Cold Weather Operations - Boeing

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

5.0 ENGINE ANTI-ICE (EAI)

EAI must be used when:
– OAT/TAT ≤ 10°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

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.

Revision #4
Created 2025-11-30 21:22:17 UTC by Randy Kaster
Updated 2025-11-30 21:57:36 UTC by Randy Kaster