§ 26.41 Audits and corrective action.

* * * * *

(d) * * *

(1) The contracts of licensees and other entities with C/Vs and HHS-certified laboratories must reserve the right to audit the C/V, the C/V's subcontractors providing FFD program services, and the HHS-certified laboratories at any time, including at unannounced times, as well as to review all information and documentation that is reasonably relevant to the audits.

* * * * *

■ 4. In § 26.69, paragraphs (c)(3) and (d)(2) are revised to read as follows:

§ 26.69 Authorization with potentially disqualifying fitness-for-duty information.

* * * * *

(c) * * *

(3) If the designated reviewing official determines that a determination of fitness is required, verify that a professional with the appropriate qualifications, as specified in § 26.189(a), has indicated that the individual is fit to safely and competently perform his or her duties;

* * * * *

(d) * * *

(2) If the designated reviewing official concludes that a determination of fitness is required, verify that a professional with the appropriate qualifications, as specified in § 26.189(a), has indicated that the individual is fit to safely and competently perform his or her duties; and

* * * * *

■ 5. In § 26.137, paragraphs (d)(2)(i), (d)(5), and (e)(6)(v) are revised to read as follows:

§ 26.137 Quality assurance and quality control.

* * * * *

(d) * * *

(2) * * *

(i) Colorimetric pH tests must have a dynamic range of 2 to 12 and pH meters must be capable of measuring pH to one decimal place.

* * * * *

(5) Each analytical run performed to conduct initial validity testing shall include at least one quality control sample that appears to be a donor specimen to the licensee testing facility technicians.

* * * * *

(e) * * *

(6) * * *

(v) At least one positive control, certified to be positive by an HHS-certified laboratory, which appears to be a donor specimen to the licensee testing facility technicians.

* * * * *

■ 6. In § 26.153, paragraph (f)(3) is revised to read as follows:

§ 26.153 Using certified laboratories for testing urine specimens.

* * * * *

(f) * * *

(3) The laboratory shall maintain test records in confidence, consistent with the requirements of § 26.37, and use them with the highest regard for individual privacy.

* * * * *

Dated at Rockville, Maryland, this 27th day of July 2009.

For the Nuclear Regulatory Commission.

Annette L. Vietti-Cook,

Secretary of the Commission.

[FR Doc. E9–18364 Filed 7–31–09; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No.: FAA–2007–27654; Amendment No. 25–129]

RIN 2120–AI90

Activation of Ice Protection

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The Federal Aviation Administration amends the airworthiness standards applicable to transport category airplanes certificated for flight in icing conditions. The rule requires a means to ensure timely activation of the airframe ice protection system. This rule is the result of information gathered from a review of icing accidents and incidents, and will improve the level of safety for new airplane designs for operations in icing conditions.

DATES: This amendment becomes effective September 2, 2009.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this final rule contact Kathi Ishimaru, FAA, Propulsion and Mechanical Systems Branch, ANM–112, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Ave., SW., Renton, Washington 98057–3356; telephone (425) 227–2674; fax: (425) 227–1320, e-mail: *kathi.ishimaru@faa.gov.* For legal questions concerning this final rule contact Douglas Anderson, FAA, Office of Regional Counsel, Federal Aviation Administration, 1601 Lind Ave., SW., Renton, Washington 98057–3356; telephone (425) 227–2166; fax: (425) 227–1007, e-mail: *Douglas.Anderson@faa.gov.*

SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, ''General requirements.'' Under that section, the FAA is charged with promoting safe flight of civil aircraft in air commerce by prescribing minimum standards required in the interest of safety for the design and performance of aircraft. This regulation is within the scope of that authority because it prescribes new safety standards for the design of transport category airplanes.

I. Background

On October 31, 1994, an accident involving an Avions de Transport Regional ATR 72 series airplane occurred in icing conditions.[1] This prompted the FAA to initiate a review of aircraft inflight icing safety and determine changes that could be made to increase the level of safety. In May 1996, the FAA sponsored the International Conference on Aircraft Inflight Icing where icing specialists recommended improvements to increase the level of safety of aircraft operating in icing conditions. The FAA reviewed the conference recommendations and developed a comprehensive multi-year icing plan. The FAA Inflight Aircraft Icing Plan (Icing Plan), dated April 1997,[2] described various activities the FAA was contemplating to improve safety when operating in icing conditions. In accordance with the Icing Plan, the FAA tasked the Aviation Rulemaking Advisory Committee (ARAC),[3] through its Ice Protection Harmonization Working Group, to consider the need for ice detectors or other acceptable means to warn flightcrews of ice accretion on critical surfaces requiring crew action. This rule

[1] This accident and an Empressa Brasilia accident resulted in NTSB recommendations nos. A–96–56 and A–98–91. This final rule partially addresses these safety recommendations.

[2] FAA Inflight Aircraft Icing Plan, dated April 1997, available in the Docket.

[3] Published in the **Federal Register**, December 8, 1997 (62 FR 64621).

is based on ARAC's recommendations to the FAA.

A. Summary of the NPRM

The notice of proposed rulemaking (NPRM), Notice No. 07–07, published in the **Federal Register** on April 26, 2007 (72 FR 20924), is the basis for this amendment. The comment period closed July 25, 2007. In the NPRM, we proposed to revise the airworthiness standards for type certification of transport category airplanes to add requirements to ensure the timely activation of an airframe ice protection system (IPS). We also proposed to add requirements to reduce the flightcrew workload associated with operation of an airframe IPS that is manually cycled, and to ensure the Airplane Flight Manual includes IPS procedures for operation.

B. Summary of the Final Rule

The FAA is adopting this final rule because accidents and incidents occurred where the flightcrew did not operate the airframe IPS in a timely manner and because of concerns over the flightcrew workload required to operate an airframe IPS that the flightcrew must manually cycle when they observe ice accretions. The final rule addresses these concerns by ensuring that flightcrews are provided with a clear means to know when to activate the airframe IPS. The final rule reduces the workload associated with monitoring ice accretions by requiring a system that operates continuously, a system that automatically cycles the IPS, or an alert to the flighcrew each time the IPS must be cycled.

This final rule adopts the proposed rule with minor changes and adds minor conforming changes to rules that were added by the final rule entitled ''Airplane Performance and Handling Qualities in Icing Conditions (72 FR 44656, August 8, 2007) (Amendment 25–121).[4] Amendment 25–121 added specific requirements for airplane performance and handling qualities for flight in icing conditions. Sections 25.143(j) and 25.207(h), at Amendment 25–121, define requirements that apply if activating the IPS depends on the pilot seeing a specified ice accretion on a reference surface (not just the first sign of ice accretion).

Section 25.1419(e) of this final rule requires one of three methods of detecting icing and activating the airframe IPS.[5] Activation based on the pilot seeing a specified ice accretion on a reference surface (not just the first sign of ice accretion) is not one of the three methods allowed under this rulemaking, so any requirements associated with this method are no longer relevant. Therefore, minor conforming changes have been made to §§ 25.143(j) and 25.207(h) to remove the references to, and requirements associated with, activating the IPS in response to the pilot seeing a specified ice accretion on a reference surface. Additional minor changes have been made to § 25.207(h) to improve readability, including moving a portion of existing § 25.207(h)(2)(ii) to a new § 25.207(i). The text of part 25, appendix C, part II(e) has been revised to include a reference to the new § 25.207(i).

In addition, minor changes have been made to § 25.207(b) to improve clarity and to correct an error introduced by Amendment 25–121. Section 25.207(b), as amended by Amendment 25–121, states, ''Except for the stall warning prescribed in paragraph (h)(2)(ii) of this section, the stall warning for flight in icing conditions prescribed in paragraph (e) of this section must be provided by the same means as the stall warning for flight in non-icing conditions.'' However, the stall warning prescribed by § 25.207(h)(2)(ii) is an exception only to the § 25.207(b) requirement that stall warning in icing conditions be provided by the same means as for non-icing conditions. It is not an exception to, nor is it associated with, the stall warning margin prescribed by § 25.207(e). The reference to § 25.207(e) is incorrect and potentially confusing. Therefore, it is removed by this final rule.

