	AIRWORTHINESS DIRECTIVE No F-1999-014-076 R2	Distribution: B	Issue date: December 10, 2003	Page : 1/7
Direction générale de l'aviation civile France **GSAC publication**	This Airworthiness Directive is published by the DGAC: [X] on behalf of EASA, the Primary Airworthiness Authority for the affected product. [ ] as the Registration Airworthiness Authority for the affected aircraft..		*Translation of « Consigne de Navigabilité » of same number.* *In case of difficulty, reference should be made to the French issue.*	
	No person may operate an aircraft to which an Airworthiness Directive applies, except in accordance with the requirements of that Airworthiness Directive, unless otherwise agreed with the Authority of the State of Registry.			

Corresponding foreign Airworthiness Directive(s): **Not applicable**	Airworthiness Directive(s) replaced: **1999-014-076 R1**
Person in charge of airworthiness: **ATR**	Type(s): **ATR 42 aircraft**
Type certificate(s) No. **176** TCDS No **176**	
ATA chapter: **30**	Subject: **Icing conditions - Revise the Airplane Flight Manual (AFM)**

1. EFFECTIVITY:

ATR 42 aircraft, models -200, -300, -320, -400 and -500, all serial numbers.

2. REASONS:

Airworthiness Directive (AD) is intended to minimize the hazards associated with inadvertent encounter of severe icing conditions (which are beyond the certification envelope) by increasing maneuver/operating icing speeds by 10 kt.

Accumulated experience on the worldwide fleet of commuter aircraft, and a recently reported in-flight incident lead to recall that a exposure to severe icing conditions, outside the certification envelope, leads to performance degradation and can lead to stall.

Reason for prolonged exposures are late detection and/or non or late application of the AFM procedures, which requires to monitor the severe icing conditions and to leave them as soon as detected.

It is however recognized that, even if the exit maneuver is initiated rapidly, it may take a few minutes before the airplane is out of the severe icing conditions.

Experience has shown that the currently recommended airspeeds in icing conditions, computed to provide adequate stall margins when flying in normal icing conditions, do not provide sufficient margins to stall speeds when the airplane has accreted a large amount of ice following prolonged flight in severe icing conditions.

The purpose of this AD is therefore to amend the AFM to:

- reinforce severe icing detection means by adding a criteria related to unusual performance degradation,
- increase the speed during the exit maneuver in order to provide improved margin to stall,
- introduce other editorial improvements to highlight the need to exit immediately severe icing conditions as soon as detected,
- incorporate and, when necessary, merge the previous AFM changes mandated by AD 1996-208-067 R1 in order to get a single AD dealing with the required operational documentation.

The purpose of this Revision 2 is to introduce, in paragraph B (actions and associated compliance times), an alternative means of compliance (AMOC) to this AD.

Note: This AD is an AMOC to the paragraphs 1.1. and 1.2. of AD 1996-208-067 R1 dated April 21, 1999.

3. MANDATORY ACTIONS AND COMPLIANCE TIMES:

Within 3 days after the effective date of this AD at original issue, accomplish the requirements of paragraphs A.1, A.2, A.3 et A.4 of this AD.

Within 15 days after the effective date of this AD at original issue accomplish the requirements of paragraph C of this AD.

A. ORIGINAL AD:

Revise the approved AFM by incorporating the following. This may be accomplished by inserting a copy of this AD in the AFM.

A.1. Into the limitations section - SYSTEMS/FLAPS

FLAPS: holding with any flaps extended is prohibited in icing conditions (except for single engine operations).

A.2. Into the limitations section - ICING CONDITIONS

All icing detection lights must be operative prior to flight at night.

NOTE: This supersedes any relief provided by the Master Minimum Equipment List (MMEL). The ice detector must be operative.

- ICING CONDITIONS (cont'd)

- SEVERE ICING

WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces.
This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following:

Visual cue identified with severe icing is characterized by ice covering all or a substantial part of the unheated portion of either forward side window, possibly associated with water splashing and streaming on the windshield.

and/or

Unexpected decrease in speed or rate of climb.

and/or

The following secondary indications:

- Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.
- Accumulation of ice on the lower surface of the wing aft of the protected area.
- Accumulation of ice on the propeller spinner farther aft than normally observed.

