



ASSESSMENT OF THE RESPONSE FROM TRANSPORT CANADA TO AVIATION SAFETY RECOMMENDATION A06-02

CESSNA 208 OPERATION INTO ICING CONDITIONS

Background

On 06 October 2005, a Cessna 208B, registration C-FEXS, operated by Morningstar Air Express as Flight MAL8060, departed Winnipeg, Manitoba, at 0537 central daylight time on an instrument flight rules (IFR) freight flight to Thunder Bay, Ontario. The aircraft, with one pilot and about 2470 pounds of cargo on board, departed Runway 36, climbed, and turned right on course. About 4.5 nautical miles (nm) southeast of the airport, the pilot requested an immediate return to the airport due to icing considerations, but did not declare an emergency. Departure control provided an initial radar vector to Runway 31, and the aircraft turned to a southwesterly heading. A second vector was provided and the pilot responded; however, the aircraft did not turn and descended below radar coverage. The aircraft departed controlled flight and crashed on railway property in the city of Winnipeg. The pilot was fatally injured. The aircraft was destroyed by impact forces and a post-impact fire. The accident occurred during hours of darkness at 0543.

The information gathered to date suggests that in-flight airframe icing was a factor in the occurrence. As well, the pilot cited aircraft icing when asking air traffic control for a clearance to return to Winnipeg. Furthermore, icing conditions were forecast, and were experienced by other aircraft operating in the Winnipeg area at the time of the occurrence.

A review of aircraft performance data and the occurrences involving the Cessna 208 aircraft type indicates that it is more significantly affected by atmospheric icing than some other types of Cessna turbopropeller aircraft certified for flight into known icing conditions. The aircraft's speed does not provide it with much benefit from the effects of friction and compression. In addition to the aircraft's fuselage and empennage, the aircraft design incorporates fixed landing gear, wing struts and a cargo pod. The manufacturer's data indicate that, with residual icing on exposed aircraft surfaces, the aircraft's cruising speed decreases to a point approaching that of the stall speed. Moderate icing conditions require aircraft ice protection systems to operate with a degree of efficiency that allows the aircraft to either operate in those conditions, or to maintain altitude and a safe airspeed for sufficient time that a diversion out of those conditions can be effected. Light icing conditions reduce the demands on ice protection systems and increase the time available for diversions into more benign conditions.

The manufacturer's data and historical data from the reviewed occurrences indicate that, in icing conditions, the aircraft's stall speed can increase substantially from 78 to 92 knots due to residual ice on the aircraft. As well, the manufacturer's data indicate that the operation of the de-icing equipment can increase the stall speed of the aircraft by 10 knots, resulting in a possible stall speed of over 100 knots in icing conditions while the de-icing equipment is operating. The manufacturer has set a minimum operating airspeed of 105 knots in icing conditions, which provides little threshold above an impending stall. In addition, the operation of the aircraft's stall warning system in icing conditions may not be reliable due to the effects of residual ice. This further reduces the pilot's ability to safely operate the aircraft in icing conditions. Some operators indicate that they have adopted the practice of maintaining 120 knots in icing conditions. The Cessna Pilot's Operating Handbook (POH) Supplement S1, Revision 7, dated 27 June 2005, recommends exiting icing conditions when the airspeed falls below 120 knots; however, it does not specify 120 knots as the minimum airspeed in icing conditions.

On 31 January 2006, the Board released interim safety recommendations as part of its investigation (A05C0187) into this occurrence.

Board Recommendation A06-02 (31 January 2006)

The manufacturer's data and historical data from the reviewed occurrences indicate that the aircraft's stall speed can increase substantially in icing conditions due to residual ice on the aircraft, combined with the effects of the operation of the de-icing equipment. Although the manufacturer has set a minimum operating airspeed in icing conditions, the Board is concerned that the recommended 105 knots is not sufficient to provide an adequate stall warning threshold. Although the Cessna POH Supplement S1, Revision 7, dated 27 June 2005, recommends exiting icing conditions when the airspeed falls below 120 knots, it does not specify 120 knots as the minimum airspeed in icing conditions. Therefore, the Board recommended that:

The Department of Transport require that Canadian Cessna 208 operators maintain a minimum operating airspeed of 120 knots during icing conditions and exit icing conditions as soon as performance degradations prevent the aircraft from maintaining 120 knots.

A06-02

Response to A06-02 (12 May 2006)

To address the subject of Cessna 208 operation into icing conditions, the Federal Aviation Administration (FAA) issued Airworthiness Directive (AD) 2006-06-06 on 10 March 2006. FAA AD 2006-06-06 was issued to implement the content of this recommendation. This mandatory corrective action specifies the minimum speed in icing conditions of 120 knots indicated airspeed (KIAS) in the flaps UP condition, and requires that the pilot depart icing conditions if 120 KIAS cannot be maintained in level flight.

On 24 January 2006, Transport Canada issued Service Difficulty Alert 2006-01. Service Difficulty Alert 2006-01R1 was released on 01 February 2006, and the latest revision 2006-01R2 was released on 24 March 2006.

Transport Canada also reviewed FAA AD 2006-06-06. The Department supports the FAA's determination that these actions are necessary for safe operation. FAA AD 2006-06-06 has been accepted and is mandatory in Canada.

Transport Canada agrees with Recommendation A06-02. Transport Canada reviewed FAA AD 2006-06-06, accepted the AD, and it is now mandatory in Canada.

Board Assessment of the Response to A06-02 (14 June 2006)

In its response, Transport Canada adopts the action of the FAA, who has issued AD 2006-06-06. Action taken by the FAA will substantially reduce or eliminate the deficiency raised in Board Recommendation A06-02.

The response is assessed as **Fully Satisfactory**.

Next TSB Action (14 June 2006)

This deficiency file is assigned an **Inactive** status.