Because of the reformatting of § 25.207(h), as discussed above, the previous § 25.207(h)(2)(ii) is now § 25.207(h)(3)(ii). The reference to this paragraph in § 25.207(b) is changed accordingly. Other minor wording changes have been made to improve clarity. We consider all of these changes to § 25.207(b) to be technical clarifications that do not change the intent of this paragraph or impose an additional burden on applicants.

Below is a more detailed discussion of the rule as it relates to the comments we received on the NPRM. Appendix 1 defines terms used in this preamble.

II. Summary of Comments

The FAA received 14 comments concerning the following general areas of the proposal:

- Acceptable methods to determine if the airframe IPS must be activated.
- Automatic cycling of the airframe IPS.

Four of the commenters, the Airline Pilots Association (ALPA), National Transportation Safety Board (NTSB), BAE Systems Regional Aircraft, and The Boeing Company (Boeing), expressed support for the rule. ALPA supported the rule without recommendations to revise the rule. Twelve commenters suggested specific improvements or clarifications. They were the NTSB, BAE Systems Regional Aircraft, Boeing, the Air Crash Victims Families Group, Bombardier Aerospace, Marinvent Corporation, the Regional Airline Association, Swan International Sensors, Transport Canada, and three individuals. Ameriflight LLC (Ameriflight) opposed certain provisions of the rule. Summaries of the comments and our responses (including explanations of any changes to the final rule in response to the comments) are provided below.[6]

A. Ice Detection, Activation of Airframe IPS, and Automatic Cycling of Airframe IPS

In the NPRM, we proposed one of the following three methods for ice detection and activation of the airframe IPS to ensure timely activation of the airframe IPS (proposed § 25.1419(e)):

- A primary ice detection system that automatically activates or alerts the flightcrew to activate the airframe IPS;
- Visual cues for recognition of the first sign of ice accretion combined with an advisory ice detection system that alerts the flightcrew to activate the airframe IPS; or
- Identification of conditions conducive to airframe icing for use by the flightcrew to activate the airframe IPS when those conditions exist.

In addition, proposed § 25.1419(g) would require an airframe IPS that operates cyclically (for example, deicing boots) to automatically cycle after the initial activation, or installation of an ice detection system to alert the flightcrew each time the deicing boots must be activated.

The following comments were received on these proposals.

1. Oppose Installation of an Ice Detection System

Ameriflight opposed the installation of an ice detection system because properly trained flightcrews can easily detect ice accretion by means such as ice forming in the corners of the

[4] *See* Docket No. FAA–2005–22840 for complete details.

[5] The three methods are: (1) Primary ice detection system, (2) visual cues of the first sign of ice accretion combined with an advisory ice detector, and (3) specifying conditions conducive to airframe icing.

[6] The full text of each commenter's submission is available in the Docket.

windshield or on windshield wiper arms. An individual commenter believed nothing, including an ice detector, can replace pilots looking out the window to gather information on icing.

Ameriflight also suggested that it would be difficult or impossible to design a sufficiently reliable ice detection system that would be economically feasible and a practicable substitute for flightcrew training and vigilance. The individual commenter opposed installation of an ice detection system because of his experience on a military airplane that was equipped with an unreliable icing warning light.

The FAA agrees that flightcrew training and vigilance are extremely important to ensure the safe operation of aircraft in icing conditions. However, visual observation of ice accretion alone, as suggested by Ameriflight and the individual commenter, is not sufficient to ensure timely operation of the airframe IPS. The flightcrew's observation of ice accretions can be difficult during times of high workload, nighttime operations, or when clear ice has accumulated. In addition, there have been icing accidents and incidents where the flightcrew was either completely unaware of ice accretion on the airframe, or was aware of ice accretion but judged that it was not significant enough to warrant operation of the airframe IPS. Therefore, reliance on only flightcrew visual observation of ice accretion alone is not adequate and must be supplemented with an advisory ice detection system to provide an acceptable level of safety.

The FAA acknowledges that it is not a simple task to design and certificate an ice detection system. However, ice detection systems exist today that meet the reliability requirements of part 25. Section 25.1309 ensures the degree of reliability of an airframe IPS is commensurate with the hazard level associated with the failure of the airframe IPS.

In response to the contention that an ice detector would not be economically feasible, the FAA notes that on recent part 25 airplane certifications manufacturers sought and received approval for installation of ice detectors without an FAA requirement for such a system. Therefore, the FAA infers that these manufacturers consider the installation of ice detectors economically feasible.

2. Reliability of Advisory Ice Detection System

Transport Canada suggested that the reliability level of the advisory ice detection system should be on the order of 1×10^{5} failure per flight hour. Transport Canada indicated the classification assigned to the unannunciated loss of an advisory ice detection system would appear to depend upon the advisory ice detection system design, the IPS design, and the airplane on which it is installed. Therefore, it is Transport Canada's position that specific cases may need to consider the unannunciated loss of the advisory ice detection system as a major failure. The natural tendency of flightcrews to become accustomed to using the advisory ice detection system may increase the need to make flightcrews aware of failure of the advisory ice detection system. The flightcrews may need to take extra precautions when they have detected a possible failure of the advisory ice detection system.

The FAA infers that Transport Canada would like the proposed rule changed to include a minimum reliability requirement for the advisory ice detection system. The FAA finds it is unnecessary to revise this rule to include a minimum reliability requirement for the advisory ice detection system because § 25.1309 requires the determination of the hazard level associated with failure of any airplane system which then drives the required degree of reliability of that system. Additionally it would not be appropriate to pick a specific minimum reliability requirement for the advisory ice detection system because, as pointed out by the commenter, the hazard level associated with the unannunciated loss of the advisory ice detection system may depend upon the advisory ice detection system design, the airframe IPS design, and the airplane on which it is installed. However, the FAA may consider including guidance on advisory ice detection system reliability in the associated advisory circular.

3. Do Not Activate Pneumatic Deicing Boots at First Sign of Ice Accretion

Ameriflight did not support activation of pneumatic deicing boots at the first sign of ice accretion, noting that these boots work better and continue to shed ice more effectively for a longer period if airfoil leading-edge ice is allowed to build to a sufficient thickness before cycling the boots. The commenter stated that when the boots are operated at the first indication of ice, the ice is only partially shed. The ice remaining on the boot provides a rough surface on which additional ice accumulates more readily than on a smooth boot surface, shortening the duration of the boots' ability to clean the wing effectively.[7] Thus, the commenter believed that activating the boots at the first sign of ice was actually contrary to safety and Ameriflight's long experience with this system.

The FAA has issued airworthiness directives requiring activation of pneumatic deicing boots early and often. The airworthiness directives and this rule address icing accidents and incidents where the flightcrew was either completely unaware of ice accretion on the airframe, or was aware of ice accretion but judged that it was not significant enough to warrant operation of the airframe IPS.

The commenter raised concerns over residual ice, which is ice remaining (not shed) after a complete boot cycle. The FAA participated in high and low speed icing wind tunnel tests that contradict the commenter's position that boots work better, and continue to shed ice effectively, for a longer period if airfoil leading ice is allowed to build before cycling the boots.

The higher speed icing wind tunnel tests (≥180 KCAS) showed that ice was shed after each boot activation and that after 2 or 3 cycles there was no discernible difference between ice accretions from early versus delayed activation of the boots. The residual ice that remained on the boot after cycling at the first sign of ice accretion was always smaller than the amount of ice that was present on the boot during the time that it took for ¼-inch of ice to form.

The lower speed icing wind tunnel tests (≤144 KCAS) showed large amounts of residual ice which the boots had difficulty shedding, regardless of the activation method employed. Immediate activation of an automatic system did not degrade ice shedding performance. Cycling early and often resulted in shedding sooner than waiting for a specified ice accretion thickness. For example, simulating an automatic one minute system activated at first sign of icing at 14 °F, 108 KCAS, resulted in a ''good shed'' at the 15th cycle at 15 minutes. Waiting for a ¼ inch accretion before cycling resulted in a ''good shed'' at the 12th cycle at 20 minutes. The residual ice after ''good sheds'' was similar regardless of the boot activation method. Based on the results of these tests, we do not agree with Ameriflight's position about the

[7] The commenter noted that this is particularly true of older boots that have been on the wing for several seasons and which—although completely airworthy—have leading edges which have become somewhat roughened by the impacts of ice crystals, snow, hail, *etc.*, and provide a better ''tooth'' to which structural ice can adhere.

effectiveness of pneumatic deicing boots.

