

# Cold Weather Altimeter Corrections

Cold Temperature Corrections are considered in three different ways, depending upon where you are flying. The three possible procedures include: ICAO procedures, European procedures, or FAA mandated.

Pilots must choose the procedure applicable to the airport/region they are operating within.

## ICAO (Canada, South America, Asia, Middle East, N & S Poles)

Since 2004, ICAO PANS-Ops states that the Pilot-in-Command is responsible for altimeter corrections due to non-standard pressure, temperature and, where appropriate, wind effects on altimeter indications. Here are some noteworthy points.

- Minimum altitudes are to be calculated by the state,
- ATC Radar vectors are to be temperature compensated,
- The PIC shall be advised on how the minimum altitude were determined.

The state calculated minimum safe altitudes must be adjusted when the ambient temperature on the surface is much lower than ISA. An approximate correction is 4% height increase for every 10°C below standard temperature as measured at the altimeter setting source. This is safe for all altimeter setting source altitudes for temperatures above -15°C. For colder temperatures, a more accurate correction should be obtained from a table found in PANS-Ops, Volume 1, Part III, Section 1, Chapter 4.

When using this table keep in mind:

- These tables are calculated for a sea level aerodrome and are conservative when applied at higher than sea level aerodromes.
- The corrections have been rounded up to the next 10ft increment.
- Temperature values from the reporting station nearest to the position of the aircraft should be used.

## Europe (European Union)

Currently, there is not a European-wide common procedure to deal with adjustments to Minimum Altitudes. Some regulators do not specify adjustments to MSAs and consequently ATC providers do not apply a temperature correction to published MSAs for cold temperatures. It is the flight crew responsibility according to the provisions of ICAO PANS OPS.

EuroControl directs ATC controllers to issue clearances such that the prescribed obstacle clearance will exist at all times until the aircraft reaches the point where the pilot will re-join the flight planned route, or a published route or instrument procedure. There is not a clear definition of how this is determined or when and where to apply this in operation.

EuroControl is not a regulatory authority for how minimum altitudes are designated or cold temperature compensated. By EuroControl and ICAO definitions, the objectives of the air traffic

control service do not include prevention of collision with terrain. The state over which you are flying determines the need and specific application of cold temperature compensation.

With respect to altitude corrections, the following procedures apply to operational pilots:

- IFR assigned altitudes may be either accepted or refused. Refusal in this case is based upon the pilot's assessment of temperature effect on obstacle clearance.
- IFR assigned altitudes accepted by a pilot should not be adjusted to compensate for cold temperatures, i.e., if a pilot accepts "maintain 3000", an altitude correction should not be applied to 3000ft.
- Radar vectoring altitudes assigned by ATC are temperature compensated and require no corrective action by pilots.
- When altitude corrections are applied to a published final approach fix, FAF crossing altitude, procedure turn or missed approach altitude, pilots should advise ATC

In 2014 EuroControl published a set of guidelines for cold temperature corrections. In this document, EuroControl enforces the idea that the flight crew is responsible for any necessary cold temperature corrections to all published minimum altitudes/heights including the altitudes/heights for the initial and intermediate segments. ATC rules and procedures do not suggest relieving pilots of their responsibility to ensure that any clearances issued by air traffic control units are safe in respect to terrain clearance.

## FAA Mandated (USA)

Since 1992 the FAA has been studying a method to publish when, where and how to describe and publish cold weather altimetry errors. The FAA conducted a risk analysis to determine if current 14 CFR Part 97 instrument approach procedures, in the United States National Airspace System, place aircraft at risk during cold temperature operations.

