Issued in Washington, DC, on December 28, 1995.

Michael Gallagher,

Acting Director, Aircraft Certification Service.

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14 CFR Part 35

[Docket No. 94–ANE–61; Special Condition No. 35–ANE–03]

Special Conditions; Hamilton Standard Model 568F Propeller

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for Hamilton Standard Model 568F propeller. This propeller is constructed using all composite blades, a novel and unusual design feature. Part 35 of the Federal Aviation Regulations (FAR's) currently does not address the airworthiness considerations associated with propellers constructed using all composite blades. These special conditions contain additional safety standards which the Administrator finds necessary to establish a level of safety equivalent to that established by the airworthiness standards of part 35 of the FAR's.

EFFECTIVE DATE: February 5, 1996.

FOR FURTHER INFORMATION CONTACT: Martin Buckman, Engine and Propeller Standards Staff, ANE–110, Engine and Propeller Directorate, Aircraft Certification Service, FAA, New England Region, 12 New England Executive Park, Burlington, Massachusetts 01803–5229; telephone (617) 238–7112, fax (617) 238–7199.

SUPPLEMENTARY INFORMATION:

Background

On January 26, 1994, Hamilton Standard applied for type certification for a new Model 568F propeller. This propeller is constructed using all composite blades, a novel and unusual design feature. A Notice of Proposed Special Conditions was published in the Federal Register on January 20, 1995 (60 FR 4116) for the Hamilton Standard Model 568F propeller constructed with composite material. Propellers constructed entirely of composite material have additional airworthiness considerations not currently addressed by part 35 of the Federal Aviation Regulations (FAR). Those additional airworthiness considerations associated with propellers constructed using all composite blades are propeller integrity following a bird strike, propeller integrity following a lightning strike, and propeller fatigue strength when exposed to the deteriorating effects of in-service use and the environment.

Type Certificate Basis

Under the provisions of § 21.17 of the FAR's, Hamilton Standard must show that the Model 568F propeller meets the requirements of the applicable regulations in effect on the date of the application. Those FAR's are § 21.21 and part 35, effective February 1, 1965, as amended.

The Administrator finds that the applicable airworthiness regulations in part 35, as amended, do not contain adequate or appropriate safety standards for the Model 568F propeller because it is constructed using composite material. Therefore, the Administrator prescribes special conditions under the provisions of § 21.16 of the FAR's to establish a level of safety equivalent to that established in the regulations.

Special conditions, as appropriate, are issued in accordance with § 11.49 of the FAR's after public notice and opportunity for comment, as required by §§ 11.28 and 11.29(b), and become part of the type certification basis in accordance with § 21.101(b)(2).

Novel or Unusual Design Features

Hamilton Standard Model 568F propeller incorporates propeller blades constructed using composite material. This material has fibers that are woven or aligned in specific directions to give the material directional strength properties. These properties depend on the type of fiber, the orientation and concentration of fiber, and matrix material. Composite materials could exhibit multiple modes of failure. Propellers constructed of composite material must demonstrate airworthiness when considering these novel design features.

The requirements of part 35 of the FAR's were established to address the airworthiness considerations associated with wood and metal propellers used primarily on reciprocating engines. Propeller blades of this type are generally thicker than composite blades, and have demonstrated good service experience following a bird strike. Propeller blades constructed using composite material are generally thinner when used on turbine engines, and are typically installed on high performance aircraft. High performance aircraft generally fly at high airspeeds with correspondingly high impact forces associated with a bird strike. Thus, composite propellers must demonstrate propeller integrity following a bird strike.

In addition, part 35 of the FAR's do not currently require a demonstration of propeller integrity following a lightning strike. No safety considerations arise from lightning strikes on propellers constructed of metal because the electrical current is safely conducted through the metal blade without damage to the propeller. Fixed pitched, wooden propellers are generally used on engines installed on small, general aviation aircraft that typically do not encounter flying conditions conducive to lightning strikes. Composite propeller blades, however, may be used on turbine engines and high performance aircraft which have an increased risk of lightning strikes. Composite blades may not safely conduct or dissipate the electrical current from a lightning strike. Severe damage can result if the propellers are not properly protected. Therefore, composite blades must demonstrate propeller integrity following a lightning strike. Information on testing for lightning protection is set out in SAE Report AE4L, entitled, ''Lightning Test Waveforms and Techniques for Aerospace Vehicles and Hardware,'' dated June 20, 1978.

Lastly, the current certification requirements address fatigue evaluation only of metal propeller blades or hubs, and those metal components of non-metallic blade assemblies. Allowable design stress limits for composite blades must consider the deteriorating effects of the environment and in-service use, particularly those effects from temperature, moisture, erosion and chemical attack. Composite blades also present new and different considerations for retention of the blades in the propeller hub.

Discussion of Comments

Interested persons have been afforded the opportunity to participate in the making of these special conditions. Due consideration has been given to comments received.

One commenter is concerned that the terms ''reasonable and foreseeable'' in paragraph (3) FATIGUE EVALUATION of the special condition is a vague interpretation, and will result in large variation in how this requirement is applied.

