

## **Annex to Decision 2016/018/R**

### **‘AMC and GM to Part-NCO — Issue 2, Amendment 3’**

The Annex to Decision 2014/016/R is hereby amended as follows:

The text of the amendment is arranged to show deleted, new or amended text as shown below:

1. deleted text is marked with ~~strike through~~;
2. new or amended text is highlighted in grey; and
3. an ellipsis (...) indicates that the remaining text is unchanged in front of or following the reflected amendment.

1. The following AMC/GM have been introduced or amended:

#### **Subpart A — General requirements**

##### **AMC1 NCO.GEN.105 Pilot-in-command responsibilities and authority**

###### **FLIGHT PREPARATION FOR PBN OPERATIONS**

- (a) The pilot-in-command should ensure that RNAV 1, RNAV 2, RNP 1, RNP 2, and RNP APCH routes or procedures to be used for the intended flight, including for any alternate aerodromes, are selectable from the navigation database and are not prohibited by NOTAM.
- (b) The pilot-in-command should take account of any NOTAMs or pilot-in-command briefing material that could adversely affect the aircraft system operation along its flight plan including any alternate aerodromes.
- (c) When PBN relies on GNSS systems for which RAIM is required for integrity, its availability should be verified during the preflight planning. In the event of a predicted continuous loss of fault detection of more than five minutes, the flight planning should be revised to reflect the lack of full PBN capability for that period.
- (d) For RNP 4 operations with only GNSS sensors, a fault detection and exclusion (FDE) check should be performed. The maximum allowable time for which FDE capability is projected to be unavailable on any one event is 25 minutes. If predictions indicate that the maximum allowable FDE outage will be exceeded, the operation should be rescheduled to a time when FDE is available.
- (e) For RNAV 10 operations, the pilot-in-command should take account of the RNAV 10 time limit declared for the inertial system, if applicable, considering also the effect of weather conditions that could affect flight duration in RNAV 10 airspace. Where an extension to the time limit is permitted, the pilot-in-command will need to ensure that en route radio facilities are serviceable before departure, and to apply radio updates in accordance with any AFM/POH limitation.

**AMC2 NCO.GEN.105 Pilot-in-command responsibilities and authority**

**DATABASE SUITABILITY**

- (a) The pilot-in-command should check that any navigational database required for PBN operations includes the routes and procedures required for the flight.

**DATABASE CURRENCY**

- (b) The database validity (current AIRAC cycle) should be checked before the flight.
- (c) Navigation databases should be current for the duration of the flight. If the AIRAC cycle is due to change during flight, the pilot-in-command should follow procedures established by the pilot-in-command to ensure the accuracy of navigation data, including the suitability of navigation facilities used to define the routes and procedures for the flight.
- (d) An expired database may only be used if the following conditions are satisfied:
- (1) the pilot-in-command has confirmed that the parts of the database which are intended to be used during the flight and any contingencies that are reasonable to expect are not changed in the current version;
  - (2) any NOTAMs associated with the navigational data are taken into account;
  - (3) maps and charts corresponding to those parts of the flight are current and have not been amended since the last cycle;
  - (4) any MEL limitations, where available, are observed; and
  - (5) the database has expired by no more than 28 days.

**AMC1 NCO.GEN.140(f) Transport of dangerous goods**

**GENERAL**

The quantities of DG carried for operational purposes should be reasonable considering the purposes for which they might be required before the aircraft is able to replenish its supplies, e.g. at its home base or, in the case of a long tour, at any aerodrome along the route where the aircraft is planned to land and where such supplies are available.

**GM1 NCO.GEN.140(f) Transport of dangerous goods**

**GENERAL**

In addition to items authorised under paragraph 1;2.2.1(a) of the Technical Instructions, the articles and substances should be items such as, e.g. aircraft spare parts, components/substances needed for aircraft repair, oil (for aircraft engine/gearbox), aircraft fuel, de-icing fluid, aircraft battery, and air starter unit.

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## Subpart B — Operational procedures

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### AMC1 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters

#### PBN OPERATIONS

For operations where a navigation specification for performance-based navigation (PBN) has been prescribed and no specific approval is required in accordance with SPA.PBN.100, the pilot-in-command should:

- (a) use operating procedures specifying:
  - (1) normal, abnormal and contingency procedures;
  - (2) electronic navigation database management; and
  - (3) relevant entries in the minimum equipment list (MEL), where applicable;
- (b) ensure that he/she is appropriately trained for the intended operation.

