European Aviation Safety Agency

Notice of Proposed Amendment 2016-02

Technical requirements and operational procedures for aeronautical information services and aeronautical information management

RMT.0477 — 27.4.2016

EXECUTIVE SUMMARY

This Notice of Proposed Amendment (NPA) addresses a safety issue related to the provision of aeronautical information services (AIS) and aeronautical information management (AIM).

The main objective of this NPA is to maintain a high level of safety, increase efficiency and provide for greater cost-effectiveness of the air navigation system by achieving an uninterrupted aeronautical data chain with no loss or corruption in data and information and with guaranteed data quality.

The role and importance of aeronautical data and aeronautical information has changed significantly with the implementation of area navigation (RNAV), performance-based navigation (PBN), airborne computer-based navigation systems and data link systems. Corrupt, erroneous, late, or missing aeronautical data and aeronautical information can potentially affect the safety of air navigation.

The specific objectives of this NPA are to: 1) ensure that aeronautical data and aeronautical information are originated, assembled, edited, formatted, published and finally provided at the required level of quality to the next intended user and for all phases of flight; the quality of the data shall be proportionate to the types of aeronautical actors involved; 2) ensure alignment in an efficient and effective way with the latest International Civil Aviation Organization (ICAO) Annex 15 amendment; and 3) ensure enough proportionality and flexibility to allow smooth implementation of AIS.

This NPA proposes rules for:

— ATM/ANS providers; and

— organisations involved in the origination of aeronautical data.

It amends Annexes I (Definitions), II (Part-ATM/ANS.AR), III (Part-ATM/ANS.OR) and VI (Part-AIS) to Regulation .../…. laying down common requirements for service providers and the oversight in air traffic management/air navigation services and other air traffic management network functions, as well as Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes.

Applicability		Process map	
Affected regulations and decisions:	Commission Implementing Regulation (EU) No 1035/2011; Commission Regulation (EU) No 73/2010; Decision 2014/012/R	Concept paper:	No
		Terms of reference:	11.10.2013
Affected stakeholders:	AIS providers, service providers, competent authorities, aerodrome operators, data originators and EASA	Rulemaking group:	Yes
		RIA type:	Light
		Technical consultation during NPA drafting:	No
		Duration of NPA consultation:	4 months
Driver/origin:	Safety	Review group:	Yes
Reference:	Article 8b of Regulation (EC) No 216/2008	Focused consultation:	Yes
		Publication date of the opinion:	2017/Q1
		Publication date of the decision:	2017/Q4

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1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (hereinafter referred to as the 'Agency') developed this NPA in line with Regulation (EC) No 216/2008[1] (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure[2].

This rulemaking activity is included in the Agency's 5-year Rulemaking Programme under RMT.0477.

The text of this NPA has been developed by the Agency based on the input of the Rulemaking Group RMT.0477. It is hereby submitted for consultation of all interested parties[3].

The process map on the title page contains the major milestones of this rulemaking activity to date and provides an outlook of the timescale of the next steps.

1.2. The structure of this NPA and related documents

Chapter 1 of this NPA contains the procedural information related to this task.

Chapter 2 explains the background, context, justification of the core technical content.

Chapter 3 contains the proposed amendments.

Chapter 4 contains the regulatory impact assessment showing which options were considered and what impacts were identified, thereby providing further detailed justification for this NPA.

To facilitate the assessment and understanding, the Agency is providing 3 tables containing the comparisons between:

— the definitions found in ICAO material and Regulation (EU) No 73/2010[4] (hereinafter referred to as the 'ADQ Regulation') with the proposed text;

— the ICAO provisions and the proposed text; and

— the provisions of ADQ Regulation and the proposed text.

1.3. How to comment on this NPA

Please submit your comments using the automated **comment-response tool (CRT)** available at http://hub.easa.europa.eu/crt/. Furthermore, it is important to be noted that throughout Chapter 2 (explanatory note) and Chapter 4 (RIA) there is an matter on which the Agency explicitly invites stakeholders to answer to questions and express their opinion. The Agency is addressing said questions

[1] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1).