The FAA disagrees. The special conditions are written with the accepted terminology from § 35.37, Fatigue limit tests, of the FAR's, which states that ''The fatigue evaluation must include consideration of all reasonably foreseeable vibration load patterns.'' This terminology has been established because each propeller installation presents a unique set of operating conditions that must be incorporated

into the fatigue evaluation. The inclusion of specific aircraft operating conditions may result in the fatigue evaluation of operating conditions of minor significance while leaving out conditions of major significance.

One commenter agreed with the three proposed special conditions as written and proposed two additional special conditions concerning ice strikes due to ice shedding from the airframe and ice accretion due to the heat transfer properties of composite materials.

The FAA disagrees with the addition of the two additional special conditions for the following reasons. First, ice strikes due to ice shedding from the airframe is a concern for pusher type installations. The Hamilton Standard Model 568F propeller is a tractor configuration and therefore normally will not be exposed to ice shedding from the airframe. Second, heat transfer properties of the Hamilton Standard Model 568F composite blade are similar to other composite shell and all composite blades with deicing systems that have had a good service history. In addition for propeller installations that require deicing, the propeller manufacture provides a deicing system and the required documentation to the airframer for compliance with the current regulations.

Conclusion

This action affects only the Hamilton Standard Model 568F propeller and future propeller models within this series. It is not a rule of general application, and it affects only the manufacturer who applied to the FAA for approval of this propeller model.

List of Subjects in 14 CFR Part 35

Air Transportation, Aircraft, Aviation safety, Safety.

PART 35—[AMENDED]

The authority citation continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704; 14 CFR 11.28, 21.16.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration (FAA) issues the following special conditions for the Hamilton Standard Model 568F Propeller:

(a) For purposes of these special conditions, a hazardous condition is considered to exist for each of the following conditions:

(1) Loss of the propeller blade, or a major portion of a blade.

(2) Overspeed of the propellers.

(3) Unintended movement of the blade below the established minimum inflight blade angle, or to an angle that results in excessive drag.

(4) The inability to feather the propeller when necessary.

(b) In addition to the requirements of Federal Aviation Regulation part 35, the following must be shown:

(1) *BIRD STRIKE*

For propeller of composite construction it must be shown that:

The propeller can withstand a 4 pound bird strike at the blade's critical radial location when operating at takeoff RPM and liftoff (Vr) speed of a typical aircraft, without giving rise to a hazardous condition and while maintaining the capability to be feathered.

(2) *LIGHTNING STRIKE*

A lightning strike on a propeller of a composite construction shall not result in a hazardous condition. The propeller shall be capable of continued safe operation.

(3) *FATIGUE EVALUATION*

A fatigue evaluation must be provided and the fatigue limits determined for each propeller hub, blade, and each primary load carrying component of the propeller. The fatigue evaluation must consider all known and reasonable foreseeable vibration and cyclic load patterns that may be encountered in service. The fatigue limits must account for the effects of in-service deterioration, such as impact damage, nicks, grooves, galling, or bearing wear; for variations in production material properties; for environmental effects such as temperature, moisture, erosion, chemical attack, etc., that cause deterioration.

Issued in Burlington, Massachusetts, on December 19, 1995.

James C. Jones,

Acting Manager, Engine and Propeller Directorate, Aircraft Certification Service.

[FR Doc. 96–56 Filed 1–3–96; 8:45 am]

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14 CFR Part 71

[Airspace Docket No. 94–AWA–3]

Modification of the Atlantic City International Airport Class C Airspace Area; NJ

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This amendment modifies the Class C airspace area at Atlantic City International Airport, Atlantic City, NJ. This action deletes the 1-mile airspace exclusion around the Nordheim Flying K Airport due to its closure, and returns this airspace to the surface area of the Class C airspace. In addition, this action reduces controller workload.

EFFECTIVE DATE: 0901 UTC, February 29, 1996.

FOR FURTHER INFORMATION CONTACT: William C. Nelson, Airspace and Obstruction Evaluation Branch (ATP–240), Airspace-Rules and Aeronautical Information Division, Air Traffic Rules and Procedures Service, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone: (202) 267–9295.

SUPPLEMENTARY INFORMATION:

History

On April 12, 1995, the FAA proposed to amend part 71 of the Federal Aviation Regulations (14 CFR part 71) to modify the Class C airspace area at Atlantic City International Airport, Atlantic City, NJ (60 FR 18552). Interested parties were invited to participate in this rulemaking proceeding by submitting written comments on the proposal to the FAA. No comments were received concerning the proposal. Except for editorial changes, this amendment is the same as that proposed in the notice. Class C airspace designations are published in paragraph 4000 of FAA Order 7400.9C dated August 17, 1995, and effective September 16, 1995, which is incorporated by reference in 14 CFR 71.1. The Class C airspace designation listed in this document will be published subsequently in the Order.

The Rule

This amendment to part 71 of the Federal Aviation Regulations (14 CFR part 71) modifies the Class C airspace area at Atlantic City International Airport, Atlantic City, NJ, by eliminating the 1-mile radius airspace exclusion around the Nordheim Flying K Airport due to its closure. This amendment will return this airspace to the surface area of the Class C airspace.

Regulatory Evaluation Summary

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effect of regulatory changes on international