



Explanatory Note to Decision 2019/011/R

Provision of airworthiness requirements in support of global performance-based navigation (PBN)

RELATED NPA/CRD 2018-02 — RMT.0519

EXECUTIVE SUMMARY

This Decision amends the Initial Issue of the Certification Specifications for Airborne Communications, Navigation and Surveillance (CS-ACNS). Issue 2 of CS-ACNS incorporates a new section on performance-based navigation (PBN) within Subpart C – Navigation (NAV) and includes minor amendments to part of the existing requirements. This Decision also simplifies the number and structure of the existing EASA references for PBN type certification by including all the PBN certification requirements in CS-ACNS and cancelling AMC 20-4A, AMC 20-5, AMC 20-12, AMC 20-26, AMC 20-27A and AMC 20-28 for new applications. With regard to RNAV 1, JAA TGL 10 Rev 1 is no longer recognised by EASA for any type certification applications after CS-ACNS Issue 2 enters into force.

The objective of this Decision is to provide up-to-date certification specifications so as to permit aircraft to be certified by EASA to the appropriate airworthiness standards and fly performance-based navigation based on any of the International Civil Aviation Organization (ICAO) recognised required navigation performance (RNP) navigation specifications, namely RNP 4, RNP 2, RNP 1, A-RNP, RNP APCH, RNP AR, and RNP 0.3. The new certification specifications will permit aircraft to benefit from the global implementation of PBN routes and approach procedures and, in particular, those specified in Commission Implementing Regulation (EU) 2018/1048.

The PBN requirements in CS-ACNS are expected to facilitate the processes that are followed by the applicants to obtain their certificates, as one single certification process could be used to demonstrate compliance with several navigation specifications and the necessary functionalities. CS-ACNS will contribute to transparency and reduce the use of certification review items (CRIs) or special conditions (SCs) as the whole set of recognised ICAO RNP specifications is now addressed. In addition, and although area navigation (RNAV) specifications are not specifically addressed, CS-ACNS considers the possibility of granting airworthiness certification for the RNAV specifications when applying for RNP certification, provided that certain criteria are met.

Action area:	Regular update of CS-ACNS		
Affected rules:	CS-ACNS; AMC-20		
Affected stakeholders:	Avionics and aircraft designers, installers and manufacturers		
Driver:	Efficiency/Proportionality	Rulemaking group:	No
Impact assessment:	Light	Rulemaking Procedure:	Standard

● EASA rulemaking process



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1. About this Decision

The European Union Aviation Safety Agency (EASA) developed ED Decision 2019/011/R in line with Regulation (EU) 2018/1139¹ (the ‘Basic Regulation’) and the Rulemaking Procedure².

This rulemaking activity is included in the latest European Plan for Aviation Safety (EPAS)³ under rulemaking task (RMT).0519. The scope and timescales of the task were defined in the related Terms of Reference⁴.

The draft text of this Decision has been developed by EASA. All interested parties were consulted through Notice of Proposed Amendment (NPA) 2018-02⁵. 537 comments were received from all interested parties, including industry, national aviation authorities, and other certification authorities.

EASA reviewed the comments received during the public consultation. The comments received and EASA’s responses to them are presented in Comment-Response Document (CRD) 2018-02⁶.

The final text of this Decision with the certification specifications (CSs) and the corresponding acceptable means of compliance (AMC)/guidance material (GM) have been developed by EASA.

The major milestones of this rulemaking activity are presented on the title page.

¹ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1536149403076&uri=CELEX:32018R1139>)

² EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the ‘Rulemaking Procedure’. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (<http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).

³ https://www.easa.europa.eu/document-library/general-publications?publication_type%5B%5D=2467

⁴ <https://www.easa.europa.eu/sites/default/files/dfu/ToR%20RMT.0519%20Issue%202.pdf>

⁵ In accordance with Article 115 of Regulation (EU) 2018/1139 and Articles 6(3) and 7 of the Rulemaking Procedure.

⁶ <https://www.easa.europa.eu/document-library/comment-response-documents>

2. In summary — why and what

2.1. Why we needed to change CS-ACNS and AMC-20

PBN implementation is a priority of the ICAO Global Air Navigation Plan (GANP)⁷ that foresees the need to increase the number of PBN operations globally in order to improve capacity, efficiency, and safety. In this regard, ICAO Assembly Resolution A37-11⁸ ‘urges all Contracting States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept laid down in the Performance-based Navigation (PBN) Manual (Doc 9613).

For its part, the European Union has regulated the implementation of these routes and approach procedures through:

- Commission Implementing Regulation (EU) No 716/2014⁹, also known as the Pilot Common Project (PCP) Regulation, which stipulates the use of particular navigation specifications and functionalities at 24 high-density terminal control areas (TMAs)¹⁰; and
- Commission Implementing Regulation (EU) 2018/1048¹¹, also known as the PBN Regulation, that extends the use of those and other navigation specifications and functionalities to all instrument runway ends¹² in the airspace above the territory to which the Treaty¹³ applies and any other airspace where Member States are responsible for the provision of air navigation services in accordance with Article 1(3) of Regulation (EC) No 551/2004 of the European Parliament and of the Council¹⁴.

