|  |
| --- |
| ΑΙΤΗΣΗ ΓΙΑ ΠΙΣΤΟΠΟΙΗΣΗ RNAV 1 Application Form for RNAV 1 (P-RNAV) Approval (Airworthiness & Operational Approval Conformance Document) |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | REFERENCES | ISSUE DATE | TITLE | | (EU) No 965/2012 |  | SPA.PBN.105 PBN operational approval | | |  | | --- | | JAA Administrative &  Guidance Material,  Section One: General Part 3: |   Tgl-10 |  | |  | | --- | | Airworthiness Approval and Operational  Criteria for P-RNAV operations | | | |  | | --- | | ICAO 9613 | |  | Performance-based Navigation Manual | | | | | | | | | | | | |
| **1. Applicant / Operator** | | | | | | | | | | | |
| **Name** |  | | | | | | | | | | |
| **Address** |  | | | | | | | | | | |
| **Tel** |  | | | **Fax** | |  | | | | | |
| **Contact person** |  | | | | | | | | | | |
|  | | | | | | | | | | | |
| AIRCRAFT DETAILS | | | | | | | | | | | |
| **Aircraft MFG** | | |  | **Aircraft Type** | |  | | **Aircraft Series** | |  | |
| **Registration**  **Marks** | | | MFG  **Serial No** | **FMS Details** | | | | **P-RNAV SYSTEM CERTIFICATION** | | | |
| T.C. | S.T.C.(s) | | S.B(s) |
|  | | |  |  | | | |  |  | |  |
|  | | |  |  | | | |  |  | |  |
|  | | |  |  | | | |  |  | |  |
|  | | |  |  | | | |  |  | |  |
|  | | |  |  | | | |  |  | |  |
|  | | |  |  | | | |  |  | |  |

1. **Scope**

This application form includes airworthiness and operational approval criteria related to P-RNAV operation intended to be used under Instrument Flight Rules in the designated European P-RNAV airspace. It addresses general certification considerations including functional requirements, accuracy, integrity, continuity of function, and system limitations together with operational considerations for attaining P-RNAV approval of a specific aircraft or fleet of an operator.

1. **The “Application form”** covers all aspects of P-RNAV for commercial and private operations. The following aspects are covered :

* Airworthiness
* Functional requirements
* Operational documentation and training
* Data base integrity

##### General

3.1 Lateral Navigation

3.1.1 For lateral navigation, the RNAV equipment enables the aircraft to be navigated in accordance with appropriate routing instructions along a path defined by waypoints held in an on-board navigation database.

* + 1. For the purposes of this document, P-RNAV operations are based upon the use of RNAV equipment that automatically determines aircraft position in the horizontal plane using inputs from the following types of positioning sensor (in no specific order of priority):

(a) Distance Measuring Equipment giving measurements from two or more ground stations (DME/DME).

(b) Very high frequency Omni-directional Radio range with a co-located DME (VOR/DME) where it is identified as meeting the requirements of the procedure.

(c) Global Navigation Satellite System (GNSS).

(d) Inertial Navigation System (INS) or Inertial Reference System (IRS), with automatic updating from suitable radio based navigation equipment.

*Notes****:***

*(1) LORAN-C is not an acceptable navigation sensor for terminal airspace operations.*

1. *TACAN beacons may be included in the on-board navigation database and used to supplement DME provided they meet ICAO Annex 10 Standards and listed in the AIP.*
2. *The term GNSS refers to the US Department of Defence Global Positioning System (GPS) with barometric altitude augmentation and Receiver Autonomous Integrity* *Monitoring (RAIM), or to a GPS with Aircraft Based Augmentation System (ABAS), or Space Based Augmentation System (SBAS), e.g. EGNOS. See also EASA AMC 20-5 (JAA TGL-3 rev 1), Appendix A, paragraphs 2.4 and 2.5.*
3. *Limitations for the use of inertial data, as the means of determining aircraft position during short periods of loss of radio updating, are discussed in further detail in paragraph 8.4.*

3.2 Vertical Navigation

(a) Although this document does not set criteria for approval of vertical navigation systems, the following provides a brief description to aid understanding of the overall navigation function and the relationship of VNAV to this guidance material. The flight crew must clearly understand the application of vertical navigation mode and/or speed management, as appropriate, particularly in the context of a continuous descent profile.

(b) For vertical navigation, the system compares the determined vertical position (barometric altitude) with a desired vertical profile derived from altitude data, a vertical angle, or a vertical flight profile, applicable to that route or procedure and selected from an on-board navigation database. The desired vertical profile to be followed and the difference between it and the determined vertical position are then output to the following types of system to enable the profile to be followed:

• Vertical Profile Deviation Indicator

• Vertical Profile Display.

• Automatic Thrust System.

• Flight Director.

• Automatic pilot.

(c) Some systems may provide the capability to determine optimised climb and descent profiles based on aircraft performance characteristics (including engine performance), aircraft weight, aircraft speed, prevailing meteorological conditions, operator cost constraints, and published altitude and speed constraints associated with a particular arrival/approach/ departure procedure.

(d) A VNAV capability is optional for P-RNAV. It should be possible to fly a published descent profile conventionally manually, given adequate flight deck information and with appropriate crew training.

(e) Unless a published VNAV procedure is being flown, the vertical profile between two altitude constraints is always at the pilot’s discretion. However, the flight crew should aim, wherever possible, to adhere to the optimum vertical profile. Crews should recognise that there are a number of methods by which adherence to the path can be achieved. Where a VNAV procedure is published, the flight crew is required to fly in accordance with the published constraints.

(f) Use of GNSS is only considered as a sensor for the purposes of lateral navigation and its use for vertical navigation is not addressed by this document.

(g) Further description of VNAV functionality and performance requirements, and their relationship with RNP-RNAV, may be found in EUROCAE/RTCA documents ED-75A/DO-236A.

1. **Operator system description**

Equipment used to comply with P-RNAV is based on following sensors:

FMC with the following sensors :

VOR/DME : YES □ No □

INS / IRS (\*) : YES □ No □

DME/DME : YES □ No □

GPS (sensor) : YES □ No □

TSO :C 129 (a) YES □ No □

(\*): Time limit may be applied in the event of unavailability or loss of radio sensor derived automatic position updating, it is permissible to use, for a short period of time, data from an inertial system as the only means of positioning. Period of time has to be agreed with HCAA.