4. Oppose Automatic Activation and Cycling of Airframe IPS

Ameriflight also opposed any system that would automatically activate ice protection equipment or automatically cycle pneumatic deicing boots. Ameriflight suggested automatic activation of deicing boots during low speed operation, takeoff, or in the landing flare could cause handling quality problems on some aircraft. The commenter stated that although such automatic operation could be inhibited by airspeed, landing gear position, or other sensors, these in turn add increments of complexity and potential unreliability that tend to offset the automatic systems' safety value.

The FAA agrees that automatic activation of the deicing boots during some phases of flight (for example, landing flare) could result in handling quality problems on some airplanes. As Ameriflight pointed out, inhibiting automatic activation during these phases of flight to prevent any handling quality problems adds complexity to the system and could potentially increase the chances for the system not to activate when it is needed. However, the FAA finds that the increase in safety afforded by automatic activation of the airframe IPS outweighs the concerns expressed by Ameriflight and that compliance with other regulations would mitigate those concerns.

Section 25.143(a) requires airplanes to be safely controllable and maneuverable during takeoff, climb, level flight, descent, and landing. Section 25.143(b) states that it must be possible to make a smooth transition from one flight condition to another without exceptional piloting skill, alertness, or strength under any probable operating condition. If the airplane cannot operate safely with the airframe IPS activated during a particular phase of flight, automatic activation of the airframe IPS would need to be inhibited during that phase of flight.

Any potential effect on the reliability of the system to activate would be assessed in accordance with § 25.1309, which requires that systems must be designed to perform their intended function under any foreseeable operating condition. Section 25.1309 also establishes the minimum allowable system reliability, which is based on the hazard that would result from failure of the system. Therefore, the increase in safety afforded by automatic activation of the airframe IPS would not be offset by the increase in complexity and potential effect on reliability if automatic activation must be inhibited in certain flight phases.

Ameriflight commented that IPS other than deicing boots should be controlled by active involvement of the flightcrew, rather than automatically. IPS operation at inopportune times could actually decrease safety, for example by causing (i) preexisting ice accumulations to be shed into engine inlets, (ii) undesired drawdown of engine bleed air, or (iii) an excess electrical load. Systems could be designed with sensors to protect against such inopportune operation, but only at the price of additional complexity and unreliability. Ameriflight opposed any system that would automatically activate ice protection equipment or automatically recycle pneumatic deicing boots because automatic systems may fail, and the flightcrew might be unaware the IPS is not operating. ''Automatic'' systems add complexity, testing requirements, and systems interfaces, and often result in decreased overall reliability and tend to remove the flightcrew from the operational loop.

The final rule does not require automatic activation of airframe IPS, but does allow it if a primary ice detection system is installed. If an applicant chooses to certificate a system to activate the airframe IPS automatically, compliance with part 25 regulations ensure the airplane can operate safely any time the airframe IPS is operated. Issues raised by the commenter such as ice shedding, bleed air, and electrical power are considered during airplane certification. As previously mentioned, any system that would be necessary to inhibit automatic activation would be required to comply with § 25.1309, which ensures system reliability commensurate with the hazard associated with the failure of that system. As indicated by the commenter, an automatic system may fail. However, § 25.1309 requires assessing the hazard associated with the failure and providing appropriate warnings commensurate with the hazard. Compliance with part 25 ensures the safe operation of the airplane if the airframe IPS is automatically activated regardless of whether the airframe IPS is a thermal anti-ice system or a deicing boot system.

5. Necessity for Visual Cues in Combination With an Advisory Ice Detector

Bombardier noted the requirement for an advisory system, in combination with visual cues for recognition of ice accretion, implies that visual cues are necessary because of ice detector failure and not ice detector performance. The fact that no visual cues are necessary for a primary ice detection system (dual ice detectors) seems to indicate an intent to focus on ice detection failure. Therefore, the commenter believed that it would be appropriate to address how primary ice detectors should be certified knowing these potential limitations.

The FAA reviewed our airworthiness directives that require operating deicing boots at the first sign of ice accretion. We determined that this means of IPS operation should be improved because such observations can be difficult during times of high workload, nighttime operations, or when clear ice has accumulated. Therefore, to mitigate the effects of human sensory limitations and inadequate attention due to workload, the final rule requires visual cues of ice accretions in combination with an advisory ice detector. The combination of visual cues and advisory ice detectors is intended to address the potential limitations of human beings, not of the ice detectors, as suggested by the commenter. Limitations of primary ice detectors, as well as advisory ice detectors, are addressed during certification through the requirements of §§ 25.1301 and 25.1309. These regulations require that equipment function properly when installed, perform its intended functions under any foreseeable operation condition, and ensure system reliability commensurate with the hazard associated with a failure of that system.

6. Require Automatic Activation of Airframe IPS

An individual commenter requested that § 25.1419(e) be revised to allow only automatic activation of airframe IPS in appendix C icing conditions, and to require IPS status displays. The commenter suggested that all other proposed options to ensure timely activation of the airframe IPS be deleted. The commenter believed that visual cues are not adequate, there is no correlation between the ice formed on the airframe and the thickness of the ice formed on the ice detector, and automatic activation would minimize hazards by making flightcrews aware of icing conditions early.

The FAA disagrees and maintains that the proposed standard that allows several means to ensure timely activation of the airframe ice protection equipment is acceptable. Icing accidents and incidents do not support the suggested revision. The FAA acknowledges that automatic activation of airframe IPS based on icing conditions will likely result in earlier activation and minimize the effects of icing compared to waiting until ice accretions have formed on the airframe.

However, later activation is acceptable, provided an applicant substantiates the airplane can operate safely with the ice accretion present at the time the airframe IPS is activated and becomes effective. Consequently, if the airframe IPS is activated based on an ice detector, it is the ice accretion present on the airframe that is important, not the correlation between the ice shape on the ice detector and the airframe. The commenter pointed out icing accidents and incidents where the flightcrew was unaware of ice accretions and concluded that visual cues are inadequate. The FAA concurs that visual cues alone are not adequate, but visual cues in addition to an advisory ice detection system would provide an acceptable level of safety and mitigate the effects of human sensory limitations and inadequate attention due to workload.

7. Remove Option To Activate Airframe IPS Based on Temperature and Visible Moisture

Proposed § 25.1419(e)(3) would allow activation of the airframe IPS based on conditions conducive to airframe icing as defined by appropriate static or total air temperature and visible moisture. Three commenters, Transport Canada, Swan International Sensors, and an individual commenter did not consider proposed § 25.1419(e)(3) an acceptable alternative to requiring an ice detection system. Transport Canada noted that it is common to base temperature indication on a single sensor, which may not have the required reliability and failure monitoring. Moreover, the display of temperature may not be conspicuous particularly on electronic flight instrument systems. In addition, it may not be easy to see visible moisture at night. The commenter requested that if paragraph (e)(3) is retained, it should be limited to airplanes that are at a lower risk of icing related incidents and accidents. The individual commenter stated that training flightcrews to recognize conditions conducive to icing is not an adequate solution because such training and documentation have existed for some time, yet icing related accidents still occurred.

The FAA concludes that § 25.1419(e)(3) should be retained as proposed because activation of the airframe IPS using visible moisture and temperature is based on the methodology currently being used safely for activating engine IPS. Flightcrews are trained to recognize conditions conducive to icing (that is, visible moisture and temperature) and have used this method safely for the operation of engine IPS. While there may be some challenges to observing visible moisture at night, the challenge is no different than for engine IPS activation. The FAA expects that activation of the airframe IPS using the same type of cues will result in timely activation just as it has for engines.

Furthermore, the accident and incident history does not support the commenter's position that training flightcrews to recognize conditions conducive to icing has not been successful. For airplanes with an airframe IPS that is activated based on visible moisture and temperature, the FAA is unaware of accidents or incidents attributed to the flightcrew not activating the airframe IPS.

