

25 of the FAR (commonly referred to as "freezing rain or freezing drizzle"), were sprayed onto the outer wing leading edges and other airplane surfaces to determine ice accretion characteristics of the various diameter droplets. Droplet diameters larger than those specified in part 25 of the FAR were tested because there is meteorological evidence that the accident airplane encountered such large droplets (freezing rain or freezing drizzle) prior to the accident.

Results of data from the numerous flight tests conducted have revealed the following significant findings:

1. Ice accretion characteristics of the normal diameter droplets, as specified in the FAR, were entirely satisfactory. This confirms that Model ATR-42 and ATR-72 series airplanes comply fully with performance requirements relating to the icing envelope specified in part 25 of the FAR for certification of these airplanes.

2. Additional testing was conducted with large water droplets (outside certification standards), and it was found to be possible for ice to accrete aft of the wing boot surface during a 17-minute exposure to the tanker spray when the aircraft operated in a flaps 15-degree configuration. Flight tests conducted in this configuration indicated that a spanwise ridge could disrupt the flow over the aileron when the flaps are retracted to the zero-degree position. This interruption caused an uncommanded aileron deflection and resultant unusual control forces.

However, during the tests conducted, the forces required to control the aircraft were within limits specified by the FAR.

3. Exposure to freezing rain or freezing drizzle on the forward side windows of the cockpit produced ice on all or a substantial part of the forward side windows. This ice accretion on the forward side windows does not appear when the airplane is flying in the icing conditions defined in part 25 of the FAR. This characteristic ice accretion begins to form within 30 seconds of the beginning of the encounter with freezing rain or freezing drizzle. Additionally, test data indicate that the crew can observe the accumulation of ice on the forward side windows at least several minutes before a significant amount of ice accumulates on the wings.

While the cause of the accident is still under investigation, the FAA has determined that if a Model ATR-42 or ATR-72 series airplane is in flight with the flaps set at the 15-degree position during freezing rain or freezing drizzle, an unusual ridge of ice on the wing (aft of the ice protection boots) can occur. This ridge can interrupt the airflow over the ailerons when the flaps are retracted

to the zero-degree position. This interruption can cause an aileron deflection and resultant unusual control forces. In actual operations, these unusual forces may result in a roll upset from which the flight crew may be unable to recover.

In an effort to break the chain of events that may lead to an aircraft roll upset, the manufacturer has developed a set of procedures to be followed if the airplane should encounter freezing rain or freezing drizzle conditions. These procedures are based on results of the tests conducted at Edwards Air Force Base. They prohibit dispatch into or operation in known or forecast freezing rain or freezing drizzle, provide the flight crew with a means to identify inadvertent encounters with freezing rain and freezing drizzle conditions, and provide procedures to take appropriate corrective action. Accomplishment of these procedures will ensure safe operation of the airplane while operating in all icing conditions, including inadvertent encounters with freezing rain or freezing drizzle.

The procedures developed by the manufacturer have been incorporated into several documents, including the following:

1. ATR-42 AFM Temporary Revision 18, dated January 10, 1995 (for Model ATR-42 series airplanes); and ATR-72 AFM Temporary Revision 14, dated January 10, 1995 (for Model ATR-72 series airplanes);

2. ATR Icing Conditions Procedures Brochure, Version 1.0;

3. ATR Technical Background Paper, Version 1.0, dated January 6, 1995; and

4. Flight Crew Operation Manual, Revision 20, dated January 11, 1995 (for Model ATR-42 series airplanes); and Flight Crew Operation Manual, Revision 12, dated January 11, 1995 (for Model ATR-72 series airplanes).

Additionally, certain modifications have been proposed by the manufacturer. The FAA finds that such modification is preferable, as a long term solution, to requiring special procedures and special training, which can be used for the short term. This is consistent with the FAA's general policy that long term continued operational safety will be better assured by design changes that will preclude the problem, rather than by long term operational limitations. Such operational limitations may not have the desired long term effect. This, coupled with a better understanding of the human factors associated with such limitations, has led the FAA to consider placing less emphasis on those limitations and more emphasis on design improvements. The optional

modification specified in this AD is in consonance with these considerations.

ATR has issued Service Bulletin ATR72-27-1039, dated January 12, 1995, which describes procedures for installation of ATR Modification Number 04213 on Model ATR-72 series airplanes. The modification permits movement of the flaps above limit speed in an emergency to give crews more operational discretion. Accomplishment of the modification eliminates the multi-function computer inhibition against flap extension.

These documents form a basis for providing added information to expand the operation of Model ATR-42 and ATR-72 series airplanes beyond that defined in AD T94-25-51.

The FAA finds that these interim procedures may be permitted until June 1, 1995, at which time an FAA-approved modification must be installed. If such a modification is not installed by June 1, 1995, dispatch into or operation in known or forecast icing, freezing rain, or freezing drizzle conditions is prohibited.

This airplane model is manufactured in France and is type certificated for operation in the United States under the provisions of section 21.29 of the Federal Aviation Regulations (14 CFR 21.29) and the applicable bilateral airworthiness agreement. Pursuant to this bilateral airworthiness agreement, the DGAC has kept the FAA informed of the situation described above. The FAA has examined the findings of the DGAC, reviewed all available information, and determined that AD action is necessary for products of this type design that are certificated for operation in the United States.

Since the unsafe condition described is likely to exist or develop on other airplanes of the same type design registered in the United States, the FAA issued Telegraphic AD T95-02-51 to minimize the potential hazards associated with operating in icing conditions, as defined in the AFM. This AD supersedes AD T94-25-51. Unless modifications are accomplished or alternative procedures and training are adopted, this AD continues to require an operational limitation that prohibits operation of the airplane when icing conditions (as defined in the AFM) are forecast or reported; and restrictions on the use of the autopilot in inadvertent icing encounters, when the airplane is operated in moderate or greater turbulence, or whenever any unusual lateral trim situation is observed.

This AD permits, as an interim measure prior to installation of an FAA-approved modification, operation of the airplane into icing conditions, provided