[2] The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such a process has been adopted by the Agency's Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material.

[3] In accordance with Article 52 of Regulation (EC) No 216/2008 and Articles 6(3) and 7 of the Rulemaking Procedure.

[4] Commission Regulation (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky (OJ L 23, 27.1.2010, p. 6).

to stakeholders in order to receive further guidance during the consultation of this NPA with a view to gaining additional information and the opinion of a wider audience.

Although nominally the formal period for consultation is 3 months, the Agency proposes to extend that period by an additional month as it is the summer period; therefore the deadline for submission of comments is **31 August 2016.**

1.4. The next steps in the procedure

Following the closing of the NPA public consultation period, the Agency will review all comments and perform a focused consultation which will consist of involving relevant technical experts in the review of the comments and in the drafting of the revised rule text.

The outcome of the NPA public consultation, as well as of the focused consultation, will be reflected in a comment-response document (CRD).

The Agency will publish the CRD concurrently with the EASA Opinion.

Based on the outcome of the consultation, the opinion will contain the proposed changes to Regulation (EU) …/…, and will be addressed to the European Commission (EC) to be used as a technical basis in order to prepare further steps within the institutions leading to the finalization of the regulatory changes.

Following the adoption of the regulation, the Agency will issue a EASA Decision containing the related acceptable means of compliance (AMC) and guidance material (GM).

2. Explanatory note

This NPA proposes a set of rules for the origination and the provision of aeronautical data and aeronautical information.

NOTE: When this document refers to 'Regulation (EU) .../…', it must be understood as the Regulation laying down common requirements for service providers and the oversight in air traffic management and air navigation services and other air traffic management network functions, which was voted at the Single Sky Committee on 25 February 2016 and which, at the time of the publication of this NPA, is still awaiting publication the EU Official Journal. Therefore, a reference number cannot be referred to at this stage.

2.1. Overview of the subject to be addressed

AIS providers in Europe provide and manage aeronautical data and aeronautical information in a very complex data chain where aeronautical 'service provision' is still primarily focused on paper/electronic data management practices. These practices contribute to errors and inconsistencies in published aeronautical information.

During the last years, the role and importance of aeronautical data and aeronautical information has changed significantly with the advent of the internet era, the implementation of RNAV, required navigation performance (RNP), air traffic management (ATM) requirements, and airborne computer-based navigation systems, which require some adaptation of the way aeronautical information is provided today. The provision and the management of aeronautical data and aeronautical information is expected to meet the operational demands in order to have the right information, in the right place, at the right time.

One way of ensuring this is to shift to a broader concept of AIM, with a different method of information provision and management. AIM introduces new methods of distribution of aeronautical information and digital products and relies on the data-centric nature (as opposed to the product-centric nature of AIS) mainly based on the management of digital aeronautical information.

Also, while one key enabler of the ATM system is interoperability, it is essential:

— that aeronautical data and aeronautical information be provided in a format that ensures consistency, authenticity and appropriate coverage of the data; and

— to provide accessibility to the data by all users of the ATM network, both on the ground and in the air.

Most importantly, ATM is dependent on the provision of timely, relevant, accurate, and quality-assured information that allows the ATM community to ensure an efficient distribution method of aeronautical data and aeronautical information.

This NPA intends to reflect the current developments occurring in the aeronautical data and aeronautical information environment in order to ensure the provision of quality aeronautical data and aeronautical information in a timely manner, with the accuracy and resolution appropriate for its intended use, and with the assurance that integrity levels are met and maintained throughout the management process in order to support all phases of flight.