Regarding the concern over the reliability of the current equipment used to detect temperature, the equipment must meet the requirements of § 25.1309. This could result in the need to install different temperature sensing equipment than what is used on aircraft today.

8. Allow Temperature and Visible Moisture in Combination With an Advisory Ice Detection System

Transport Canada recommended the FAA include temperature and visible moisture in combination with an advisory ice detection system as an acceptable configuration under the proposed rule.

The FAA determines there is no need to revise the rule to explicitly provide the suggested option. The regulations provide minimum requirements and an applicant has the option of exceeding these requirements. Therefore, even though the suggested option is not identified in the proposed rule, it would be acceptable for an applicant to comply with proposed § 25.1419(e)(3) and voluntarily go beyond that requirement and install an advisory ice detection system.

9. Need Definition of Environmental Conditions Conducive to Icing

The National Transportation Safety Board (NTSB) commented that industry could not realistically be expected to implement § 25.1419(e)(3) until the FAA provides a more specific definition of ''environmental conditions conducive to icing.'' Swan International Sensors stated that the flightcrew would be required to interpret icing conditions because they are not defined adequately by paragraph (e)(3).

The FAA concludes that the proposed rule adequately defined environmental conditions conducive to icing and does not require interpretation by the flightcrew. The rule requires the manufacturer to identify conditions conducive to airframe icing as defined by an appropriate static or total air temperature and visible moisture for use by the flightcrew to activate the airframe IPS. The proposed rule defined the environmental conditions as a static or total air temperature and visible moisture. Advisory circular (AC) 25–1419–2, Compliance with the Ice Protection Requirements of §§ 25.1419(e), (f), (g), will provide guidance on determining the temperature cue. Therefore, we made no changes to proposed § 25.1419(e)(3) in this final rule.

10. Require Aircraft Be Equipped With All Three Proposed Methods of Airframe Ice Detection

The proposed § 25.1419(e) would require one of three ice detection and activation methods. The Air Crash Victims Families Group and an individual commenter requested that the final rule require all three ice detection and activation methods identified in proposed § 25.1419(e). The commenters also requested that the FAA require automatic ice detection systems to warn pilots of icing and to activate IPS automatically. The commenters referenced the Circuit City airplane accident in Pueblo, Colorado, on February 16, 2005, where the NTSB found the probable cause to be the flightcrew's failure to monitor and maintain airspeed and comply with procedures for ice boot activation on approach.[8] In addition, the NTSB found that distractions impeded the flightcrew's ability to monitor and maintain airspeed and manage the deicing system.

The FAA finds that icing accidents and incidents do not support the commenters' suggestion to require all three proposed methods to ensure timely activation of the airframe IPS or require a system to activate the airframe IPS automatically. The three proposed methods would independently ensure timely activation of the airframe IPS. The FAA is unaware of any icing accidents or incidents attributed to untimely activation of the airframe IPS on an airplane that had equipment compliant with this rule. The flightcrew of the Circuit City airplane relied on visual observation of ice accretions for determining if the airframe IPS should be activated and cycled manually. There was not a detector to tell the flightcrew to cycle the airframe IPS. This rule requires an advisory ice detection

[8] The commenter noted that the Cessna Citation 560 was equipped with deice boots that do not cycle automatically, which require pilots to continually monitor accumulation and reactivate the deice boots each time.

system in addition to visual observation of the first sign of ice accretion as a means to determine the airframe IPS must be activated. In addition, the rule addresses flightcrew workload by requiring deice boots to automatically cycle or by equipping the airplane with an ice detection system to alert the flightcrew each time the airframe IPS must be cycled. For these reasons, the suggested revisions are not being adopted.

11. Require Manual Back-Up to Automatic Activation of Airframe IPS

Proposed § 25.1419(g) addressed the flightcrew workload associated with an airframe IPS that operates cyclically and that requires continuous monitoring of ice accretions to determine when to activate the IPS. Proposed paragraph (g)(2) requires that these systems automatically cycle the airframe IPS to eliminate the need to continuously monitor ice accretions. An individual commenter requested that proposed paragraph (g) be revised to require manual system activation as a back-up to automatic activation. Compliance with § 25.1309, which requires an assessment of the hazard associated with the failure of a system, will determine whether a manual system is required as a back-up to an automatic activation system. Therefore, the FAA finds it is unnecessary to require a back-up manual system as suggested by the commenter.

12. Allow an Aerodynamic Performance Monitoring System

Marinvent and the Regional Airline Association requested revising the proposed rule to include an aerodynamic performance monitoring (APM) system as an alternative to ice detection systems.[9] The commenters believed APMs have several advantages over ice detectors, but that they do not inherently detect ice. Therefore, the proposed rule text did not directly address APMs because they are not strictly ''ice detection systems.'' The commenters understood that applicants may propose the APM as an alternative means of compliance by demonstrating an equivalent level of safety. However, the commenters thought the process of obtaining an equivalent level of safety finding would discourage the use of this alternative and believed there was a fundamental conceptual difference between the ice detection and aerodynamic monitoring, making it difficult for the applicant and the regulator to establish common ground to demonstrate an equivalent level of safety. The commenters contended the existing proposed rule text would effectively exclude the APM systems as a viable alternative means of compliance with the regulation.

The Regional Airline Association added that at least one of their associate members currently provides an APM system as an option in their aircraft (Aerospatiale model ATR 72) for their airline members.

The FAA concludes that, at this time, APMs are not sufficiently mature to use as a method to ensure timely activation of the airframe IPS. Further, contrary to the commenters' beliefs, the equivalent level of safety process is commonly used in certification programs and would not discourage the use of alternatives such as an APM.

In response to the Regional Airline Association's comment that an APM is currently offered as an option on the Aerospatiale ATR 72 aircraft, the FAA is aware that Aerospatiale has certificated an aircraft performance monitor, not an aerodynamic performance monitor. The aircraft performance monitor system used on the ATR 72 is intended to provide the flightcrew with information that could help them manage a severe icing encounter. The ATR 72's aircraft performance monitor system is not intended, nor certificated, to provide the flightcrew with information to ensure the airframe IPS is activated in a timely manner.

B. Airframe Ice Protection System Operation

Proposed § 25.1419(f) would allow an applicant to substantiate that the airframe IPS need not be operated during specific phases of flight. An individual commenter requested that § 25.1419(f) be revised to allow airplane operations with the IPS inactive if the airplane can be operated safely with the ice accretions associated with probable failures. The commenter also requested that § 25.1419(f) be revised to require that safe operation be demonstrated by flight test, icing tunnel tests, or other means.

The FAA finds the suggestion to consider only the ice accretions associated with probable failures unacceptable. Compliance with § 25.1309 determines the failures that must be considered, and this rule should not predetermine that only probable failures need be considered. Regarding the suggestion to specify the acceptable means of showing compliance, the FAA finds it is not necessary because § 25.1419(a) and (b) already specify the means that can be used to substantiate that an airplane can operate safely in icing conditions. For these reasons, the FAA did not adopt the suggested changes to § 25.1419(f).

C. Airplane Flight Manual Requirements

Proposed section § 25.1419(h) would require that procedures for operation of the IPS be established and documented in the Airplane Flight Manual (AFM).

BAE Systems Regional Aircraft requested the word ''airframe'' be added to § 25.1419(h). The FAA finds that adding the word ''airframe'' to § 25.1419(h) is not necessary because the procedures for operation of both engine and airframe IPS must be in the AFM. Traditionally, manufacturers provide adequate information in the AFM regarding the operation of the engine IPS, but information for an airframe IPS is sometimes lacking or is not consistent with the methods of operation used during certification. Proposed paragraph (h) is included to ensure future AFMs also include information for the operation of airframe IPS.

Another commenter requested that § 25.1419(h) be deleted because the requirement is already covered by the existing regulation in the section titled ''Airplane Flight Manual.''

The FAA finds that the sections relating to the AFM in part 25, Subpart G (§§ 25.1581–25.1587) do not explicitly address IPS operations. Therefore, the Subpart G regulations must be supplemented with the proposed § 25.1419(h) to ensure that procedures for operating the IPS are included in the AFM and are consistent with the requirements of § 25.1419. For these reasons, the suggested revision is not being adopted in this final rule.

