Inspectie Leefomgeving en Transport
Ministerie van Infrastructuur en Waterstaat

Informatieblad

Introductie PBN

Dit informatieblad beschrijft de introductie van Performance Based Navigation (PBN) voor de volgende doelgroepen:

- Houders van een Instrument Rating (IR)
- Vliegscholen
- Examinatoren
- Instructeurs

Houders van een IR

De bevoegdheid instrumentvliegen, ofwel instrument rating (IR), dient vanaf 25 april 2021 de component PBN te bevatten.

Brevethouders die op dit moment in bezit zijn van een IR uitgegeven voor 25 april 2021 en niet beschikken over de component PBN mogen geen gebruik maken van de IR. Om de component PBN binnen de IR alsnog te verkrijgen kunnen deze brevethouders een verschillencursus volgen bij een Approved Training Organisation (ATO) die is gecertificeerd om deze cursus aan te bieden. Deze cursus omvat zowel theorie als praktijk zoals uitgewerkt in de bijlage. De cursus wordt afgesloten met een IR profcheck. Bij voldoende resultaat zal de examinator de IR verlengen.

Vliegscholen

ATO's die de verschillencursus (zoals omschreven in de bijlage) aanbieden zijn hiertoe gecertificeerd voor 25 april 2021. De verschillencursus staat op het ATO certificaat vermeld. Om de verschillencursus te onderhouden is vereist dat de ATO de IR opleiding op het ATO certificaat heeft staan en blijft voldoen aan bijbehorende vereisten. Voor de inrichting is vereist dat de verschillencursus blijft voldoen aan de bijlage.

Examinatoren

Voor examinatoren gelden geen aanvullende eisen.

Instructeurs

Voor de instructeurs gelden geen aanvullende eisen.

Afkortingen

AMC	Acceptable means of Compliance
ATO	Approved Training Organisation
FCL	Flight Crew Licensing
FSTD	Flight Simulation Training Device
HT	Head of Training
ILT	Inspectie Leefomgeving en Transport – Luchtvaart
IR	Instrument Rating
PBN	Performance Based Navigation

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Mei 2021

Bijlage

INRICHTINGSEISEN VERSCHILLENCURSUS

De verschillencursus bevat tenminste de onderstaande elementen en is opgebouwd uit intake assessment, theorie-instructie en praktijkinstructie.

1.1 Instroomeisen:
De cursist die de verschillencursus wenst te doorlopen dient minimaal in het bezit te zijn van:
- een EU IR(A) of IR(H) bevoegdheid uitgegeven voor 25 april 2021;
- een geldig Medical class I of II met IR uitbreiding;
- een geldig LPE level 4, 5 of 6.

1.2 Intake assessment:
Voor aanvang van de opleiding wordt door de ATO een intake assessment gedaan. Tijdens dit assessment wordt door de ATO bepaald wat de kennis van en ervaring de cursist is met PBN. Indien nodig kan een aanvullende test in een FSTD of luchtvaartuig worden gedaan. Op basis van dit assessment stelt de ATO een trainingsplan op toegesneden op de cursist. De ATO stelt hierbij zeker dat de cursist aan het einde van de verschillencursus beschikt over de theoretische kennis (genoemd onder theorie-instructie hieronder) en de praktische vaardigheden (genoemd onder praktijkinstructie hieronder) om deel te kunnen nemen aan de prof check.

1.3 Theorie-instructie
De theorie-instructie dient de volgende onderwerpen te omvatten (ref. AMC1 FCL.310; FCL.515(b); FCL.615(b)):

062 07 00 00 PBN

062 07 01 00 PBN concept (as described in ICAO Doc 9613)

062 07 01 01 PBN principles

- List the factors used to define RNAV or RNP system performance requirements (accuracy, integrity, continuity and functionality).
- Explain the concept of continuity.
- Explain the concept of integrity.
- State that, unlike conventional navigation, performance-based navigation is not sensorspecific.
- Explain the difference between raw data and computed data.

062 07 01 02 PBN components

- List the components of PBN as NAVAID infrastructure, navigation specification and navigation application.
- Identify the components from an example.

062 07 01 03 PBN scope

- State that in oceanic/remote, en route and terminal phases of flight PBN is limited to operations with linear lateral performance requirements and time constraints.
- State that in the approach phases of flight PBN accommodates both linear and angular laterally guided operations.

062 07 02 00 Navigation specifications

062 07 02 01 RNAV and RNP

- State the difference between RNAV and RNP in terms of the requirement for on-board performance monitoring and alerting.

062 07 02 02 Navigation functional requirements

- List the basic functional requirements of RNAV and RNP specifications (continuous indication of lateral deviation, distance/bearing to active waypoint, g/s or time to active waypoint, navigation data storage and failure indication).

