DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA–2007–27654; Notice No. 07–07]

RIN 2120–AI90

Activation of Ice Protection

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

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

DATES: Send your comments on or before July 25, 2007.

ADDRESSES: You may send comments identified by Docket Number FAA–2007–27654 using any of the following methods:

- DOT Docket Web site: Go to *http://dms.dot.gov* and follow the instructions for sending your comments electronically.
- Government-wide rulemaking Web site: Go to *http://www.regulations.gov* and follow the instructions for sending your comments electronically.
- Mail: Docket Management Facility; U.S. Department of Transportation, 400 Seventh Street, SW., Nassif Building, Room PL–401, Washington, DC 20590–0001.
- Fax: 1–202–493–2251.
- Hand Delivery: Room PL–401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For more information on the rulemaking process, see the **SUPPLEMENTARY INFORMATION** section of this document.

Privacy: We will post all comments we receive, without change, to *http://dms.dot.gov,* including any personal information you provide. For more information, see the Privacy Act discussion in the **SUPPLEMENTARY INFORMATION** section of this document.

Docket: To read background documents or comments received, go to *http://dms.dot.gov* at any time or to Room PL–401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Kathi Ishimaru, FAA, Propulsion/Mechanical Systems Branch, ANM–112, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, WA 98057–3356; telephone (425) 227–2674; facsimile (425) 227–1320, e-mail *kathi.ishimaru@faa.gov.*

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. We also invite comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this preamble between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. You may also review the docket using the Internet at the web address in the **ADDRESSES** section.

Privacy Act: Using the search function of our docket web site, anyone can find and read the comments received into any of our dockets, including the name of the individual sending the comment (or signing the comment 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 (65 FR 19477–78) or you may visit *http://dms.dot.gov.*

Before acting on this proposal, we will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring expense or delay. We may change this proposal in light of the comments we receive.

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

Proprietary or Confidential Business Information

Do not file in the docket information that you consider to be proprietary or confidential business information. Send or deliver this information directly to the person identified in the **FOR FURTHER INFORMATION CONTACT** section of this document. You must mark the information that you consider proprietary or confidential. If you send the information on a disk or CD ROM, mark the outside of the disk or CD ROM and also identify electronically within the disk or CD ROM the specific information that is proprietary or confidential.

Under Title 14, Code of Federal Regulations (14 CFR) 11.35(b), when we are aware of proprietary information filed with a comment, we do not place it in the docket. We hold it in a separate file to which the public does not have access, and place a note in the docket that we have received it. If we receive a request to examine or copy this information, we treat it as any other request under the Freedom of Information Act (5 U.S.C. 552). We process such a request under the DOT procedures found in 49 CFR part 7.

Availability of Rulemaking Documents

You can get an electronic copy using the Internet by:

(1) Searching the Department of Transportation's electronic Docket Management System (DMS) web page (*http://dms.dot.gov/search*);

(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 docket number, notice number, or amendment number of this rulemaking.

Authority for This Rulemaking

The FAA's authority to issue rules regarding 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; regulations and minimum standards in the interest of safety for inspecting, servicing, and overhauling aircraft; and regulations for other practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it prescribes—

• New safety standards for the design of transport category airplanes.

• New safety requirements that are necessary for the design, production, operations, and maintenance of those airplanes, and for other practices, methods and procedures relating to those airplanes.

Background

On October 31, 1994, an accident involving an Avions de Transport Regional ATR 72 series airplane occurred in icing conditions. 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,[1] 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),[2] 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 proposed rule is based on ARAC's recommendations to the FAA.

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

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

Appendix 1 defines terms used in this notice of proposed rulemaking (NPRM).