Boeing requested that proposed § 25.1419(g)(1) be changed to require that the IPS must operate continuously only while the aircraft remains in icing conditions. The proposed rule would require operating the anti-icing system continuously throughout a potentially long flight after exiting icing conditions. Such continued operation while not in icing conditions is not necessary and wastes fuel. Boeing suggested that the proposed rule be revised to specify when an IPS that operated continuously can be deactivated.

Based on Boeing's comment, it appears the intent of § 25.1419(g) may be unclear. Proposed § 25.1419(g) provided three options to minimize the flightcrew workload associated with airframe IPS operation. One option (§ 25.1419(g)(1)) is an airframe IPS that operates continuously. Section 25.1419(g)(1) has been revised to clarify

[9] Aerodynamic performance monitoring systems directly measure the degradation of airfoil performance caused by the roughness and profile changes induced by the contamination of the airfoil.

that the airframe IPS must be designed to operate continuously, not to require continuous operation of an airframe IPS. We also clarified that procedures for operation of the IPS as specified in § 25.1419(h) include both activation and deactivation procedures. In addition, we revised § 25.1419(g)(1) to say that the IPS must be designed to operate continuously.

For future certification programs (as with past certification programs), it is incumbent upon the manufacturer to propose and substantiate when it is acceptable to deactivate the IPS. The only difference from past certifications will be that the activation requirements of § 25.1419(e) must be considered.

D. Other Comments

1. Clarify the Rule Is Applicable to Airframe IPS

BAE Systems Regional Aircraft requested that § 25.1419(f) and (g) be modified to indicate the ''airframe'' IPS are being referenced.

The FAA agrees that §§ 25.1419(f) and (g) should be clarified by adding the word ''airframe.'' Therefore, in § 25.1419(f), we revised the introductory language to reference the airframe IPS (''Unless the applicant shows that the airframe ice protection system * * *). In § 25.1419(g), we made a similar revision to the introductory language (''After the initial activation of the airframe ice protection system * * *).

2. Expand Rule To Include Certain Existing Airplanes and Prohibitions With IPS Inoperable

The NTSB requested a revision to address its perceived ongoing disconnect between the industry's guidance on deicing boot activation and what the FAA has learned and research has shown regarding ice bridging and deice boot effectiveness. The NTSB noted the Cessna 208 Caravan AFM instructs crews to wait for ¼ to ¾ inch of ice to accrete before activating the pneumatic deicing boots.

The FAA finds that for the new part 25 airplane and for existing part 25 airplanes that are modified in the future with significant airframe IPS design changes, this rule precludes the potential for perpetuating the belief that flightcrews should wait for a specific amount of ice to accumulate before activating the deicing boots. The final rule requires activation of the airframe IPS based on ice detectors or icing conditions and requires procedures for operating the IPS in the AFM. Therefore, for new part 25 airplanes, the industry guidance in the AFM will reflect the FAA regulatory requirements for activation of the IPS which does not allow activation of deicing boots based on the flightcrew determining that a specified thickness of ice has accumulated.

The NTSB, Air Crash Victims Families Group, and one other commenter requested the proposed rule be expanded to include existing airplanes equipped with pneumatic deicing boots and reference the NTSB safety recommendations A–98–91, A–98–100, A–07–14, and A–07–16 (which recommend icing related actions the FAA should take for existing airplanes).

We disagree. The NPRM did not address this issue, and revising this final rule to include retrofit requirements for existing airplanes would delay its issuance, which is not in the interest of safety. However, the FAA may consider additional rulemaking to address activation of the IPS on part 121 airplanes at a later date.

The NTSB also believed the proposed rule should prohibit crews from operating the airplane when certain functions of the IPS are inoperable, and should prohibit flight into known icing conditions if certain functions of the IPS are inoperable.

The FAA maintains that if certain equipment is inoperable, transport category airplanes should be prohibited from flight in forecasted icing conditions in addition to prohibiting flight in known icing conditions (as suggested by the NTSB). However, we do not concur with incorporating such a requirement into a certification rule. The FAA utilizes the Master Minimum Equipment List (MMEL) to evaluate whether an airplane may be operated with a particular piece of equipment inoperative. Each airplane is unique and the MMEL is the best way to determine the impact of an inoperable piece of equipment.

3. Revise Rule To Encourage Specific Airfoil Designs

The Regional Airline Association noted that several aircraft types over many years have been operated safely without any incidents or accidents attributed to icing. The commenter requested the proposed rule be rewritten to encourage airfoil design as the best means to address safety concerns due to operations in icing conditions.

Although the FAA does not write regulations to ''encourage'' specific airfoil designs, we do establish the performance and handling requirements an airplane must meet to substantiate that the airplane can operate safely in icing conditions. These safety requirements (to a certain extent) drive the design of the airfoil. However, it is the responsibility of the airframe manufacturer to design an airplane that meets the Federal Aviation Regulations icing regulations.

E. Economic Analysis

An individual commenter stated that the Goodrich Corporation cost estimates identified in the NPRM appear to be realistic, but the non-recurring costs could be reduced by a system that uses a detector that is different than the assumed ice detector. The commenter suggested using a ''universal'' sensor or detector that is independent of the airplane type and installation location; like a pressure sensor, a temperature sensor, a humidity sensor, or a system that consists of sensors that are universal.[10]

The commenter provided cost estimates that are less than the ice detector certification estimates used in our economic assessment. However, even with the more costly estimates, the FAA concluded the economic impact of the rulemaking is minimal. Since decreasing the cost estimates would not affect this conclusion, the FAA has determined it is not necessary to revise the costs in our economic assessment.

The FAA requested comments from U.S. manufacturers on their plans to produce a new part 25 certificated aircraft with deicing systems that operate cyclically and the associated certification costs. Bombardier and Transport Canada referenced this FAA request, but did not provide any data. Bombardier believes the FAA's economic analysis, which noted the trend of part 25 manufacturers to install thermal anti-ice protection systems in newly certificated part 25 airplanes, implied that the FAA considered ''cyclical'' deicing systems to be anachronistic. Bombardier indicated that technology in development may reintroduce cyclical deicing systems. Transport Canada indicated that if cyclical deicing systems are being considered for the future, then the FAA trend noted in the NPRM would not be correct.

While technology development may result in the reintroduction of cyclical deicing systems in the future, the FAA is unaware of any actual plans to produce a new part 25 certificated aircraft with deicing systems that operate cyclically and the associated certification costs. Without such information, we believe the economic assessment stating that the trend for

[10] The commenter estimated the non-recurring costs could be: Architecture/integration $7,500, qualification testing $10,000, system certification $50,000, and installation design $5,000.

new part 25 aircraft certifications is toward thermal anti-ice ice protection systems is accurate.

Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. We have determined that there is no current or new requirement for information collection associated with this amendment.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has determined that there are no ICAO Standards and Recommended Practices that correspond to these regulations.

III. Regulatory Evaluation, Regulatory Flexibility Determination, International Trade Impact Assessment, and Unfunded Mandates Assessment

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 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or Tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this final rule.

An assessment has been conducted of the economic cost impact of the final rule amending § 25.1419 of Title 14 of the Code of Federal Regulations (14 CFR) part 25, and we have determined the final rule has minimal costs. This final rule is the result of information gathered from a review of historical icing accidents and incidents. It is intended to improve the level of safety when part 25 airplanes are operated in icing conditions.

Amendment 25–121 revised § 25.207 to add requirements for considering the effects of icing on stall warning. At the time we issued Amendment 25–121, it was permissible for type certificate applicants to instruct pilots to wait for a specified amount of ice accretion to accumulate before activating the ice protection system (IPS). Section 25.207(h)(1), as adopted in Amendment 25–121, addressed this scenario by requiring flight testing with the specified amount of ice accretion to show the airplane could be operated safely until the IPS is functioning. This rule will prohibit use of this method for activating the IPS. Therefore, there is no longer any need to have the existing provision § 25.207(h)(1) that provides stall warning margin requirements for this method, and we are removing those provisions from § 25.207. This is a conforming change, and does not add any new requirements or costs. In addition, § 25.207 has been revised to improve its readability and to correct an error introduced by Amendment 25–121, but none of these revisions affect the substantive requirements.