062 07 02 03 Designation of RNP and RNAV Specifications

- Interpret "X" in RNAV X or RNP X as the lateral navigation accuracy (total system error) in nautical miles, which is expected to be achieved at least 95 per cent of the flight time by the population of aircraft operating within the airspace, route or procedure.
- State that aircraft approved to the more stringent accuracy requirements may not necessarily meet some of the functional requirements of the navigation specification having a less stringent accuracy requirement.
- State that RNAV10 and RNP4 are used in the oceanic/remote phase of flight.
- State that RNAV5 is used in the en route and arrival phase of flight.
- State that RNAV2 and RNP2 are also used as navigation specifications.
- State that RNP2 is used in the en route and oceanic/remote phases of flight.
- State that RNAV1 and RNP1 are used in the arrival and departure phases of flight.
- State that RNP APCH is used in the approach phase of flight.
- State that RNP AR APCH is used in the approach phase of flight.
- State that RNP 0.3 navigation specification is used in all phases of flight, except for oceanic/remote and final approach, primarily for helicopters.

062 07 03 00 Use of PBN

062 07 03 01 Airspace planning

- State that navigation performance is one factor used to determine minimum route spacing.

062 07 03 02 Approval

- State that the airworthiness approval process assures that each item of the area navigation equipment installed is of a type and design appropriate to its intended function and that the installation functions properly under foreseeable operating conditions.
- State that some PBN specifications require operational approval.

062 07 03 03 Specific RNAV and RNP system functions

- Recognise the definition of an RF leg.
- Recognise the definition of a fixed radius transition.
- Recognise the definition of a fly-by-turn and a fly-over.
- Recognise the definition of a holding pattern.
- Recognise the definition of an "ARINC 424 path terminator".
- Recognise the definition of the following path terminators: IF, TF, CF, DF, FA, CA.
- Recognise the definition of an offset flight path.

062 07 03 04 Data processes

- State that the safety of the application is contingent upon the accuracy, resolution and integrity of the data.
- State that the accuracy of the data depends upon the processes applied during data origination.

062 07 04 00 PBN operations

062 07 04 01 PBN principles

- Recognise the definition of path definition error.
- Recognise the definition of flight technical error.
- Recognise the definition of navigation system error.
- Recognise the definition of total system error.

062 07 04 02 On-board performance monitoring and alerting

- State that on-board performance monitoring and alerting of flight technical error is managed by on-board systems or crew procedures.
- State that on-board performance monitoring and alerting of navigation system error is a requirement of onboard equipment for RNP.
- State that on-board performance monitoring and alerting of path definition error are managed by gross reasonableness checks of navigation data.

062 07 04 03 Abnormal situations

- State that abnormal and contingency procedures are to be used in case of loss of the PBN capability.

062 07 04 04 Database management

- State that, unless otherwise specified in operations documentation or AMC, the navigational database must be valid for the current AIRAC cycle.

062 07 05 00 Requirements of specific RNAV and RNP specifications

062 07 05 01 RNAV10

- State that RNAV10 requires that aircraft operating in oceanic and remote areas be equipped with at least two independent and serviceable LRNSs comprising an INS, an IRS FMS or a GNSS.
- State that aircraft incorporating dual inertial navigation systems (INS) or inertial reference units (IRU) have a standard time limitation.
- State that operators may extend their RNAV10 navigation capability time by updating.

062 07 05 02 RNAV5

- State that manual data entry is acceptable for RNAV5.

062 07 05 03 RNAV/RNP1/2

- State that pilots must not fly an RNAV/RNP1/2 SID or STAR unless it is retrievable by oute name from the on-board navigation database and conforms to the charted route.
- State that the route may subsequently be modified through the insertion (from the database) or deletion of specific waypoints in response to ATC clearances.
- State that the manual entry, or creation of new waypoints by manual entry, of latitude and longitude or place/bearing/distance values is not permitted.

062 07 05 04 RNP4

- State that at least two LRNSs, capable of navigating to RNP4 and listed in the flight manual, must be operational at the entry point of the RNP airspace.

062 07 05 05 RNP APCH

- State that pilots must not fly an RNP APCH unless it is retrievable by procedure name from the on-board navigation database and conforms to the charted procedure.
- State that an RNP APCH to LNAV minima is a nonprecision instrument approach procedure designed for 2D approach operations.
- State that an RNP APCH to LNAV/VNAV minima has lateral guidance based on GNSS and vertical guidance based on either SBAS or BaroVNAV.
- State that an RNP APCH to LNAV/VNAV minima may only be conducted with vertical guidance certified for the purpose.
- Explain why an RNP APCH to LNAV/VNAV minima based on BaroVNAV may only be conducted when the aerodrome temperature is within a promulgated range.
- State that the correct altimeter setting is critical for the safe conduct of an RNP APCH using BaroVNAV.
- State that an RNP APCH to LNAV/VNAV minima is a 3D operation.
- State that an RNP APCH to LPV minima is a 3D operation.
- State that RNP APCH to LPV minima requires an FAS datablock.