### AMC2 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters

#### MONITORING AND VERIFICATION

- (a) Preflight and general considerations
  - (1) At navigation system initialisation, the pilot-in-command should confirm that the navigation database is current and verify that the aircraft position, if required, has been entered correctly.
  - (2) The active flight plan, if applicable, should be checked by comparing the charts or other applicable documents with navigation equipment and displays. This includes confirmation of the waypoint sequence, reasonableness of track angles and distances, any altitude or speed constraints, and, where possible, which waypoints are fly-by and which are fly-over. Where relevant, the RF leg arc radii should be confirmed.
  - (3) The pilot-in-command should check that the navigation aids critical to the operation of the intended PBN procedure are available.
  - (4) The pilot-in-command should confirm the navigation aids that should be excluded from the operation, if any.
  - (5) An arrival, approach or departure procedure should not be used if the validity of the procedure in the navigation database has expired.
- (b) Departure
  - (1) Prior to commencing a take-off on a PBN procedure, the pilot-in-command should verify that the area navigation system is available and operating correctly and the correct aerodrome and runway data has been loaded. A positive check should be made that the indicated aircraft position is consistent with the actual aircraft position at the start of the take-off roll (aeroplanes) or lift-off (helicopters).
  - (2) Where GNSS is used, the signal should be acquired before the take-off roll (aeroplanes) or lift-off (helicopters) commences.

- (3) Unless automatic updating of the actual departure point is provided, the pilot-in-command should ensure initialisation on the runway or FATO either by means of a manual runway threshold or intersection update, as applicable. This is to preclude any inappropriate or inadvertent position shift after take-off.

(c) Arrival and approach

- (1) The pilot-in-command should verify that the navigation system is operating correctly and the correct arrival procedure and runway (including any applicable transition) are entered and properly depicted.
- (2) Any published altitude and speed constraints should be observed.
- (3) The pilot-in-command should check approach procedures (including alternate aerodromes if needed) as extracted by the system (e.g. CDU flight plan page) or presented graphically on the moving map, in order to confirm the correct loading and the reasonableness of the procedure content.
- (4) Prior to commencing the approach operation (before the IAF), the pilot-in-command should verify the correctness of the loaded procedure by comparison with the appropriate approach charts. This check should include:
  - (i) the waypoint sequence;
  - (ii) reasonableness of the tracks and distances of the approach legs and the accuracy of the inbound course; and
  - (iii) the vertical path angle, if applicable.

(d) Altimetry settings for RNP APCH operations using Baro VNAV

(1) Barometric settings

- (i) The pilot-in-command should set and confirm the correct altimeter setting and check that the two altimeters provide altitude values that do not differ more than 100 ft at the most at or before the FAF.
- (ii) The pilot-in-command should fly the procedure with:
  - (A) a current local altimeter setting source available — a remote or regional altimeter setting source should not be used; and
  - (B) the QNH/QFE, as appropriate, set on the aircraft's altimeters.

(2) Temperature compensation

- (i) For RNP APCH operations to LNAV/VNAV minima using Baro VNAV:
  - (A) the pilot-in-command should not commence the approach when the aerodrome temperature is outside the promulgated aerodrome temperature limits for the procedure, unless the area navigation system is equipped with approved temperature compensation for the final approach;
  - (B) when the temperature is within promulgated limits, the pilot-in-command should not make compensation to the altitude at the FAF; and

(C) since only the final approach segment is protected by the promulgated aerodrome temperature limits, the pilot-in-command should consider the effect of temperature on terrain and obstacle clearance in other phases of flight.

(ii) For RNP APCH operations to LNAV minima using Baro VNAV:

(A) the pilot-in-command should consider the effect of temperature on terrain and obstacle clearance in all phases of flight, in particular on any step-down fix;

(B) if the temperature is outside promulgated limits for RNP APCH to LNAV/VNAV minima, the pilot-in-command should not use a Baro VNAV function for vertical guidance, unless the area navigation system is equipped with approved temperature compensation for the final approach.

(e) Sensor and lateral navigation accuracy selection

(1) For multi-sensor systems, the pilot-in-command should verify, during the approach, that the GNSS sensor is used for position computation.

(2) For aircraft with RNP input selection capability, the pilot-in-command should confirm that the indicated RNP value is appropriate for the PBN operation.

### **AMC3 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters**

#### **MANAGEMENT OF THE NAVIGATION DATABASE**

(a) For RNAV 1, RNAV 2, RNP 1, RNP 2, and RNP APCH, the pilot-in-command should neither insert nor modify waypoints by manual entry into a procedure (departure, arrival or approach) that has been retrieved from the database. User-defined data may be entered and used for waypoint altitude/speed constraints on a procedure where said constraints are not included in the navigation database coding.

(b) For RNP 4 operations, the pilot-in-command should not modify waypoints that have been retrieved from the database. User-defined data (e.g. for flex-track routes) may be entered and used.

(c) The lateral and vertical definition of the flight path between the FAF and the missed approach point (MAPt) retrieved from the database should not be revised by the pilot-in-command.

