# A310 AIRCRAFT PREPARATION FOR COLD WEATHER OPERATION

FCOM>>Procedure and Techniques >>Inclement Weather Operation

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## General:

- Cold weather operation covers the following operating conditions:

    a) Cold soaked aircraft after stop over in very low OAT (below -15 deg C).

    b) Accumulation of frost, ice or snow on airplane surfaces.

- Recommendations and procedures mentioned by the aircraft manufacturer are to be used in conjunction with company policies and national operational requirements.

- For operation with OAT below -40 deg C make sure that cold weather maintenance procedure before and after cold soak have been applied, in accordance with aircraft maintenance manual.

## APU Start:

- Check that APU air intake, air conditioning packs deflect doors and modulating flaps are free form snow and ice.

- After cold soak in very low temperatures (below -15deg C) it is recommended to start APU on external ground power unit.

## Cabin Warm-up and Window/Probe Preheating:

- Set compartment temperature selector as required and window / probe heat to ON.

## Exterior Walk Around Safety Inspection:

- The aircraft should be free of frost, snow and ice, especially the lift producing and control surfaces. Also give special emphasis to probes, engine inlets, reverser assemblies, fuel vents, landing gear assemblies, outflow valves and water drains.

- A thin layer of rime (thin hoar frost) or a light coating of powdery (loose) snow is acceptable on the upper surface of fuselage. Thin hoar frost is a white crystalline deposit that usually develops uniformly on exposed surfaces during cold and cloudless nights, thin enough to distinguish surface features underneath (lines or markings).

- Frost on underside of wing in the area of fuel tanks is acceptable, if due to cold fuel (low fuel temperature, high humidity and OAT above freezing).

- A frost layer is acceptable up to 3mm only.

- Potable water tank should be drained and refilled in accordance with the following requirements:

| Air Conditioning | Cabin Temperature | OAT (deg C) | Exposure Time | Water Tank Drain |
|---|---|---|---|---|
| ON | Above 10 deg C | Between 0 & -15 | Any | Not Required |
| | | Below -15 | 1 hr 15 minutes | Required |
| OFF | | Between 0 & -7 | 1 hr 30 minutes | Required |
| | | Between -7 & -15 | 0 hr 45 minutes | |
| | | Below -15 | Any | |
| After required draining, refilling shall be performed 30 minutes before engine start with warm water (30 deg C) | | | | |

**Ground De-Icing / Anti-Icing:**

- De/Anti-icing fluids should be used in accordance with company requirements and aircraft maintenance manual instructions.

- Good communication with ground personnel should be established.

- De-icing may be done with engines and APU stopped or running, however engines and APU should not be started while de/anti-icing fluid is being sprayed on the aircraft.

- If repeated anti-icing is necessary, the surfaces must first be de-iced with a hot fluid mix before a further application of anti-icing fluid is made.

- Do not move slats/flaps, flight control surfaces and trims if they are not free of ice.

- Avoid indiscriminate usage or ingestion of de-icing fluid into APU or engine intakes.

- Treat aircraft symmetrically (left and right side must receive same and compete treatment).

- Crew actions associated with de-icing are as under:

| | | Engines and APU Stopped | APU Running | Engines Running |
|---|---|---|---|---|
| Before Spraying Operation | APU Bleed Valve | --- | CLOSE | --- |
| | Engine Bleed Valves | --- | --- | CLOSE |
| | PACK Valves | --- | CLOSE | CLOSE |
| | Engine Throttles | --- | --- | IDLE |
| After Spraying Operation | Pitch Trim | TAKEOFF POSITION | TAKEOFF POSITION | TAKEOFF POSITION |
| | APU and Engine Bleeds | --- | RESTORE (as required) | RESTORE (as required) |
| | PACK Valves | --- | ON | ON |
| | PTU's & Green Electric Pumps | TURN OFF (as applicable) | TURN OFF (as applicable) | --- |

- With passengers on board it is not recommended to exceed 20 minutes without air-conditioning supply.

- After de-icing, make sure the aircraft is clear from all ground equipment.

