

Performance Based Navigation Implementation – Regulatory overview

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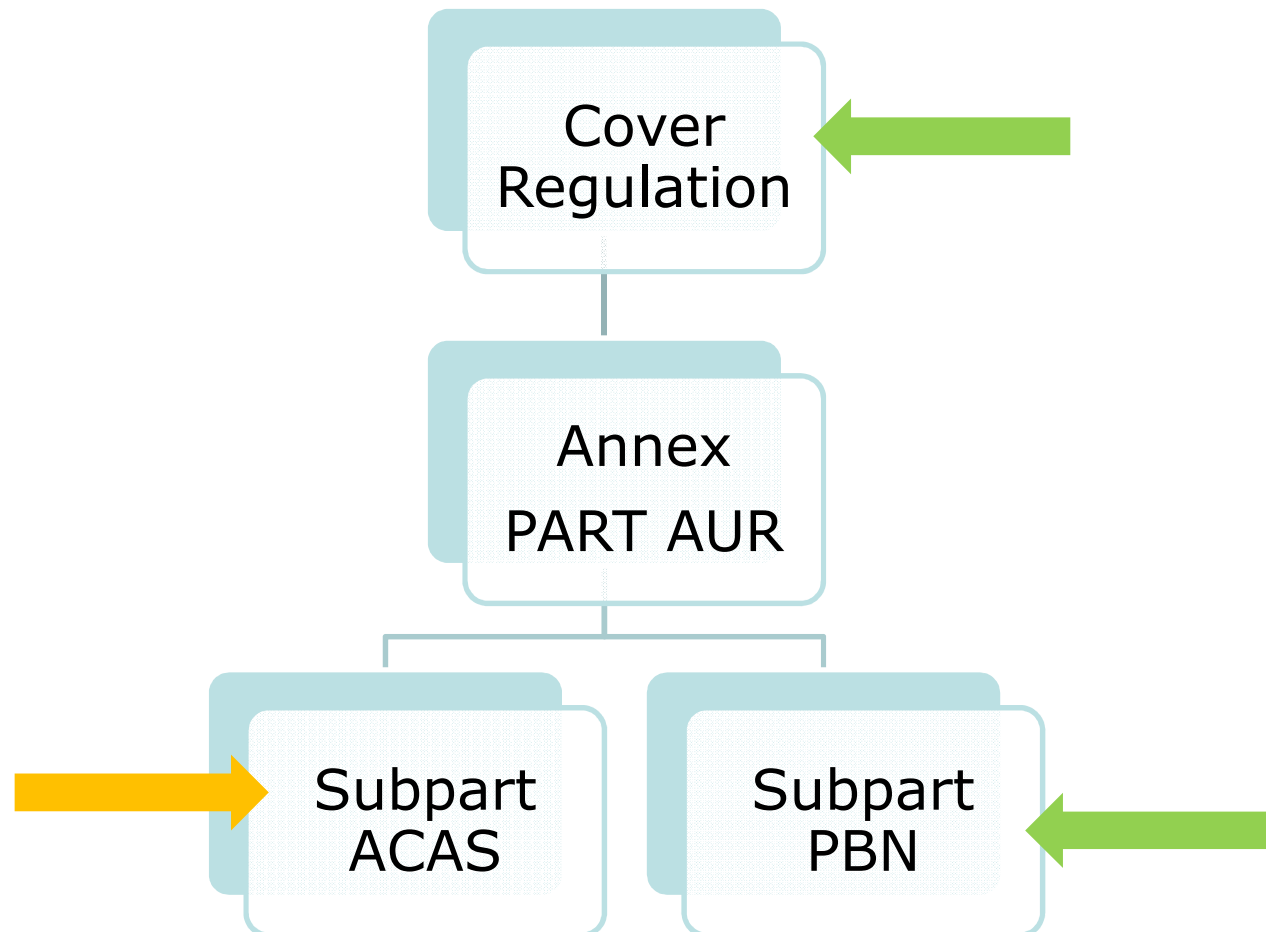
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PART AUR Articles