Note: The table below shows the different NAV Sensor requirements for the various P-RNAV procedures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Aircraft sensors | P-RNAV procedure based on | | P-RNAV procedure  based on  DME/DME | P-RNAV procedure  based on  VOR/DME |
| 1 GNSS | 2GNSS |
| 1X GNSS | YES | NO | YES | YES |
| 2X GNSS | YES | YES | YES | YES |
| DME/DME | NO | NO | YES | NO |
| VOR/DME | NO | NO | NO | YES |

(Yes) : Means P-RNAV can be executed

1. **Aircraft Airworthiness Approvals**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | |
| **Aeroplane Flight Manual (or AFM Supplement) shows following airworthiness approval for navigation system installation:** | | | | | | | |
| FAA AC 20-130A | | **Yes** **No** | | FAA TSO-C146 | | **Yes** **No** | |
| FAA AC 20-138 | | **Yes** **No** | | FAA TSO-C129a | | **Yes** **No** | |
| FAA AC 25-4 | | **Yes** **No** | | JAA JTSO-2C115 | | **Yes** **No** | |
| FAA AC 90-45A | | **Yes** **No** | | JAA JTSO-2C129a | | **Yes** **No** | |
| FAA AC 25-15 | | **Yes** **No** | | JAA GEN TGL No. 10 | | **Yes** **No** | |
| RNP-10 | | **Yes** **No** | | AMC 20-4 | | **Yes** **No** | |
| FAA Notice 8110.60 | | **Yes** **No** | | FAA AC 90-94 | | **Yes** **No** | |
| FAA TSO-C115 | | **Yes** **No** | | FAA Order 8400.12A | | **Yes** **No** | |
| FAA TSO-C145 | | **Yes** **No** | | MNPS | | **Yes** **No** | |
| RNP10 | | **Yes** **No** | | RNP4 | | **Yes** **No** | |
| Other | | **Yes** **No** (If Yes please refer below) | | | | | |
|  |  | |  | |  | |  |
|  |  | |  | |  | |  |
| *Refer to* | | | | | | | |

#### PART B SECTION 6: AIRWORTHINESS / AVIONICS CERTIFICATION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 6.1 | **Accuracy**    During operations on routes or in areas notified exclusively for P-RNAV equipped aircraft, the lateral track keeping accuracy of the on-board PRNAV system shall be equal to or better than +/- 1 NM for 95% of the flight time.  Notes: *(1)* *The track keeping accuracy is dependent on the navigation system error (a combination of path definition error, position estimation error and display error) and Flight Technical Error (FTE). It corresponds to the accuracy component of RNP-1 and RNP-1 RNAV. Further explanation may be found in documents ED-75A / DO-236A*.  *(2) For the purposes of obstacle clearance, a FTE of ± 0.5NM is assumed for the departure (except at the departure end of the runway where, in accordance with PANS-OPS Doc 8168, Volume II, Part II, 7.3.2 and 8.1, a value of ±0.1NM is assumed), ±1NM for the initial and intermediate segments, and 2NM for en-route.*  *(3) The objective behind this chosen level of performance is to enable RNAV systems based on DME/DME, as currently installed in many aircraft, to be used in terminal airspace on P-RNAV procedures designed according to the published criteria without further evaluation of system accuracy.*  *(4) Provided that the assumption of paragraph 4(c) has been shown to be valid in respect of typical DME performance, then, for RNAV systems that have been declared (e.g. in the Aircraft Flight Manual) to be compliant with the 2D navigation accuracy criteria of FAA AC 90-45A, AC 20- 130(), FAA TSO-C115(), or JAA JTSO-2C115(), the intent of this paragraph is considered as satisfied and no further accuracy demonstration is required. However, such a Flight Manual statement, by itself, does not constitute an airworthiness approval for P-RNAV and compliance with all other criteria of this document will need to be shown.* | Per Note (4), show that the FMS installation is compliant with AC 20-130a and relevant TSO’s, as is usually noted in the AFM. The assumptions of paragraph 4c regard the procedure design and supporting navigation infrastructure, which is unrelated to the FMS equipment. |  | Operator respond :    **HCAA Note:**   1. Refer to statement in the AFM that the aircraft is P-RNAV compliant. 2. In case that an STC or a Mod has been performed then refer to and submit all related evidences. |

LEGEND FOR COMPLIANCE STATUS: COMPLIED WITH = X NO COMPLIANCE = NC NOT APPLICABLE = N/A NOTED = \*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 6.2 | **Integrity**  With respect to the airborne system, the probability of displaying hazardously misleading navigational or positional information simultaneously to both pilots shall be Remote. | Show by providing FMS data, as installed in aircraft that this is established in the System Safety  Assessment either as already submitted for the existing installation's Type Certification or as it is submitted for a new or modified installation. |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered complied . |
| 6.2 (1) | *Note****:*** *In the context of P-RNAV operations in the terminal area, hazardous should be interpreted as involving misleading information without a timely warning and which, in the absence of other cues, is unlikely to be detected by the flight crew.* | Explanatory text for notification only |  | NOTED |
| 6.2 (2) | *Note: An airborne safety objective of Remote is an alleviation to the current guidelines of paragraph 4.a.(3)(viii) of AMJ 25-11, which specifies Extremely Remote for the departure, arrival and approach phases of flight. This alleviation recognises that the PANS-OPS procedure design and PANS-RAC air traffic separation criteria account for and accommodate these type of aircraft and their system integrity in current airspace. Furthermore, conservative safety margins are used in the design of P-RNAV procedures such that the risks are not increased above those currently experienced.* | Explanatory text for notification only |  | NOTED |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 6.2 (3) | *Note: A safety objective of* ***Extremely Remote*** *will continue to be applicable to a precision approach on the final segment i.e. from the FAWP down to the runway..* | Not applicable, for notification only |  | NOTED |
| 6.2 (4) | *Note: Systems approved for RNP operations have capabilities exceeding that required for P-RNAV operations. These systems provide higher navigation integrity through implementation of containment and by giving the flight crew better awareness of accuracy through the availability of estimated position uncertainty.* | Explanatory text for notification only |  | NOTED |
| 6.2 (5**)** | *Note: Probability terms are defined in JAA AMJ 25.1309.* | Show evidence or support compliance. See also EASA  CS 25.1309 |  | NOTED |
| 6.3 | **Continuity of Function**  With respect to the airborne systems, it shall be shown that: | This is established in the System Safety Assessment, either as already submitted for the existing installation's Type Certification or as to be submitted for a new or modified nstallation. |  | NOTED |
| 6.3 (a) | The probability of loss of all navigation information is Remote |  |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered complied. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 6.3 (b) | The probability of non-restorable loss of all navigation and  communication functions is Extremely Improbable. | Usually established in the System Safety Assessment for the existing installation’s Type Certification. Provide relevant compliance data |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered complied. |
|  | *Note 1: In addition to the equipment required by JAR-OPS 1, Sub-par L for IFR flight (or equivalent national requirements), at least one area navigation system is required.*  *Note 2 : Probability terms are defined in JAA AMJ 25.1309.*  *Operations (not FMS) It is an operational requirement to assure that the quantity (one or two) of FMS required for the for the planned operations are installed and functioning correctly in the aircraft* | For notification only |  | NOTED |