A. Existing Regulations for Flight in Icing Conditions

Currently, the certification regulations applicable to transport category airplanes for flight in icing conditions require: ''the airplane must be able to operate safely in the continuous maximum and intermittent maximum icing conditions of appendix C.'' [3]

Parts 91, 121, and 135 contain regulations that apply to airplane operations in icing conditions. Operating regulations under part 91 and 135 address limitations in icing conditions for airplanes operated under these regulations.[4] Part 121 addresses operations in icing conditions that might adversely affect safety and installation of certain types of ice protection equipment and wing illumination equipment.[5]

Neither the operating regulations nor the certification regulations require a means to warn flightcrews of ice accretion on critical surfaces requiring crew action.

B. National Transportation Safety Board Safety Recommendations

The National Transportation Safety Board (NTSB) issued the following safety recommendations related to airframe icing that are partially addressed by this proposal:

• NTSB Safety Recommendation No. A–96–56 [6] is a result of the Avions de Transport Regional ATR 72 series airplane accident in Roselawn, Indiana on October 31, 1994, where 68 people died. The accident airplane crashed during a rapid descent after an uncommanded roll excursion while operating in icing conditions. The NTSB recommended that the FAA require a means for flightcrews to positively determine when they are in icing conditions that exceed the limits for aircraft certification.

• NTSB Safety Recommendation No. A–98–91 [7] is a result of the Empresa Brasileira de Aeronautica, S/A (Embraer) EMB–120 series airplane accident near Monroe, Michigan, on January 9, 1997, where 29 people died. The accident airplane crashed while operating in icing conditions. The flightcrew may not have activated the airframe ice protection system. The NTSB recommended that the FAA require manufacturers and operators to revise their manuals and training to emphasize that leading edge deicing boots should be activated as soon as the airplane enters icing conditions.

[3] Section 25.1419, Ice Protection.

[4] 14 CFR 91.527, Operating in icing conditions; and § 135.227, Icing conditions: Operating limitations.

[5] 14 CFR 121.629(a), Operation in icing conditions and § 121.341, Equipment for operations in icing conditions.

[6] NTSB recommendation A–96–56; available in the Docket and on the Internet at: *http://www.ntsb.gov/Recs/letters/1996/A96_48_69.pdf.*

[7] NTSB recommendation A–98–91, available in the Docket and on the Internet at *http://www.ntsb.gov/Recs/letters/1998/A98_88_106.pdf.*

C. Authorities

1. Federal Aviation Administration

Title 14 CFR part 25 contains the U.S. airworthiness standards for type certification of transport category airplanes. These standards apply to airplanes manufactured within the U.S. and to airplanes manufactured in other countries and imported to the U.S. under a bilateral airworthiness agreement.

2. Joint Aviation Authorities

The Joint Airworthiness Requirements (JAR)–25 contain the European airworthiness standards for type certification of transport category airplanes. Thirty-seven European countries accept airplanes type certificated to JAR–25 standards, including airplanes manufactured in the U.S. that are type certificated to JAR–25 standards for export to Europe.

3. European Aviation Safety Agency

A new aviation regulatory body, the European Aviation Safety Agency (EASA), was established by the European community to develop standards to ensure the highest level of safety and environmental protection, oversee their uniform application, and promote them internationally. The EASA formally became operational for certification of aircraft, engines, parts, and appliances on September 28, 2003. The EASA will eventually absorb all functions and activities of the Joint Aviation Authorities, including its efforts to harmonize EASA's airworthiness certification regulations with those of the U.S.

The JAR–25 standards have been incorporated into EASA's ''Certification Specifications for Large Aeroplanes,'' (CS)–25, in similar if not identical language. The EASA's CS–25 became effective October 17, 2003.

D. Harmonization of U.S. Standards With Those of Other Countries

The airworthiness standards proposed in this NPRM were developed before EASA began operations. They were developed in coordination with the Joint Aviation Authorities (JAA), United Kingdom Civil Aviation Authority, and Transport Canada.

E. Related Rulemaking Activity

1. Docket No. 2005–22840; Notice No. 05–10

The proposed rulemaking would amend part 25 by adding specific requirements for airplane performance and handling qualities for flight in icing conditions. Further, the proposal amends § 25.1419 to address certification approval for flight in icing conditions for airplanes without ice protection features. Those proposed changes do not impact this rulemaking. However, this rulemaking may result in minor conforming changes to the airplane performance and handling qualities for flight in icing conditions rules.

