



U.S. Department
of Transportation
**Federal Aviation
Administration**

SAFO

Safety Alert for Operators

SAFO 06016
DATE: 11/1/06

Flight Standards Service
Washington, DC

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo

A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest.

Subject: In-Flight Icing, Turbo Propeller Powered Airplanes

1. Purpose. Increase pilot awareness of the dangers associated with in-flight icing and emphasize the importance of following limitations and procedures established for flight in icing conditions.

2. Background. The National Transportation Safety Board's (NTSB) preliminary findings indicate that in-flight icing may have been a major factor in a recent Saab-340 series airplane incident. In this incident the Saab-340 was climbing through 11,500 feet in icing conditions when it departed controlled flight. The airplane descended about 5,000 feet before the pilots regained control. The NTSB has issued several safety recommendations as a result of this incident, which the FAA is evaluating. This incident is similar to other icing incidents and accidents that have occurred on other turbo propeller-powered airplanes in the past. Until more information is available, it is critical for safety that pilots of turbo propeller-powered airplanes are aware of the dangers associated with in-flight icing, know all flight manual limitations and restrictions for flight in icing conditions, and follow all flight manual procedures if icing is encountered.

3. Discussion. Pilots should use all available meteorological information where forecasts indicate that structural icing may occur and should plan flight to avoid these areas if possible. If flight weather conditions are such that icing may occur, pilots should know how to recognize the early signs of ice accumulation on their airplane, e.g., ice on the windshield wipers, propeller spinners, and ice behind the boots. Other cues such as airspeed degradation, higher power settings, and unanticipated trim changes may also indicate icing accumulation. Finally, if icing conditions are encountered, pilots should follow the guidance in their flight and operating manuals for operating in icing conditions and exit the icing conditions as soon as practicable. Where specific in-flight icing procedures are not specified in their manuals, the FAA recommends the following:

a. Exit the Icing Conditions. Take action to exit the known icing conditions as soon as practicable. This is especially critical if any unusual airplane or flight control response or performance degradation is experienced.

b. Ice Protection Systems. Know when to activate the airplane's anti-ice and deicing systems. Unless otherwise stated in the flight manual, pneumatic boot deicing systems should be activated at the first sign of ice accretion.

c. Speed. An additional margin of speed should be added to maintain at least 50% to 60% above stall speed in a clean configuration as a minimum ($V_s \times 1.5$ or 1.6). Airspeed and engine power settings should be closely monitored during in-flight icing conditions. Pilots should closely monitor these settings to make sure adequate speed margins are maintained, that engine operation and parameters are normal, and that excessive power is not required to accomplish the desired airplane performance. This requires special attention on airplanes not equipped with auto throttle systems. In many icing events airspeed decreased from cruise to stall in less than three minutes.

d. Air Traffic Control (ATC). Pilots should not accept an airspeed assigned by ATC that is inconsistent with their manuals or the airplane manufacturer recommended airspeed, or inconsistent with 50% to 60% margin above stall speed as recommended above.

e. Use of Autopilot. Pilots should follow approved guidance for use of the autopilot. Unless authorized in the airplane flight manual, the vertical modes of the autopilot that maintain a constant rate of climb or descent or pitch should not be used. If not closely monitored, the autopilot may mask dangerous airspeed losses. When ice is accumulating on the airplane the autopilot should be disconnected at least once every five minutes to ensure normal airplane trim and handling qualities are maintained. Pilots should be prepared for the possibility of unusual control displacements and forces on the flight controls when disconnecting the autopilot.

f. Severe Icing Conditions. If severe icing is encountered, disconnect the autopilot and immediately request priority handling from air traffic control to exit the severe icing conditions.

4. Recommended action. Directors of Safety and Directors of Operations should ensure that that the above guidance is included in their flight manuals and their approved pilot training program. Operators should ensure that their pilots are aware of the information contained in this SAFO.

5. Additional Resources.

a. Applicable Web Sites:

- <http://aircrafticing.grc.nasa.gov/index.html>
- <http://adds.aviationweather.gov/icing/>
- <http://www.ibac.org/is-bao/isbao.htm>

b. FAA Advisory Circulars (AC) (current editions). The following ACs can be found at http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/MainFrame?OpenFrameSet

- AC 91-74, Pilot Guide Flight in Icing Conditions
- AC 135-9, FAR Part 135 Icing Limitations