



LEGAL REQUIREMENTS for FLYING IN ICE

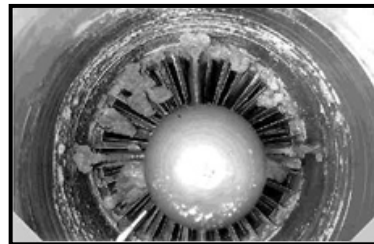
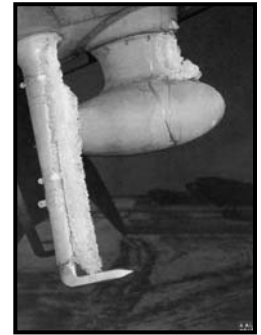
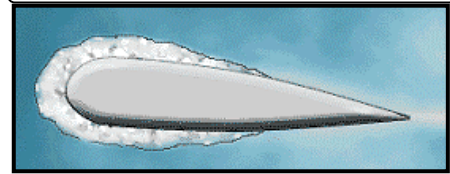
General rules — Deice units must be provided for the wings, tail, propellers or engine inlets, pitot/static sources; an alternate source of air for reciprocating engines; and a thermal or chemical means of providing vision through the windshield. External lighting must also be provided to enable adequate monitoring during icing conditions encountered at night. The FAA must approve the equipment and any operational limitation such as, “flight into known icing conditions is prohibited” must be formally removed from the AFM or POH (if the statement was previously included). It is important to note that aircraft certified for flight in known ice are approved for flight in light or moderate conditions only, and even then the systems cannot cope with severe or continuous icing.

ICE

[Part 23, Part 25, 91.9, 91.13, 91.527, 121.341, 121.629, 125.221, 135.227, 135.345, AIM 7-1-16, 7-1-19, AC 20-73, AC 23.1419-1, AC 135-9, AFM or POH]

1. Found in VISIBLE MOISTURE between +5° & -20°C or colder — but usually between +2° & -10°C.
2. Any mention of icing conditions during a weather briefing, even if only a “slight possibility” is considered “KNOWN ICING” by the FAA and the NTSB. The briefer should check AIRMETS — issued at the first indication of moderate ice; and SIGMETs — issued for severe icing. Flight in known icing is definitely forbidden unless the aircraft is certificated for these conditions. You might want to mention to the briefer that you plan to remain below the freezing level or clear of clouds, just for the record. If the aircraft is not certified for flight in known icing, your job then becomes flying where the ice ain’t. If you crash, or seriously disrupt the ATC system because of an encounter with ice — chances are — you will receive a very unpleasant phone call from an FAA Safety Inspector.
3. 91.527 and 135.227 do not require the aircraft to be “certified for flight into known icing” in order to depart into “known or forecast light or moderate icing”, as long as the aircraft has some kind of “functioning deicing or anti-icing equipment protecting each rotor blade, propeller, windshield, wing, stabilizing or control surface, and each airspeed, altimeter, rate of climb, or flight attitude instrument system”. However, if the aircraft also carries a placard or limitation in the AFM that states, “flight into known icing conditions is prohibited”, the aircraft could not be launched into icing conditions because it would be subject to compliance with placards and limitations (91.9).
4. Nevertheless — Advisory Circular 135-9 (pertaining to Part 135) says — “...aircraft could be operated in forecast or known light or moderate icing under VFR or IFR rules if it was equipped as required in Section 135.227 and this equipment was functioning, unless the aircraft was prohibited by operating limitations from operating in icing conditions.”
AC 135-9 also says:
 - a. “Aircraft equipped with functioning equipment meeting Section 135.227(b) and NOT placarded restricting operations in icing conditions [many aircraft manufactured prior to 1973] may fly under IFR or VFR rules in known or forecast light or moderate icing and continue flight in actual icing conditions.”
 - b. “Aircraft equipped with functioning equipment meeting Part 135.227(b) and a PLACARD PROHIBITING operation in icing conditions may depart on a flight when light or moderate icing is forecast or reported to exist for the intended route to be flown. However, continued flight in actual icing conditions is NOT permitted since such flight does not comply with the placard or the operating limitation in the aircraft flight manual.”
5. Rule #1 — take off “CLEAN” without ANY ice, snow, or frost on the aircraft. (91.527, 135.227, 121.629)
6. Find out what the freezing level is, stay 3000 feet below it or 8000 feet above it, or above the clouds.
7. At the 1st sign of ice — do something about it — when doing battle with ice, especially in rapidly building severe ice, by far the safest tactic is to GENTLY turn around and RUN AWAY!
8. Boots & prop heat will buy a little time, but if ice is bad enough it can bring down any aircraft. Don’t think that boots will allow you to fly for extended periods of time in moderate to severe icing. BFGoodrich ICEX boot treatment DOES help. It creates a slick surface and minimizes ice adhesion.
9. Alcohol windshields are anti-ice not de-ice; however alcohol will remove some (most) ice. NOTE: Save the windshield alcohol for the landing approach and don’t forget to turn it OFF at least 20 seconds before touchdown. It’s virtually impossible to see through alcohol streaming over a windshield.
10. When prop heat is not available, operate the propellers at MAXIMUM RPM. High RPM helps to prevent ice from forming down the blades and the greatly increased centrifugal force tends to sling it off.