2. ARAC Ice Protection Harmonization Working Group Recommendations

The ARAC has submitted additional rulemaking recommendations to the FAA to improve the safety of operations in icing conditions:

- Part 121 recommendations to address activation of ice protection systems.
- Part 121 recommendations to require certain airplanes to exit icing conditions.
- Part 25 and 33 recommendations to address operations in supercooled large droplet, mixed phase, and glaciated icing conditions.

The recommendations may lead to future rulemaking, but do not directly impact this NPRM.

F. Advisory Material

In addition to this NPRM, the FAA is developing Advisory Circular (AC) 25.1419–2x, Compliance with the Ice Protection Requirements of §§ 25.1419(e), (f), (g), and (h). This proposed AC would provide guidance material for one acceptable means, but not the only means, of demonstrating compliance with this proposed rule. The proposed AC will be posted on ''Aircraft Certification Draft Documents Open for Comment'' Web site, *http://www.faa.gov/aircraft/draft_docs,* on the same date this NPRM is published in the **Federal Register** The date comments are due is indicated on that Web site.

Discussion of the Proposal

A. Safety Concern

The ARAC Ice Protection Harmonization Working Group reviewed icing events and found 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 ice protection system (IPS). The ARAC Ice Protection Harmonization Working Group concluded and recommended to the FAA that flightcrews must be provided with a clear means to know when to activate the IPS.

B. Means To Address the Safety Concern

The FAA has issued airworthiness directives to address the safety concern of when to activate the IPS on certain airplanes. These airworthiness directives require activation of pneumatic deicing boots at the first signs of ice accretion on the airplane. This requirement relieves the pilot of the responsibility for determining if the amount of ice accumulated on the wing warrants activation of the IPS. However, activation of the deicing boots is still subject to the flightcrew's observation of ice accretions, and such observations can be difficult during times of high workload, operations at night, or when clear ice has accumulated. Also, the difficulties of observing ice accretions are applicable to *any* IPS that relies on the flightcrew's observations for activating the system, not just pneumatic deicing boots.

The ARAC Ice Protection Harmonization Working Group concluded that installing a device to alert the flightcrew to activate the IPS would be an improved means to address these situations for future airplanes. A primary ice detection system would be one acceptable means. A primary ice detection system typically consists of two independent detectors. It could either automatically activate the IPS, or provide an indication to the flightcrew when the system must be activated manually. An advisory ice detection system, in conjunction with substantiated visual cues, would also be an acceptable means. The acceptability is contingent upon:

- An advisory ice detection system that annunciates when icing conditions exist or when the substantiated visual cues are present.
- The substantiated visual cues rely on the flightcrew's observation of the first sign of ice accretion on the airplane and do not depend on the pilot determining the thickness of the accretion.
- The flightcrew activates the ice protection system when they observe the ice accretion or when the ice detector annunciates, whichever occurs first.

An advisory ice detection system typically consists of one detector. Such a system does not have sufficient reliability to be the primary means of determining when the IPS must be activated. However, the advisory ice detection system would provide a much higher level of safety than visual cues alone and would mitigate the effects of human sensory limitations and inadequate attention due to workload.

The ARAC Ice Protection Harmonization Working Group also concluded that an acceptable alternative to requiring an ice detector would be to require operating the IPS whenever the airplane is operating in conditions conducive to airframe icing. In this case, the flightcrew would activate the IPS in response to a specific air temperature threshold and the presence of visible moisture. Because ambient temperature is indicated by flightdeck instruments and the flightcrew can readily observe visible moisture, deciding when to initiate the system would require little increased effort by the flightcrew.

The IPS activation method should be applicable during all phases of flight, unless it can be shown that the IPS need not be activated during certain phases of flight. For example, if the IPS is not operated during takeoff until after the second segment climb, then the applicant must substantiate that the airplane can operate safely with ice accretions that could form prior to this point.