Aircraft need to be properly equipped and certified to benefit from PBN implementation. Implementation may vary depending on the region when it comes to the particular navigation specifications and functionalities used. It is essential that EASA provides aircraft certification specifications that are able to respond to stakeholders’ needs. This objective was only partially met by certain parts of the General Acceptable Means of Compliance for Airworthiness of Products, Parts and Appliances (AMC-20)¹⁵, in particular:

- AMC 20-4A ‘Airworthiness Approval and Operational Criteria for the Use of Navigation Systems in European Airspace Designated for Basic RNAV Operations’;
- AMC 20-5 ‘Airworthiness Approval and Operational Criteria for the use of the NAVSTAR Global Positioning System (GPS)’;
- AMC 20-12 ‘Recognition of FAA Order 8400.12a for RNP 10 Operations’;

⁷ ICAO 2016-2030 Global Air Navigation Plan, Fifth Edition, 2016 (Doc 9750-AN/963).

⁸ ICAO Assembly Resolution A37-11 — Performance-based navigation global goals, November 2010.

⁹ Commission Implementing Regulation (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan (OJ L 190, 28.6.2014, p. 19).

¹⁰ See, in particular, Point 1 of the Annex to said Regulation.

¹¹ Commission Implementing Regulation (EU) No 1048/2018 of 18 July 2018 laying down airspace usage requirements and operating procedures concerning performance-based navigation (OJ L 189, 26.7.2018, p.3).

¹² The reader can consult GM 1 to Article 7 in the Issue 2 of ‘[AMC & GM to AUR](#)’ for detailed information about the implementation.

¹³ Treaty on the Functioning of the European Union.

¹⁴ Regulation (EC) No 551/2004 of the European Parliament and of the Council of 10 March 2004 on the organisation and use of the airspace in the single European sky (the airspace Regulation) (OJ L 96, 31.3.2004, p. 20).

¹⁵ Reference is made to EASA Decision 2003/12/RM of 5 November 2003.



- AMC 20-26 ‘Airworthiness Approval and Operational Criteria for RNP Authorisation Required (RNP AR) Operations’;
- AMC 20-27A ‘Airworthiness Approval and Operational Criteria for RNP APPROACH (RNP APCH) Operations Including APV BARO-VNAV Operations’;
- AMC 20-28 ‘Airworthiness Approval and Operational Criteria related to Area Navigation for Global Navigation Satellite System approach operation to Localiser Performance with Vertical guidance minima using Satellite Based Augmentation System’.

The above documents did not cover all of the existing PBN operations and mixed requirements for both operational and airworthiness approval.

Incomplete certification bases have historically led EASA to develop certification review items (CRIs) or apply special conditions (SCs) for those PBN navigation specifications that were not explicitly addressed¹⁶. These processes are not transparent since the applicants do not know in advance about the applicable certification requirements. Additionally, they also translate into administrative burden and associated costs for both EASA and applicants. Furthermore, following the publication of Regulation (EU) 2016/1199¹⁷, EASA published in 2016 a number of ED Decisions¹⁸ that transposed all PBN operational approval requirements from AMC 20-4A, AMC 20-5, AMC 20-12, AMC 20-26, AMC 20-27A and AMC 20-28 into the AMC and GM to Regulation (EU) No 965/2012¹⁹. However, these PBN-related AMC-20 references were not amended at the time to delete the transposed texts and avoid duplication and confusion with respect to the applicable requirements.

Also CS-ACNS required an update with regard to:

- Subpart B, Section 1, where the voice communication system continuity requirements were considered disproportionate for some aircraft, and the references to ICAO standards with regard to performance requirements needed to be amended;
- Subpart E, Section 1, where the alerts associated with terrain awareness and warning system (TAWS) together with testing guidance material need to take into account approaches other than those served by an instrument landing system (ILS).

2.2. What were the objectives

The overall objectives of the EASA system are defined in Article 1 of Regulation (EU) 2018/1139. The adopted changes will contribute to the achievement of the overall objectives by addressing the issues outlined in Section 2.1.

The specific objective of this Decision is, therefore, to provide applicants with certification specifications that allow aircraft to be equipped and certified to fly the emerging PBN routes and

¹⁶ It should be noted that the AMC-20 references do not cover RNP 4, RNP 2, RNP 1, RNP 0.3 and A-RNP. As for RNP specifications, only the RNP APCH specification had been previously addressed.

¹⁷ Commission Regulation (EU) 2016/1199 of 22 July 2016 amending Regulation (EU) No 965/2012 as regards operational approval of performance-based navigation, certification and oversight of data services providers and helicopter offshore operations, and correcting that Regulation (OJ L 198, 23.7.2016, p. 13).