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PART AUR Articles

Article 1

Subject matter and scope

1. This Regulation lays down common airspace usage requirements and operating procedures to be applied above **the territory to which the Treaty applies** as well as in any other airspace in accordance with Article 1.3 of Regulation (EC) No 551/2004.
2. This Regulation shall apply to:
 - a) **aircraft operations** as referred to in Article 4(3) of Regulation (EC) No 216/2008;
 - b) **aerodrome Operations** as referred to in Article 4(3a) of said Regulation; and
 - c) **ATM/ANS provisions** as referred to in Article 4(3c) of said Regulation.
3. This Regulation shall not apply to operations of aircraft referred to in Article 4(3) of Regulation (EC) No 216/2008 undertaking operations for the purpose of maintenance, delivery or flight testing.
4. Member States shall undertake to ensure that operations of aircraft referred to in Article 1(2)(a) and the facilities and services referred to in Articles 1(2)(b) and 1(2)(c) of Regulation (EC) No 216/2008 when used by or made available to the public have due regard to the provisions of this Regulation.



PART AUR Articles

Article 3

Airspace usage

1. The aircraft operators as defined in AUR.ACAS.1005 shall be equipped as specified in Subpart ACAS of the Annex to this Regulation.
2. The **Air Traffic Service Providers (ATSPs) and aerodrome operators** as defined in AUR.PBN.1005 shall comply with the rules and procedures as specified in subpart PBN of the Annex to this Regulation.





SUBPART PBN

AUR.PBN.1005 Scope

AUR.PBN.2005 Routes and procedures

AUR.PBN.2010 Surveillance and communications

AUR.PBN.2015 Performance and functionality

AUR.PBN. 2020 Contingency

AUR.PBN. 3005 Mixed operations

AUR.PBN. 3010 Coordinated deployment



This Subpart shall apply to:

- a) Air Traffic Service Providers (ATSPs) referred to under Article 1(2) that provide air traffic services (ATS) in the airspace as defined in Article 1(1); and
- b) aerodrome operators referred to under Article 1(2).



AUR.PBN.2005

Routes and procedures

1. ATSPs or aerodrome operators, responsible for the provision of instrument approach procedures, **shall implement approach procedures with vertical guidance**, that correspond to the performance and functionality as defined in AUR.PBN.2015(1) **at all instrument runway ends which are not served by a precision approach procedure**.
2. Without prejudice to paragraph 1, where limiting obstacles conditions exist, ATSPs or aerodrome operators, responsible for the provision of instrument approach procedures, may implement approach procedure with vertical guidance to aerodromes that correspond to the performance and functionality as defined in AUR.PBN.2015(2).
3. **When implementing** Standard Instrument Departures (SIDs) and Standard Arrival Routes (STARs), using PBN **to meet the airspace performance needs**, ATSPs or aerodrome operators, responsible for the provision of the routes, shall ensure that the routes correspond to the **performance and functionality as defined in AUR.PBN.2015(3)**.
4. **When implementing** ATS routes using PBN **to meet the network performance needs**, the Network Manager, as required by Article 3(4)(a) of Regulation (EU) No 677/2011, shall ensure the coordinated design of the European Route Network that corresponds with the **performance and functionality as defined in AUR.PBN.2015(4)**.



Surveillance and communications

ATSPs shall ensure that the surveillance and communications infrastructure has the capabilities needed to support the intended PBN operation.

- For PBN recognised that the underlying assumption that either independent or cooperative independent surveillance is available.
- surveillance and navigation position source should be different



Approach Procedures

The instrument approach procedures required by AUR.PBN.2005(1) shall be consistent with the following aircraft performance and functionality:

- a) the lateral TSE and the along-track error are within ± 1 NM for at least 95 % of the total flight time;
- b) for the Final Approach Segment when supported by BARO-VNAV:
 - i. the lateral TSE and the along-track error is within ± 0.3 NM for at least 95% of the total flight time;
 - ii. the operations are along a vertical path;
- c) for the Final Approach Segment when supported by SBAS, the angular lateral performance shall be equivalent to (b)(i) and (b)(ii) respectively; and
- d) on-board performance monitoring and alerting.