The FAA concurs with the safety concern that flightcrews must be provided with a clear means to know when to activate the IPS. To ensure timely activation of the IPS, the proposed § 25.1419(e) requires one of the three acceptable methods recommended by the ARAC Ice Protection Harmonization Working Group: a primary ice detector, visual cues and an advisory ice detector, or operation based on temperature and visible moisture.

Specifically, proposed § 25.1419(e) requires one of the following methods of icing detection and activation of the airframe IPS:

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

(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 IPS; 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 IPS.

Proposed § 25.1419(f) requires the activation method be applicable to all phases of flight unless it can be shown that the ice protection system need not be operated during specific phases of flight. Proposed § 25.1419(h) requires that the procedures for operating the ice protection system be included in the Airplane Flight Manual.

C. Flightcrew Workload

The FAA is concerned with the flightcrew workload created if an IPS must be manually cycled. Manual operation of the IPS could be a distraction during the approach and landing phases of flight which typically involve higher pilot workloads. During these critical phases of flight, flightcrews have less time to devote to managing the airplane ice accretions. An IPS that is automatically cycled or operates on a continuous basis (for example, an anti-icing system) does not create this additional workload and, therefore, is not a concern. Section 25.1419(g) of this proposed rule alleviates the workload concerns by requiring airplanes to be equipped with an IPS that would operate in a cyclical manner. This would include a system that would automatically cycle the IPS or an ice detection system that would alert the flightcrew whenever IPS cycling is necessary.

D. Applicability of the Proposed Rule

A review of icing events found discriminating design factors, such as wing chord length or airplane weight, significantly influence the risk of icing accidents and incidents. The FAA and the ARAC Ice Protection Harmonization Working Group, however, determined that a certification rule dealing with ice detectors should not be limited to a specific group of airplanes because of past performance. Since future airplane designs could change, a similar safety record might not be achieved. Relying solely on past performance data for future airplane designs would not be prudent. Therefore, the proposed rule is applicable to all part 25 airplanes.

E. Technology

The FAA and ARAC Ice Protection Harmonization Working Group reviewed the current state of ice detector technology and found that it provides a viable means of compliance with the proposed rule. Several methods exist that can reliably alert the flightcrew to activate the IPS. This technology has been certificated for use on airplanes to alert or advise the pilot of ice or as the primary means of determining when the IPS should be activated.

One ice detection system that is commercially available indicates when a deicing IPS should be initially activated and subsequently activated if the IPS operates in a cyclical manner. This system has sensors installed on the protected airplane surfaces that sense the accretion of ice sufficient to warrant cycling of a deicing system. Other ice detection systems are capable of sensing the rate of ice accretion and are able to indicate when a deicing IPS should be cycled based on ice accretion since the preceding cycling of the system.

F. Differences From the ARAC Recommendation

The ARAC Ice Protection Harmonization Working Group recommended identification of conditions conducive to airframe icing as one method of icing detection and activation of the airframe ice protection system. However, identification of conditions conducive to airframe icing is only a method of icing detection and not of activation. Therefore, the FAA revised the ARAC recommendation by clarifying that identification of conditions conducive to airframe icing is to be used for both icing detection and activation of the IPS. The revision is considered a minor change and does not affect the intent of the ARAC recommendation.

Rulemaking Notices and Analyses

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. An Airplane Flight Manual is required by existing part 25 regulations and must contain information that is necessary for safe operation of the airplane. The proposed rule requires that the procedures for operating the ice protection system be included in the Airplane Flight Manual. The proposed rule is applicable to future certification programs and does not require changes to existing Airplane Flight Manuals. Therefore, we have determined that there are no new information collection requirements associated with this proposed rule.

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 determined that there are no ICAO Standards and Recommended Practices that correspond to these proposed regulations.