¹⁸ See ED Decision 2016/014/R, 2016/015/R, 2016/016/R, 2016/017/R, 2016/018/R, 2016/019/R, 2016/020/R and 2016/021/R.

¹⁹ Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1).

procedures. In particular, the new certification specification has been developed to largely comply with any of the RNP specifications and functionalities that are defined in the ICAO PBN Manual²⁰.

Completeness of the certification specifications will minimise the use of CRIs or SCs, thereby resulting in savings for both applicants and EASA in terms of time and costs. Moreover, a complete set of certification specifications adds to transparency with respect to the applicable certification requirements, thus ensuring confidence to the applicant for being treated equally.

In order to meet the above objectives, EASA considered it to be advantageous that the PBN certification requirements should be made available to aircraft and avionics design and manufacturing organisations in one single EASA document, whose structure should be simplified as much as possible by considering the similarities and commonalities between different navigation specifications. The use of one single reference for PBN will result in fewer duplications or aspects being missed or overlooked, and enables applicants to use the same process to obtain certification with respect to several navigation specifications and associated functionalities, particularly, those required by EU regulations. In addition, EASA has facilitated the demonstration of compliance with the individual certification specifications (CSs), especially for those applicants that do not possess expert knowledge of the requirements that apply to area navigation systems.

In drafting the new Subpart C to CS-ACNS, EASA applied the following principles:

1. Although the document should cater for all, the target audience are small and medium-sized organisations, holding a design organisation approval (DOA). These organisations do not always have access to, or a full understanding of, the ICAO PBN Manual and associated documents or the various industry standards. The new Subpart C aims at facilitating an easier and less burdensome compliance demonstration in relation to PBN type-certification applications by those enterprises.
2. The CS requirements should be high-level and objective-based and take into account the criteria of the PBN Manual, whereas the AMC are based on the EUROCAE ED-75D Minimum Aviation System Performance Standards (MASPS) for area navigation systems.
3. There should be no duplication of requirements. While comparing the criteria of the existing EASA AMC-20 and JAA TGL-10 references to the standards invoked by the European Technical Standard Orders (ETSOs), EASA observed many duplications. By maximising credit for ETSO authorisation, we avoid duplication of compliance demonstrations at aircraft level when these have already been demonstrated at equipment level.
4. Although the PBN Manual contains 11 different navigation specifications, most of the navigation specifications contain very similar requirements with regard to aircraft eligibility. Subpart C of CS-ACNS has been drafted recognising that all these PBN routes and procedures are flown supported by the same equipment; i.e the RNP system and its sources, the navigation instruments/displays, and, where applicable, the autopilot or flight director. The approach has therefore been aircraft-centric instead of the navigation-specification-driven approach taken in the ICAO PBN Manual.
5. We recognise that virtually all new aircraft are equipped with GNSS receivers and provide on-board monitoring and alerting capability. With GNSS receivers installed, there is a small

²⁰ ICAO Doc 9613-AN/937 'Performance-based Navigation (PBN) Manual', Fourth Edition, 2013.



difference between aircraft-approval criteria for RNAV specifications compared to RNP specifications. This has allowed us to create a much more simplified document that:

- a. is based on RNP specifications, rather than considering all the different navigation sources that are recognised in the RNAV specifications;
 - b. recognises aircraft eligibility for RNAV operations based on compliance with the RNP criteria that are addressed in Subpart C.
6. The new Subpart C of CS-ACNS is forward-looking. It allows EASA to create a lean and relatively simple and straight-forward document. Means, such as SCs or CRIs, are, however, available to cater for the exceptional cases whereby compliance with the CS is more complicated, due to the fact that the aircraft is equipped with older systems.

2.3. Overview of the changes to CS-ACNS and AMC-20

2.3.1 The new certification basis for PBN

CS-ACNS has been amended to primarily incorporate RNP certification specifications into Subpart C 'Navigation' (NAV), which had previously been reserved in anticipation of the adoption of airworthiness and interoperability standards for area navigation systems. Additionally, CS-ACNS has been subject to minor amendments, as detailed in Section 2.3.4, to update the contents of the document.

To facilitate the reading of the document, EASA has published Issue 2 of CS-ACNS, which constitutes a consolidated document that integrates all the changes. Furthermore, with the purpose of facilitating the identification of the changes made to CS-ACNS, EASA has published a document that applies the same convention as in the Notices of Proposed Amendments (NPAs) to show the changes.

Issue 2 of CS-ACNS continues to present the contents divided into Book 1 and Book 2. Book 1 contains the CSs, while Book 2 describes the corresponding AMC and GM.

CS-ACNS has become the only reference that contains airworthiness requirements for the approval of aircraft's PBN capabilities. All the relevant material considered in AMC 20-4A, AMC 20-5, AMC 20-12, AMC 20-26, AMC 20-27A and AMC 20-28 has been transposed into Section 1 'Performance-based Navigation, Subpart C – Navigation'. Hence, the PBN-related AMC-20 references have been cancelled. In addition, JAA TGL 10 Rev 1 will cease to be recognised for RNAV 1 certification.