#### PART C SECTION 7: FUNCTIONAL CRITERIA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.1 | **Required Functions** Following are the minimum system functions required |  |  |  |
| 7.1.1 | Display elements, e.g. CDI, (E)HSI,    Each with a lateral deviation display, To/From flag, and failure indicator, for use as primary flight instruments for navigation of the aircraft, for manoeuvre anticipation, and for failure/status/integrity indication, visible to the pilot and located in the primary field of view when looking forward along the flight path.  The course selector of the deviation display shall be automatically slaved to the RNAV computed path.  The deviation display shall have a full-scale deflection suitable for the phase of flight and based on the required track keeping accuracy.  Scaling may be set automatically by default logic or to a value obtained from a navigation database.  The full-scale deflection value must be known or made available for display to the flight crew. For P-RNAV operations, a value of ±1 NM is acceptable.  An acceptable alternative is a navigation map display, readily visible to the flight crew, with appropriate map scales and giving equivalent functionality to the lateral deviation display, except that scaling may be set manually by the pilot.  *Note: JAA JTSO-C129a, for GPS equipment, prescribes scaling values of 5.0 NM for en-route,1.0 NM for terminal airspace, and 0.3 NM for a non-precision approach.* | Show that FMS and EFIS, fully comply to all requirements, as installed in aircraft.  Show that CDI scaling is in accordance with requirements.  Refer to the appropriate FMS Pilots Guide to determine the operation of the installed equipment.  Show that all affected operations comply with TGL-10 and per Note (4 ) in paragraph 6.1. |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered complied. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.1.2 | Capability to continuously display to the pilot flying, on the primary flight instruments for navigation of the aircraft, the RNAV computed desired path (DTK) and aircraft position relative to the path. | Show that RNAV computed path is displayed when FMS is in the selected navigation source |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered complied. |
| 7.1.3 | Where the minimum flight crew is two pilots, means for the pilot not flying to verify the desired path and the aircraft position relative to the path. | Show that operations (not FMS) Operation is supported by installed equipment |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered complied. |
| 7.1.4 | A navigation database, containing current navigation data officially promulgated for civil aviation, which can be updated in accordance with the AIRAC cycle and from which terminal airspace procedures can be retrieved and loaded into the RNAV system. The resolution to which the data is stored must be sufficient to achieve the required track keeping accuracy. The database must be protected against flight crew modification of the stored data.  *Note****:***  *When a procedure is loaded from the database, the RNAV system is required to fly it as published. This does not preclude the flight crew from having the means to modify a procedure or route already loaded into the RNAV system as permitted by Section 10. However, the procedure stored in the database must not be modified and must remain intact within the database for future use and reference*. | Show that FMS and Navigation Dbase comply |  | Operator respond :    **HCAA Note**:  [Refer to data base provider and submit LOA] |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.1.5 | Means to display the validity period of the navigation database to the flight crew. | Show that FMS and Navigation Data base provide relevant display on MCDU or equivalent Unit. |  | Operator respond : |
| 7.1.6 | Means to retrieve and display data stored in the navigation database relating to individual waypoints and navigation aids, to enable the flight crew to verify the procedure to be flown. | Provide system compliance details |  | Operator respond : |
| 7.1.7 | Capacity to load from the database into the RNAV system the whole terminal procedure(s) to be flown. | Comment that FMS and Dbase systems used support DEPARTURE / ARRIVAL pages on the MCDU or elsewhere to load the whole terminal procedure(s) as selected by the flight crew. |  | Operator respond : |
| 7.1.8 | Display of the active navigation sensor type, either in the pilot’s primary field of view, or on a readily accessible page on an MCDU together with a means of determining navigation system performance. | Show that readily accessible means is provided for the Active sensor to be displayed on pages on the MCDU or elsewhere. |  | Operator respond : |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.1.9 | Display of the identification of the active (To) waypoint, either in the pilot’ s primary field of view, or on a readily accessible page on an MCDU, readily visible to the flight crew. | Show that the active (To) waypoint is displayed in the pilot's primary view or elsewhere, when FMS is the selected navigation source.  *Note* : *The active (To) waypoint may be displayed elsewhere,*  *such as on the first LEGS page on the MCDU or equiv.Unit*. |  | Operator respond : |
| 7.1.10 | Display of distance and bearing to the active (To) waypoint in the pilot’s primary field of view. Where impracticable, the data may be displayed on a readily accessible page on an MCDU, readily visible to the flight crew. | Show that when FMS is the selected navigation source, all required information is displayed in pilot's primary view.  State whether the information is also displayed elsewhere |  | Operator respond : |
| 7.1.11 | Display of ground speed or time to the active (To) waypoint, either in the pilot’ s primary field of view, or on a readily accessible page on a MCDU, readily visible to the flight crew. | Show that Information is readily accessible on MCDU and MFD text pages or equivalent Units |  | Operator respond : |
| 7.1.12 | Where the MCDU is to be used to support the accuracy checks of Section 10, display of lateral deviation with a resolution of 0.1NM. | Support compliance |  |  |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.1.13 | Automatic tuning of VOR and DME navigation aids used for position updating together with the capability to inhibit individual navigation aids from the automatic selection process.  *Note*: *Further guidance may be found in ED-75A/DO-236A, Section 3.7.3.1.* | Document that Individual navaids may be inhibited by a relevant on the MCDU or equivalent Unit. |  | Operator respond : |
| 7.1.14 | Capability for the P-RNAV system to perform automatic selection (or de-selection) of navigation sources, a reasonableness check, an integrity check, and a manual override or deselect.  *Note:*  *Further guidance may be found in ED-75A/DO-236A, Section 3.7.3.1.* | Document that FMS equipment support manual override or deselect Navigation sources page on the MCDU. |  | Operator respond : |
| 7.1.15 | Capability for the “Direct to” function. | Document capability |  | Operator respond : |
| 7.1.16 | Capability for automatic leg sequencing with display of sequencing to the flight crew. | Document capability |  | Operator respond : |
| 7.1.17 | Capability to execute database procedures including fly-over and fly-by turns. | Document capability |  | Operator respond : |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.1.18 | Capability to execute leg transitions and maintain tracks consistent with the following ARINC 424 path terminators, or their equivalent:  Initial Fix (IF),  Track between Two Fixes (TF),  Course to a Fix (CF)  Course from a Fix to an Altitude (FA),  Direct to a Fix (DF)  *Note: Path terminators are defined in ARINC Specification 424, and their*  *application is described in more detail in documents EUROCAE ED-75A/*  *RTCA DO-236A, ED-77/ DO-201A, and EUROCONTROL document*  *NAV.ET1.ST10.* | Document all capabilities required |  | Operator respond : |
| 7.1.19 | Indication of the RNAV system failure, including the associated sensors, in the pilot’s primary field of view. | Document availability of all required indications |  | Operator respond : |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.1.20 | For multi-sensor systems, automatic reversion to an alternate RNAV sensor if the primary RNAV sensor fails.  *Note: This does not preclude means for manual navigation source*  *selection.* | Document availability of the required capability. |  | Operator respond : |
| 7.1.21 | Alternative means of displaying navigation information, sufficient to perform the checking procedures of Section 10. | State any alternate means of EFIS display for VOR/DME data, FMS and VOR/DME (E)HSI data, and FMS map. |  | Operator respond : |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.2 | **Recommended Functions**  Following are the recommended functions for P-RNAV operations |  |  | NOTED |
| 7.2.1 | Capability to fly a path parallel to, but offset left or right from, the original active route.  The system should provide for entry of an offset distance of at least 20 NM in increments of 1 NM. Operation in offset mode should be clearly indicated to the flight crew. When in offset mode, the system should provide reference parameters (e.g. cross-track deviation, distance-to-go) relative to the offset path and offset reference points. An offset should not be propagated through route discontinuities, unreasonable path geometry, or beyond the initial approach waypoint.  Prior to the end of the offset path, indication should be provided to the flight crew, to allow sufficient time to return to the original active route. Once a parallel offset is activated, it should remain active for all route segments of the flight plan until either it is removed automatically, until the flight crew enter a Direct-To routing, or until flight crew (manual) cancellation.  *Note: The purpose of this function is to enable offsets for tactical operations authorised by ATC (e.g. weather avoidance). It is not intended to be used for strategic offsets which will be promulgated and coded in the navigation database as separate parallel routes.* | State any available recommended function. |  | Operator respond : |
| 7.2.2 | Coupling to the flight director and /or automatic pilot from the RNAV system with unambiguous mode indication. (See also item 8.1.1 (e)). | State any available recommended function. |  | Operator respond : |
| 7.2.3 | Capability for vertical navigation based upon barometric inputs. | State if VNAV Autopilot option is installed in aircraft |  | Operator respond : |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 7.2.4 | For an RNAV system using DME/DME updating, supported by IRS, means for automatic runway position update at the start of the takeoff run including means to enter a distance offset for situations where the published threshold and the actual start of the take of run differ (i.e. takeoff shift). | State whether FMS supports a manual selection on the LEGS page to update the FMS to the position of the selected departure  runway.  *Note : Some systems perform an automatic update to the selected departure runway position upon selection of Take-off mode.* |  | Operator respond : |
| 7.2.5 | Display of the navigation mode in the pilot’s primary field of view. | State weather the EFIS system displays the navigation mode in the pilot’s PFD. |  | Operator respond : |
| 7.2.6 | Capability to execute leg transitions and maintain tracks consistent with the following ARINC 424 path terminators, or equivalent:  Holding Pattern to a Manual Termination (HM)  Holding Pattern to an Altitude (HA)  Holding Pattern to a Fix (HF)  Constant Radius to a Fix (RF).  *Notes: (1) Path terminators are defined in ARINC Specification 424, and their application is described in more detail in documents EUROCAE ED-75A/ RTCA DO-236A, ED-77/ DO-201A, and EUROCONTROL document NAV.ET1.ST10.*  *(2) The RF leg type is unique to RNP-RNAV systems whereas the other types may exist in non-RNP systems.* | State whether the FMS and navigation database support leg transitioning |  | Operator respond : |

