat rating corner point.

(ii) The rotational speed limits are the same as those associated with the engine takeoff rated thrust.

(iii) The applicant must establish a gas temperature steady-state limit and, if necessary, a transient gas over temperature limit for which the duration is no longer than 30 seconds.

(iv) The use is limited to two periods of no longer than 10 minutes each under OEI conditions or 5 minutes each under AEO conditions in any one flight, for a maximum accumulated usage of 20 minutes in any one flight. Each flight where the Rated TOTHAT is used must be followed by mandatory inspections and maintenance actions prescribed by paragraph 2(a)(1) of these special conditions.

(2) The applicant must propose language to include in the type certificate data sheet specified in § 21.41 for the following:

(i) Rated TOTHAT and associated limitations.

(ii) As required by § 33.5(b), Operating instructions, include a note stating that “Rated Takeoff Thrust at High Ambient Temperature (Rated TOTHAT) means the approved engine thrust developed under specified altitudes and temperatures within the operating limitations established for the engine. Use is limited to two periods, no longer than 10 minutes each under OEI conditions or 5 minutes each under AEO conditions in any one flight, for a maximum accumulated usage of 20 minutes in any one flight. Each flight where the Rated TOTHAT is used must be followed by mandatory inspection and maintenance actions.”

(iii) As required by § 33.5(b), Operating instructions, include a note stating that the engine thrust control system automatically resets the thrust on the operating engine to the Rated TOTHAT level when one engine fails during takeoff at specified altitudes and temperatures, and the Rated TOTHAT is available by manual selection when all engines are operational during takeoff at specified altitudes and temperatures.

(d) Section 33.28, Engine Control Systems.

The engine must incorporate a means, or a provision for a means, for automatic availability and automatic control of the Rated TOTHAT under OEI conditions and must permit manual activation of the Rated TOTHAT under AEO conditions.

(e) Section 33.29, Instrument connection.

The engine must:

(1) Have means, or provisions for means, to alert the pilot when the Rated TOTHAT is in use, when the event begins and when the time interval expires.

(2) Have means, or provision for means, which cannot be reset in flight, to:

(i) Automatically record each use and duration of the Rated TOTHAT, and

(ii) Alert maintenance personnel that the engine has been operated at the Rated TOTHAT and permit retrieval of recorded data.

(3) Have means, or provision for means, to enable routine verification of the proper operation of the means in paragraph 2(e)(1) and (e)(2) of these special conditions.

(f) Section 33.85(b), Calibration tests.

The applicant must base the calibration test on the thrust check at the end of the endurance test required by § 33.87 of these special conditions.

(g) Section 33.87, Endurance test.

(1) In addition to the applicable requirements of § 33.87(a):

(i) The § 33.87 endurance test must be modified as follows:

(A) Modify the thirty minute test cycle at the rated takeoff thrust in § 33.87(b)(2)(ii) to run one minute at rated takeoff thrust, followed by five minutes at the Rated TOTHAT, followed by the rated takeoff thrust for the remaining twenty-four minutes.

(B) The modified thirty minute period described above in paragraph 2(g)(1)(i)(A) must be repeated ten times in cycles 16 through 25 of the § 33.87 endurance test.

(2) After completion of the tests required by § 33.87(b), as modified in paragraph 2(g)(1)(i) above, and without intervening disassembly, except as needed to replace those parts described as consumables in the ICA, the applicant must conduct the following test sequence for a total time of not less than 120 minutes:

(i) Ten minutes at Rated TOTHAT.

(ii) Eighty-eight minutes at rated maximum continuous thrust.

(iii) One minute at 50 percent of rated takeoff thrust.

(iv) Ten minutes at Rated TOTHAT.

(v) Ten minutes at rated maximum continuous thrust.

(vi) One minute at flight idle.

(3) The test sequence of § 33.87(b)(1) through (6) of these special conditions must be run continuously. If a stop occurs during these tests, the interrupted sequence must be repeated unless the applicant shows that the severity of the test would not be reduced if the current tests were continued.

(4) Where the engine characteristics are such that acceleration to the Rated TOTHAT results in a transient over temperature in excess of the steady-state temperature limit identified in

paragraph 2(c)(1)(iii) of these special conditions, the transient gas overtemperature must be applied to each acceleration to the Rated TOTHAT of the test sequence in paragraph 2(g)(2) of these special conditions.

(h) Section 33.93, Teardown inspection.

The applicant must perform the teardown inspection required by § 33.93(a), after completing the endurance test prescribed by § 33.87 of these special conditions.

(i) Section 33.201, Design and test requirements for Early ETOPS eligibility.

In addition to the requirements of § 33.201(c)(1), the simulated ETOPS mission cyclic endurance test must include two cycles of 10 minute duration, each at the Rated TOTHAT; one before the last diversion cycle and one at the end of the ETOPS test.

Issued in Burlington, Massachusetts, on June 13, 2017.

Carlos A. Pestana,  
Acting Assistant Manager, Engine and Propeller Directorate,  
Aircraft Certification Service.

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