CS-ACNS is to be used for new applications for type certification of area navigation systems for RNP operations and deliberately does not specifically address RNAV navigation specifications. Today's navigation systems are commonly designed to fly RNP applications, and hence provide on-board performance monitoring and alerting²¹.

Following the publication of CS-ACNS, applicants do not need to recertify their systems. On the contrary, in response to questions received during the consultation phase, CS-ACNS states that there are cases whereby these certification bases can be reused to certify changes to systems previously certified against them, provided that the change to the design remains within the scope of the previous application. Even for changes that are outside the scope of a previous application and where the CS-ACNS requirements are similar to those that were used to certify the aircraft in accordance

²¹ A gradual transition to RNP applications is expected, as the proportion of aircraft equipped with RNP systems gradually increases, which will enable airspace users to perform PBN operations in those airspace where an improvement in the integrity of the navigation function is deemed necessary.

with the previous certification bases, applicants are encouraged to benefit, as far as practicable, from the demonstration of compliance conducted during an earlier application.

CS-ACNS includes GM to explain in more detail that the certification obtained from earlier approvals with regard to AMC 20-4, AMC 20-5, AMC 20-12, AMC 20-26, AMC 20-27, AMC 20-28 and TGL-10 will continue to be recognised in accordance with Part 21²².

Additionally, also due to the comments made during the consultation, CS-ACNS has explicitly incorporated AMC on how to automatically obtain certification for RNAV specifications when applying for RNP certification. Moreover, the different possibilities have been described in CS-ACNS for applicants to understand how certificates can be granted.

An applicant that requests a type certification only against RNAV specification(s) may continue to file their application. EASA will work closely with the applicant to have the installation approved through the use of one (or more) SC(s) or the development of CRIs. Based on EASA's experience with applications for approval of installation of area navigation systems, the number of such cases is expected to be very low and limited to the retrofit of area navigation systems on legacy aircraft that cannot be equipped with certified GNSS position sensors.

It should be noted that the implementation of RNP APCH procedures down to the 3 lines of minima (LNAV, LNAV/VNAV and LPV) has been mandated by Regulation (EU) 2018/1048. Therefore, EASA expects an increasing number of applications for the RNP APCH specification, whose certification requirements encompass those established for RNP 1 certification. This means that an RNP APCH-capable aircraft is also capable of flying RNP 1 applications, and that it becomes automatically certified to perform RNAV 1 operations within TMA airspace as well, on condition that the corresponding navigation applications are predicated on GNSS. Therefore, CS-ACNS has been designed to simplify the certification of aircraft and adapt their capabilities to the airspace usage requirements (AUR), as per EU law.

After a review of the comments received, the structure of the PBN Section in Subpart C has been rearranged with respect to the proposal presented in NPA 2018-02, as described in Table 1:

Table 1: Mandatory and optional airworthiness requirements

	Basic criteria		Supplementary criteria						
	Subsections 1 & 2	Subsection 3	Subsection 4	Subsection 5	Subsection 6	Subsection 7	Subsection 8	Subsection 9	Subsection 10
PBN specification	LNAV	LNAV in final approach	VNAV	VNAV in final approach	RNP AR	Advanced-RNP	RF	FRT	Parallel offset
RNP 4	Required							<i>Optional</i>	Required
RNP 2	Required							<i>Optional</i>	<i>Optional</i>
RNP 1	Required		<i>Optional</i>				<i>Optional</i>		
RNP 0.3	Required		<i>Optional</i>				<i>Optional</i>		
RNP APCH	Required	Required	<i>Optional</i>	Required			<i>Optional</i>		
RNP AR	Required	Required	Required	Required	Required		Required		
A-RNP	Required	Required	<i>Optional</i>	Required		Required	Required	<i>Optional</i>	Required

²² Part 21' are the requirements and procedures for aircraft certification described in Annex I to Commission Regulation (EU) No 748/2012.

The scope of the 10 subsections is detailed below:

- Subsection 1: General applicability for performance-based lateral navigation;
- Subsection 2: Generic specifications for performance-based lateral navigation;
- Subsection 3: Supplementary specifications for lateral navigation in final approach;
- Subsection 4: Supplementary specifications for vertical navigation;
- Subsection 5: Supplementary specifications for vertical navigation in final approach;
- Subsection 6: Supplementary specifications for RNP authorisation required (AR);
- Subsection 7: Supplementary specifications for applications for advanced-RNP (A-RNP);
- Subsection 8: Supplementary specifications supporting radius to fix (RF);
- Subsection 9: Supplementary specifications supporting fixed radius transition (FRT);
- Subsection 10: Supplementary specifications supporting tactical parallel offset.

