

# Airframe Icing

See <http://44RF.com/ice/ice.htm> for lots of links to icing information and training

## **On Thin Ice** (Nov/Dec 2009 FAA Aviation News)

[http://www.faa.gov/news/aviation\\_news/2009/media/NovDec2009OnThinIce.pdf](http://www.faa.gov/news/aviation_news/2009/media/NovDec2009OnThinIce.pdf)

### Ice before takeoff

- More high-wing airplanes crash because of wing ice not being removed by the pilots.
- Medium sandpaper reduces lift by 30% and drag by 40%
- Control problems
  - More lift on one side than the other
  - Less control effectiveness
  - Jammed controls
- Don't forget the:
  - Prop
  - Engine inlets
  - Pitot tube
  - Static Ports
  - Stall warnings
  - AoA
- Don't polish the frost – remove it.
- Don't use eyeball only to make sure it's free of ice – feel it (tactile check)
- Anti-Icing Fluid – it depends?
  - Check the POH – but if nothing in POH consider that if a/c rotation speed is
    - < 60 knots use only Type I fluid
      - Orange
      - Mostly glycol
      - Good for about 5 minutes or less
    - > 60 knots can use type III
    - Don't use type II or IV (unless you rotate > 110 knots)
- Blowing snow off during takeoff
  - Don't trust this method
  - Ice might be under show

## **Ice Belongs in Drinks** (Nov/Dec 2009 FAA Aviation News)

[http://www.faa.gov/news/aviation\\_news/2009/media/NovDec2009IceBelongs.pdf](http://www.faa.gov/news/aviation_news/2009/media/NovDec2009IceBelongs.pdf)

- Bad philosophy: "I've had ice before so I know I can handle it again"
- Flying with a morphed airfoil can create bad surprises
- Ice can form in a couple minutes
- Expect icing when flying in visible precipitation, such as rain or cloud droplets, and the outside air temperature is between +2 degrees and -10 degrees C. However, water can remain "super cooled" at temperatures as low as -40 degrees.
- Water can remain liquid at below-freezing temperatures until it contacts a solid surface like your airplane.
- Supercooled large droplets, or SLD (which include freezing drizzle or freezing raindrops within or below clouds), are particularly dangerous because they can coat large areas of the wing and tail very quickly.
- If you are in ice with a non-ice airplane
  - Get clearance out – NOW! Declare an emergency if delayed
  - Turn off the autopilot
  - Have an exit strategy
  - Submit a PIREP when able
  - Turn on pitot heat and defrost

- Remember the stall AoA will change with airfoil change

## **Landing with Ice** (October 2009 IFR Magazine)

- **Tailplane ice**
  - Small leading edge radius makes ice accumulate faster than on the wing
  - If tail stalls the nose drops
  - Usually caused by flap extension
    - Flaps moves the center of lift aft which causes the tail to work harder
    - Flaps change the airflow around the tail
  - Wing and tailplane stall indications are very similar – but correcting is 180 out
    - Tailplane stalls are felt more in the yoke than the airframe
    - Impending tailplane stalls indicated by:
      - Yoke pulsing or vibrating vs your paints pulsing
      - Difficulty trimming
      - Light force to pitch down and heavy force to pitch up
    - Tailplane stalls:
      - Rapid pitch-down movement
      - Strong “pull” of the yoke forward
    - Recovery
      - Full-aft stick
      - Flap retraction
      - Power as needed
- **Prop ice**
  - Loss of thrust
  - Operate at max allowable RPM to fling it off
  - Rapidly change the RPM
- **Landing after icing up**
  - Defrost on
  - Disconnect autopilot
  - If possible, get to above freezing air and stay there until ready to land
  - Pick a big airport with a wide, long runway (Radar, overruns and fire trucks are nice)
  - Know your max vertical speed without picking up too much IAS speed?
    - Probably 1500-2000 fpm (idle, high RPM, gear down, no flap)
  - If weather permits, use a non-precision approach to get through that freezing layer as quickly as possible (1500-2000 fpm?)
    - Example: 6000 ft to lose, start down 3 to 4:30 minutes before ETA at FAF or runway.
    - Remember, if you pick up more ice, you may not be able to fly a 3° glide slope
  - Fly it onto the runway then reduce power
  - Taxi to the FBO
  - Clean out our pants
  - Take a picture and hang it on the panel for reference to never to that again.