11. The term “**ice bridging**” has been proven to be a **myth** unless the boots have longer than 10-second inflation and deflation times (usually an indication of malfunctioning boots). However, the more ice that accumulates prior to boot inflation, the more that will tend to shed when the boots are inflated. So, let at least some ice build before activating the boots.
12. As a rule of thumb — **CLIMBING** is **usually** the preferred **FIRST option** — you’ll either **break out on top** or climb into **air too cold for icing**. This must be done at the **first sign of ice**, while the aircraft is **still capable of climbing**. Of course there are no guarantees, without knowing what the conditions are at the higher altitudes, you may be going from bad to worse. But the higher you fly, the more stored energy you’ll have should you need to “drift down” due to ice accumulation. **DESCENDING** is usually the preferred **SECOND option** (get to warmer temperatures below the clouds and the ice if possible). As another rule of thumb, research has shown that 90% of icing encounters are limited to a **3000-foot** vertical area. The other 10% of the time, **ANYTHING is possible**. Call ATC. Get pilot reports.
13. **Cloud tops** in winter rarely extend above 30,000 feet.
14. **Penetrate the icing altitudes as quickly as possible** going up or down. If you’re at an ice-free altitude closing in on your destination, try to stay there until the very last minute, then make a rapid descent.
15. **Don’t allow ATC to fly your airplane**. TELL THEM what you need to do. TELL THEM you are in a dangerous icing situation and you **MUST** climb/descend or turn around RIGHT NOW. If the situation really gets serious — TELL THEM you need “**PRIORITY**”, then use your emergency authority (91.3) to do what you have to do RIGHT NOW. Do **NOT** let the aircraft completely ice up and fall out of the sky while waiting for a request to be granted. Keep in mind however, if you declare an icing emergency in an aircraft not properly equipped, an ugly enough incident may come to the attention of the local FSDO. A small price to pay if you’re still alive!
16. Some of the **heaviest icing** can be found in the **tops of clouds**. An altitude that puts you in and out of the cloud tops is not the best place to be.
17. Some of the **WORST ICING** can be found over or **downwind** of **mountainous terrain** (enormous lifting factor) and over or **downwind** of the **Great Lakes region** (copious amounts of moisture).
18. As ice accumulates, it **destroys lift** and **adds** massive amounts of **weight** and **drag**. **Cruise speed drops** and **stall speed increases**. When those speeds meet, you are **forced to descend**. If there is warm air below, there is no problem. If there is an airport below, there is **usually** no problem. If there are **BIG ROCKS** below, there **WILL be** a **BIG PROBLEM**.
19. Remember, **fuel consumption** increases dramatically as more and more power is needed to keep the struggling aircraft flying.
20. When approaching to land carrying a load of ice, find a **LONG runway** preferably **with an ILS**. **KEEP the POWER & SPEED UP**, the **URNS GENTLE**, and **DON’T CHANGE** the **FLAP SETTING**. You **don’t NEED flaps**. Flaps can cause a very exciting “**TAIL STALL**” (the negative lift of the tailplane is eliminated and the aircraft pitches nose down). A **sharp turn** can cause a sudden **accelerated stall** that will not be recoverable at low altitude.
21. **KEEP the POWER UP**. **KEEP the SPEED UP**. **EVEN a SMALL POWER or SPEED REDUCTION during APPROACH or EVEN in the FLARE**, could cause an **INSTANT STALL** that will bend a lot of metal. **Better to slide off the end at 10 kts** than to **corkscrew into the ground** a **½ mile short** at well over a **100 kts**.