In particular, the concept of advisory VNAV has been redefined. As a consequence, the corresponding requirements have been significantly simplified with regard to the proposal in NPA 2018-02 and are considered as optional requirements that may supplement those that are addressed in the 'VNAV in final approach' Subsection. Therefore, the 'advisory-VNAV' requirements are now included in Subsection 5. As a consequence, Subsection 4 now deals with VNAV, in particular, with the requirements for the definition of vertical paths by means of vertical constraints as set out in the Commission Implementing Regulation (EU) 2018/1048 when addressing the implementation of PBN routes in terminal airspace.

The other relevant element that has been altered in the above table with regard to the NPA is the FRT applicability to A-RNP, which has been downgraded to 'optional' for consistency with the ICAO PBN Manual and for the purpose of facilitating the implementation of this navigation specification.

2.3.2 Compatibility with the ICAO PBN Manual

With regard to compatibility with ICAO, CS-ACNS has been drafted to enable aircraft to achieve the minimum performance and functionality that is required by ICAO. The proposed airworthiness CSs are compatible with the aircraft requirements specified in the ICAO PBN Manual, Fourth Edition (2013), for all the RNP specifications, i.e. RNP 4, RNP 2, RNP 1, advanced RNP (A-RNP), RNP approach (RNP APCH), RNP authorisation required approach (RNP AR APCH), RNP 0.3.

The CSs are also compatible with the following functionalities:

- radius to fix (RF);
- fixed radius transition (FRT);
- parallel offset;

The time of arrival control (TOAC) functionality is not addressed, as the corresponding section of the ICAO PBN Manual still needs to be developed.

The following are the main differences between the CSs and those requirements related to aircraft airworthiness considered in the ICAO PBN Manual:



- The CSs are largely based on the EUROCAE ED-75D Minimum Aviation System Performance Standards (MASPS) for area navigation systems, which was published in 2014. The ICAO PBN Manual (Doc 9613, Fourth Edition) predates the MASPS, which introduces some differences between the CSs and the ICAO PBN Manual. The next edition of the ICAO PBN Manual, which is currently being updated by ICAO's PBN Study Group (PBNSG), is anticipated to incorporate these changes.
- The CSs also introduce new requirements for RNP AR departures. These are based on an agreement reached by the PBNSG on the future aircraft qualification requirements for such procedures, which EASA considers mature enough to be already incorporated into the CSs. These requirements are also anticipated to be incorporated in the next update of the ICAO PBN Manual.
- The CSs also include a provision which would allow operators of smaller and relatively slow²³, general aviation aircraft to operate on procedures with radius to fix (RF) legs, without the need for an autopilot or flight director, provided that specific installation criteria are met. Similar to the RNP AR departure operations, this provision is based on an agreement reached by the PBNSG, which EASA considers mature enough for incorporation into the CSs.
- The CS introduces a new definition of, and criteria for Advisory Vertical Navigation ('Advisory VNAV'), that are not contained in Edition 4 of the PBN Manual. EASA decided to include criteria for Advisory VNAV to address concerns related to the implementation of the function, which has not been standardised. The urgency in addressing the implementation concerns made EASA decide to nevertheless include the definition and some basic criteria in CS-ACNS. These have been shared with the ICAO PBNSG prior to publication of CS-ACNS.
- Other requirements are more stringent or demanding than the corresponding requirements of the ICAO PBN Manual. EASA considers that the ICAO PBN Manual sets out the minimum requirements and that Contracting States or regional aviation authorities may adapt them to address issues with the specific regulatory and operational environments or safety culture in that particular State or region. Whenever this applied to the CSs, the more stringent requirements have been formulated as CSs, including the transfer of the relevant requirements from the existing AMC-20 references.

The CSs deliberately deviate from the ICAO PBN Manual in two particular aspects:

1. The CSs intentionally refer to 'RNP value' whereas the ICAO PBN Manual uses the term 'navigation accuracy'. EASA prefers to keep the notion of 'RNP value' instead of introducing 'navigation accuracy', since in day-to-day operations, system designers, certification experts, pilots, and other aviation professionals have become accustomed to this term. Moreover, EASA has striven to draft the CS in a manner that is easily understood by all stakeholders. Consequently, EASA has decided to keep the term 'RNP value'.
2. EASA has not grouped the requirements by navigation specification, but has structured CS-ACNS in a way that maximises the commonalities that exist amongst them. In this regard, EASA has carefully reviewed the aircraft qualification requirements throughout the various PBN navigation specifications and found that these are, with a few exceptions, similar. This

²³ CS-23 Level 1, 2 and 3 aircraft.



conclusion is supported by the notion that aircraft are not equipped with specific equipment supporting a particular navigation specification. Instead, EASA concluded that the same systems (e.g. flight management system (FMS), displays, autopilot/flight director) support all the navigation specifications and that the differences are particularly related to the specific functions that the FMS supports.

2.3.3 Compatibility with FAA Advisory Circular AC 20-138D including Changes 1 and 2

With a few exceptions, the CSs are fully harmonised with the guidance offered by the FAA in their Advisory Circular (AC) 20-138D including Changes 1 and 2.