Executive Order 12866 and DOT Regulatory Policies and Procedures

Executive Order 12866, ''Regulatory Planning and Review,'' dated September 30, 1993 (58 FR 51736) directs the FAA to assess both the costs and the benefits of a regulatory change. We are not allowed to propose or adopt a regulation unless we make a reasoned determination that the benefits of the intended regulation justify the costs. Our assessment of this rulemaking indicates that its economic impact is minimal. Because the costs and benefits of this action do not make it a ''significant regulatory action'' as defined in the Order, we have not prepared a ''regulatory evaluation,'' which is the written cost/benefit analysis ordinarily required for all rulemaking under the DOT Regulatory Policies and Procedures. We do not need to do a full evaluation where the economic impact of a rule is minimal.

Economic Evaluation, Regulatory Flexibility Determination, 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, the 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 proposed rule.

Department of Transportation Order DOT 2100.5 prescribes policies and

procedures for simplification, analysis, and review of regulations. If the expected cost impact is so minimal that a proposed or final rule does not warrant a full evaluation, this order permits that a statement to that effect and the basis for it be included in the preamble if a full regulatory evaluation of the cost and benefits is not prepared. Such a determination has been made for this proposed rule. The reasoning for this determination follows.

An assessment has been conducted of the economic cost impact of the proposed rule amending § 25.1419 of Title 14 of the Code of Federal Regulations (14 CFR) part 25. The FAA proposes to change the regulations applicable to transport category airplanes certificated for flight in icing conditions. This proposal would require newly certificated part 25 transport category airplanes certificated for flight in icing 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 the first sign 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.

This proposal is the result of information gathered from a review of historical icing accidents and incidents. This proposal is intended to improve the level of safety when part 25 airplanes are operated in icing conditions.

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.[8]
- 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. *Industry Estimate of Costs.* This section discusses the costs to require part 25 manufacturers to include a method of ice detection for newly certificated transport category airplanes.

This proposal would require manufacturers of part 25 airplanes to provide the flightcrew with an effective method of ice detection. Such a method would provide a means, via an ice detection system (IDS), to alert the flightcrew of icing conditions and enable timely activation of the airframe ice protection system (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 IPS need not be operated during specific phases of flight. If the IPS operates in a cyclical manner, it must either include a system that automatically cycles the IPS, or there must be a method that alerts the flightcrew each time the IPS must be cycled. In addition, this proposal would require that the Airplane Flight Manual contain procedures for activation and operation of the IPS.

The Goodrich Corporation and the ARAC Ice Protection Harmonization Working Group provided us with manufacturer cost estimates for System Design, System Qualification, Hardware, Installation, and Maintenance.

3. *Section-by-Section Estimate of Costs.* The cost estimates, by section, are discussed next.

§ 25.1419(e)

This section proposes three alternative methods of ice detection:

- A primary IDS, automatic or manual; or
- The 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; or
- The identification of icing conditions by an appropriate static or total air temperature and visible moisture cues.

Any of the three proposed ice detection methods would enable timely activation of the airframe IPS and satisfy the intent of this proposal.

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. 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.

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

[8] ''APO–300 Guidance on Labor Costs'', May 2006.

TABLE 1.—COSTS FOR § 25.1419(e)(1)—PRIMARY ICE DETECTION SYSTEM—Continued

Manufacturer non-recurring costs (per aircraft group/type) 2006$	Hours	Hourly rate	Additional cost	Cost
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 IDS is the principal means to determine when the airframe IPS should be activated. 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 cost 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 would be used by the flightcrew to activate the airframe IPS. This definition would be included in the Airplane Flight Manual. There are no costs imposed on the airplane manufacturers with this option.

A summary of the costs for each alternative is shown in Table 3:

TABLE 3.—COST SUMMARY—§ 25.1419(e)

§ 25.1419 Alternatives	Costs	
	Per certification	Per airplane
(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 existing 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 proposed rule, so there are no additional costs associated with this section.