#### PART D SECTION 8: ACCEPTABLE MEANS OF AIRWORTHINESS COMPLIANCE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 8.1 | **General**  Where practicable, to get a concurrent process that ensures the operational evaluation rationale is based on the certification rationale for the particular equipment installation, the airworthiness assessment of this Section should be performed in conjunction with the operational evaluation of Section 10, taking account of the proposed normal and contingency procedures. The following compliance guidelines assume that the aircraft is equipped in accordance with JAR-OPS 1 Sub-part L for IFR flight, or equivalent national requirements. | Explanatory text |  | NOTED |
| 8.1.1 | New or Modified Installations  In demonstrating compliance with this leaflet, the following specific points should be noted: | Certification package Responsibility of certification applicant |  | NOTED |
| 8.1.1 (a) | The applicant will need to submit, to the responsible authority, a compliance statement which shows how the criteria of TGL-10 have been satisfied. The statement should be based on a plan, agreed by the responsible authority at an early stage of the implementation programme. The plan should identify the certification data to be submitted which should include, as appropriate, a system description together with evidence resulting from the activities defined in the following paragraphs*.* | Certification package Responsibility of certification applicant |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered N/A. |
| 8.1.1 (b) | Compliance with the airworthiness requirements for intended function and safety may be demonstrated by equipment qualification, system safety analysis, confirmation of appropriate software design assurance level (i.e. consistent with paragraph 6.2), performance analyses, and a combination of ground and flight tests. To support the approval application, design data will need to be submitted showing that the objectives and criteria of Sections 6 and 7 of this document have been satisfied. | Certification package Responsibility of certification applicant |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered N/A. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 8.1.1 (c) | Use of the RNAV systems and the manner of presentation of lateral and vertical guidance information on the flight deck must be evaluated to show that the risk of flight crew error has been minimised. In particular, during the transition to the final approach, the display of ILS information simultaneously with RNAV information to a flight crew member will need careful consideration. | Certification package Responsibility of certification applicant |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered N/A. |
| 8.1.1 (d) | Equipment failure scenarios involving conventional navigation sensors  and the RNAV system(s) must be evaluated to demonstrate that adequate alternative means of navigation are available following failure of the RNAV system, and that reversionary switching arrangements, e.g. VOR#2 on HSI#1, do not lead to misleading or unsafe display configurations. The evaluation must consider also the probability of failures within the switching arrangements | Certification package Responsibility of certification applicant |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered N/A. |
| 8.1.1 (e) | The coupling arrangements for the RNAV system to flight director/automatic pilot must be evaluated to show compatibility and that operating modes, including RNAV system failures modes, are clearly and unambiguously indicated to the flight crew. | Certification package Responsibility of certification applicant |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered N/A. |
| 8.1.1 (f) | To comply with Section 7, item 7.1.18, and item 7.2.6 (if applicable), the execution of all leg types (in particular when intercepting a CF leg) must be shown to be possible without the need for manual intervention, i.e. without disengaging the RNAV mode, and then a manual course selection. This does not preclude means for manual intervention when needed. | Certification package Responsibility of certification applicant |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered N/A. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 8.1.2 | Existing Installations  The applicant will need to submit, to the responsible authority, a compliance statement which shows how the criteria of this leaflet have been satisfied for existing installations. Compliance may be established by inspection of the installed system to confirm the availability of required features and functionality. The performance and integrity criteria of Section 6 may be confirmed by reference to statements in the Aircraft Flight Manual or to other applicable approvals and supporting certification data. In the absence of such evidence, supplementary analyses and/or tests may be required. Paragraph 9.3 addresses Aircraft Flight Manual changes that might be necessary. | Certification package Responsibility of certification applicant |  | **HCAA Note**: A statement in the AFM that the aircraft is approved for  P-RNAV per TGL-10 then the requirement is considered complied. |
| 8.2 | **Database Integrity**  The navigation database updating process shall comply with EUROCAE ED-76 / RTCA DO--200A, or equivalent approved procedures (see paragraph No.10.6) | The navigation databases should be obtained from a supplier holding an EASA or FAA type 2 Letter of Acceptance (LOA)  The quality of received data must be audited under the operator’s Quality System. Update action should be considered as a maintenance action |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 8.3 | **Use of GPS Equipment** |  |  |  |
| 8.3.1 | The use of GPS to perform P-RNAV operations is limited to equipment approved under FAA TSO-C145, TSO-146, and JTSOC129a/TSO-C129 (), in the equipment classes: A1, B1, C1, B3 and C3, and which support the minimum required system functions specified in Section 7.1 of this document. Receiver Autonomous Integrity Monitoring (RAIM), or an equivalent means of integrity monitoring as part of a multi-sensor navigation system, must be provided. | Document that particular GPS in use conforms to applicable TSO’s. |  | Operator respond: |
| 8.3.2 | To complete the compliance statement of paragraph 8.1.1(a) for JTSO-C129a/TSO-C129() equipment, the criteria of EASA AMC 20-5 (JAA Guidance Leaflet No.3, revision 1), paragraph 5.4, needs to be taken into  consideration when stand-alone GPS equipment is the only installed  means of meeting the P-RNAV criteria. | In case of a stand alone GPS state weather the criteria of TGL- 3 have been taken into account. |  | Operator respond: |
| 8.3.3 | GPS with the capability for satellite Fault Detection and Exclusion (FDE) is recommended to improve Continuity of Function. | State if functionality is available |  | Operator respond: |
| 8.4 | **Use of Inertial Data**  In the event of unavailability or loss of radio sensor derived automatic position updating, it is permissible to use, for a short period of time, data  from an inertial system as the only means of positioning. For such operations, in the absence of a position integrity indication, the applicant must establish how long the aircraft can maintain the required accuracy using only inertial data. Both take-off and terminal area operations will need to be considered and may need to be addressed in the contingency procedures. The limits may be based on an acceptable drift rate model as agreed by the responsible aircraft operations authority. | State provisions for time needed for IRS or INS systems to update  If installed.  Are there any indications to the crew when the duration of IRS usage becomes excessive for the current operation? |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 8.5 | **Intermixing of Equipment**  Installation of area navigation systems with different crew interfaces can be very confusing and can lead to problems when they have conflicting methods of operation and conflicting display formats. There can be problems even when intermixing different versions of the same equipment. For approach operations, intermixing of RNAV equipment is not permitted. As a minimum, consideration must be given to the following potential incompatibilities particularly where the flight deck architecture includes cross coupling capabilities (e.g. GNSS-2 switched to drive the number 1 displays). | State if intermixing is available |  | Operator respond: |
| 8.5 (a) | Data entry: The two systems must have consistent methods of data entry, and similar pilot procedures for accomplishing common tasks. Any differences should be evaluated for pilot workload. If the wrong procedures are used, (for example, the data entry procedures for the offside system are used by mistake for the onside), there must be no misleading information and it must be easy to identify and recover from the mistake. | State if intermixing is available. If yes, how mistakes or misleads are avoided. |  | Operator respond: |
| 8.5 (b) | CDI scaling: Sensitivity must be consistent or annunciated. | Respond accordingly |  | Operator respond: |
| 8.5 (c) | Display symbology and mode annunciation: There must be no conflicting  symbols or annunciation (e.g., a common symbol used for two different  purposes), and differences should be specifically evaluated to evaluate  the potential confusion they may cause. | If intermixing exists state any differences, evaluating potential confusion |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 8.5 (d) | Mode logic: The modes internal to the equipment and their interface to the rest of the aircraft must be consistent. | State if mode logic is consistent |  | Operator respond: |
| 8.5 (e) | Equipment failure: The effect of failure of one unit must not result in  misleading information | Respond accordingly |  | Operator respond: |
| 8.5 (f) | Displayed data: The display of primary navigation parameters must use  consistent units and a consistent notation. Any inconsistency in the display of the primary information will not be approved. | Respond accordingly |  | Operator respond: |
| 8.5 (g) | Database differences: Due to the inherent data conflict, differences in the  area navigation database will not be permitted. | Respond accordingly |  | Operator respond: |