Notable differences are the following:

- For aircraft equipped with a Class A TAWS, CS-ACNS requires an alert for excessive downward deviation from the flight path on RNP approach procedures to localiser performance with vertical guidance (LPV) minima. This requirement is consistent with the requirements found in AMC1 CAT.IDE.A.150 and the former AMC 20-28. Contrary to the FAA, EASA concludes that the evident benefit that this function provides to safety outweighs the burden on industry to develop, install, and certify the function.
- The requirements for RNP AR operations with regard to demonstration of performance in failure cases, as well as the requirements on continuity of function, differ from those in the FAA's Advisory Circular (AC). These differences already existed between the FAA's A C and AMC 20-26 and relate to differing regulatory and operational environments. The situation in the United States allows aspects of RNP AR operations, such as mitigating the effects of failure conditions, to be addressed through the process of operational approval. In the European Union regulatory and operational context, and possibly elsewhere in the world, this is more difficult to achieve with an appropriate level of consistency. Consequently, EASA found that it is appropriate to address some of these aspects by putting more emphasis on the qualification of the aircraft.

2.3.4 Minor amendments to the previous CS-ACNS

In Subpart B, the voice communication system continuity requirements have been formulated to ask for designs that support the intended operation. In addition, a new AMC considers an allowable likelihood of 'probable' for some aircraft, since the former requirement has proved to be too demanding in some cases²⁴. In addition, the voice communication system performance requirements have been updated to refer to Amendment 90 to ICAO Annex 10, Volume III, Part II (2nd Edition – July 2007)²⁵, although the contents of the related standards and recommended practices have not been amended since Amendment 85.

Finally, the TAWS requirements have been aligned with the operational requirements considered in the AMC and GM to Regulation (EU) No 965/2012 for the provision of alerts related to excessive deviations below the glide path²⁶.

²⁴ See the amendment to CS ACNS.B.VCS.030 and the new GM1 ACNS.B.VCS.030 on continuity.

²⁵ See the amendment to CS ACNS.B.VCS.020 on performance requirements.

²⁶ See the amendments to AMC1 ACNS.E.TAWS.035 on aural and visual alerts and to guidance material on TAWS installation testing.



2.4. What are the stakeholders' views?

2.4.1 More stringent classification of failure conditions in comparison with EASA PBN-related AMC-20 material and the FAA AC 20-138D Change 2 guidance

Stakeholders commented that, in NPA 2018-02, EASA did not explain the rationale behind the changes to the classification of failure conditions related to erroneous or loss of guidance, i.e. integrity and continuity requirements in relation to several navigation specifications.

With the planned publication of the new Subpart C to CS-ACNS, EASA considered it prudent to assess again whether the previous classifications of failure conditions were still appropriate. Another consideration for the reassessment was the publication of the Commission Implementing Regulation (EU) 2018/1048, which was subject to scrutiny by the Single Sky Committee at the time the NPA was published.

The reassessment concluded that the classification for erroneous guidance when conducting Baro-VNAV operations in the final approach segment (FAS) would generically range from the high-end of 'Major' to 'Hazardous'. In the NPA, EASA kept a conservative position and proposed to classify these procedures as 'Hazardous' when both vertical and horizontal guidance are affected.

Following the discussions between EASA and a limited number of stakeholders, EASA has agreed to classify the integrity of RNP APCH procedures with VNAV as 'Major/Hazardous', whereby the higher classification is assumed, unless proven otherwise by a functional hazard assessment (FHA) that is acceptable to EASA.

Further review showed that the same concerns apply to RNP AR APCH procedures that are supported by Baro-VNAV. To address these concerns, erroneous guidance has been classified as 'Major/Hazardous', to be consistent with the RNP APCH procedures.

All the failure classifications have been removed from the individual AMC and consolidated into a single appendix ('Appendix A') to Subpart C. This allows EASA to provide more context and offer more flexibility. It also helps to address the concerns that were expressed by some applicants that the AMC were infringing on their DOA privileges. In this regard, EASA leaves the option open for applicants to demonstrate, through a thoroughly conducted Functional Hazard Assessment that is acceptable to EASA, that the failure classifications applicable to their specific design, including design specific mitigations, differ from the generic classifications provided in CS-ACNS.

EASA has further decided to simplify the classifications by not distinguishing between the individual segments of the procedure. Consequently, a single generic failure classification is provided for the entire procedure. Where a less demanding failure condition could potentially be considered for a particular segment, it is indicated through notes in Appendix A to CS-ACNS.

The classifications for RNP 4, RNP 2, RNP 1 and RNP 0.3 are largely consistent with FAA AC 20-138D Change 2, FAA TSO-C115d, ETSO/TSO146e, and the PBN Manual. Note that EASA's ETSO-C115d refers to the guidance material for the classification of failure conditions at aircraft level. Applications for RNP 1 approval alone are addressed through a separate note.