- Get the De-icing / Anti-icing Report from ground personnel who carried out de-icing and post application check. Information must include (Anti Icing Code):

a) Type of fluid used.
b) Fluid to water ratio (e.g. 75/25)
c) Beginning of Hold over time.
d) Post application check result: "Aircraft critical parts are clean".

- Perform TAXI checklist while taxing out after de-icing.

- Resume normal procedure.

- Decision for takeoff or to re-protect the aircraft is based on actual contamination of critical surfaces which is judged by checks from inside or outside the aircraft prior to exceeding the hold over time or just prior to take off.

- If fuselage has been sprayed, there is a risk of de-icing fluid ingestion into APU air intake, resulting in specific odors and/or smoke warnings (e.g. upper deck cargo smoke). Thus consider APU bleed off during takeoff.

## 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 PRETAKEOFF CHECK PROCEDURES.**

| Outside Air Temperature | | Approximate Holdover Times Under Various Weather Conditions (hours: minutes) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Degrees Celsius | Degrees Fahrenheit | 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 | 0:11-0:17 | 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 | 0:08-0:13 | 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 | 0:06-0:10 | 0:11-0:13 | 0:06-0:11 | 0:04-0:06 | 0:04-0:07 | 0:02-0:05 | | |
| below -10 | below 14 | 0:05-0:09 | 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
† Use light freezing rain holdover times in conditions of light snow mixed with light rain.

**◆◆ 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/M$^2$ (≈ 2 GALS/100FT$^2$) 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.

- FAA Type II Holdover time guidelines:

## TABLE 2. FAA GUIDELINES FOR HOLDOVER TIMES SAE TYPE II 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 PRETAKEOFF CHECK PROCEDURES.**

| Outside Air Temperature | | Type II Fluid Concentration | Approximate Holdover Times Under Various Weather Conditions (hours: minutes) | | | | | |
|---|---|---|---|---|---|---|---|---|
| Degrees Celsius | Degrees Fahrenheit | Neat-Fluid/Water (Volume %/Volume %) | Freezing Fog | Snow/ Snow Grains | Freezing Drizzle* | Light Freezing Rain† | Rain on Cold Soaked Wing** | Other‡ |
| -3 and above | 27 and above | 100/0 | 0:35-1:30 | 0:20-0:45 | 0:30-0:55 | 0:15-0:30 | 0:05-0:40 | |
| | | 75/25 | 0:25-1:00 | 0:15-0:30 | 0:20-0:45 | 0:10-0:25 | 0:05-0:25 | |
| | | 50/50 | 0:15-0:30 | 0:05-0:15 | 0:05-0:15 | 0:05-0:10 | | |
| below -3 to -14 | below 27 to 7 | 100/0 | 0:20-1:05 | 0:15-0:30 | ***0:20-0:45 | ***0:10-0:20 | CAUTION: No holdover time guidelines exist | |
| | | 75/25 | 0:25-0:50 | 0:10-0:20 | ***0:15-0:30 | ***0: 05-0: 15 | | |
| Below -14 to -25 or LOUT | Below 7 to -13 or LOUT | 100/0 | 0:15-0:35 | 0:15-0:30 | | | | |

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 °C (32 °F) only
*** No holdover time guidelines exist for this condition below -10 °C (14 °F)
‡ Snow pellets, ice pellets, heavy snow, moderate and heavy freezing rain, and hail
† Use light freezing rain holdover times in conditions of light snow mixed with light rain.

**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 II FLUID USED DURING GROUND DEICING/ANTI-ICING IS NOT INTENDED FOR AND DOES NOT PROVIDE PROTECTION DURING FLIGHT.