This final rule requires newly certificated part 25 transport category airplanes certificated for flight in icing conditions to have one of the following methods to detect ice and activate the airframe IPS:

- A primary ice detection system, automatic or manual;
- The definition of visual cues for recognition of ice accretion on a specified surface combined with an advisory ice detection system that alerts the flightcrew; or
- The identification of icing conditions by an appropriate static or total air temperature and visible moisture cues.

The FAA did not receive comments causing us to change our NPRM determination that the expected costs are minimal. Bombardier indicated future technology may reintroduce cyclical deicing systems. Since 1971, no U.S. manufacturer has certificated cyclical deicing systems. Also, recent part 23 Very Light Jet (VLJ) certification programs have automatic cyclical deicing systems. We do not anticipate manufacturers to certificate manually-cycled deicing systems.

A. Cost Discussion

1. Major Assumptions

This evaluation makes the following assumptions:

- We used a $50 hourly rate for a mechanic/technician and a $75 hourly rate for an engineer working for an airplane manufacturer or modifier.
- Whenever various compliance options are available to the manufacturers, we chose the least costly option in our analysis.

Other data and derived assumptions are discussed in the following sections on costs and benefits.

2. Estimate of Costs

This section discusses the costs of a new requirement for transport category airplane manufacturers to include a method of ice detection on newly certificated airplanes. The cost estimate included below is not an estimate per manufacturer, rather an estimate per new part 25 airplane certification.

This final rule will require manufacturers of part 25 airplanes to provide the flightcrew with an effective method of ice detection. Such a method can provide a means, using an ice detection system (IDS), to alert the flightcrew of icing conditions and enable timely activation of the airframe IPS for the initial and any subsequent cycles.

The requirements for ice detection and activation of the airframe IPS are applicable to all phases of flight, unless it can be shown that the airframe IPS need not be operated during specific phases of flight. If the airframe IPS operates in a cyclical manner, it must either include a system that automatically cycles the airframe IPS, or there must be a method that alerts the flightcrew each time the airframe ice protection system must be cycled. This final rule requires:

- (e)(1) A primary IDS that automatically activates or alerts the flightcrew to activate the airframe IPS;
- (e)(2) A definition of visual cues for recognition of the first sign of ice accretion on a specified surface combined with an advisory IDS that alerts the flightcrew to activate the airframe IPS; or
- (e)(3) Identification of conditions conducive to airframe icing as defined by an appropriate static or total air temperature and visible moisture for use by the flightcrew to activate the airframe IPS.

Any of the three ice detection methods will enable timely activation of the airframe IPS and satisfy the requirements of this final rule.

The first method of ice detection is the use of a primary IDS. A primary IDS usually has two ice detectors. The cost of an ice detector used in this analysis is based on the Goodrich Corporation's average price of $6,000 per ice detector for a production airplane. The Aviation Rulemaking Advisory Committee (ARAC) Ice Protection Harmonization Working Group provided us with manufacturer cost estimates for System Design, System Qualification, Hardware, Installation, and Maintenance. Assuming the primary IDS has two ice detectors, we estimate the average cost for a primary IDS to be about $485,000 per certification, $12,000 ($6,000 × 2) for the hardware and $2,500 for the installation, or $14,500 ($12,000 + $2,500) per airplane. Table 1 shows a detailed breakout of these cost estimates.

One commenter to the NPRM, regarding Goodrich costs, stated there was a cheaper alternative system than the Goodrich system. The FAA notes a lower cost alternative is feasible.

TABLE 1—COSTS FOR § 25.1419(E)(1)—PRIMARY ICE DETECTION SYSTEM

Manufacturer non-recurring costs (per aircraft group/type) 2006$	Hours	Hourly rate	Additional cost	Cost
System Design:				
System architecture/Integration	3,000	$75		$225,000
Ice detector positioning	300	75		22,500
Procedures for AFM, AOM/FCOM & MMEL	200	75		15,000
System Qualification/certification:				
Ice detector qualification	300	75		22,500
Ice detection system certification	600	75		45,000
Flight tests	400	75	100,000	130,000
Installation Design:				
Installation drawings	500	50		25,000
Total	5,300			485,000
Costs (per airplane):				
Hardware (Primary Ice Detection System)			12,000	12,000
Installation	50	50		2,500
Additional weight is 5–10 kg				0
Total				14,500

The second method of ice detection is the use of an advisory IDS along with visual cues. The major difference between a primary and an advisory IDS is that the primary is the principal means to determine when the airframe IPS should be activated and has two ice detectors. In contrast, an advisory IDS is a backup to the flightcrew and has only one ice detector. The average cost for an advisory IDS is estimated to be $447,500 per certification, $6,000 for the hardware and $1,250 for the installation, or $7,250 ($6,000 + $1,250) per airplane. Table 2 shows a detailed breakout of these costs estimates.

TABLE 2—COSTS FOR § 25.1419(E)(2)—ADVISORY ICE DETECTION SYSTEM AND VISUAL CUES

Manufacturer non-recurring costs (per aircraft group/type) 2006$	Hours	Hourly rate	Additional cost	Cost
System Design:				
System architecture/Integration	2,500	$75		$187,500
Ice detector positioning	200	75		15,000
Visual cue determination/design	200	75		15,000
Procedures for AFM, AOM/FCOM & MMEL	200	75		15,000
System Qualification/certification:				
Ice detection qualification	300	75		22,500
Visual cue substantiation	200	75		15,000
Ice detection system certification	300	75		22,500
Flight tests	400	75	$100,000	130,000
Installation Design:				
Installation drawings	500	50		25,000
Total	4,800			447,500
Costs (per airplane):				
Hardware (Advisory Ice Detection System)			6,000	6,000
Installation	25	50		1,250
Additional weight is 5–10 kg				0
Total				7,250

The third method of ice detection is a definition of conditions conducive to airframe icing that will be used by the flightcrew to activate the airframe IPS. This definition will be included in the Airplane Flight Manual. There are no costs imposed on the airplane manufacturers with this option. Table 3 shows a summary of the costs for each alternative.

TABLE 3—COST SUMMARY—§ 25.1419(E)

	Costs	
	Per certification	Per airplane
§ 25.1419 Alternatives:		
(e)(1) Primary IDS	$485,000	$14,500
(e)(2) Advisory IDS and Visual Cues	447,500	7,250
(e)(3) Temperature and Moisture	0	0

The least cost alternative is to activate the airframe IPS whenever the airplane is operating in conditions conducive to airframe icing based on a specific air temperature threshold and the presence of visible moisture. Since there are no additional certification or production costs to manufacturers by complying with § 25.1419(e)(3) through this alternative, we have determined there are no costs associated with compliance with § 25.1419(e).

We are aware some manufacturers may choose to install more complex systems ((e)(1) or (e)(2)), and want to note these more complex systems are acceptable alternatives to (e)(3).

§ 25.1419(f)

Section 25.1419(f) describes the applicability of the final rule to all phases of flight, so there are no additional costs associated with this section.

§ 25.1419(g)

After the initial operation of the airframe IPS, § 25.1419(g) provides alternatives the manufacturer must provide to the operator for safe flight. These alternatives are:

- The IPS must be designed to operate continuously (§ 25.1419(g)(1)), or
- The airplane must be equipped with a system that automatically cycles the IPS (§ 25.1419(g)(2)), or
- An IDS must be provided to alert the flightcrew each time the IPS must be cycled (§ 25.1419(g)(3)).

Section 25.1419(g) applies to airplanes with either a thermal anti-icing IPS or an IPS that operates in a cyclical manner. Thermal anti-icing systems typically operate continuously while deicing systems usually operate cyclically.

Section 25.1419(g)(1) applies primarily to a thermal anti-icing IPS, which typically uses heat to keep protected surfaces of the airplane free of ice accretions.

No additional manufacturing costs are associated with § 25.1419(g)(1) because, once a thermal anti-IPS is activated, it is capable of operating continuously.