### **AMC4 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters**

#### **DISPLAYS AND AUTOMATION**

(a) For RNAV 1, RNP 1, and RNP APCH operations, the pilot-in-command should use a lateral deviation indicator, and where available, flight director and/or autopilot in lateral navigation mode.

(b) The appropriate displays should be selected so that the following information can be monitored:

(1) the computed desired path;

(2) aircraft position relative to the lateral path (cross-track deviation) for FTE monitoring; and

(3) aircraft position relative to the vertical path (for a 3D operation).

(c) The pilot-in-command of an aircraft with a lateral deviation indicator (e.g. CDI) should ensure that lateral deviation indicator scaling (full-scale deflection) is suitable for the navigation accuracy associated with the various segments of the procedure.

- (d) The pilot-in-command should maintain procedure centrelines unless authorised to deviate by ATC or demanded by emergency conditions.
- (e) Cross-track error/deviation (the difference between the area-navigation-system-computed path and the aircraft-computed position) should normally be limited to  $\pm \frac{1}{2}$  time the RNAV/RNP value associated with the procedure. Brief deviations from this standard (e.g. overshoots or undershoots during and immediately after turns) up to a maximum of 1 time the RNAV/RNP value should be allowable.
- (f) For a 3D approach operation, the pilot-in-command should use a vertical deviation indicator and, where required by AFM/POH limitations, a flight director or autopilot in vertical navigation mode.
- (g) Deviations below the vertical path should not exceed 75 ft at any time, or half-scale deflection where angular deviation is indicated, and not more than 75 ft above the vertical profile, or half-scale deflection where angular deviation is indicated, at or below 1 000 ft above aerodrome level. The pilot-in-command should execute a missed approach if the vertical deviation exceeds this criterion, unless the pilot-in-command has in sight the visual references required to continue the approach.

#### **AMC5 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters**

##### **VECTERING AND POSITIONING**

- (a) ATC tactical interventions in the terminal area may include radar headings, 'direct to' clearances which bypass the initial legs of an approach procedure, interceptions of an initial or intermediate segments of an approach procedure or the insertion of additional waypoints loaded from the database.
- (b) In complying with ATC instructions, the pilot-in-command should be aware of the implications for the navigation system.
- (c) 'Direct to' clearances may be accepted to the IF provided that it is clear to the pilot-in-command that the aircraft will be established on the final approach track at least 2 NM before the FAF.
- (d) 'Direct to' clearance to the FAF should not be acceptable. Modifying the procedure to intercept the final approach track prior to the FAF should be acceptable for radar-vectorred arrivals or otherwise only with ATC approval.
- (e) The final approach trajectory should be intercepted no later than the FAF in order for the aircraft to be correctly established on the final approach track before starting the descent (to ensure terrain and obstacle clearance).
- (f) 'Direct to' clearances to a fix that immediately precede an RF leg should not be permitted.
- (g) For parallel offset operations en route in RNP 4 and A-RNP, transitions to and from the offset track should maintain an intercept angle of no more than 45° unless specified otherwise by ATC.

**AMC6 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters****ALERTING AND ABORT**

- (a) Unless the pilot-in-command has sufficient visual reference to continue the approach operation to a safe landing, an RNP APCH operation should be discontinued if:
  - (1) navigation system failure is annunciated (e.g. warning flag);
  - (2) lateral or vertical deviations exceed the tolerances; and
  - (3) loss of the on-board monitoring and alerting system.
- (b) Discontinuing the approach operation may not be necessary for a multi-sensor navigation system that includes demonstrated RNP capability without GNSS in accordance with the AFM/POH.
- (c) Where vertical guidance is lost while the aircraft is still above 1 000 ft AGL, the pilot-in-command may decide to continue the approach to LNAV minima, when supported by the navigation system.

**AMC7 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters****CONTINGENCY PROCEDURES**

- (a) The pilot-in-command should make the necessary preparation to revert to a conventional arrival procedure where appropriate. The following conditions should be considered:
  - (1) failure of the navigation system components including navigation sensors, and a failure effecting flight technical error (e.g. failures of the flight director or autopilot);
  - (2) multiple system failures affecting aircraft performance;
  - (3) coasting on inertial sensors beyond a specified time limit; and
  - (4) RAIM (or equivalent) alert or loss of integrity function.
- (b) In the event of loss of PBN capability, the pilot-in-command should invoke contingency procedures and navigate using an alternative means of navigation.
- (c) The pilot-in-command should notify ATC of any problem with PBN capability.
- (d) In the event of communication failure, the pilot-in-command should continue with the operation in accordance with published lost communication procedures.

**AMC8 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters****RNAV 10**

- (a) Operating procedures and routes should take account of the RNAV 10 time limit declared for the inertial system, if applicable, considering also the effect of weather conditions that could affect flight duration in RNAV 10 airspace.
- (b) The operator may extend RNAV 10 inertial navigation time by position updating. The operator should calculate, using statistically-based typical wind scenarios for each planned route, points at which updates can be made, and the points at which further updates will not be possible.