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

- The IPS must operate continuously, or
- The airplane must be equipped with a system that automatically cycles the IPS, or
- An ice detection system must be provided to alert the flightcrew each time the IPS must be cycled.

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

Section 25.1419(g)(1) applies primarily to thermal anti-ice protection systems. Thermal anti-ice protection systems typically use heat or freezing point depressant fluids 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-ice protection system is activated, it is capable of operating continuously.

Section 25.1419(g)(2) and (3) applies to IPS that operate in a cyclical manner. Past delivery history has shown that about 97% of U.S manufactured part 25 airplanes delivered have thermal anti-ice protection systems and 3% have deicing IPSs that operate in a cyclical manner. Cessna is the only U.S. manufacturer that currently delivers new part 25 certificated airplanes with an IPS that operates in a cyclical manner. Those airplanes delivered with an IPS that operates in a cyclical manner were certificated in September 1971.[9] Later variants from that September 1971 type certificate and all later part 25 new Cessna certifications have thermal anti-ice protection systems that operate continuously. We believe the trend for new part 25 aircraft certifications is toward thermal anti-ice protection systems that operate continuously. Because of the trend of part 25 manufacturers to install thermal anti-ice protection systems in their newly certificated part 25 airplanes, we believe there are no costs imposed on the airplane manufacturers by § 25.1419(g).

We seek 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.

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

4. *Conclusion.* Since this final rule has minimal costs, a full regulatory evaluation was not prepared. The FAA requests comments with supporting justification about our determination of a minimal impact from this proposal.

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.

All United States transport category aircraft manufacturers exceed the Small Business Administration small-entity criteria of 1,500 employees.

Therefore, the FAA certifies that this proposed rule would not have a significant economic impact on a substantial number of small entities. The FAA solicits comments regarding this determination.

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 proposed rule and has determined that it would impose the same costs on domestic and international entities and thus 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 (adjusted annually for inflation with the base year 1995) 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 $128.1 million in lieu of $100 million. This proposed rule does not contain such a mandate.

Executive Order 13132, Federalism

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

Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying regulations in 14 CFR 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 such regulatory distinctions as he or she considers appropriate. Because this proposed rule would apply to the certification of future designs of transport category airplanes and their subsequent operation, it could, if adopted, affect intrastate aviation in Alaska. The FAA therefore specifically requests comments on whether there is justification for applying the proposed rule differently in intrastate operations in Alaska.

Plain English

Executive Order 12866 (58 FR 51735, Oct. 4, 1993) requires each agency to write regulations that are simple and easy to understand. We invite your comments on how to make these proposed regulations easier to understand, including answers to questions such as the following:

- Are the requirements in the proposed regulations clearly stated?
- Do the proposed regulations contain unnecessary technical language or jargon that interferes with their clarity?
- Would the proposed regulations be easier to understand if they were divided into more (but shorter) sections?
- Is the description in the preamble helpful in understanding the proposed regulations?

[9] Type Certification Data Sheet No. A22CE.

Please send your comments to the address specified in the **ADDRESSES** section.

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 that this proposed rulemaking action qualifies for the categorical exclusion identified in paragraph 4(j).

Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA has analyzed this NPRM 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 it is not a ''significant regulatory action'' under Executive Order 12866, and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

Appendix 1—Definition of Terms Used in This NPRM

For the purposes of this NPRM, the following definitions are applicable. These definitions of terms are intended for use *only* with this NPRM:

a. *Advisory ice detection system:* An advisory 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. 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 portions of the airplane, with the exception of the propulsion system, on which supercooled liquid droplets may impinge.

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 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 airframe 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. 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.''

List of Subjects in 14 CFR Part 25

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

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 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 § 25.1419 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 ice protection system need not be operated during specific phases of flight, the requirements of paragraph (e) are applicable to all phases of flight.

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

(1) The ice protection system must 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 must be established and documented in the Airplane Flight Manual.

Issued in Washington, DC, on April 11, 2007.

John J. Hickey,

Director, Aircraft Certification Service.

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