Due to the bundling and simplification of the requirements, some of the resulting failure conditions for PBN operations may be perceived as more stringent than those in the previous AMC-20 material, the FAA AC, and the PBN Manual. This is however balanced by the fact that CS-ACNS offers more



flexibility to those stakeholders that have the capability to perform a thorough Functional Hazard Assessment to deviate from the generic classifications provided in Appendix A.

As an action resulting from the discussions with stakeholders, EASA has reassessed all the failure classifications once again against all foreseeable scenarios. This assessment was performed by EASA's chief and senior experts for flight test/human factors and avionics before publication. The failure classifications have been found to be appropriate and consistent.

2.4.2 Lack of a traceability matrix to identify the changes with respect to the AMC-20 references that have been cancelled

Stakeholders have been requesting a traceability matrix to more easily identify the changes with respect to the guidance provided in AMC 20. Noting that CS-ACNS has been structured in a very different way and it has a significantly wider scope, which cannot be compared to the previous references for PBN certification, therefore, a traceability matrix has not been provided due to its limited usefulness.

2.4.3 Automatic temperature compensation

With regard to automatic temperature compensation, EASA considers that automatic temperature compensation, when properly applied, enhances safety. This is not only the case for operations within the FAS, but on the initial, and more particularly, the intermediate segment, too. However, it is recognised that not all systems are currently capable of providing this functionality. In addition, automatic temperature compensation may result in loss of vertical separation between aircraft that apply automatic compensation and nearby aircraft that do not, unless ATC operational procedures are duly adjusted. Hence clarification that the requirement for the function is to be selectable if provided outside the FAS. As the requirement is now conditional, EASA considers that the revised text is commensurate with and supports temperature compensation requirements placed in the AMC to Regulation (EU) 965/2012.

2.4.4 Display of the GNSS core constellations and the SBAS provider in use

The requirement to provide an indication of the core constellations being used together with the requirement to display the SBAS provider, excluding the FAS on an LPV approach, has been deleted as there is no certainty with regard to the potential use of this information on-board the aircraft.

2.4.5 Advisory VNAV

Stakeholders expressed much concern with the proposed criteria for Advisory VNAV. These criteria were added in response to concerns on the implementation and absence of standardisation, for example for the annunciations associated with the function. EASA strongly supports stabilised, 3D approach operations, but was concerned with the non-standardised ways in which the function was implemented. One major dilemma was the gap between the implementation of the function on large aircraft and the implementation of the function on General Aviation aircraft and light rotorcraft. After consulting selected stakeholders, the wording of the criteria was amended to cater for both cases.

2.4.6 Excessive-deviation-below-the-glide-path alert

For RNP approaches down to LPV minima, aircraft equipped with Class A TAWS are required to provide an alert for excessive deviation below the glide path. Years ago, it was reported difficult for some aircraft to interface the TAWS and the SBAS system for the purpose of providing this alert. AMC 20-28 permitted the possibility of providing these alerts by another system, on condition that it had the



equivalent effect to that provided by a TAWS system. In most of today's aircraft, the alert is provided by the TAWS. However, EASA will still consider alternatives whereby the alert is provided by another system, provided that it is equally effective.

Until recently, EASA accepted applications for aircraft that did not have the TAWS coupled with the SBAS/GNSS receiver and where the alerts could not be provided by other means with the operational limitation whereby the decision height (DH) was limited to 250 ft.

It should be noted that the situation has changed since EASA published AMC 20-28. EASA therefore considers there is no reason to continue to approve installations with those limitations included in the aircraft flight manual (AFM). ETSO-C151c (TAWS) considers excessive deviation below the glide path alerts to be provided by Class A equipment during LPV approaches, as well as for instrument landing system (ILS) and GBAS landing system (GLS) operations. Therefore, new equipment that provides this function is widely available and said alerts will be required for new applications requesting type-certification against CS-ACNS.

EASA is aware that in FAA AC 20-138D Change 2, applicants are highly recommended, but not required, to install a glidepath deviation alerting function on aircraft that have the capability to perform approaches to LPV and LNAV/VNAV minima.

For approaches to LPV minima, EASA considers it should not simply be a recommendation because if LPV approaches are supposed to be flown similarly to ILS, then similar alerts should be triggered. Certainly, a pilot that is used to flying ILS approaches and starts flying LPV approaches may expect a similar alert to be triggered in case it deviates from the glide path.

When discussing the requirement in AMC 20-28 to provide the capability to provide an alert for excessive downward deviation from the glide path, EASA has considered the case of approach procedures to LNAV/VNAV minima and considered that, although it would have a safety benefit, implementation would likely be impractical. It was furthermore considered that the minima on approaches to LPV minima were lower and commensurate with ILS CAT I procedures for which said function was already required. Extending the requirement to approaches to LNAV/VNAV minima is not considered appropriate, but a note has been added to align with the recommendation of FAA AC 20-138D Change 2.