**GM1 NCO.OP.116 Performance-based navigation — aeroplanes and helicopters****DESCRIPTION**

- (a) For both, RNP X and RNAV X designations, the 'X' (where stated) refers to the lateral navigation accuracy (total system error) in NM, which is expected to be achieved at least 95 % of the flight time by the population of aircraft operating within the airspace, route or procedure. For RNP APCH and A-RNP, the lateral navigation accuracy depends on the segment.
- (b) PBN may be required on notified routes, for notified procedures and in notified airspace.  
RNAV 10
- (c) For purposes of consistency with the PBN concept, this Regulation is using the designation 'RNAV 10' because this specification does not include on-board performance monitoring and alerting.
- (d) However, it should be noted that many routes still use the designation 'RNP 10' instead of 'RNAV 10'. 'RNP 10' was used as designation before the publication of the fourth edition of ICAO Doc 9613 in 2013. The terms 'RNP 10' and 'RNAV 10' should be considered equivalent.

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#### **GM1 NCO.OP.142 Destination aerodromes — instrument approach operations**

##### **PBN OPERATIONS**

The pilot-in-command may only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.

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#### **AMC1 NCO.OP.190(a) Use of supplemental oxygen**

##### **DETERMINATION OF SUPPLEMENTAL OXYGEN NEED**

When determining the need for supplemental oxygen carriage and use, the pilot-in-command should:

- (a) in the preflight phase:
  - (1) be aware of hypoxia conditions and associated risks;
  - (2) consider the following objective conditions for the intended flight:
    - (i) altitude;
    - (ii) duration of the flight; and
    - (iii) any other relevant operational conditions.
  - (3) consider individual conditions of flight crew members and passengers in relation to:
    - (i) altitude of the place of residence;
    - (ii) smoking;
    - (iii) experience in flights at high altitudes;
    - (iv) actual medical conditions and medications;
    - (v) age
    - (vi) disabilities; and
    - (vii) any other relevant factor that may be detected, or reported by the person; and



- (4) when relevant, ensure that all flight crew members and passengers are briefed on hypoxia conditions and symptoms, as well as on the usage of supplemental oxygen equipment.

(b) during flight:

- (1) monitor for early symptoms of hypoxia conditions; and
- (2) if detecting early symptoms of hypoxia conditions:
  - (i) consider to return to a safe altitude, and
  - (ii) ensure that supplemental oxygen is used, if available.

#### **GM1 NCO.OP.190 Use of supplemental oxygen**

##### **GENERAL**

- (a) The responsibility of the pilot-in-command for safety of all persons on board, as required by NCO.GEN.105(a)(1), includes the determination of need for supplemental oxygen use.
- (b) The altitudes above which NCO.OP.190(b) requires oxygen to be available and used are applicable to those cases when the pilot-in-command cannot determine the need for supplemental oxygen. However, if the pilot-in-command is able to make this determination, he/she may elect in the interest of safety to require oxygen also for operations at or below such altitudes.
- (c) The pilot-in-command should be aware that flying below altitudes mentioned in NCO.OP.190(b) does not provide absolute protection against hypoxia symptoms, should individual conditions and aptitudes be prevalent.

#### **GM2 NCO.OP.190 Use of supplemental oxygen**

##### **DETERMINATION OF OXYGEN NEED — BEFORE FLIGHT**

Detailed information and guidance on hypoxia conditions and symptoms, content of the briefing on hypoxia and assessment of individual conditions may be found in the EASA leaflet 'Hypoxia'.

##### **DETERMINATION OF OXYGEN NEED — IN FLIGHT**

Several methods for monitoring hypoxia early symptoms may be used and some methods may be aided by personal equipment, such as finger-mounted pulse oximeters. Detailed information and guidance on entering hypoxia conditions, on hypoxia symptoms early detection, and on use of personal equipment such as finger-mounted pulse oximeters or equivalent may be found in the EASA leaflet 'Hypoxia'.

### **Subpart D — Instruments, data and equipment**

#### **Section 1 — Aeroplanes**

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#### **AMC2 NCO.IDE.A.140 Seats, seat safety belts, restraint systems and child restraint devices**

##### **UPPER TORSO RESTRAINT SYSTEM**

- (a) The following systems are deemed to be compliant with the requirement for an upper torso restraint system:
  - (a1) A seat belt with a diagonal shoulder strap;

- (b2) A restraint system having a seat belt and two shoulder straps that may be used independently;
- (b3) A restraint system having a seat belt, two shoulder straps and additional straps that may be used independently.

(b) The use of the upper torso restraint independently from the use of the seat belt is intended as an option for the comfort of the occupant of the seat in those phases of flight where only the seat belt is required to be fastened. A restraint system including a seat belt and an upper torso restraint that both remain permanently fastened is also acceptable.

#### SEAT BELT

A seat belt with a diagonal shoulder strap (three anchorage points) is deemed to be compliant with the requirement for a seat belt (two anchorage points).

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### AMC2 NCO.IDE.A.155 Supplemental oxygen supply – non-pressurised aeroplanes

#### OXYGEN SUPPLY

The need for oxygen supply, when required by NCO.OP.190, may be met either by means of installed equipment or portable equipment.

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### GM1 NCO.IDE.A.195 Navigation equipment

#### AIRCRAFT ELIGIBILITY FOR PBN SPECIFICATION NOT REQUIRING SPECIFIC APPROVAL

- (a) The performance of the aircraft is usually stated in the AFM/POH.
- (b) Where such a reference cannot be found in the AFM/POH, other information provided by the aircraft manufacturer as TC holder, the STC holder or the design organisation having a privilege to approve minor changes may be considered.
- (c) The following documents are considered acceptable sources of information:
  - (1) AFM/POH, supplements thereto, and documents directly referenced in the AFM/POH;
  - (2) FCOM or similar document;
  - (3) Service Bulletin or Service Letter issued by the TC holder or STC holder;
  - (4) approved design data or data issued in support of a design change approval;
  - (5) any other formal document issued by the TC or STC holders stating compliance with PBN specifications, AMC, Advisory Circulars (AC) or similar documents issued by the State of Design; and
  - (6) written evidence obtained from the State of Design.
- (d) Equipment qualification data, in itself, is not sufficient to assess the PBN capabilities of the aircraft, since the latter depend on installation and integration.
- (e) As some PBN equipment and installations may have been certified prior to the publication of the PBN Manual and the adoption of its terminology for the navigation specifications, it is not always possible to find a clear statement of aircraft PBN capability in the AFM/POH. However, aircraft eligibility for certain

PBN specifications can rely on the aircraft performance certified for PBN procedures and routes prior to the publication of the PBN Manual.

(f) Below, various references are listed which may be found in the AFM/POH or other acceptable documents (see listing above) in order to consider the aircraft's eligibility for a specific PBN specification if the specific term is not used.

(g) RNAV 5

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 5 operations.

- (i) B-RNAV;
- (ii) RNAV 1;
- (iii) RNP APCH;
- (iv) RNP 4;
- (v) A-RNP;
- (vi) AMC 20-4;
- (vii) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 2 (TGL 2);
- (viii) JAA AMJ 20X2;
- (ix) FAA AC 20-130A for en route operations;
- (x) FAA AC 20-138 for en route operations; and
- (xi) FAA AC 90-96.

(h) RNAV 1/RNAV 2

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 1/RNAV 2 operations.

- (i) RNAV 1;
- (ii) PRNAV;
- (iii) US RNAV type A;
- (iv) FAA AC 20-138 for the appropriate navigation specification;
- (v) FAA AC 90-100A;
- (vi) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 Rev1 (TGL 10); and
- (vii) FAA AC 90-100.

(2) However, if position determination is exclusively computed based on VOR-DME, the aircraft is not eligible for RNAV 1/RNAV 2 operations.

(i) RNP 1/RNP 2 continental

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 1/RNP 2 continental operations.

- (i) A-RNP;
- (ii) FAA AC 20-138 for the appropriate navigation specification; and
- (iii) FAA AC 90-105.

(2) Alternatively, if a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above and position determination is primarily based on GNSS, the aircraft is eligible for RNP 1/RNP 2 continental operations. However, in these cases, loss of GNSS implies loss of RNP 1/RNP 2 capability.

- (i) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 (TGL 10) (any revision); and
- (ii) FAA AC 90-100.

(j) RNP APCH — LNAV minima

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV operations.

- (i) A-RNP;
- (ii) AMC 20-27;
- (iii) AMC 20-28;
- (iv) FAA AC 20-138 for the appropriate navigation specification; and
- (v) FAA AC 90-105 for the appropriate navigation specification.

(2) Alternatively, if a statement of compliance with RNP 0.3 GNSS approaches in accordance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV operations. Any limitation such as 'within the US National Airspace' may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

- (i) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 3 (TGL 3);
- (ii) AMC 20-4;
- (iii) FAA AC 20-130A; and
- (iv) FAA AC 20-138.

(k) RNP APCH — LNAV/VNAV minima

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV/VNAV operations.

- (i) A-RNP;
- (ii) AMC 20-27 with Baro VNAV;
- (iii) AMC 20-28;
- (iv) FAA AC 20-138; and
- (v) FAA AC 90-105 for the appropriate navigation specification.

