

Příloha 3 – Provozní postupy RNP AR APCH

RNP AR APCH (LOWI)

1. General

1.1. Introduction

These operation procedures are designated for Innsbruck airport (LOWI) for **RNP AR approach** RWY 08 and RWY 26, and **LOC R approach** RWY 26.

1.2. Required Equipment

- **EGPWS**
- **2 FMCs**
- **2 GPS Receivers**
- **2 Radio Altimeters**
- **2 CDUs**
- **2 ADIRUs, IRSs in NAV mode**
- **2 EFIS/MAP or PFD and ND displays**
- **1 A/P and 2 F/Ds capable of LNAV and VNAV**
- **current NAV database**

1.3. Navigational Database

Every RNP AR APCH procedure in FMS NAV DB must be validated by the operator before using in IMC. Operator must:

- before the first flight assuming usage of RNP AR APCH in IMC validate the FMC nav. data in FSTD (if not before confirmed in the actual aircraft in VMC) by flying the entire procedure to confirm the path is flyable with no disconnects
- use a copy of validated procedure for comparison with following data updates (responsibility of NAV department each AIRAC cycle)
- if any navigation data changes/updates occur = validate the nav. data in FSTD again before using them on a flight in IMC
- if aircraft system has modified and modification may have effect on the procedure: operator must conduct initial data validation with the modified system

Pilots shall compare the nav. data in FMC and procedure on the map display with published procedure before usage of the RNP AR APCH procedure as described further in procedures.

1.4. Procedure Characteristics

RNP AR APCH:

RWY 08 descent from FAP: 3,6° (6,3%) RF legs: MAX IAS 160 KT minimum temperature: -7 °C only RNP 0.30	RWY 26 descent from FAP: 3,5° (6,1%) RF leg: MAX IAS 165 KT (missed approach) minimum temperature: -7 °C RNP 0.15 / 0.30
VOR/DME or DME/DME or LOC update not authorized	

LOC R Approach RWY 26:

This is **LOC/DME** approach procedure followed by **RNAV(RNP) 0.3** missed approach procedure. Pilots must hold an **authorization for RNP AR operations** to commence this approach.

- **LOC/DME** approach: standard non-precision SOPs
- **RNP AR** missed approach:
 - must comply with Required Equipment (see 1.2.) and with RNP availability predictions (RAIM check) before commencing the approach (see 2.)
 - **LOC, VOR and DME/DME UPDATE – OFF**
(before commencing the approach, see 3.2.)
 - if RNP capability loss **before D4.0 OEV** = switch to **special LOC/DME EAST** procedure and continue to land/perform missed approach procedure
 - if RNP capability loss **after D4.0 OEV** or during missed approach = proceed according to **contingency procedures** (see 4.1.)

1.4.1. Weather Specifics

In vicinity of the Innsbruck Airport, FOEHN conditions may occur.

During FOEHN conditions expect:

- surface wind 100° - 180°, windspeed 15 - 25 KT, gust 30 - 50 KT
- strong winds, severe turbulence with windshears
- **RNP AR APCH cannot be commenced during Foehn conditions if:**
windspeed exceeds **25 KT** and/or gust exceeds **40 KT**

On final RWY 08 expect severe downdraughts over the Inn river.

RNP AR APCH cannot be commenced with **tailwind component exceeding 5 KT**.

2. Preflight

2.1. Preflight Briefing

- verify validity of approach charts
- check NOTAMs or SNOWTAMs (*NAVAIDS, RWY/TWY/apron status, restrictions, hazards*)
- check TAF/ Adverse weather (*strong wind, low ceiling, low RVR/ VIS, low temperatures*)
- check MEL restrictions
- check ATC FPL field **18** (*field 18 = PBN/T1 for RNP AR with RF*)
- check OFP contains ALTN destination aerodrome with non-RNP approach
- **pilots hold RNP AR APCH qualification**

2.2. Preflight Check

- check RNP availability predictions (RAIM check)

3. In Flight

3.1. Approach Briefing

Additional steps to standard approach briefing:

- check **required equipment** (*see 1.1.*)
- TERR display at least one side (*preferably on PF side*)
- check RNP limits are set in FMC (*depends on the intended procedure*)
- check weather conditions
- check FMC database against charted procedure:
 - waypoints sequence, track angles, distances, altitude and speed constraints, vertical path angle, fly-over and fly-by waypoints**
- brief missed approach and contingency procedures (*see 4. and 4.1.*)
 - ... during approach **RNAV (RNP) RWY 26** report distances **D6.3 OEV** and **D2.5 OEV** in case of contingency procedure due to **RNP capability loss**
 - ... during approach **LOC R RWY 26** report distance **D4.0 OEV** in case of contingency procedures due to **RNP capability loss**

