



AAVA – FLIGHT OPERATIONS MANUAL

COLD WEATHER OPERATIONS – BOEING 737 SERIES (73x)

FOR FLIGHT SIMULATION USE ONLY

1.0 GENERAL

This section defines cold weather operational standards for all AAVA Boeing 737 series aircraft (including 737-700/800/900 variants). Procedures reflect Boeing FCOM/FCTM guidance and simulation-appropriate best practices.

Cold weather operations apply when any of the following exist:

- OAT/TAT at or below **10°C**
- Visible moisture (rain, snow, ice crystals, fog)
- Frost or ice present on aircraft surfaces
- Operations from **contaminated taxiways or runways**

The **Clean Aircraft Concept** applies at all times.

2.0 CLEAN AIRCRAFT CONCEPT

An aircraft **must not depart** unless all critical surfaces are free from contamination.

The **Captain** is responsible for confirming the aircraft is clean after deicing/anti-icing and prior to takeoff.

2.1 CRITICAL SURFACES

The following must be free of frost, ice, snow, or slush:

- Wing leading edges, upper wing surfaces
- Horizontal stabilizer, elevators
- Vertical stabilizer, rudder

- Slats, flaps, flap tracks
- Engine inlets, spinner, fan blades
- AoA vanes, pitot probes, static ports
- Flight controls and fairings

2.2 CLEAN AIRCRAFT VERIFICATION

A Clean Aircraft Check is required when:

- Frozen precipitation continues after deicing
- Holdover time is near expiration
- A delay occurs after deicing
- Fluid effectiveness is uncertain

Verification may be completed from:

- **Flight deck** (within HOT)
- **Cabin overwing windows** (HOT expired or heavy precipitation)

Left wing root is used as the reference point (first area sprayed, oldest fluid).

3.0 GROUND DEICING / ANTI-ICING

3.1 OVERVIEW

Deicing removes contamination.

Anti-icing protects against further accumulation.

Clear coordination between Flight Crew and Ground Deicing Personnel is required.

3.2 APPROVED FLUID TYPES

Type I Fluid

- Hot glycol mixture
- Used primarily for **deicing**
- Short holdover time
- Smooth glossy appearance indicates active protection

Type IV Fluid

- Thickened, long-lasting anti-ice fluid
- Applied after Type I
- Provides extended protection before takeoff
- Designed to shear off during takeoff roll

3.3 HOLDOVER TIME (HOT)

Holdover Time begins when the **final anti-icing** application starts.

HOT expires when the fluid can no longer prevent frozen contamination.

Precipitation **anticipated** at application time affects HOT selection.

3.4 ENGINE & AIRFRAME CONFIGURATION

Engines Running Deicing

- May be conducted only when the spray zone is safe
- Crew and Ground Team must coordinate carefully
- If APU is inoperative, crew may shut down the engine on the side being sprayed
- Perform crossbleed start after completion

Flaps During Deicing

The Boeing 737 uses **flap angles** (1°, 5°, 10°, 15°, 25°, 30°, 40°).

- For uniform protection, extend flaps to **15°** prior to deicing when contamination on flap areas exists
- If contamination is present on upper wing surfaces, extending to 15° does **not** risk damage
- If flaps remain at 15° for flap-area contamination removal, do **not** retract until contamination is removed

CAUTION:

Retracting flaps below **15°** with contamination present can cause flap track damage.

4.0 IN-FLIGHT ICING OPERATIONS

4.1 WING ANTI-ICE OPERATION

Boeing WAI may be used in two ways:

Primary Method — Deicer Mode

Activate WAI when ice is observed on:

- Window frames
- Wiper arms
- Side window posts
- Wing leading edges

This method:

- Produces clean leading edges
- Minimizes runback ice
- Reduces fuel and thrust penalties

Secondary Method — Anti-Icer Mode

Use WAI **before** ice accumulation during prolonged exposure in **moderate or severe icing**.

General Notes

- WAI is unnecessary below **–40°C SAT**
 - Turn WAI **OFF** when clear of icing
 - Avoid prolonged icing operation with flaps extended
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5.0 ENGINE ANTI-ICE (EAI)

EAI must be used when:

- OAT/TAT $\leq 10^{\circ}\text{C}$ **and** visible moisture exists
- Ice is detected or suspected
- Conditions conducive to icing exist

Indicators of engine icing:

- Fan vibration
- Increasing EGT at constant thrust
- N1/N2 instability
- Engine spool-up sluggishness

Use **ENGINE ANTI-ICE switches ON** as required.

6.0 DESCENT IN ICING CONDITIONS

When descending or holding in **moderate or severe icing** with low thrust:

Every ~15 minutes:

- Increase thrust on **each engine separately** to a minimum of **70–80% N1**
- Maintain increase for several seconds

This sheds ice from:

- Spinner

- Fan blades
 - Inlet lips
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7.0 APPROACH, LANDING & CONTAMINATED RUNWAY OPERATIONS

7.1 FLAP RETRACTION AFTER LANDING (BOEING 737)

If ice accumulation is present after landing:

- Do **not** retract flaps **below 15°**
- Maintain flaps at **15°** until ice is removed from:
 - Flap surfaces
 - Tracks
 - Fairings

Once contamination is removed, flaps may be retracted to **UP**.

7.2 REVERSE THRUST USE

On slippery or contaminated runways:

- Use reverse thrust as required for a **safe stop**
- Reduce reverse thrust smoothly below **60 kt**, depending on deceleration rate

7.3 TAKEOFF FROM CONTAMINATED RUNWAYS

- Use **maximum takeoff thrust**
- Within 5 minutes of takeoff:
 - Perform an **engine run-up to ~50% N1** for at least 5 seconds
 - Confirm stable engine operation
 - During a rejected takeoff, rudder provides primary directional control to approximately **60 kt**

7.4 SAFETY PRIORITY

During landing or a rejected takeoff in contamination:

Stopping the aircraft is always the highest priority.