- (2) Alternatively, if a statement of compliance with FAA AC 20-129 is found in the acceptable documentation as listed above, and the aircraft complies with the requirements and limitations of EASA SIB 2014-04<sup>1</sup>, the aircraft is eligible for RNP APCH — LNAV/VNAV operations. Any limitation such as ‘within the US National Airspace’ may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

(l) RNP APCH — LPV minima

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LPV operations.
- (i) AMC 20-28;
  - (ii) FAA AC 20-138 for the appropriate navigation specification; and
  - (iii) FAA AC 90-107.
- (2) For aircraft that have a TAWS Class A installed and do not provide Mode-5 protection on an LPV approach, the DH is limited to 250 ft.

(m) RNAV 10

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 10 operations.
- (i) RNP 10;
  - (ii) FAA AC 20-138 for the appropriate navigation specification;
  - (iii) AMC 20-12;
  - (iv) FAA Order 8400.12 (or later revision); and
  - (v) FAA AC 90-105.

(n) RNP 4

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 4 operations.
- (i) FAA AC 20-138B or later, for the appropriate navigation specification;
  - (ii) FAA Order 8400.33; and
  - (iii) FAA AC 90-105 for the appropriate navigation specification.

(o) RNP 2 oceanic

- (1) If a statement of compliance with FAA AC 90-105 for the appropriate navigation specification is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 2 oceanic operations.
- (2) If the aircraft has been assessed eligible for RNP 4, the aircraft is eligible for RNP 2 oceanic.

(p) Special features

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<sup>1</sup> <http://ad.easa.europa.eu/ad/2014-04>

- (1) RF in terminal operations (used in RNP 1 and in the initial segment of the RNP APCH)
  - (i) If a statement of demonstrated capability to perform an RF leg, certified in accordance with any of the following specifications or standards, is found in the acceptable documentation as listed above, the aircraft is eligible for RF in terminal operations.
    - (A) AMC 20-26; and
    - (B) FAA AC 20-138B or later.
  - (ii) If there is a reference to RF and a reference to compliance with AC 90-105, then the aircraft is eligible for such operations.
- (q) Other considerations
  - (1) In all cases, the limitations in the AFM/POH need to be checked, in particular the use of AP or FD which can be required to reduce the FTE primarily for RNP APCH, RNAV 1, and RNP 1.
  - (1) Any limitation such as 'within the US National Airspace' may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

## **GM2 NCO.IDE.A.195 Navigation equipment**

### **GENERAL**

- (a) The PBN specifications for which the aircraft complies with the relevant airworthiness criteria are set out in the AFM/POH, together with any limitations to be observed.
- (b) Because functional and performance requirements are defined for each navigation specification, an aircraft approved for an RNP specification is not automatically approved for all RNAV specifications. Similarly, an aircraft approved for an RNP or RNAV specification having a stringent accuracy requirement (e.g. RNP 0.3 specification) is not automatically approved for a navigation specification having a less stringent accuracy requirement (e.g. RNP 4).

### **RNP 4**

- (c) For RNP 4, at least two LRNSs, capable of navigating to RNP 4, and listed in the AFM/POH, may be operational at the entry point of the RNP 4 airspace. If an item of equipment required for RNP 4 operations is unserviceable, then the pilot-in-command may consider an alternate route or diversion for repairs. For multi-sensor systems, the AFM/POH may permit entry if one GNSS sensor is lost after departure, provided one GNSS and one inertial sensor remain available.

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## **Section 2 — Helicopters**

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## **AMC2 NCO.IDE.H.155 Supplemental oxygen supply – non-pressurised helicopters**

### **OXYGEN SUPPLY**

The need for oxygen supply, when required by NCO.OP.190, may be met either by means of installed equipment or portable equipment.

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**GM2 NCO.IDE.H.195 Navigation equipment****AIRCRAFT ELIGIBILITY FOR PBN SPECIFICATION NOT REQUIRING SPECIFIC APPROVAL**

- (a) The performance of the aircraft is usually stated in the AFM/POH.
- (b) Where such a reference cannot be found in the AFM/POH, other information provided by the aircraft manufacturer as TC holder, the STC holder or the design organisation having a privilege to approve minor changes may be considered.
- (c) The following documents are considered acceptable sources of information:
  - (1) AFM/POH, supplements thereto, and documents directly referenced in the AFM/POH;
  - (2) FCOM or similar document;
  - (3) Service Bulletin or Service Letter issued by the TC holder or STC holder;
  - (4) approved design data or data issued in support of a design change approval;
  - (5) any other formal document issued by the TC or STC holders stating compliance with PBN specifications, AMC, Advisory Circulars (AC) or similar documents issued by the State of Design; and
  - (6) written evidence obtained from the State of Design.
- (d) Equipment qualification data, in itself, is not sufficient to assess the PBN capabilities of the aircraft, since the latter depend on installation and integration.
- (e) As some PBN equipment and installations may have been certified prior to the publication of the PBN Manual and the adoption of its terminology for the navigation specifications, it is not always possible to find a clear statement of aircraft PBN capability in the AFM/POH. However, aircraft eligibility for certain PBN specifications can rely on the aircraft performance certified for PBN procedures and routes prior to the publication of the PBN Manual.
- (f) Below, various references are listed which may be found in the AFM/POH or other acceptable documents (see listing above) in order to consider the aircraft's eligibility for a specific PBN specification if the specific term is not used.
- (g) RNAV 5
  - (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 5 operations.
    - (i) B-RNAV;
    - (ii) RNAV 1;
    - (iii) RNP APCH;
    - (iv) RNP 4;
    - (v) A-RNP;
    - (vi) AMC 20-4;