062 07 05 06 RNP AR APCH

- State that RNP AR APCH requires authorisation.

062 07 05 07 A-RNP

- State that Advanced RNP incorporates the navigation specifications RNAV5, RNAV2, RNAV1, RNP2, RNP1 and RNP APCH.
- State that Advanced RNP may be associated with other functional elements.

062 07 05 08 PBN Point in Space (PinS) departure

- State that a PinS departure is a departure procedure designed for helicopters only.
- State that a PinS departure procedure includes either a "proceed VFR" or a "proceed visually" instruction from landing location to IDF.
- Recognise the differences between "proceed VFR" and "proceed visually" instruction.

062 07 05 09 PBN Point in Space (PinS) approach

- State that a PinS approach is an instrument RNP APCH procedure designed for helicopters only, and that may be published with LNAV minima or LPV minima.
- State that a PinS approach procedure includes either a "proceed VFR" or a "proceed visually" instruction from the MAPt to a landing location.

- Recognise the differences between "proceed VFR" and "proceed visually" instruction.

De theorie-instructie wordt afgesloten met een theorietest die door de ATO wordt afgenomen. De vragen in de test zijn evenwichtig verdeeld over de bovengenoemde onderwerpen. Voor de test dient de cursist een score van minimaal 75% te behalen.

De ATO mag de theorie-instructie zelf verzorgen, maar mag deze instructie ook uitbesteden aan een andere ATO die erkend is de verschillencursus te verzorgen of erkend is om de betreffende theorieopleiding inclusief PBN te verzorgen.

1.4 Praktijkinstructie

De praktijkinstructie dient tenminste de volgende oefeningen te bevatten (gerelateerd aan PBN):

PRE-FLIGHT OPERATIONS AND DEPARTURE

- Use of flight manual (or equivalent) especially a/c performance calculation, mass and Balance
- Use of Air Traffic Services document, weather document
- Preparation of ATC flight plan, IFR flight plan/log
- Identification of the required navaids for departure, arrival and approach procedures
- Weather Minima
- PBN departure:
  - Check that the correct procedure has been loaded in the navigation system; and
  - Cross-check between the navigation system display and the departure chart.
- Pre-take-off briefing, take-off and transition to instrument flight
- PBN departures, and altimeter setting
- ATC liaison — compliance, R/T procedures

ARRIVAL PROCEDURE

- Setting and checking of navigational aids, if applicable
- Arrival procedures, altimeter checks
- Altitude and speed constraints, if applicable
- PBN arrival:
  - Check that the correct procedure has been loaded in the navigation system; and
  - Cross-check between the navigation system display and the arrival chart.

3D OPERATIONS – RNP approach[1]

- Setting and checking of navigational aids:
  - Check Vertical Path angle
  - Check that the correct procedure has been loaded in the navigation system; and
  - Cross-check between the navigation system display and the approach chart.
- Approach and landing briefing, including descent/approach/landing checks, including identification of facilities
- Compliance with published approach procedure

[1] Indien van toepassing: voor Multi Pilot Aircraft en Single-Pilot High Performance Complex Aeroplanes dient de 3D approach minimaal in de volgende settings te worden getraind: 1) manually, without flight director; 2) manually, with flight director; 3) with autopilot; 4) manually with one engine inoperative.

- Approach timing
- Altitude, speed, heading control (stabilised approach),
- ATC liaison — compliance, R/T procedures

2D OPERATIONS – RNP approach

- Setting and checking of navigational aids:
  - Check that the correct procedure has been loaded in the navigation system; and
  - Cross-check between the navigation system display and the approach chart.
- Approach and landing briefing, including descent/approach/landing checks, including identification of facilities
- Compliance with published approach procedure
- Approach timing
- Altitude/Distance to MAPT, speed, heading control (stabilised approach), Stop Down Fixes (SDF(s)), if applicable
- ATC liaison — compliance, R/T procedures

OTHER APPROACH AND LANDING OPERATIONS (may be combined with either 3D or 2D operations)

- Holding procedure
- Go-around action during a 3D operation[2]
- Missed approach procedure
- Landing

1.5 Course completion certificate

Na het succesvol doorlopen van de verschillencursus geeft de ATO een course completion certificate uit. Op dit course completion certiifcate dient tenminste vermeld te staan dat de cursist de training 'PBN conversion course' succesvol heeft doorlopen.

[2] Indien van toepassing: voor Multi Pilot Aircraft en Single-Pilot High Performance Complex Aeroplanes dient deze go-around te worden uitgevoerd tijdens de 3D approach 'with all engines operating'.