



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

# SAFO

Safety Alert for Operators

SAFO 01001  
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Flight Standards Service  
Washington, DC

[http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/safo](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo)

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*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. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.*

**Subject:** Possible effects of Thickened Anti-icing Fluids on Takeoff Rotation for Airplanes with Unpowered Elevator Controls

**Purpose:** To alert operators and pilots of airplanes with unpowered elevator control surfaces that increased elevator control forces may be required for proper rotation to the takeoff attitude after treatment with Type II or IV anti-icing fluids.

**Background:** The Federal Aviation Administration (FAA) has received several reports of flightcrews that have conducted rejected takeoffs after their airplanes were treated with thickened anti-icing fluids. The flightcrews have reported that the aircraft did not respond to normal, or even slightly above normal, control column back pressure inputs for rotation to the takeoff attitude. The flightcrews assessed the need for unusually high back pressure forces to be a flight control failure and elected to reject the takeoff at speeds in excess of  $V_R$  or  $V_1$  as applicable. Fortunately, these rejected takeoffs did not occur on runways of limited length.

**Discussion:** A common factor in these incidents is that the rotation speeds were below, at, or only slightly above the 100 knot minimum rotation speed recommended for application of Type II or IV anti-icing fluids. In addition, the transport category aircraft involved all had unpowered elevator flight controls. In all of the reported cases, the use of thickened anti-icing fluids was approved for the airplane, and the flightcrews reported following the airplane manufacturer's procedures for takeoff after the aircraft was treated with thickened anti-icing fluids. In many of these reported cases, the rejected takeoffs occurred during the flightcrew's first takeoff, or their first takeoff for that winter season, when the airplane had been treated with thickened anti-icing fluids.

It appears that the flightcrews were not familiar with the added control column pressure that could be needed to rotate the aircraft to the takeoff attitude after the aircraft was treated with thickened anti-icing fluids. These added forces, if not properly identified, could lead a pilot to reject a takeoff from speeds above  $V_R$  or  $V_1$  as applicable and exceed the available runway length during the rejected takeoff.

Flightcrews must be trained on and be aware of the airplane manufacturer's procedures for operation after application of de/anti-icing fluids. Training needs to cover any added control column forces that may be necessary to achieve the appropriate takeoff pitch attitude. There are several theories to the cause of this above normal control elevator force requirement including the possibility that the thickened anti-icing fluid is being applied too heavily, above the thickness recommended by the fluid manufacturer and the SAE standard, to the horizontal tail surfaces. Only the de/anti-icing fluid Types (I, II, III, IV) approved by the airplane manufacturer should be applied to the airplane. The airplane must be operated in accordance with the airplane manufacturer's procedures specified for operations after being treated with de/anti-icing fluids.

**Recommended Action:** For operators of aircraft with unpowered elevator controls and rotation speed below, at, or only marginally above 100 knots, directors of training, directors of operations, directors of safety, chief pilots, check airmen, pilot instructors, and training providers should review winter operations training to ensure that pilots are trained on the control column forces that may be necessary to rotate the aircraft to the takeoff attitude when the airplane is treated with thickened anti-icing fluids. Simulator programming for the aircraft to be representative of the affects of anti-icing fluid application and an appropriate takeoff scenario during simulator training would be one way to effectively address this training need. Operators should include in the flightcrew operating procedures the airplane manufacturer's procedures for operation of the airplane after being treated with de/anti-icing fluids.

Additionally operators should ensure that all de/anti-icing service providers are aware of the potential impact of applying anti-icing fluids on the horizontal tail surfaces in excess of that needed to provide adequate ice protection. Operators should ensure that de/anti-icing service providers have processes and procedures in place to prevent thicker anti-icing fluid applications to the horizontal surface areas than recommended by the fluid manufacturer and SAE standard.

Multi-pilot crews should, as part of the pre-takeoff crew briefing, single pilot crew as part of the takeoff procedures review should brief/review the airplane manufacturer's procedures regarding the possible need for added control column back pressure if the aircraft is treated with thickened anti-icing fluids. Flightcrews should adhere to the manufacturer's operating procedures for the aircraft when their aircraft is treated with de/anti-icing fluids.

**Contact:** Questions or comments concerning this SAFO should be addressed to the Air Carrier Operations Branch, AFS-220, Attn: Mr. Jerry Ostronic (412) 886-2580 Ext 332.