- FAA Type III Holdover time guidelines:

## TABLE 3. FAA GUIDELINES FOR HOLDOVER TIMES SAE TYPE III FLUID MIXTURE 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 PRETAKEOFF CHECK PROCEDURES.**

| Outside Air Temperature | | Approximate Holdover Times Under Various Weather Conditions (hours: minutes) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Degrees Celsius | Degrees Fahrenheit | Type III Fluid Concentration Neat Fluid/Water (Volume %/Volume %) | 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 | 100/0 | 0:20 - 0:40 | 0:35 - 0:40 | 0:20 - 0:35 | 0:10 - 0:20 | 0:10 - 0:20 | 0:08 - 0:10 | 0:06 - 0:20 | |
| | | 75/25 | 0:15 - 0:30 | 0:25 - 0:35 | 0:15 - 0:25 | 0:08 - 0:15 | 0:08 - 0:15 | 0:06 - 0:10 | 0:02 - 0:10 | |
| | | 50/50 | 0:10 - 0:20 | 0:15 - 0:20 | 0:08 - 0:15 | 0:04 - 0:08 | 0:05 - 0:09 | 0:04 - 0:06 | | |
| below -3 to -10 | below 27 to 14 | 100/0 | 0:20 - 0:40 | 0:30 - 0:35 | 0:15 - 0:30 | 0:09 - 0:15 | 0:10 - 0:20 | 0:08 - 0:10 | | |
| | | 75/25 | 0:15 - 0:30 | 0:25 - 0:30 | 0:10 - 0:25 | 0:07 - 0:10 | 0:09 - 0:12 | 0:06 - 0:09 | | |
| Below -10 | below 14 | 100/0 | 0:20 - 0:40 | 0:30 - 0:35 | 0:15 - 0:30 | 0:08 - 0:15 | CAUTION: No holdover time guidelines exist | | | |

**SAE Type III** fluid may be used below -10 °C (14 °F), provided the freezing point of the fluid is at least 7 °C (13 °F) below OAT and aerodynamic acceptance criteria (LOUT) are met.

Consider the use of **SAE Type I** when **Type III** fluid cannot be used.

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 °C (32 °F) only

‡ Snow pellets, ice pellets, heavy snow, moderate and heavy freezing rain, and hail

† Use light freezing rain holdover times in conditions of light snow mixed with light rain.

**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 WILL 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 III FLUID USED DURING GROUND DEICING/ANTI-ICING IS NOT INTENDED FOR - AND DOES NOT PROVIDE - PROTECTION DURING FLIGHT.

- FAA Type IV Holdover time guidelines:

**TABLE 4. FAA GUIDELINES FOR HOLDOVER TIMES SAE TYPE IV 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 PRETAKEOFF CHECK PROCEDURES.**

| Outside Air Temperature | | Type IV Fluid Concentration Neat-Fluid/Water (Volume %/Volume %) | Approximate Holdover Times Under Various Weather Conditions (hours: minutes) | | | | | |
|---|---|---|---|---|---|---|---|---|
| Degrees Celsius | Degrees Fahrenheit | | Freezing Fog | Snow/Snow Grains | Freezing Drizzle* | Light Freezing Rain† | Rain on Cold Soaked Wing** | Other‡ |
| -3 and above | 27 and above | 100/0 | 1:15-2:30 | 0:35-1:15 | 0:40-1:10 | 0:25-0:40 | 0:10-1:05 | CAUTION: No holdover time guidelines exist |
| | | 75/25 | 1:00-1:45 | 0:20-0:55 | 0:35-0:50 | 0:15-0:30 | 0:05-0:40 | |
| | | 50/50 | 0:15-0:35 | 0:05-0:15 | 0:10-0:20 | 0:05-0:10 | | |
| below -3 to -14 | below 27 to 7 | 100/0 | 0:20-1:20 | 0:20-0:40 | ***0:20-0:45 | ***0:10-0:25 | | |
| | | 75/25 | 0:25-0:50 | 0:15-0:35 | ***0:15-0:30 | ***0:10-0:20 | | |
| below -14 to -25 or LOUT | below 7 to -13 or LOUT | 100/0 | 0:15-0:40 | 0:15-0:30 | | | | |

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 °C (32 °F) only
***No holdover time guidelines exist for this condition below -10 °C (14 °F)
‡ Snow pellets, ice pellets, heavy snow, moderate and heavy freezing rain, and hail
† Use light freezing rain holdover times in conditions of light snow mixed with light rain.

**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 IV FLUID USED DURING GROUND DEICING/ANTI-ICING IS NOT INTENDED FOR AND DOES NOT PROVIDE PROTECTION DURING FLIGHT.