The instrument approach procedures required by AUR.PBN.2005(2) shall be consistent with the following aircraft performance and functionality:

- a) the lateral TSE and the along-track error are within the applicable value of ± 0.1 NM to ± 0.3 NM for at least 95 % of the total flight time;
- b) the operations are along a vertical path;
- c) execution of fly-over and fly-by turns and to maintain a track consistent with an RF leg; and
- d) on-board performance monitoring and alerting.

➤ RNP APCH with vertical guidance (APV)

➤ Supported by BARO or SBAS

➤ RNP AR APCH were RNP APCH not possible



SID and STAR

The routes required by AUR.PBN.2005(3) shall be consistent with the following aircraft performance and functionality:

- a) the lateral TSE and the along-track error are within ± 1 NM for at least 95 % of the total flight time;
- b) the operations along a vertical path and between two fixes and able to comply with:
 - i. an 'AT' altitude constraint; or
 - ii. an 'AT OR ABOVE' altitude constraint; or
 - iii. an 'AT or BELOW' altitude constraint; or
 - iv. a 'WINDOW' constraint;
- c) execution of fly-over and fly-by turns and to maintain a track consistent with an RF leg;
- d) on-board performance monitoring and alerting.

- RNP 1 with
 - RF
 - vertical profile constraints



En-Route

The routes required by AUR.PBN.2005(4) shall be consistent with the following aircraft performance and functionality:

above Flight Level 195:

- i. the lateral TSE and along track error are within the applicable accuracy ranging from ± 1 NM for at least 95 % of the total flight time;
- ii. the operations along a vertical path and between two fixes and able to comply with:
 - A. an 'AT' altitude constraint; or
 - B. an 'AT OR ABOVE' altitude constraint; or
 - C. an 'AT or BELOW' altitude constraint ; or
 - D. a 'WINDOW' constraint;
- iii. a flight path transition and track consistent with a fixed radius between two route segments;
- iv. on-board performance monitoring and alerting;

below Flight Level 195:

- i. the lateral TSE and along track error are within the applicable accuracy ranging from ± 1 NM for at least 95 % of the total flight time;
- ii. on-board performance monitoring and alerting; and
- iii. holding in a pattern defined by a point, the turn direction, an inbound track and an outbound distance.

➤ Above FL195

- RNP 1 performance with FRT and vertical profile constraints

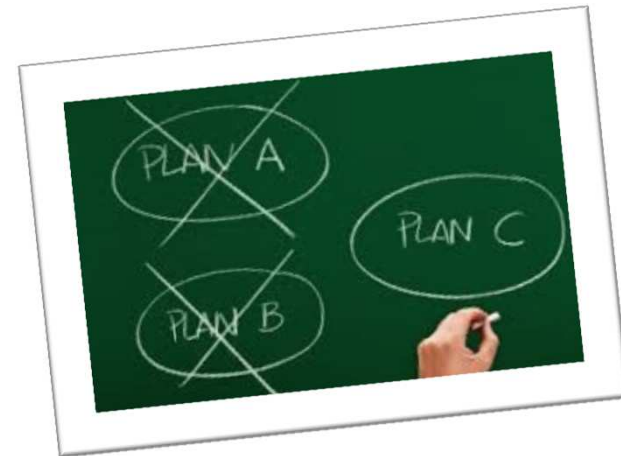
➤ Below FL195

- RNP1 Performance with RNAV holding



Contingency

ATSPs and aerodrome operators shall ensure that appropriate contingency procedures are established in case of reported loss of continuity of the navigation



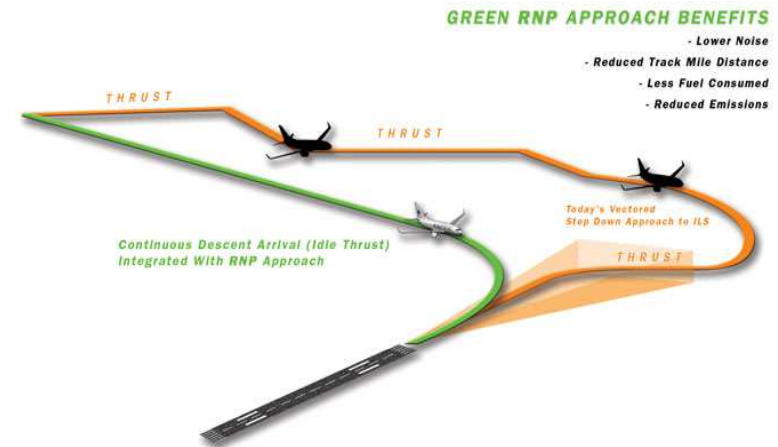


Mixed Operations

ATSPs and aerodrome operators shall ensure that:

- a) approach procedures, Standard Instrument Departures (SID), Standard Arrival Routes (STAR) and ATS routes based on non-PBN applications are available; or
- b) the required operation procedures are available to permit operation of aircraft that do not conform to the requirements to operate on the Standard Instrument Departures, Standard Arrival Routes and ATS routes required by AUR.PBN.2005.

The operational use of such approach procedures and routes required by paragraph 1 may be limited, commensurate with the operational performance needs.





Coordinated Deployment

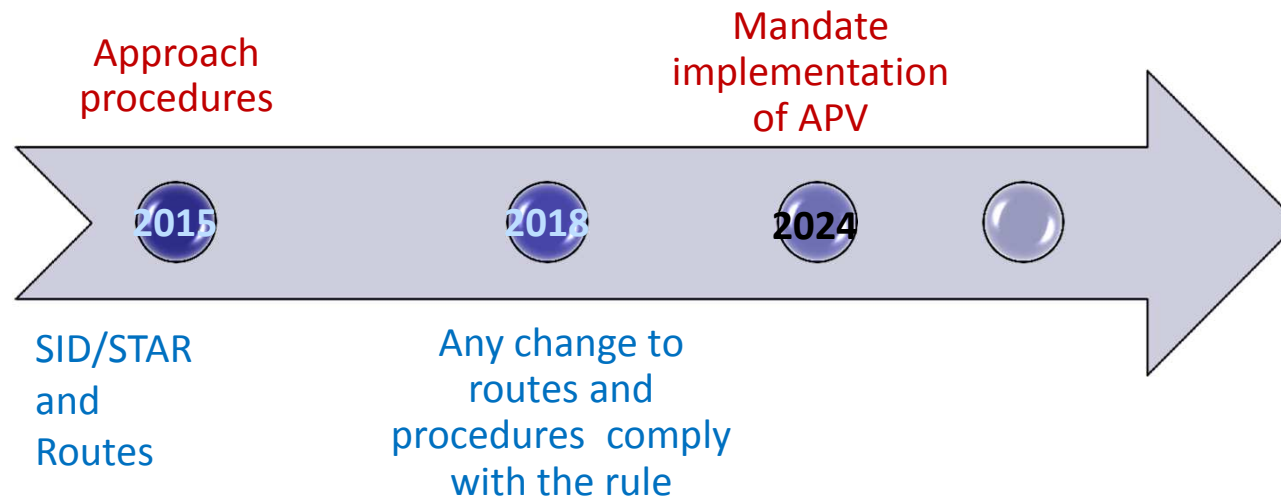
Member States, in coordination with the ATSPs and aerodrome operators shall ensure a coordinated and phased implementation of the instrument approach procedures required by AUR.PBN.2005(1).

ATSPs and aerodrome operators shall notify airspace users and the Network Manager of their intent to implement PBN Standard Instrument Departures (SID), Standard Arrival Routes (STAR) and ATS routes as specified in AUR.PBN.2005(3) and AUR.PBN.2005(4), 36 months prior to the implementation date.





Effectivity





PART AUR -PBN

PBN - Requires Air traffic service providers or Aerodrome operators to

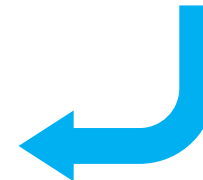
Implement PBN Approach with Vertical Guidance Instrument Approach Procedures (RNP APCH)

Implement PBN Standard Instrument Departures and Standard Arrival Routes (RNP 1)

Implement PBN ATS routes (A-RNP)

Maintain availability of instrument approach procedures and routes based on non PBN applications

**To achieve the
airspace performance
needs**





European Aviation Safety Agency
Any questions?
Thank you for your attention



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