The cost estimates for each option do not include primary and advisory ice detection system maintenance, which would make the costs for these alternatives higher. The FAA has determined that the trend for new part 25 aircraft certification is toward anti-ice protection systems so the maintenance costs associated with deicing ice protection systems are not considered. The cost estimates for § 25.1419(g)(1) do not include the associated maintenance costs for anti-ice protection systems as operators are already incurring these costs.

Sections 25.1419(g)(2) and (3) apply to an airframe IPS that operates in a cyclical manner. Past delivery history has shown that about 97% of U.S. manufactured part 25 airplanes delivered have thermal anti-icing IPS and 3% have deicing IPSs that operate in a cyclical manner. Cessna is the only U.S. manufacturer that currently delivers part 25 certificated airplanes with an IPS that operates in a cyclical manner. Those airplanes were certificated in September 1971.[11] Newer variants of airplanes from that September 1971 type certificate and all newer part 25 new Cessna certifications have thermal anti-icing IPS that operate continuously. We believe the trend for new part 25 aircraft certifications is toward a thermal anti-icing IPS that operates continuously. Because of the trend of part 25 manufacturers to install thermal anti-icing IPS in their newly certificated part 25 airplanes, we believe there are no costs imposed on the airplane manufacturers by § 25.1419(g).

Bombardier indicated future technology may reintroduce cyclical deicing systems. No U.S. manufacturer has certificated cyclical deicing systems since 1971. Since recent part 23 Very Light Jet (VLJ) certification programs have automatic cyclical deicing systems, we do not anticipate airplane manufacturers to certificate manually-cycled deicing systems.

[11] Type Certification Data Sheet No. A22CE.

We received no comments from U.S. manufacturers on their plans to produce a newly part 25 certificated aircraft with deicing systems that operate cyclically and the associated certification costs; therefore, we believe § 25.1419(g) will add no additional costs.

§ 25.1419(h)

Future Airplane Flight Manuals can be readily prepared to include appropriate icing procedures for future certificated air transport category airplanes. Thus, minimal costs are associated with § 25.1419(h).

B. Benefits

The FAA is adopting this final rule because accidents and incidents occurred where the flightcrew did not operate the airframe IPS in a timely manner and because of concerns over the flightcrew workload required to operate an airframe IPS that the flightcrew must manually cycle. The final rule addresses these concerns by ensuring that flightcrews are provided with a clear means to know when to activate the airframe IPS and by reducing the workload associated with an airframe IPS that operates cyclically. The safety benefit of this final rule is that it will improve the level of safety of new airplane designs for operations in icing conditions.

C. Conclusions

The FAA has determined that this final rule has benefits that justify its minimal costs. However, the Office of Management and Budget has determined that this final rule is a ''significant regulatory action,'' because it harmonizes U.S. aviation standards with those of other civil aviation authorities.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Pub. L. 96–354) (RFA) establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.'' The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

However, if an agency determines that a rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

As we stated in the NPRM, all United States transport category aircraft manufacturers exceed the Small Business Administration small-entity criteria of 1,500 employees. We received no public comments disputing this determination. Therefore, as the FAA Administrator, I certify that this rule will not have a significant economic impact on a substantial number of small entities.

International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39) prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this final rule and has no basis for believing the rule will impose substantially different costs on domestic and international entities. Thus the FAA believes the rule has a neutral trade impact.

Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (in 1995 dollars) in any one year by State, local, and Tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $136.1 million in lieu of $100 million. This final rule does not contain such a mandate; therefore, the requirements of title II of the Act do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action will not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, does not have federalism implications.

Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the FAA, when modifying its regulations in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish appropriate regulatory distinctions. In the NPRM, we requested comments on whether the proposed rule should apply differently to intrastate operations in Alaska. We did not receive any comments, and we have determined, based on the administrative record of this rulemaking, that there is no need to make any regulatory distinctions applicable to intrastate aviation in Alaska.

Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 4(j) and involves no extraordinary circumstances.

Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA has analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). We have determined that it is not a ''significant energy action'' under the executive order because while it is a ''significant regulatory action,'' it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

Availability of Rulemaking Documents

You can get an electronic copy of rulemaking documents using the Internet by—

1. Searching the Federal eRulemaking Portal (*http://www.regulations.gov*);
2. Visiting the FAA's Regulations and Policies Web page at *http://www.faa.gov/regulations_policies/*; or
3. Accessing the Government Printing Office's Web page at *http://www.gpoaccess.gov/fr/index.html.*

You can also get a copy by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267–9680. Make sure to identify the amendment number or docket number of this rulemaking.

Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act statement in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70; Pages 19477–78) or you may visit *http://DocketsInfo.dot.gov.*

Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. If you are a small entity and you have a question regarding this document, you may contact your local FAA official, or the person listed under the **FOR FURTHER INFORMATION CONTACT** heading at the beginning of the preamble. You can find out more about SBREFA on the Internet at *http://www.faa.gov/regulations_policies/rulemaking/sbre_act/.*

Appendix 1—Definition of Terms Used in This Preamble

For the preamble of this rulemaking, the following definitions are applicable. These definitions of terms are for use *only* with this rulemaking's preamble:

a. *Advisory ice detection system:* An advisory ice detection system annunciates the presence of icing conditions or ice accretion. The advisory ice detection system provides information advising the flightcrew of the presence of ice accretion or icing conditions. An advisory ice detection system differs from a primary ice detection system in that it usually consists of a single ice detector without redundancies that provide sufficient reliability to comply with § 25.1309. Therefore, it can only be used in conjunction with other means (most commonly, visual observation by the flightcrew) to determine the need for, or timing of, activating the anti-icing or deicing system. The flightcrew is responsible for monitoring the icing conditions or ice accretion as defined in the AFM (typically using total air temperature and visible moisture criteria or visible ice accretion) and activating the anti-icing or deicing system(s).

b. *Airframe icing:* Airframe icing is ice accretions on the airplane, except for the propulsion system.

c. *Anti-icing:* Anti-icing is the prevention of ice accretions on a protected surface, either:

- By evaporating the impinging water; or
- By allowing it to run back and off the protected surface or freeze on non-critical areas.

d. *Automatic cycling mode:* An automatic cycling mode is a mode of operation of the airframe deicing system that provides repetitive cycles of the system without the need for the pilot to select each cycle. This is generally done with a timer, and there may be more than one timing mode.

e. *Deicing:* Deicing is the removal or the process of removal of an ice accretion after it has formed on a surface.

f. *Ice Protection System:* An ice protection system (IPS) is a system that protects certain critical aircraft parts from ice accretion. To be an approved system, it must satisfy the requirements of § 25.1419.

g. *Primary ice detection system:* A primary ice detection system is used to determine when the IPS must be activated. A primary ice detection system is a system with redundancies that provide sufficient reliability to comply with § 25.1309 so the flight crew does not need to visually monitor the icing accretions that may be building on the airplane. The system annunciates the presence of ice accretion or icing conditions, and may also provide information to other aircraft systems. A primary automatic system automatically activates the anti-icing or deicing IPS. With a primary manual system, the flightcrew activates the anti-icing or deicing IPS upon indication from the primary ice detection system.

h. *Static air temperature:* The air temperature as would be measured by a temperature sensor not in motion with respect to that air. This temperature is also referred to in other documents as ''outside air temperature,'' ''true outside temperature,'' or ''ambient temperature.''

i. *Total air temperature:* The temperature of a parcel of air brought to rest relative to the aircraft resulting from adiabatic compression of the parcel. This temperature is also referred to in other documents as ''stagnation temperature.''

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements, Safety, Transportation.

The Amendment

■ In consideration of the foregoing, the Federal Aviation Administration amends Part 25 of Title 14, Code of Federal Regulations as follows:

PART 25—AIRWORTHINESS STANDARDS, TRANSPORT CATEGORY AIRPLANES

■ 1. The authority citation for part 25 continues to read as follows:

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

■ 2. Amend § 25.143 by revising paragraph (j) to read as follows:

§ 25.143 General.