3.2. Approach Preparations

- select or verify **LNAV, VNAV, F/D** and **A/P**
- for **RNP AR APCH approach procedure**:
LOC or VOR/DME or DME/DME UPDATE – **OFF** (*FMS – NAV STATUS/PROG page*)
- for **LOC R approach procedure**:
VOR/DME or DME/DME UPDATE – **OFF** during missed approach procedure
- check these alerts **are NOT displayed**:
UNABLE REQD NAV PERF-RNP
FMC DISAGREE
VERIFY POSITION
IRS NAV ONLY
SINGLE FMC OPERATION
GPS-L (R) INVALID
... if they are, RNP AR APCH **cannot** be commenced
- if alert **VERIFY RNP** is displayed:
confirm **the RNP entry** and correct it in FMC
- prepare conventional **NAVAIDs** to keep situational awareness and to prepare contingency procedures:
LLZ OEV, DME PAT, NDB INN, LLZ OEJ (*see 4.*)
- set/check **current local** altimeter
- crosscheck the altimeters (*difference within 100 feet*)
if altimeters **disagree** = APPROACH CANNOT BE COMMENCED
- verify the crossing altitude
- set missed approach altitude (*if 300 feet below missed approach altitude*)
- altitude restriction **“at or above” before FAF** may be changed to **“at”** altitude
- verify RNP is equal to or greater than **0.15** (A/P or F/D) – as required
- verify RNP limits are still set in FMC
- verify ANP is within RNP limits
- check temperature and wind = within limits
- request ATC about wind component
- **10 NM range** on ND in map mode on PF side

3.3. Approach Procedure

Additional steps to non-precision approach SOPs.

- lateral path **cannot** be modified with exception of ATC radar vectoring to fix **before FAF**
- loss of RNP prior to the approach = **DO NOT COMMENCE RNP AR APCH**
- proceed according to the **contingency procedures** (see 4.1.) if:
 - loss of **RNP** or **A/P** or **F/D** or **map display**
- alert message **IRS NAV ONLY** is shown = an average drift is **0.6NM/0.5hr** at the beginning (after that 2NM/hour)
- do not deviate from lateral path unless authorized by ATC or during emergency conditions
- if lateral deviation occurs = immediate correction required
- vertical deviation must be within **±75 ft** of the glide-path during final approach segment
- proceed according to **contingency procedures** (see 4. and 4.1.) if:
 - lateral deviation exceeds 1×RNP value (**RNP 0.15/0.30**)
 - deviation below vertical path exceeds 75 feet or half-scale deflection, at any time
 - deviation above vertical path exceeds 75 feet or half-scale deflection, at or below 1000 AAL
- ... unless the visual reference is established and **maintained** with the RWY
- missed approach procedure during or shortly after RF leg = maintain published path as closely as possible
- **do not exceed maximum airspeed during RF leg** (see 3.3.1.)
- pilots must request opposite RWY in case of tailwind component exceeding **5 KT**
- verify or re-engage **LNAV/VNAV** immediately **after TOGA** during missed approach procedure

3.3.1. Radius-to-fix (RF) Legs

- **do not exceed** maximum speed and maximum bank angle:

Segment	B737-800 (Cat C)
FAF to DA	160 KIAS
Missed approach (DA to MAHP)	240 KIAS (for RWY 26: 165 KIAS)

- if **go-around** on RF leg:

immediately **re-select LNAV** (or verify that LNAV has re-engaged)

3.3.2. Additional Information

3.3.2.1. Holding Patterns

- reduce speed 3 min before entry the holding pattern
- FMC holding speed is higher than max. holding speed = use flaps 1
- icing or turbulent conditions = maintain clean configuration
- advise ATC if:
 - 1) higher speed necessary due to turbulence,
 - 2) unable to fly holding procedure, or
 - 3) unable to comply with speed in table below:

ALTITUDE	MAX SPEED
Through 14 000 ft	230 KT
* it is expected that holdings are performed up to this altitude	

- if holding procedure is selected (PROC HOLD):
 - exiting is automatic (no need to select EXIT HOLD)
 - new holding pattern must be entered if remain in holding is required

3.3.2.2. Terrain Avoidance

- short duration (momentary) terrain caution-level alerts:
 - flight crew verifies they are on required track
 - consider continue the procedure using LNAV/VNAV
- terrain warning-level alerts:
 - **immediate action** required

3.3.2.3. Cold Temperature Altitude Corrections

When the temperature is warmer than ISA, true altitude is higher than indicated. When the temperature is **colder** than ISA, true altitude of the aircraft is **lower** than indicated.

- check the lowest temperature published in the chart
LOWI: -7 °C
- cold temperature corrections = correct **the initial and intermediate segments, DA/H, missed approach altitudes**
- if actual temperature is below the limit = DO NOT commence RNP AR APCH

4. Contingency Procedures

Go-around shall be initiated in all cases described in **SOPs** or whenever CMD decides it is **safest course of action**.

Go-around must be initiated **at DA** at the latest.