#### PART E SECTION 9: AIRCRAFT FLIGHT MANUAL

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 9.1 | For new or modified aircraft, the Aircraft Flight Manual (AFM) or the Pilot’ s Operating Handbook (POH), whichever is applicable, should provide at least the following information. This limited set assumes that a detailed description of the installed system and related operating instructions and procedures are available in other approved operating or training manuals.  (a) A statement which identifies the equipment and aircraft build or modification standard certificated for P-RNAV operations or having RNP-1 or better capability. | Operator’s responsibility.  Please state compliance. |  | Operator respond: |
| 9.2 | In the absence of suitable material in other approved operating or training manuals, appropriate amendments or supplements to cover PRNAV operations will need to be provided for the following sections of the Flight Manual, or the Pilot’ s Operating Handbook, whichever is applicable:  · Limitations  · Normal Procedures  · Abnormal Procedures  · Emergency Procedures  · Performance | Operator’s responsibility.  Please state compliance. |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 9.3 | For existing aircraft already equipped with an RNAV system but where the Flight Manual or Pilot’ s Operating Handbook does not define, or is unclear about, the system capability, the aircraft operator may adopt, as an alternative to Change Sheets or Supplements produced by the aircraft constructor, one of the following options, subject to agreement of the responsible authority:  (a) Submit a compliance statement as discussed in 8.1.2 together with a  proposed Supplement, devised by the operator, in accordance with the  guidelines of 9.1, and in a format using the template given in TGL-10 Annex E; or  (b) Submit a compliance statement as discussed in 8.1.2 together with a  proposed Operational Specification that includes information equivalent  to that normally contained in a Flight Manual | Operator’s responsibility.  Please show compliance. |  | Operator respond: |
| 9.4 | Systems approved for RNP operations have capabilities exceeding  that required for P-RNAV operations. These systems provide higher  navigation integrity through implementation of containment integrity and  by giving the flight crew better awareness of accuracy through the  availability of estimated position uncertainty. Therefore, reference in the  AFM to specific RNP(s) of the system may then be used in determining  compatibility of the RNAV capability with the performance required for  specific flight operations | Please provide performance data, if system is approved for RNP operations, as stated in the AFM |  | Operator respond: |