- (vii) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 2 (TGL 2)
- (viii) JAA AMJ 20X2;
- (ix) FAA AC 20-130A for en route operations;
- (x) FAA AC 20-138 for en route operations; and
- (xi) FAA AC 90-96.

(h) RNAV 1/RNAV 2

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 1/RNAV 2 operations.
  - (i) RNAV 1;
  - (ii) PRNAV;
  - (iii) US RNAV type A;
  - (iv) FAA AC 20-138 for the appropriate navigation specification;
  - (v) FAA AC 90-100A;
  - (vi) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 Rev1 (TGL 10); and
  - (vii) FAA AC 90-100.
- (2) However, if position determination is exclusively computed based on VOR-DME, the aircraft is not eligible for RNAV 1/RNAV 2 operations.

(i) RNP 1/RNP 2 continental

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 1/RNP 2 continental operations.
  - (i) A-RNP;
  - (ii) FAA AC 20-138 for the appropriate navigation specification; and
  - (iii) FAA AC 90-105.
- (2) Alternatively, if a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above and position determination is primarily based on GNSS, the aircraft is eligible for RNP 1/RNP 2 continental operations. However, in these cases, loss of GNSS implies loss of RNP 1/RNP 2 capability.
  - (i) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 (TGL 10) (any revision); and
  - (ii) FAA AC 90-100.

(j) RNP APCH — LNAV minima

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV operations.
  - (i) A-RNP;



- (ii) AMC 20-27;
- (iii) AMC 20-28;
- (iv) FAA AC 20-138 for the appropriate navigation specification; and
- (v) FAA AC 90-105 for the appropriate navigation specification.

(2) Alternatively, if a statement of compliance with RNP 0.3 GNSS approaches in accordance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV operations. Any limitation such as ‘within the US National Airspace’ may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

- (i) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 3 (TGL 3);
- (ii) AMC 20-4;
- (iii) FAA AC 20-130A; and
- (iv) FAA AC 20-138.

(k) RNP APCH — LNAV/VNAV minima

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV/VNAV operations.

- (i) A-RNP;
- (ii) AMC 20-27 with Baro VNAV;
- (iii) AMC 20-28;
- (iv) FAA AC 20-138; and
- (v) FAA AC 90-105 for the appropriate navigation specification.

(2) Alternatively, if a statement of compliance with FAA AC 20-129 is found in the acceptable documentation as listed above, and the aircraft complies with the requirements and limitations of EASA SIB 2014-04<sup>2</sup>, the aircraft is eligible for RNP APCH — LNAV/VNAV operations. Any limitation such as ‘within the US National Airspace’ may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

(l) RNP APCH — LPV minima

(1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LPV operations.

- (i) AMC 20-28;
- (ii) FAA AC 20-138 for the appropriate navigation specification; and
- (iii) FAA AC 90-107.

<sup>2</sup> <http://ad.easa.europa.eu/ad/2014-04>

- (2) For aircraft that have a TAWS Class A installed and do not provide Mode-5 protection on an LPV approach, the DH is limited to 250 ft.

(m) RNAV 10

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNAV 10 operations.
  - (i) RNP 10;
  - (ii) FAA AC 20-138 for the appropriate navigation specification;
  - (iii) AMC 20-12;
  - (iv) FAA Order 8400.12 (or later revision); and
  - (v) FAA AC 90-105.

(n) RNP 4

- (1) If a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 4 operations.
  - (i) FAA AC 20-138B or later, for the appropriate navigation specification;
  - (ii) FAA Order 8400.33; and
  - (iii) FAA AC 90-105 for the appropriate navigation specification.

(o) RNP 2 oceanic

- (1) If a statement of compliance with FAA AC 90-105 for the appropriate navigation specification is found in the acceptable documentation as listed above, the aircraft is eligible for RNP 2 oceanic operations.
- (2) If the aircraft has been assessed eligible for RNP 4, the aircraft is eligible for RNP 2 oceanic.