The parameters for this study were:

1. Only specific airports in the USA were considered at risk and evaluated,
2. A five year "look-back" period was used for evaluation,
3. The coldest average low temperature, in the coldest month was identified,
4. Anticipated barometric altimetry system errors were factored in,
5. Intermediate, Final and Missed Approach segments were evaluated for all procedures,

If probability was greater than 1% that the Required Obstacle Clearance (ROC) used on a procedure segment altitudes would be lost, a temperature restriction was **applied to that segment.**

Effective July 2020, the FAA included Cold Temperature Correction procedures in the US AIP. This means that the procedures are regulatory and included in the AIM and Jeppesen Publications. A list of Cold Temperature Restricted Airports is promulgated by domestic NOTAM, and included as "textual notes" on affected Jeppesen Approach Charts.

**Temperatures for Cold Temperature Restricted Airports are completely separate from the temperatures published on RNAV approaches.** Temperature restrictions on RNAV approaches for LP or LNAV/VNAV minima must be followed, even if it is warmer than the temperature associated with the Cold Temperature Restricted Airport procedure. In other

words, “APPROACH NOT AUTHORIZED BELOW XX” is a separate limitation when using LNAV/VNAV or LP lines of minima.

Pilots must not correct altitudes published on Standard Instrument Departures, SIDs, Obstacle Departure Procedures, ODPs and Standard Terminal Arrivals, STARs. ATC will not apply a cold temperature correction to radar vectoring altitudes. Pilots must be cleared by ATC to apply a cold temperature compensation to an ATC assigned altitude or when flying on a radar vector in lieu of a published missed approach procedure.

**If the applicable airport is defined as a, Temperature Restricted Airport, pilots must choose one of the following correction methods.**

## “Individual Segments Method”

Pilots using the “Individual Segments Method” will need to reference the list of affected airports per the NOTAM. Pilots may correct only the required segment(s) indicated on the NOTAM restricted airports list.

Calculations will be made based on the altitude at the Final Approach Fix (FAF), the Minimum Descent Altitude or Decision Altitude (DA) and the Missed Approach (MA) final holding altitude. The calculations made at these fixes will be used to make altitude corrections on the other fixes in the applicable approach segment(s). For example:

Intermediate Segment:

All altitudes from the FAF up to but not including the intermediate fix (IF) altitude. Calculate correction by taking FAF altitude and subtracting the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Round this number as applicable and then add to FAF altitude and all step-down altitudes.

Final segment:

Calculate correction by taking the MDA or DA for the approach being flown and subtract the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Use this number or round up. Add this number to MDA or DA, as applicable, and any applicable step-down fixes in the final segment.

Missed Approach Segment:

Calculate the correction by taking the final missed approach (MA) holding altitude and subtract the airport elevation. This number will be used to enter the height above airport in the ICAO table until reaching the reported temperature. Round this number as applicable and then add to the final MA altitude only.

Here are the key points to remember using this method:

1. Only airports with a runway length of 2,500 feet or greater were evaluated,

2. A critical temperature is identified that when, “at or below” , temperature compensation MUST be used on the identified approach segments,
3. A “Text Note” on the approach chart indicates there has been a critical temperature and segment for this airport combination.
4. A manual calculation using the AIM 7-2-3, ICAO Cold Temperature Error Table (or equivalent) is needed to determine the required add-on.
5. No extrapolation above the 5000ft column required. Pilots should use the 5000ft “height above airport in feet” column for calculating corrections of greater than 5000ft above reporting station.
6. ATC will require the pilot to report what altitude they are flying vice the published altitude.

## “All Segments Method”

Like the name implies, this involves all segments from the Initial Approach Fix, IAF to the Missed Approach Holding Fix.

Here are the items to remember:

1. Specifically look for a note on the applicable Jeppesen Chart and note the Temperature.
2. If below the Temperature for Cold Weather Correction, correct all altitudes from the IAF altitude to the missed approach final holding altitude.
3. ATC will require the pilot to report what altitude they are flying versus the published altitude.

**When using either the “Individual Segments” or “All Segments” methods, pilots need to calculate and add a correction to the published MDA or DA. DH is not affected.**

Fly safe,

Captain Paul Jeeves

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