…/…

If one of these phenomena is observed, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions. Apply procedure specified in the Emergency Procedures Chapter.

- *Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when the severe icing defined above exists, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.*

A.3. Into the Normal procedures section - ICING CONDITIONS, add the following note which replaces the previous one :

NOTE : Be alert to severe icing detection.
In case of severe icing refer to emergency procedures 4.05.05.

A.4. Into the Emergency procedures section - ICING CONDITIONS

- SEVERE ICING

DETECTION

Visual cue identified with severe icing is characterized by ice covering all or a substantial part of the unheated portion of either forward side window, possibly associated with water splashing and streaming on the windshield.

and/or

Unexpected decrease in speed or rate of climb.

and/or

The following secondary indications:

- *Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.*
- *Accumulation of ice on the lower surface of the wing aft of the protected area.*
- *Accumulation of ice on the propeller spinner farther aft than normally observed.*

The following weather conditions may be conductive to severe in flight icing:

- *Visible rain at temperatures close to 0 degrees Celsius ambient air temperature.*
- *Droplets that splash or splatter on impact at temperatures close to 0 degrees Celsius ambient air temperature.*

EXIT THE SEVERE ICING ENVIRONMENT:

This procedure is applicable to all flight phases from initial climb to landing. Monitor the ambient air temperature. While the severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present.

If severe icing, as determined above, is encountered:

- *Immediately increase and bug the minimum maneuver/operating icing speeds by 10 kt. Increase power up to MAX CONT, if needed.*
- *Request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid an extended exposure to flight conditions more severe than those for which the airplane has been certificated.*
- *Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.*
- *Do not engage the autopilot.*

If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.

If the flaps are extended, do not retract them until the airframe is clear of ice.

…/…

If an unusual roll response or uncommanded roll control movement is observed, maintain the roll controls at the desired position and reduce the angle of attack by:

- Pushing on the wheel as needed,
- Extended flaps to 15,
- Increasing power, up to MAX CONT if needed.

If the aircraft is not clear of ice:

- Maintain flaps 15 for approach and landing, with "reduced flaps APP/LDG icing speed" + 5 kt.
- Multiply landing distance flaps 15 by 1.06.

Report these weather conditions to Air Traffic Control.

B. <u>ALTERNATIVE MEANS OF COMPLIANCE</u>:

An alternative means of compliance to this AD is to revise the AFM by incorporating the following improve procedure. This may be accomplished by inserting a copy of this AD in the AFM.

B.1. Limitations section - SYSTEMS/FLAPS

*Unchanged versus paragraph **A.1***

B.2. Into the limitations section - ICING CONDITIONS

All icing detection lights must be operative prior to flight at night.

NOTE : This supersedes any relief provided by the Master Minimum Equipment List (MMEL).
The ice detector must be operative.

2.06.01- ICING CONDITIONS (cont'd)

- SEVERE ICING :

WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build-up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces.

This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

- During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following:

Visual cue identifying severe icing is characterized by ice covering all or a substantial part of the unheated portion of either side window,

and/or

Unexpected decrease in speed or rate of climb.

and/or

The following secondary indications:

- Water splashing and streaming on the windshield
- Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.
- Accumulation of ice on the lower surface of the wing aft of the protected area.
- Accumulation of ice on the propeller spinner farther aft than normally observed.

… / …

The following weather conditions may be conducive to severe in-flight icing:

- Visible rain at temperatures close to 0°C ambient air temperature (SAT),
- Droplets that splash or splatter on impact at temperatures close to 0°C ambient air temperature (SAT).

If one of these phenomena is observed, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions. Apply procedure specified in the Emergency Procedures Chapter.

- Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when the severe icing defined above exists, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

B.3. Into the Normal procedures section - ICING CONDITIONS, add the following note which replaces the previous one:

*Unchanged versus paragraph **A.3***

B.4. Into the Emergency procedures section - ICING CONDITIONS

B.4.1. ATR 42-200, -300, -320 models:

4 . 05 . 05 - SEVERE ICING

MINIMUM ICING SPEED ..... INCREASE RED BUG by 10 kt
PWR MGT ..... MCT
CL / PL ..... 100% / MCT
AP (if engaged) ..... FIRMLY HOLD CONTROL WHEEL and DISENGAGE
SEVERE ICING CONDITIONS ..... ESCAPE
ATC ..... NOTIFY

- If an unusual roll response or uncommanded roll control movement is observed:

Push firmly on the control wheel
FLAPS 15

- If the flaps are extended, do not retract them until the airframe is clear of ice

- If the aircraft is not clear of ice:

GPWS ..... FLAP OVRD
STEEP SLOPE APPROACH ($\geq$4.5°) ..... PROHIBITED
APP/LDG CONF ..... MAINTAIN FLAPS 15
. . . . . .with "REDUCED FLAPS APP/LDG icing speeds" + 5 kt…….Multiply landing distance FLAPS 30 by 1.22

4 . 05 . 05 - SEVERE ICING (Cont'd)

DETECTION

Visual cue identifying severe icing is characterized by ice covering all or a substantial part of the unheated portion of either side window

and/or

Unexpected decrease in speed or rate of climb

and/or

The following secondary indications:

. Water splashing and streaming on the windshield
. Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice
. Accumulation of ice on the lower surface of the wing aft of the protected areas
. Accumulation of ice on propeller spinner farther aft than normally observed

The following weather conditions may be conducive to severe in-flight icing:
. Visible rain at temperatures close to 0°C ambient air temperature (SAT)
. Droplets that splash or splatter on impact at temperatures close to 0°C ambient air temperature (SAT)

B.4.2. ATR 42-400 and -500 models:

4 . 05 . 05 - SEVERE ICING

MINIMUM ICING SPEED.....INCREASE RED BUG by 10 kt
PWR MGT .....MCT
CL / PL..... 100% / MCT
AP (if engaged)..... FIRMLY HOLD CONTROL WHEEL and DISENGAGE
SEVERE ICING CONDITIONS..... ESCAPE
ATC .....NOTIFY

- If an unusual roll response or uncommanded roll control movement is observed:

Push firmly on the control wheel
FLAPS 15

- If the flaps are extended, do not retract them until the airframe is clear of ice

- If the aircraft is not clear of ice:

GPWS..... FLAP OVRD
STEEP SLOPE APPROACH ($\geq$4.5°) .....PROHIBITED
APP/LDG CONF ..... MAINTAIN FLAPS 15
. . . . . with "REDUCED FLAPS APP/LDG icing speeds" + 5 kt……. Multiply landing distance FLAPS 35 by 1.22

4 . 05 . 05 - SEVERE ICING (Cont'd)

DETECTION

Visual cue identifying severe icing is characterized by ice covering all or a substantial part of the unheated portion of either side window

and/or

Unexpected decrease in speed or rate of climb

and/or

The following secondary indications:

- *Water splashing and streaming on the windshield*
- *Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice*
- *Accumulation of ice on the lower surface of the wing aft of the protected areas*
- *Accumulation of ice on propeller spinner farther aft than normally observed*

The following weather conditions may be conducive to severe in-flight icing:

- *Visible rain at temperatures close to 0°C ambient air temperature (SAT)*
- *Droplets that splash or splatter on impact at temperatures close to 0°C ambient air temperature (SAT)*

C. Operators documentation must take into account the modification of the Limitations, Normal Procedures and Emergency Procedures Sections of the AFM.

D. ATR has issued AFM Revisions incorporating the above modifications. These approved revisions are considered as an AMOC to this AD (see § 4).
The AFM revisions, to be approved by Authorities other than the French DGAC, are being prepared and will be issued as soon as approved.

4. REFERENCE PUBLICATIONS:

Normal revision NR23 dated January 2004 for AFM ATR 42-200, -300, -320
Temporary revision TR29 dated October 2003 for AFM ATR 42-400, -500

5. EFFECTIVE DATES:

Original issue : January 23, 1999
Revision 1 : May 1st, 1999
Revision 2 **:** Upon receipt from December 10, 2003

6. REMARK:

For questions concerning the technical content of this AD's requirements, contact:

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7. APPROVAL:

This AD is approved under EASA reference No 1442 dated December 02, 2003.