#### 

#### PART F SECTION 10: OPERATIONAL CRITERIA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.1 | General |  |  |  |
| 10.1.1 | An operational evaluation based on the criteria /rationale of paragraphs 8.1.1(c) to (f), or paragraph 8.1.2, as applicable, will need to be made to confirm the adequacy of the operator’ s normal and contingency procedures for the particular equipment installation. | Operational evaluation with specified criteria is needed based on present equipment installation |  | NOTED |
| 10.1.2 | The following guidelines may be used by the operator to develop operating procedures that are appropriate to the aircraft installation and to the environment within which the aircraft will be operated. It should be noted that airworthiness approval alone does not authorise flight in airspace, along routes, or for terminal area procedures for which PRNAV approval is required. Operational approval will be stated in the applicable Air Operator Certificate, or issued in accordance with national procedures, as appropriate. | P-RNAV operational approval must be specifically stated in the AOC.  *Note: When operating RNAV Terminal Airspace procedures, it is of utmost importance that the procedures are operated in accordance with the approval status of aircraft and flight crew. It is a legal responsibility of the pilot in command to ensure the safe operation of the aircraft in accordance with the published requirements and the associated approval status* |  | NOTED |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.2 | **Normal Procedures** |  |  |  |
| 10.2.1.1 | During the pre-flight planning phase, the availability of the navigation infrastructure, required for the intended operation, including any non-RNAV contingencies, must be confirmed for the period of intended operation. Availability of the onboard navigation equipment necessary for the route to be flown must be confirmed. The onboard navigation database must be appropriate for the region of intended operation and must include the navigation aids, waypoints, and coded terminal airspace procedures for the departure, arrival and alternate airfields. | Operational requirement supported by ground-based FMS software tool and FMS equipment. |  | Operator respond: |
| 10.2.1.2 | Where the responsible airspace authority has specified in the AIP that dual P-RNAV systems are required for specific terminal P-RNAV procedure, the availability of dual P-RNAV systems must be confirmed. This typically will apply where procedures are effective below the applicable minimum obstacle clearance altitude or where radar coverage is inadequate for the purposes of supporting P-RNAV. This will also take into account the particular hazards of a terminal area and the feasibility of contingency procedures following loss of P-RNAV capability. | Operational requirement supported by FMS equipment. |  | Operator respond: |
| 10.2.1.3 | If a stand-alone GPS is to be used for P-RNAV, the availability of RAIM must be confirmed with account taken of the latest information from the US relevant Service, giving details of satellite non-availability.  *Note****:*** *RAIM prediction may be a function of the equipment provided that satellite non-availability data can be entered. In the absence of such a function, an airspace service provider may offer an approved RAIM availability service to users*. | The FMS is not to be considered as a stand-alone GPS.  (A ground-based tool for checking RAIM along the route is not currently available.) |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.2.2 | Departure |  |  |  |
| 10.2.2.1 | At system initialisation, the flight crew must confirm that the navigation database is current and verify that the aircraft position has been entered correctly. The active flight plan should be checked by comparing the charts, SID or other applicable documents, with the map display (if applicable) and the MCDU. 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. If required by a procedure, a check will need to be made to confirm that updating will use a specific navigation aid(s), or to confirm exclusion of a specific navigation aid. A procedure shall not be used if doubt exists as to the validity of the procedure in the navigation database.  *Note: As a minimum, the departure checks could be a simple inspection of a suitable map display that achieves the objectives of this paragraph.* | Operations (not FMS) Operational requirement supported by FMS equipment.  Note that existing navigation database and FMS support use of a single specific navigation aid (not multiple specific ones) for approach. |  | Operator respond: |
| 10.2.2.2 | The creation of new waypoints by manual entry into the RNAV system by the flight crew is not permitted as it would invalidate the affected P-RNAV procedure. Route modifications in the terminal area may take the form of radar headings or ‘direct to’ clearances and the flight crew must be capable of reacting in a timely fashion. This may include the insertion in the flight plan of waypoints loaded from the database. | Operational requirement supported by FMS equipment in  conjunction with the Heading mode or equivalent mode selection on the Flight Control Panel. |  | Operator respond: |
| 10.2.2.3 | Prior to commencing take off, the flight crew must verify that the RNAV system is available and operating correctly and, where applicable, the correct airport and runway data have been loaded. | Operational requirement supported by FMS equipment  *Note****:*** *Some FMS do not support the automatic runway pos shift function listed in Recommended functions, herein.* |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.2.2.4 | Unless automatic updating of the actual departure point is provided, the flight crew must ensure initialisation on the runway 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. Where GNSS is used, the signal must be acquired before the take-off roll commences and GNSS position may be used in place of the runway update. | Operational requirement supported by FMS equipment.  *Note: Some FMS equipment do not support the automatic runway pos shift function that is listed under Recommended functions).* |  | Operator respond: |
| 10.2.2.5 | During the procedure and where feasible, flight progress should be monitored for navigational reasonableness, by cross-checks, with conventional navigation aids using the primary displays in conjunction with the MCDU. Where applicable and when used, the flight crew procedures will need to include monitoring to verify automatic updating of the inertial systems to ensure the period without updating does not exceed the permitted limit.  (See relevant paragraph 8.4). | Operational requirement supported by FMS equipment.  (e.g., display of lateral NAV position on MFD map, and relevant warning messages such as FMS-IRS DISAGREE or IRS REVERTED, etc). |  | Operator respond: |
| 10.2.2.6 | Where the initialisation of paragraph 10.2.2.4 is not achieved, the departure should be flown by conventional navigation means. A transition to the P-RNAV structure should be made at the point where the aircraft has entered DME/DME coverage and has had sufficient time to achieve an adequate input.  *Note: If a procedure is designed to be started conventionally, then the latest point of transition to the P-RNAV structure will be marked on the charts. If a pilot elects to start a P-RNAV procedure using conventional methods, there will not be any indication on the charts of the transition point to the P-RNAV structure.* | Operational requirement.  State specific provisional procedure |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.2.3 | Arrival |  |  |  |
| 10.2.3.1 | Prior to the arrival phase, the flight crew should verify that the correct terminal procedure has been loaded. The active flight plan should be checked by comparing the charts with the map display (if applicable) and the MCDU. 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. If required by a procedure, a check will need to be made to confirm that updating will exclude a particular navigation aid. A procedure shall not be used if doubt exists as to the validity of the procedure in the navigation database.  *Note****:*** *As a minimum, the arrival checks could be a simple inspection of a suitable map display that achieves the objectives of this paragraph*. | Operational requirement supported by FMS equipment.  Describe equipment relevant display provisions |  | Operator respond: |
| 10.2.3.2 | The creation of new waypoints by manual entry into the RNAV system by the flight crew would invalidate the P-RNAV procedure and is not permitted. | Operations Prohibiting manual entry by the flight crew of the loaded procedure should be addressed in the AFM. State compliance and AFM reference |  | Operator respond: |
| 10.2.3.3 | Where the contingency to revert to a conventional arrival procedure is required, the flight crew must make the necessary preparation | Operations (not FMS) Prohibiting manual entry by the flight crew of the loaded procedure should be addressed in the AFM.  State compliance and AFM reference |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.2.3.4 | During the procedure and where feasible, flight progress should be monitored for navigational reasonableness by cross-checks with conventional navigation aids using the primary displays in conjunction with the MCDU. In particular, for a VOR/DME RNAV procedure, the reference VOR/DME used for the construction of the procedure must be displayed and checked by the flight crew. For RNAV systems without GNSS updating, a navigation reasonableness check is required during the descent phase before reaching the Initial Approach Waypoint (IAWP). For GNSS based systems, absence of an integrity alarm is considered sufficient. If the check fails, a conventional procedure must then be flown.  *Notes:**(1) For example, where feasible, display bearing/range to a VOR/DME from the RNAV system and compare the result with the RMI read-out (selected to same VOR/DME).*  *(2) For some systems the accuracy may be derived from the navigation mode or accuracy mode.*  *(3) Where the MCDU shows only integers and is unable to display errors with sufficient resolution for P-RNAV accuracy checks, an alternative means of checking will need to be followed.* | Operational requirement.  State method of compliance |  | Operator respond: |