2.5. What are the benefits and drawbacks

The expected benefits are essentially those summarised below:

- Simplification and expansion of the applicable certification specifications that applicants should follow to enable approval of RNP systems, as demanded by today's applications.
- Increase in transparency, as well as savings for both the applicants and EASA in terms of administrative burden due to fewer applicants resorting to CRIs or SCs.
- Use of one single process to demonstrate compliance with several navigation specifications, as necessary, thus minimising the risk of aspects being duplicated or overlooked.
- Airworthiness of aircraft to perform the emerging PBN ATS routes and approach procedures.

EASA did not identify any worthy of notice drawbacks in comparison with the potential benefits associated with this update of CS-ACNS.



In conclusion, EASA has decided to amend CS-ACNS to minimise the negative impact that is associated with the use of an incomplete and fragmented set of certification references.

Please see NPA 2018-02 for more information with regard to the impact assessment, which remains valid after the changes made to the initial proposal.



3. How do we monitor and evaluate the rules

This Section focuses on the new Subpart C, since it includes the majority the changes to CS-ACNS. In particular, this amendment applies to new aircraft-type designs, and to changes to existing aircraft for the purpose of flying the emerging PBN flight procedures. Therefore, the monitoring of the effects created by the new specifications and acceptable means of compliance will consist of:

- (1) feedback from future CS-ACNS certification projects, and
- (2) the monitoring of the global developments in PBN operations.

Point 1 depends on the applications received after the amendment of CS-ACNS. Therefore, a review cannot be made earlier than 5 years after the Issue 2 of CS-ACNS.

Point 2 will allow EASA to evaluate the adequacy of the CS-ACNS certification requirements in consistency with the evolution of the operational environment.

The monitoring will be ensured in the frame of the usual airworthiness processes followed by EASA and type-certificate holders.



4. References

4.1. Related regulations

- Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1)

4.2. Affected decisions

- Decision 2013/031/R of the Executive Director of the Agency of 17 December 2013 adopting Certification Specifications for Airborne Communications Navigation and Surveillance (CS ACNS) — CS-ACNS Initial Issue
- ED Decision 2003/12/RM of the Executive Director of the Agency of 5 November 2003 on general acceptable means of compliance for airworthiness of products, parts and appliances (« AMC-20 »)

4.3. Other reference documents

- Commission Implementing Regulation (EU) 2018/1048 of 18 July laying down airspace usage requirements and operating procedures concerning performance-based navigation (OJ L 189, 26.7.2018, p. 3)
- Commission Implementing Regulation (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan (OJ L 190, 28.6.2014, p. 19)
- Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1)
- ICAO Assembly Resolution A37-11 — Performance-based navigation global goals, November 2010
- ICAO Doc 9613 — Performance-Based Navigation (PBN) Manual, Fourth Edition, 2013
- ICAO Doc 9750 — ICAO 2016-2030 Global Air Navigation Plan, Fifth Edition, 2016
- Executive Director Decision 2016/014/R of 29 July 2016 amending the Acceptable Means of Compliance and Guidance Material to Part-ARO of Regulation (EU) No 965/2012 (AMC and GM to Part-ARO — Issue 3, Amendment 3)
- Executive Director Decision 2016/015/R of 29 July 2016 amending the Acceptable Means of Compliance and Guidance Material to Part-CAT of Regulation (EU) No 965/2012 (AMC and GM to Part-CAT — Issue 2, Amendment 6)
- Executive Director Decision 2016/016/R of 29 July 2016 amending the Guidance Material to Annex I (Definitions) of Regulation (EU) No 965/2012 (GM to Annex I (Definitions) — Amendment 4)



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- Executive Director Decision 2016/017/R of 29 July 2016 amending the Acceptable Means of Compliance and Guidance Material to Part-NCC of Regulation (EU) No 965/2012 (AMC and GM to Part-NCC — Amendment 5)
 - Executive Director Decision 2016/018/R of 29 July 2016 amending the Acceptable Means of Compliance and Guidance Material to Part-NCO of Regulation (EU) No 965/2012 (AMC and GM to Part-NCO — Issue 2, Amendment 3)
 - Executive Director Decision 2016/019/R of 29 July 2016 amending the Acceptable Means of Compliance and Guidance Material to Part-ORO of Regulation (EU) No 965/2012 (AMC and GM to Part-ORO — Issue 2, Amendment 8)
 - Executive Director Decision 2016/020/R of 29 July 2016 amending the Acceptable Means of Compliance and Guidance Material to Part-SPA of Regulation (EU) No 965/2012 (AMC and GM to Part-SPA — Amendment 3)
 - Executive Director Decision 2016/021/R 2016/021/R of 29 July 2016 amending the Acceptable Means of Compliance and Guidance Material to Part-SPO of Regulation (EU) No 965/2012 (AMC and GM to Part-SPO — Amendment 5)



5. Appendix

Appendix to Decision 2019/011/R 'CS-ACNS – Issue 2 and AMC-20 Amendment 17' — CRD 2018-02