* * * * *

(j) For flight in icing conditions before the ice protection system has been activated and is performing its intended function, it must be demonstrated in flight with the ice accretion defined in appendix C, part II(e) of this part that:

(1) The airplane is controllable in a pull-up maneuver up to 1.5 g load factor; and

(2) There is no pitch control force reversal during a pushover maneuver down to 0.5 g load factor.

■ 3. Amend § 25.207 by revising paragraphs (b) and (h), and adding a new paragraph (i) to read as follows:

§ 25.207 Stall warning.

* * * * *

(b) The warning must be furnished either through the inherent aerodynamic qualities of the airplane or by a device that will give clearly distinguishable indications under expected conditions of flight. However, a visual stall warning device that requires the attention of the crew within the cockpit is not acceptable by itself. If a warning device is used, it must provide a warning in each of the airplane configurations prescribed in paragraph (a) of this section at the speed prescribed in paragraphs (c) and (d) of this section. Except for showing compliance with the stall warning margin prescribed in paragraph (h)(3)(ii) of this section, stall warning for flight in icing conditions must be provided by the same means as stall warning for flight in non-icing conditions.

* * * * *

(h) For flight in icing conditions before the ice protection system has been activated and is performing its intended function, with the ice accretion defined in appendix C, part II(e) of this part, the stall warning margin in straight and turning flight must be sufficient to allow the pilot to prevent stalling without encountering any adverse flight characteristics when:

(1) The speed is reduced at rates not exceeding one knot per second;

(2) The pilot performs the recovery maneuver in the same way as for flight in non-icing conditions; and

(3) The recovery maneuver is started no earlier than:

(i) One second after the onset of stall warning if stall warning is provided by the same means as for flight in non-icing conditions; or

(ii) Three seconds after the onset of stall warning if stall warning is provided by a different means than for flight in non-icing conditions.

(i) In showing compliance with paragraph (h) of this section, if stall warning is provided by a different means in icing conditions than for non-icing conditions, compliance with § 25.203 must be shown using the accretion defined in appendix C, part II(e) of this part. Compliance with this requirement must be shown using the demonstration prescribed by § 25.201, except that the deceleration rates of § 25.201(c)(2) need not be demonstrated.

■ 4. Amend § 25.1419 by adding new paragraphs (e), (f), (g), and (h) to read as follows:

§ 25.1419 Ice protection.

* * * * *

(e) One of the following methods of icing detection and activation of the airframe ice protection system must be provided:

(1) A primary ice detection system that automatically activates or alerts the flightcrew to activate the airframe ice protection system;

(2) A definition of visual cues for recognition of the first sign of ice accretion on a specified surface combined with an advisory ice detection system that alerts the flightcrew to activate the airframe ice protection system; or

(3) Identification of conditions conducive to airframe icing as defined by an appropriate static or total air temperature and visible moisture for use by the flightcrew to activate the airframe ice protection system.

(f) Unless the applicant shows that the airframe ice protection system need not be operated during specific phases of flight, the requirements of paragraph (e) of this section are applicable to all phases of flight.

(g) After the initial activation of the airframe ice protection system—

(1) The ice protection system must be designed to operate continuously;

(2) The airplane must be equipped with a system that automatically cycles the ice protection system; or

(3) An ice detection system must be provided to alert the flightcrew each time the ice protection system must be cycled.

(h) Procedures for operation of the ice protection system, including activation and deactivation, must be established and documented in the Airplane Flight Manual.

■ 5. Amend appendix C to part 25 by revising part II (e) to read as follows:

Appendix C to Part 25

* * * * *

Part II—Airframe Ice Accretions for Showing Compliance With Subpart B

* * * * *

(e) The ice accretion before the ice protection system has been activated and is performing its intended function is the critical ice accretion formed on the unprotected and normally protected surfaces before activation and effective operation of the ice protection system in continuous maximum atmospheric icing conditions. This ice accretion only applies in showing compliance to §§ 25.143(j) and 25.207(h), and 25.207(i).

Issued in Washington, DC, on July 17, 2009.

Lynne A. Osmus,

Acting Administrator.

[FR Doc. E9–18483 Filed 7–31–09; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2009–0227; Directorate Identifier 2007–SW–65–AD; Amendment 39–15978; AD 2009–15–15]

RIN 2120–AA64

Airworthiness Directives; Bell Helicopter Textron Canada Model 427 Helicopters

AGENCY: Federal Aviation Administration (FAA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for Bell Helicopter Textron Canada (BHTC) Model 427 helicopters. This AD results from mandatory continuing airworthiness information (MCAI) originated by the aviation authority of Canada to identify and correct an unsafe condition on an aviation product. Transport Canada, the aviation authority of Canada, with which we have a bilateral agreement, states that it has been determined that the existing hardware connecting the vertical fin to the tail rotor gearbox needs to be upgraded to prevent the vertical fin from becoming loose.

BHTC has received reports of loose vertical fins discovered during inspections. Investigation revealed that the current vertical fin attachment hardware may not provide adequate clamp-up. If not corrected, the vertical fin could become loose and cause vibration, which could lead to subsequent loss of control of the helicopter. This AD requires actions that are intended to address this unsafe condition.

DATES: This AD becomes effective on September 8, 2009.

ADDRESSES: You may examine the AD docket on the Internet at *http://regulations.gov* or in person at the Docket Operations office, U.S. Department of Transportation, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue, SE., Washington, DC between 9 a.m. and 5 p.m. Monday through Friday, except Federal holidays.

You may get the service information identified in this AD from Bell Helicopter Textron Canada Limited, 12,800 Rue de l'Avenir, Mirabel, Quebec J7J1R4, telephone (450) 437–2862 or (800) 363–8023, fax (450) 433–0272, or at *http://www.bellcustomer.com/files/*.

Examining the AD Docket: The AD docket contains the Notice of proposed rulemaking (NPRM), the economic evaluation, any comments received, and other information. The street address and operating hours for the Docket Operations office (telephone (800) 647–5527) are in the **ADDRESSES** section of this AD. Comments will be available in the AD docket shortly after they are received.

FOR FURTHER INFORMATION CONTACT: Sharon Miles, Aviation Safety Engineer, FAA, Rotorcraft Directorate, Regulations and Guidance Group, 2601 Meacham Blvd., Fort Worth, Texas 76137, telephone (817) 222–5122, fax (817) 222–5961.

SUPPLEMENTARY INFORMATION:

Discussion

We issued an NPRM to amend 14 CFR part 39 to include an AD that would apply to BHTC Model 427 helicopters on March 4, 2009. That NPRM was published in the **Federal Register** on March 23, 2009 (74 FR 12098). That NPRM proposed to require actions to prevent the vertical fin from becoming loose and causing vibration, which could lead to subsequent loss of control of the helicopter. You may obtain further information by examining the MCAI and any related service information in the AD docket.

Comments

By publishing the NPRM, we gave the public an opportunity to participate in developing this AD. However, we received no comment on the NPRM or on our determination of the cost to the public. Therefore, based on our review and evaluation of the available data, we have determined that air safety and the public interest require adopting the AD as proposed.

Relevant Service Information

Bell Helicopter Textron has issued Alert Service Bulletin No. 427–06–15, dated December 14, 2006. The actions described in the MCAI are intended to correct the same unsafe condition as that identified in the service information.

Differences Between This AD and the MCAI AD

We have reviewed the MCAI AD and related service information and, in general, agree with their substance. This AD differs from the MCAI AD as follows:

- We do not require compliance ''no later than November 27, 2007'', because that date has passed.
- We refer to the compliance time as ''hours time-in-service'' rather than ''air time hours.''

These differences are highlighted in the ''Differences Between this AD and the MCAI AD'' section in the AD.

Costs of Compliance

We estimate that this AD will affect about 17 products of U.S. registry. We also estimate that it will take about 2 work-hours per helicopter to remove and visually inspect the vertical fin and the tail rotor gearbox attachment legs and to re-install the vertical fin. The average labor rate is $80 per work-hour. Required parts will cost about $227 per helicopter. Based on these figures, we estimate the cost of this AD on U.S. operators to be $6,579 for the fleet, or $387 per helicopter, to perform the inspections and remove and re-install the vertical fin.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. ''Subtitle VII: