

Docket No. SA-533

Exhibit No. 2-FF

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

Excerpts from Empire Airlines Aircraft Deicing Program (ADP)

(4 Pages)

ATTACHMENT

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Date:	08/10/07
Revision:	26

PROGRAM DESCRIPTION

Scope

- A. Empire's Aircraft Deicing Program (ADP) is designed to provide safe and expeditious release of Empire aircraft in icing conditions. The program is designed to assure that, in accordance with Federal Aviation Regulation 121.629 and conforming to the guidance contained in AC 120-60B no Empire aircraft is released for flight in icing conditions without determining that the aircraft has been safely deiced/anti-iced and remains safe through takeoff.
- B. In accordance with 14 CFR 121.629(a) no person may release an aircraft, continue to operate an aircraft en route, or land an aircraft when in the opinion of the pilot in command icing conditions are expected or met that might adversely affect the safety of the flight.
- C. In accordance with 14 CFR 121.597(b) no person may release a flight unless the pilot in command and the flight follower believe the flight can be completed safely.
- D. 14 CFR 121.629(b) prohibits takeoff when snow, ice, or frost is adhering to wings, propellers, control surfaces, engine inlets, and other critical surfaces of the aircraft. This rule is the basis for the *clean aircraft concept*. It is imperative that takeoff not be attempted unless the pilot-in-command (PIC) has determined that all critical surfaces of the aircraft are free of frozen contaminants. The PIC has the ultimate responsibility to determine that the aircraft is clean and in a condition for safe flight. The requirement for a clean aircraft may be met if the PIC obtains verification from trained deice personnel that the aircraft is ready for flight.

Revisions and Approvals

- A. The ADP will be reviewed by the Director of Operations (DO) each year to determine that it continues to meet the requirements of FAR 121.629 and incorporates the applicable guidance of the latest Advisory Circulars, Flight Standard Information Bulletins for Air Transportation (FSAT), and aircraft manufacturers' limitations and procedures.
- B. ADP revisions are controlled by the List of Effective Pages (LEP) in the front of the manual. Revisions will be distributed to manual holders in accordance with the Technical Library procedures; distribution control is also listed in the Technical Library. Program approval is shown by FAA approval stamp and signature on the LEP and by Operations Specifications paragraph A023.
- C. A copy of this manual will be located at:
 - Empire Technical Publications library;
 - Empire aircraft operated under Part 121 or 135;
 - Empire stations where ADP operations are anticipated;
 - Flight Following/Maintenance Control, and
 - Vendors contracted to perform ADP operations.

ADP Authority and Control

- A. Authority and control over the administration and revision to the ADP rests with the Director of Operations. The Director of Operations has authority to approve changes to the ADP.
- B. The Director of Operations has the authority to approve the use of another air carrier's deicing/anti-icing procedures and/or training based on their program's conformity to AC 120-60, current edition.



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- (b) Ground operations instructors as determined by the Maintenance Training Manager.
- I (11) **Frozen Contaminants** – include all forms of frozen moisture such as freezing rain, freezing drizzle, frost, ice, ice pellets, snow, snow grains, and slush.
- I (12) **Freezing Point (FP)** – The temperature at which a liquid (precipitation) turns into a solid (frozen contaminant).
- I (13) **Freezing Point Depressant (FPD)** – Refers to deicing/anti-icing fluid and describes the purpose of the fluid, which is to lower or depress the freezing point of precipitation on aircraft surfaces.
- I (14) **Holdover Table** – Guideline on the amount of time that an FPD in a specified icing condition will protect the aircraft’s critical surfaces from frozen contaminants.
- I (15) **Holdover Time (HOT)** – is the estimated time an FPD will prevent the formation of frost or ice, or the accumulation of snow on the critical surfaces of an aircraft. HOT begins when the final application of FPD commences and expires when the FPD loses its effectiveness.
- I (16) **Icing Conditions** – conditions that are conducive to ground icing, such that frost, ice or snow may reasonably be expected to adhere to the aircraft, also when frozen contaminants are adhering to aircraft surfaces or freezing precipitation conditions exist.
- I (17) **MIL Spec Fluids** – Military deicing/anti-icing fluids are different from SAE or ISO fluids and no holdover times have been established.
- I (18) **Neat** – Undiluted Type II, III, or IV fluid as supplied by the manufacturer. HOT tables for Type II, III, and IV contain a column showing various concentration ratios of neat fluid to water. For instance a 75/25 concentration is 75% fluid and 25% water by volume.
- I (19) **Pre-takeoff Check** – is a check of the aircraft’s representative surfaces for frozen contaminants. This check is conducted within the aircraft’s HOT and may be made by observing the aircraft specific representative surfaces from the flight deck.
- I (20) **Pre-takeoff Contamination Check** – is a check, conducted after the aircraft’s HOT has been exceeded, to ensure the aircraft’s critical surfaces are free of frozen contaminants:
 - (a) The check must be made by trained deice personnel from outside the aircraft.
 - (b) The check must confirm that the critical surfaces are free of frozen contamination.
 - (c) The check must be conducted within 5 minutes of takeoff.
- I (21) **Post Anti-Ice Check** – is a check, after anti-icing fluid application, to ensure a uniform application of anti-ice fluid on the critical surfaces.
- I (22) **Post Deicing Check** – is a check, after deicing fluid application, to ensure critical aircraft surfaces are free of frozen contaminants.
- I (23) **Representative Surface – Where fluids tend to fail first.** Preliminary aircraft testing indicates that the first fluid failure on test aircraft appear to occur on the leading or trailing edges of the wing’s surface. Representative aircraft surfaces can be observed from within the aircraft and used to determine whether or not frozen contaminants are accumulating or forming on that surface. By using it as a representative surface, the flight crew can make a judgment regarding whether or not frozen contaminants are adhering to other aircraft surfaces. For use during the pre-takeoff check only. See the aircraft specific chapter of the ADP for a description of the representative surfaces.
- I (24) **Sensitive Areas** – are areas that should be avoided during deice/anti-ice fluid application. See the aircraft specific chapter of the ADP for a description of the sensitive areas.

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HOLDOVER TABLES

TABLE 1. FAA Guidelines for Holdover Times SAE Type I Fluid Mixtures as a Function of Weather Conditions and Outside Air Temperature

CAUTION: THIS TABLE IS FOR DEPARTURE PLANNING ONLY AND SHOULD BE USED IN CONJUNCTION WITH PRE-TAKEOFF CHECK PROCEDURES.

Outside Air Temperature		Approximate Holdover Times Under Various Weather Conditions (hours: minutes)								
Degrees Celsius	Degrees Fahrenheit	Active Frost	Freezing Fog	Snow/Snow Grains			Freezing Drizzle*	Light Freezing Rain	Rain on Cold Soaked Wing**	Other†
				Very Light**	Light **	Moderate**				
-3 and above	27 and above	0:45	0:11-0:17	0:18-0:22	0:11-0:18	0:06-0:11	0:09-0:13	0:02-0:05	0:02-0:05	
below -3 to -6	below 27 to 21	0:45	0:08-0:13	0:14-0:17	0:08-0:14	0:05-0:08	0:05-0:09	0:02-0:05		CAUTION: No holdover time guidelines exist
below -6 to -10	below 21 to 14	0:45	0:06-0:10	0:11-0:13	0:06-0:11	0:04-0:06	0:04-0:07	0:02-0:05		
below -10	below 14	0:45	0:05-0:09	0:07-0:08	0:04-0:07	0:02-0:04				

THE RESPONSIBILITY FOR THE APPLICATION OF THESE DATA REMAINS WITH THE USER.

* Use light freezing rain holdover times if positive identification of freezing drizzle is not possible

** This column is for use at temperatures above 0 degrees Celsius (32 degrees Fahrenheit) only

† Heavy snow, snow pellets, ice pellets, moderate and heavy freezing rain, hail

**** TO USE THESE TIMES, THE FLUID MUST BE HEATED TO A MINIMUM TEMPERATURE OF 60°C (140°F) AT THE NOZZLE AND AT LEAST 1 LITER/M² (= 2 GALS/100FT²) MUST BE APPLIED TO DEICED SURFACES**

SAE Type I fluid/water mixture is selected so that the freezing point of the mixture is at least 10°C (18°F) below OAT.

CAUTIONS:

- THE TIME OF PROTECTION WILL BE SHORTENED IN HEAVY WEATHER CONDITIONS. HEAVY PRECIPITATION RATES OR HIGH MOISTURE CONTENT, HIGH WIND VELOCITY, OR JET BLAST MAY REDUCE HOLDOVER TIME BELOW THE LOWEST TIME STATED IN THE RANGE. HOLDOVER TIME MAY BE REDUCED WHEN AIRCRAFT SKIN TEMPERATURE IS LOWER THAN OAT.
- SAE TYPE I FLUID USED DURING GROUND DEICING/ANTI-ICING IS NOT INTENDED FOR AND DOES NOT PROVIDE PROTECTION DURING FLIGHT.

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TABLE 1A. FAA Guidelines for the Application of SAE Type I Fluid Mixture Minimum Concentrations as a Function of Outside Air Temperature

Concentrations in % volume

Outside Air Temperature (OAT)	One-step Procedure Deicing/Anti-icing ²	Two-step Procedure	
		First step: Deicing	Second step: Anti-icing ^{1,2}
-3°C (27°F) and above	Mix of fluid and water heated to 60°C (140°F) minimum at the nozzle, with a freezing point of at least 10°C (18°F) below OAT	Heated water or a mix of fluid and water heated to 60°C (140°F) minimum at the nozzle	Mix of fluid and water heated to 60°C (140°F) minimum at the nozzle, with a freezing point of at least 10°C (18°F) below OAT
Below -3°C (27°F)		Freezing point of heated fluid mixture shall not be more than 3°C (5°F) above OAT	

Notes:

- Upper temperature limit shall not exceed fluid and aircraft manufacturers' recommendations.
- To use Type I holdover time guidelines in snow conditions, at least 1 liter per square meter (2 gal. Per 100 square feet) fluid must be applied to the deiced surfaces.
- This table is applicable for the use of Type I Holdover Time Guidelines. If holdover times are not required, a temperature of 60°C (140°F) at the nozzle is desirable.

Caution: Wing skin temperatures may differ and, in some cases, be lower than OAT. A stronger mix (more glycol) can be used under these conditions.

- 1) To be applied before first-step fluid freezes, typically within 3 minutes.
- 2) Fluids must only be used at temperatures above their lowest operational use temperature (LOUT).

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