(p) Special features

- (1) RF in terminal operations (used in RNP 1 and in the initial segment of the RNP APCH)
  - (i) If a statement of demonstrated capability to perform an RF leg, certified in accordance with any of the following specifications or standards, is found in the acceptable documentation as listed above, the aircraft is eligible for RF in terminal operations:
    - (A) AMC 20-26; and
    - (B) FAA AC 20-138B or later.
  - (ii) If there is a reference to RF and a reference to compliance with AC 90-105, then the aircraft is eligible for such operations.

(q) Other considerations

- (1) In all cases, the limitations in the AFM/POH need to be checked, in particular the use of AP or FD which can be required to reduce the FTE primarily for RNP APCH, RNAV 1, and RNP 1.
- (1) Any limitation such as 'within the US National Airspace' may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

**GM3 NCO.IDE.H.195 Navigation equipment**

**GENERAL**

- (a) The PBN specifications for which the aircraft complies with the relevant airworthiness criteria are set out in the AFM/POH, together with any limitations to be observed.
- (b) Because functional and performance requirements are defined for each navigation specification, an aircraft approved for an RNP specification is not automatically approved for all RNAV specifications. Similarly, an aircraft approved for an RNP or RNAV specification having a stringent accuracy requirement (e.g. RNP 0.3 specification) is not automatically approved for a navigation specification having a less stringent accuracy requirement (e.g. RNP 4).

**RNP 4**

- (c) For RNP 4, at least two LRNSs, capable of navigating to RNP 4, and listed in the AFM/POH, may be operational at the entry point of the RNP 4 airspace. If an item of equipment required for RNP 4 operations is unserviceable, then the pilot-in-command may consider an alternate route or diversion for repairs. For multi-sensor systems, the AFM/POH may permit entry if one GNSS sensor is lost after departure, provided one GNSS and one inertial sensor remain available.

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**Section 3 — Sailplanes**

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**AMC 1 NCO.IDE.S.130 Supplemental oxygen supply**

**OXYGEN SUPPLY**

The need for oxygen supply, when required by NCO.OP.190, may be met either by means of installed equipment or portable equipment.

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## Subpart E — Specific Requirements

### Section 1 — General

#### AMC1 NCO.SPEC.110(f) Pilot-in-command responsibilities and authority

##### DETERMINATION OF SUPPLEMENTAL OXYGEN NEED

When determining the need for supplemental oxygen carriage and use, the pilot-in-command should:

- (a) in the preflight phase:
  - (1) be aware of hypoxia conditions and associated risks;
  - (2) consider the following objective conditions for the intended flight:
    - (i) altitude;
    - (ii) duration of the flight; and
    - (iii) any other relevant operational conditions;
  - (3) consider individual conditions of flight crew members and task specialists in relation to:
    - (i) altitude of the place of residence;
    - (ii) smoking;
    - (iii) experience in flights at high altitudes;
    - (iv) actual medical conditions and medications;
    - (v) age;
    - (vi) disabilities; and
    - (vii) any other relevant factor that may be detected, or reported by the person; and
  - (4) when relevant, ensure that all flight crew members and task specialists are briefed on hypoxia conditions and symptoms, as well as on the usage of supplemental oxygen equipment.
- (b) during flight:
  - (1) monitor for early symptoms of hypoxia conditions; and
  - (2) if detecting early symptoms of hypoxia conditions:
    - (i) consider to return to a safe altitude, and
    - (ii) ensure that supplemental oxygen is used, if available.

#### GM1 NCO.SPEC.110(f) Pilot-in-command responsibilities and authority

##### DETERMINATION OF SUPPLEMENTAL OXYGEN NEED

- (a) The responsibility of the pilot-in-command for safety of all persons on board, as required by NCO.GEN.105(a)(1), includes the determination of need for supplemental oxygen use.
- (b) The altitudes above which NCO.SPEC.110(f) requires oxygen to be available and used are applicable to those cases when the pilot-in-command cannot determine the need for supplemental oxygen. However,

if the pilot-in-command is able to make this determination, he/she may elect in the interest of safety to require oxygen also for operations at or below such altitudes.

- (c) The pilot-in-command should be aware that flying below altitudes mentioned in NCO.SPEC.110(f) does not provide absolute protection against hypoxia symptoms, should individual conditions and aptitudes be prevalent.

**GM2 NCO.SPEC.110(f) Pilot-in-command responsibilities and authority**

**DETERMINATION OF OXYGEN NEED — BEFORE FLIGHT**

Detailed information and guidance on hypoxia conditions and symptoms, content of the briefing on hypoxia and assessment of individual conditions may be found in the EASA leaflet 'Hypoxia'.

**DETERMINATION OF OXYGEN NEED — IN FLIGHT**

Several methods for monitoring hypoxia early symptoms may be used and some methods may be aided by personal equipment, such as finger-mounted pulse oximeters. Detailed information and guidance on entering hypoxia conditions, on hypoxia symptoms early detection, and on use of personal equipment such as finger-mounted pulse oximeters or equivalent may be found in the EASA leaflet 'Hypoxia'.