Comments Vary on Ice-Protection Proposal

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U.S. certification standards would require new equipment and operating procedures to combat ice-related accidents.

A relatively small but disparate response was received by the U.S. Federal Aviation Administration (FAA) to proposed new certification standards intended to ensure timely activation of airframe ice protection systems (IPSs).[1]

The proposal, issued in April 2007, would require manufacturers seeking icing certification of new transport category airplanes to provide one of the following methods for detecting airframe icing and activating the IPS:

- "A primary ice-detection system that automatically activates the IPS or alerts the flight crew to activate the IPS;
- "A definition [in the airplane flight manual (AFM)] 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 flight crew to activate the IPS; or,
- "Identification [in the AFM] of conditions conducive to airframe icing as defined by an appropriate static or total air temperature and visible moisture for use by the flight crew to activate the IPS."

The proposed additions to Federal Aviation Regulations Part 25.1419, *Ice Protection*, would include a requirement for continuous operation of the IPS after initial activation, a system that automatically cycles the IPS or an ice-detection system that alerts the flight crew each time IPS activation is required.

The FAA said that the proposal partially addresses recommendations by the U.S. National Transportation Safety Board (NTSB) stemming from the investigations of ice-related accidents involving an ATR 72 in October 1994 and an Embraer Brasilia in January 1997.[2,3] The NTSB recommendations included a "means for flight crews to positively determine when they are in icing conditions that exceed the limits for aircraft certification" and "revision of manuals and training [procedures] to emphasize that leading-edge deicing boots should be activated as soon as the airplane enters icing conditions."

The proposal is based on recommendations by an Aviation Rulemaking Advisory Committee working group that was formed after the ATR 72 accident to review in-flight icing safety issues. The FAA said that the working group found subsequent accidents and incidents in which "the flight crew 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 IPS."

The FAA received 15 comments on the proposal before the public comment period ended on July 25. The following are partial summaries of the comments:

The NTSB said that although it supports the proposed requirements, the scope should be expanded to include airplanes that already are certified for flight in icing conditions and that current AFM recommendations to delay activation of deicing boots until a specific amount of ice accumulates should be revised. Such recommendations are based, in part, on the belief that premature activation of deicing boots might cause ice to form a bridge over the boots, rendering them ineffective. "Ice bridging does not occur on modern airplanes," NTSB said. "The IPS should be activated as soon as the airplane enters icing conditions."

Comments filed for Airbus, the Air Line Pilots Association International, BAE Systems, Boeing Commercial Airplanes and Bombardier generally supported the proposal.

Boeing recommended one revision: adding words to specify that continuous operation of the IPS is required "while the aircraft remains in icing conditions." Without this clarification, the IPS would have to operate even after the airplane exits icing conditions, Boeing said.

Bombardier took issue with the FAA's definitions of a primary ice-detection system as comprising two ice detectors and an advisory ice-detection system as comprising one ice detector. The systems should be defined by their performance, not by the number of ice detectors they incorporate, Bombardier said.

Comments filed for the Air Crash Victims Families Group also supported the proposal but chided the FAA for not having taken action sooner.

Several comments opposed the requirements for ice detectors. Charter aircraft operator Ameriflight said that an ice detector should be required only if it is shown that the flight crew cannot visually detect ice on a particular airplane. "It is our experience that the onset of icing is easily detectable … in the corners of the windshield, on windshield wiper arms, etc.," the company said.

A similar comment was filed by a former U.S. Air Force pilot, who said, "Each airplane will accumulate ice first on a certain part, and the pilots know where to look for the first indication of ice buildup."

Ameriflight also argued against automatic activation of the IPS at the first sign of ice. "Ice is only partially shed [on initial activation]," the company said. "The remainder on the boot results in 'islands' of ice that are sufficiently well-attached that they are not readily shed on successive cycles and provide a rough surface onto which additional ice accumulates more readily than upon a smooth boot surface."

Automatic IPS operation "at inopportune times could actually *decrease* safety by causing pre-existing ice accumulations to be shed into engine inlets, undesired drawdown of engine bleed air, excess electrical load, etc.," Ameriflight said.

Comments filed for Swan International Sensors and a family member of a passenger killed in an ice-related airplane accident disagreed, saying that no alternatives to ice-detection systems and automatic IPS activation should be allowed. "Simply training flight crews to recognize conditions conducive to icing is not an adequate solution," the family member said. "Such training … has existed for some time, yet these icing-related accidents still occur."

Similarly, Transport Canada said that alternatives to ice-detection systems should either not be allowed or be allowed only in airplanes that have been identified as having "a lower risk of icing-related incidents and accidents."

The founder of Innovative Safety Systems International said that requiring ice detectors would be folly. "They provide warning after the fact," he said. "They are fragile [and] unreliable." He told the FAA that it should simply specify the requirement and allow the industry to design systems that meet the intent of the requirement.

Aerodynamic performance monitoring systems were alternatives proposed by both the Regional Airline Association and by Marinvent Corp. The systems "directly measure the degradation of airfoil performance caused by the roughness and profile changes induced by the contamination of the airfoil," Marinvent said, noting that degradation of airfoil performance is "the root cause of icing accidents."

The FAA will consider the public comments as it progresses toward publication of final rules or withdrawal of the proposal. ●

Notes

1. The notice of proposed rulemaking and the public comments are available by searching for docket no. 27654 at <http://dms.dot.gov/search/searchResultsSimple.cfm>.
2. NTSB. *Aircraft Accident Report: In-Flight Icing Encounter and Loss of Control; Simmons Airlines, d.b.a. American Eagle Flight 4184; Avions de Transport Regional (ATR) 72-212, N401AM; Roselawn, Indiana; October 31, 1994*. July 9, 1996. NTSB/AAR-96/01.
3. NTSB. *Aircraft Accident Report: In-Flight Icing Encounter and Uncontrolled Collision With Terrain; Comair Flight 3272; Embraer EMB-120RT, N265CA; Monroe, Michigan; January 9, 1997*. Nov. 4, 1998. NTSB/AAR-98/04.