| 10.2.3.5 | Route modifications in the terminal area may take the form of radar headings or ‘ direct to’ clearances and the flight crew must be capable of reacting in a timely fashion. This may include the insertion of tactical waypoints loaded from the database. Manual entry or modification by the flight crew of the loaded procedure, using temporary waypoints or fixes not provided in the database, is not permitted. | FMS with autopilot should support radar headings and direct-to clearances. Manual entry or modification by the flight crew of the loaded procedure should be addressed |  | Operator respond: |
| 10.2.3.6 | Although a particular method is not mandated, any published altitude and speed constraints must be observed.  *Note****:*** *Paragraph 5.2 provides further information on vertical navigation* | Altitude and speed restrictions are displayed on the CDU when provided in the navigation database. When used with coupled VNAV, flight guidance is provided relative to database altitude and speed restrictions. |  | Operator respond: |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.3 | Contingency Procedures |  |  |  |
| 10.3.1 | Contingency procedures will need to be developed by the operator to address Cautions and Warnings for the following conditions:  (a) Failure of the RNAV system components including those affecting flight technical error (e.g. failures of the flight director or automatic pilot).  (b) Multiple system failures.  (c) Failure of the navigation sensors.  (d) Coasting on inertial sensors beyond a specified time limit. | Operational requirement, supported by FMS system (including EFIS and CAS). |  | Operator respond: |
| 10.3.2 | The flight crew must notify ATC of any problem with the RNAV system that results in the loss of the required navigation capability, together with the proposed course of action. | Operational requirement to be supported by FMS equipment |  | Operator respond: |
| 10.3.3 | In the event of communications failure, the flight crew should continue with the RNAV procedure in accordance with the published lost communication procedure. | Operational requirement.  State accordingly and describe procedure |  | Operator respond: |
| 10.3.4 | In the event of loss of P-RNAV capability, the flight crew should invoke contingency procedures and navigate using an alternative means of navigation which may include the use of an inertial system. The alternative means need not be an RNAV system. | Operational requirement dependent on other installed equipment and is specific to the operation.  State available provisions and procedure. |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.4 | **Incident Reporting**  Significant incidents associated with the operation of the aircraft which affect or could affect the safety of RNAV operations, need to be reported in accordance with AMC 20-8 etc. Specific examples may include: | Operational requirement |  | Operator respond: |
| 10.4(a) | Aircraft system malfunctions during P-RNAV operations which lead to:  (i) Navigation errors (e.g. map shifts) not associated with transitions from an inertial navigation mode to radio navigation mode  (ii) Significant navigation errors attributed to incorrect data or a navigation  database coding error  (iii) Unexpected deviations in lateral or vertical flight path not caused by Pilot input  (iv) Significant misleading information without a failure warning  (v) Total loss or multiple navigation equipment failure. | State compliance by referring to specific procedures. |  | Operator respond: |
| 10.4(b) | Problems with ground navigational facilities leading to significant navigation errors not associated with transitions from an inertial navigation mode to radio navigation mode. |  |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.5 | Flight Crew Training    All flight crews must receive appropriate training, briefings and guidance  material in the operation of RNAV-based departure and arrival procedures. This should cover the normal and contingency procedures identified in paragraphs 10.2 (Normal Procedures) and 10.3 (Contingency Procedures). Wherever practicable, standard training events (simulator checks/proficiency checks) should include departures and arrivals using the RNAV-based procedures. The operator must ensure that the Training Manual contains appropriate material to support P-RNAV operations. As a minimum, the subjects listed in the following paragraphs should be addressed in the Training Manual. | Operational requirement.  Document compliance of Training Manual provisions. |  | Operator respond:  **HCAA Note:** Appropriate sections of OM (D) has to be included as attachment |
| 10.5.1 | Theory of RNAV, including the differences between B-RNAV, PRNAV and RNP-RNAV. |  |  | Operator respond: |
| 10.5.2 | Limitations of RNAV |  |  | Operator respond: |
| 10.5.3 | Charting, database and avionics issues including:  Waypoint naming concepts.  RNAV Path terminator concepts and especially:  Use of the ‘ CF’ path terminator.  Use of the ‘ TF’ path terminator.  Fly-by and fly-over waypoints. |  |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.5.4 | Use of the RNAV equipment including, where appropriate:  Retrieving a procedure from the database.  Verification and sensor management.  Tactically modifying the flight plan.  Addressing discontinuities.  Entering associated data such as:  Wind.  Altitude/Speed constraints.  Vertical Profile/Vertical Speed.  Flying the procedure.  Use of Lateral Navigation Mode and associated lateral control  techniques.  Use of Vertical Navigation Mode and associated vertical control  techniques.  Use of automatic pilot, flight director and auto-throttle at different stages  of the procedure. | Document compliance of training programme provisions. |  | Operator respond: |
| 10.5.5 | RT phraseology for RNAV |  |  | Operator respond: |
| 10.5.6 | The implications for RNAV operations of system malfunctions which are not RNAV related (e.g. hydraulic failure or engine failure). |  |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.6 | Database Integrity |  |  |  |
| 10.6.1 | The navigation database should be obtained from a supplier holding an EASA or FAA type 2 Letter Of Acceptance (LOA). This LOA demonstrates compliance with EUROCAE/RTCA document ED-76/DO-200A, Standards for Processing Aeronautical Data.  *Note 1: Type 1 Letter of Acceptance is granted where a navigation database supplier complies with ED-76/DO-200A with no identified compatibility with an aircraft system.*  ***A Type 1 LOA may not release navigation databases directly to end users.***    *Note 2: Type 2 Letter of Acceptance is granted where a navigation database supplier complies with ED-76/DO-200A and provides data compatible with specified avionics system(s). Data quality requirements must be provided by or agreed with the specified equipment design opganisation in accordance with a formal arrangement.* ***A Type 2 LOA may release navigation databases directly to end users.*** *Such releases may also include data packing tools, where the use of such tools has been demonstrated to be ED-76/DO-200A compliant.* | Provide evidence of supplier qualification |  | Operator respond: |
| 10.6.2 | In case the navigation data products are not assured as meeting the required standard of integrity (not obtained from an approved or accepted supplier), the operator, as a minimum, prior to the effective date of the navigation database must implement navigation database integrity checks using appropriate software tools or approved manual procedures to verify data relating to waypoints below the applicable minimum obstacle clearance altitude (MSA).  *Note: Such checks are in addition to any checks previously performed by other parties. The integrity checks need to identify any discrepancies between the navigation database and the published charts/procedures. Integrity checks may be performed by an approved third party.* | Refer to any additionally required integrity checks, software tools used, approved procedures etc. |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.6.3 | Discrepancies that invalidate a procedure must be reported to the navigation database supplier and affected procedures must be prohibited by an operator’s notice to its flight crew. | Document compliance by referring to relevant operator’s procedure |  | Operator respond: |
| 10.6.4 | Aircraft operators should consider the need to continue their own database checks even for products obtained from suppliers accredited in accordance with ED-76/DO-200A  *Note 1: Operators are reminded that AMC OPS 1.035 to JAR-OPS Quality Systems requires audits to ensure safe operational practices. Such audits should be used to monitor the quality of received data, but need not be carried out as frequently as each 28-day AIRAC cycle. This requirement applies whether or not data is purchased from a supplier accredited in accordance with ED-76/DO-200A*  *Note 2: Operators must establish procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data, compatible with the intended function of the equipment that will use them, to all affected aircraft.*  *(See also ICAO Annex 6, Part I, Chapter 7, paragraph 7.4)* | Establish procedures, approved by the HCAA (if not already in place), for the management and monitoring of the navigation data.  *Note: Procedures should be a part of the aircraft Field Loadable Software (FLS) and Data Field Loadable Databases (DFLD) tasks and processes, to ensure that continued airworthiness and operating safety standards are met.*  *Additional information may be found in the following EUROCAE/ RTCA documents:*  *ED-12B/DO-178B,*  *ED-75A/DO-236A*  *ED-77/DO-201A.* |  | Operator respond: |