AWOS vs. ASOS

Pilots can access ASOS/AWOS @
www.nws.noaa.gov/om/osd/portal.shtml

AWOS: (AIM 7-1-11)

1. **Automated Weather Observing System.** A suite of weather sensors of many different configurations that were either procured by the FAA or purchased by individuals, groups, airports, etc. that are required to meet FAA standards. AWOS can be purchased from three different contractors in the U.S.
2. A state or airport can purchase an AWOS with assistance from the FAA's Airport Improvement Program.
3. Provides minute-by-minute weather to pilots at airports that have no other approved weather reporting.
4. Typically includes ceiling & visibility (**AWOS-3**), sky conditions, temperature, dewpoint, altimeter, wind speed including gusts and wind direction.
 - AWOS-A — Only reports the altimeter setting.
 - AWOS-1 (I) — Altimeter, wind, temperature, dew point, and density altitude.
 - AWOS-2 (II) — Information provided by AWOS-1 plus **VISIBILITY**.
 - **AWOS-3** (III) — Information provided by AWOS-2 plus **CLOUD/CEILING** data.
 - **AWOS-3-P** (III-P) — Adds a precipitation type identification sensor.
5. AWOS can also generate automated remarks about density altitude, variable winds, and ceilings.
6. **A01** indicates a station **WITHOUT** a precipitation identification sensor (i.e., cannot determine the difference between liquid or frozen/freezing precipitation).
7. **A02** indicates a station **WITH** a precipitation identification sensor.
8. AWOS information can be obtained on the proper frequency in-flight and normally by **telephone** on the ground (**Airport Facility Directory**, "**AC-U-KWIK**", etc.).
9. An AWOS commissioned prior to July 1996 is not *required* to use the METAR format. That means it might report temperature in degrees Fahrenheit amongst other differences.

AWOS observations are considered the "**official weather**" unless "**challenged as incorrect**". If the AWOS is reporting IFR conditions (e.g. isolated fog around the sensor), but the pilot's eyesight is reporting obvious VFR, the **Part 91 pilot's observation overrules** the AWOS. **Part 121 & 135** rules are **more restrictive**, they require those pilots to consider the **AWOS** information as **correct no matter how bogus** it may seem.

ASOS: (AIM 7-1-11)

1. **Automated Surface Observation System.** **More sophisticated than AWOS** and is designed to provide the necessary information to generate weather forecasts. A product of a National Weather Service (NWS), Department of Defense (DoD) and FAA joint venture. ASOS is comprised of a standard suite of weather sensors (with several exceptions) all procured from one contractor.
2. Continuous minute-by-minute observations necessary to generate an aviation routine weather report (METAR).
3. Similar to AWOS but **more sophisticated** and is designed to provide the essential information (**METAR**) to generate weather **forecasts (TAF)**.
4. ASOS can determine type and intensity of precipitation (rain, snow, freezing rain), thunderstorms and obstructions to visibility such as fog and haze.
5. ASOS can also measure wind shifts, peak gusts, rapid pressure changes, and the amount of accumulated precipitation.
6. ASOS shines a laser ceilometer into the sky to observe cloud layers. It takes a measurement every 30 seconds over a 30-minute period, then double-weighs measurements during the last 10 minutes so the computer can decide if the cloud layers are scattered, broken or overcast.
7. The ASOS visibility sensor is normally located near the touchdown zone of the primary instrument runway.
8. The word "**AUTO**" included in the broadcast signifies that an observer is not logged onto the ASOS for backup or augmentation.
10. ASOS information can be obtained on the proper frequency in-flight and normally by **telephone** on the ground (**Airport Facility Directory**, **AC-U-KWIK**, etc.).

ASOS and AWOS:

1. The flag word "**TEST**" is added to the voice transmission of an ASOS/AWOS when it is being tested before commissioning. The quality of the observations may not be up to FAA standards. Therefore, the data should not be used operationally until the "TEST" flag word is removed.
2. Ceiling information is "time averaged" over a 30-minute period and visibility over a 10-minute period.
3. The upper limit of cloud height and visibility reported by ASOS/AWOS is 12,000 feet and 10 miles.
4. Most common reason ASOS/AWOS cannot be received by telephone is due to maintenance or repair.
5. **Questions** about **ASOS/AWOS?** — call **202-366-9908** (FAA Weather Sensors Research Team).