Go-around if:

- deviation exceeds the limits, or
- an amber deviation alert occurs, or
- A/P or F/D or map display fails, or
- these alert messages are shown:

UNABLE REQD NAV PERF-RNP

FMC DISAGREE

VERIFY POSITION

IRS NAV ONLY

SINGLE FMC OPERATION

GPS-L (R) INVALID

... unless visual reference is established and **maintained** and/or switching on Special LOC/DME EAST approach procedure is not possible

If any of these specific failures, which might affect RNP capability, occur during the approach or missed approach procedure, the crew must be **prepared** to initiate procedure described in

"4.1. Contingency Missed Approach Procedure (RNP Capability Loss)"

4.1. Contingency Missed Approach Procedure (RNP Capability Loss)

Flight crew must brief these contingency procedures prior to the approach

VMC:

During the approach for **RWY 26 & 08:**

If visual contact is established and **maintained** with RWY

... CONTINUE TO LAND

IMC:

RWY 26 – LOC R approach:

During the approach:

a) position **before D4.0 OEV**

... switch to **special LOC/DME EAST** approach procedure and CONTINUE TO LAND or perform MISSED APPROACH PROCEDURE as published

During the missed approach procedure or position **after D4.0 OEV**:

- 1) climb straight ahead and after passing **D2.0 OEV** (outbound) turn right to intercept **OUTBOUND track 286°** from **INN NDB**
- 2) at **D19.0 PAT** commence a **25-degree** banked **left** turn (MAX 172 KIAS) to continue along **track 058°**
- 3) turn right to intercept **INBOUND track 106°** from **INN NDB** and continue along this track until intercepting **OEJ LOC**
- 4) turn left to establish on **OEJ LOC** (frontbeam **course 066°**)
- 5) after passing **OEJ LOC** and altitude **11 500 feet MSL** is reached, continue direct to **RTT NDB** and hold as published

RWY 26 – RNAV(RNP) approach:

During the approach:

b) position **before D6.3 OEV**

... switch to **special LOC/DME EAST** approach procedure and CONTINUE TO LAND or perform MISSED APPROACH PROCEDURE as published

c) position **between D6.3 OEV – D2.5 OEV**

... perform MISSED APPROACH PROCEDURE as for **special LOC/DME EAST**

During missed approach procedure or position **after D2.5 OEV** (inbound):

- 6) climb straight ahead and after passing **D2.0 OEV** (outbound) turn right to intercept **OUTBOUND track 286°** from **INN NDB**

- 7) at **D19.0 PAT** commence a **25-degree** banked **left** turn (MAX 172 KIAS) to continue along **track 058°**
- 8) turn right to intercept INBOUND **track 106°** from **INN NDB** and continue along this track until intercepting **OEJ LOC**
- 9) turn left to establish on **OEJ LOC** (frontbeam **course 066°**)
- 10) after passing **OEJ LOC** and altitude **11 500 feet MSL** is reached, continue direct to **RTT NDB** and hold as published

RWY 08 – RNAV(RNP) approach:

During the approach:

- a) **Above altitude 9500 feet MSL:**
 - 1) climb straight ahead to altitude **12 000 feet MSL** maintaining **track 083°**
 - 2) after crossing INBOUND **track 106°** from **INN NDB** proceed **direct to RTT NDB** or request ATC vectoring

- b) **Below altitude 9500 feet MSL:**
 - 1) climb straight ahead and intercept INBOUND **track 106°** from **INN NDB**
 - 2) continue along this track until intercepting **OEJ LOC**
 - 2) establish on **OEJ LOC** (frontbeam **course 066°**)
 - 3) after passing **OEJ LOC**, proceed **direct to RTT** and join holding pattern

During missed approach procedure:

- 1) intercept **OEJ LOC** (frontbeam **course 066°**/ backbeam **course 064°**)
- 2) continue along LOC course until reaching altitude **9 500 feet MSL**
- 3) after reaching altitude, proceed **direct to RTT NDB** and hold as published

5. Reportable Events

The flight crew shall **fill and submit** the flight report anytime a reportable event occurs. A reportable event is one that adversely affects the safety of the operation and may be caused by actions or events external to the functioning of the aircraft navigation system.

Technical defects and the exceedance of technical limitations, including:

- 11) significant navigation errors which affect data or a database coding

- 12) unexpected deviations in lateral/vertical flight path **not caused by flight crew**
- 13) incorrect operation of equipment
- 14) significant misleading information **without a failure warning**
- 15) total loss or multiple navigation equipment failure
- 16) loss of integrity (e.g. RAIM function), even if the integrity was **predicted to be available** during preflight planning

6. RNP Monitoring Programme

The flight crew shall make a record about performed RNP AR APCH in the **Journey log**. If the approach was unsatisfactory (according to the parameters stated below) fill the flight report in addition.

The Data Collection and Flight Safety departments are collecting and periodically submitting the following information recorded in the **Journey log/Flight reports** every year (**every 30 days** during **first 3 month** of operation to each new airport) to CAA:

- 17) total number of RNP AR APCH operations conducted
- 18) number of approaches by aircraft/system which were completed as planned (with no anomalies)
- 19) the reasons for unsatisfactory approaches
- 20) flight crew comments

The reasons for unsatisfactory approaches are:

- 21) UNABLE REQ NAV PERF or other RNP messages during approaches
- 22) excessive lateral or vertical deviation
- 23) TAWS warning
- 24) A/P disconnect
- 25) navigation data errors
- 26) flight crew reports of any anomaly