LEGEND FOR COMPLIANCE STATUS: COMPLIED WITH = X NO COMPLIANCE = NC NOT APPLICABLE = N/A NOTED = \*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| § No | REQUIREMENT | COMMENTS | COMPLSTATUS | EVIDENCE OF COMPLIANCE |
| 10.7 | **Flight Operations Documentation** |  |  |  |
| 10.7.1 | The aircraft Operations Manual (e.g. Aircraft or Flight Crew Operating Manuals (A/FCOM)) and check lists must be revised to take account of the information specified in 9.1, 9.2 and 9.3, and the operating procedures detailed in paragraphs 10.2 (Normal Procedures) and 10.3 (Contingency Procedures). The operator must make timely amendments to his Operations Manual to reflect relevant P-RNAV procedures and database checking strategies. Manuals and checklists need to be submitted for review by the responsible authority as part of the approval process. | Provide A/ FCOM and checklists additional or revised procedures to support P-RNAV operations. |  | Operator respond: |
| 10.7.2 | The aircraft operator should propose an amendment to the Minimum Equipment List (MEL) appropriate to P-RNAV operations. | Provide appropriate MEL proposed amendments to support P-RNAV operations. |  | Operator respond: |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Documents to be submitted** | | | | |
| ***Description*** | | | ***Appl.*** | ***Not Appl.*** |
| 1. *The current HCAA conformance report filled in* | | |  |  |
| 1. *Sections of AFM-Type certificate-SB etc that document P-RNAV approval* | | |  |  |
| 1. *Service bulletin-STC-or Major modification (if the aircraft is modified) approval as per Par.6.1* | | |  |  |
| 1. *Sections of MEL related to P-RNAV* | | |  |  |
| 1. *Evidences for recommended functions as per Par.7.2* | | |  |  |
| 1. *Navigation Data provider and LOA as per Par.7.1.4* | | |  |  |
| 1. *Sections of Operation manual regarding Limitations/Normal-Abnormal procedures/Performance/Emergency* | | |  |  |
| 1. *Contingency procedures as per Par.10.3.1* | | |  |  |
| 1. *Incident reporting procedure as per 10.4* | | |  |  |
| 1. *Flight crew training and assessment (OM) as per par.10.5 (Refer also to Attachement I)* | | |  |  |
| 1. *Appropriate sections of Operation Manual covering P-RNAV* | | |  |  |
| *l) Aircraft Airworthiness approvals as per Par.5* | | |  |  |
| **7. Applicant Compliance statement** | | | | |
| **I hereby declare that all documentation and information submitted have been verified and found in compliance with Regulation (EC) No 216/2008, its Implementing Rules and all other applicable requirements/procedures.** | | | | |
| **Continuing Airworthiness Manager**  **(name)** |  | **(Signature)** | | |
| **Flight Operation Manager**  **(name)** |  | **(Signature)** | | |
| **Date** | | | | |

**ATTACHEMENT I**

**Recommended Training syllabus (For details refer to Paragraph 10.5)**

**The following items is recommended to be covered :**

* P-RNAV principles
* RNAV and RNP operations
* Availability of the onboard navigation equipment necessary for the route to be flown
* GPS concept and limitations
* Fly-by and Fly-over waypoints
* ATC communication procedures explained referring to operations within the P-RNAV environment
* The onboard navigation database appropriateness for the region of intended operation
* Contingency procedures for Failure of the RNAV system-Multiple system failures-Failure of the navigation sensors.
* Normal, Abnormal and Contingency procedures related to P-RNAV operations
* Reportable Events
* The currency of the onboard navigation data (current AIRAC cycle)
* MEL
* Correct loading and the reasonableness of the procedure content as displayed in MCDU
* Inertial sensors limitations beyond a specified time limit
* Use of RAIM (Receiver Autonomous Integrity Monitoring)
* NOTAM Information with emphasis on items related to the necessary navigation environment such as availability of DME and VOR stations if applicable
* The Impact of technical deficiencies as accepted by the approved MEL
* Aircraft Instrumentation and Display description in regard to P-RNAV operation
* AFDS mode behaviour; adherence to speed constraints;
* Application of SOPs and abnormal procedures related to P-RNAV operations as described in OM-A and OM-B