2.2. The overall context

This NPA proposes rules on aeronautical data quality and on aeronautical information services and products, based respectively on the upcoming 'major' amendment to ICAO Annex 15 and the new PANS-AIM, on ICAO Annex 4 including up to amendment 58 on aeronautical charts and on the ADQ Regulation. The proposed rules have taken into account:

1. The development of the upcoming 'major' amendment to ICAO Annex 15; and
2. The implementation of the ADQ Regulation.

The upcoming 'major' amendment to ICAO Annex 15

Currently, ICAO Annex 15 'Aeronautical Information Services' is the basis of the national regulatory framework for Member States and AIS providers. Since 2008, ICAO has set up the ICAO AIS/AIM Study Group to assist the ICAO Secretariat with the development of a global road map for the transition from AIS to AIM[5] and the development of revised Standards And Recommended Practices (SARPs) and guidance material related to the provision of aeronautical data and aeronautical information. As from 2012, this Study Group developed a new ICAO amendment proposing a revised Annex 15 that will contain the core requirements, and the new PANS-AIM containing the provisions on how to fulfil these requirements. This ICAO proposal is known as 'the' big amendment to the current SARPs of Annex 15[6].

The work of the ICAO Study Group was conducted in parallel to that of the EASA Rulemaking Group. Hence, one challenge during the development of this NPA was to be able to align as closely as possible with the latest text of the ICAO proposed amendment. The major amendments already known during the rulemaking phase were the replacement of 1) the 'Integrated aeronautical information publication (IAIP)' with the concept of 'aeronautical information products and services' in order to include the different elements of the IAIP as well as the digital data sets, and 2) the definition of data quality that is expanded, to cover additional criteria to be met (data quality is not only about accuracy, resolution and integrity, but contains four additional criteria: traceability, timeliness, completeness and format). Another important element that was introduced by the ICAO proposal is the ICAO data catalogue which includes an exhaustive list of data elements that can be collected and maintained by the AIS providers. It thus provides a common terminology that can be used by data originators and service providers.

The Rulemaking Group finished its drafting at the same time as the ICAO AIS/AIM Study Group. Therefore, all the changes anticipated within the ICAO material are reflected in this NPA. Any other important change to the proposed amendment that would occur at ICAO level before its final adoption can be considered during the subsequent Agency rulemaking process, and alignment can be assured until the publication of the associated Agency opinion.

This NPA therefore reflects the current status of the ICAO proposed amendment but further alignment with the adopted ICAO amendment may be necessary at a later stage in order to ensure proper transposition of the ICAO SARPs.

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[5] Roadmap for the Transition from AIS to AIM, ICAO, first edition - 2009

[6] At the time of publication of this NPA, the latest amendment adopted by ICAO (on 22 February 2016) is amendment 39.

ADQ Regulation

This Regulation entered into force on 16 February 2010 and has been applicable, for most of its articles, since 1 July 2013. The ADQ Regulation was developed to complement ICAO Annex 15 which provides the main baseline for the data quality requirements. The requirements on the quality of aeronautical data and aeronautical information in terms of accuracy, resolution and integrity are meant to ensure and improve safety and support new concepts of operation within the European ATM network.

The ADQ Regulation defines the implementation dates (1 July 2013, 1 July 2014, and 30 June 2017) as well as the main obligations for stakeholders. In 2013, the EC consulted the Member States on the implementation status of the ADQ Regulation. The consultation revealed delays in most Member States in the application of the ADQ Regulation and underlined a number of implementation issues. In 2015, the EC conducted a second survey[7] on the status of implementation in the EASA Member States. The survey demonstrated that most of the parties concerned are still not compliant as regards the application dates of 1 July 2013 and of 1 July 2014. Furthermore, with regard to the application date of 30 June 2017, there is no certainty that stakeholders can comply with the ADQ Regulation. The reported reasons for the indicated delays included the lack or late availability of guidance material and specifications; the high cost of implementation and the lack of available resources; furthermore unclear legal provisions (requiring further clarification) and the complexity of addressing data originators (both technical and institutional).

2.3. Summary of the proposal

The proposed rules are applicable to AIS providers, to organisations involved in the origination of aeronautical data, to service providers and to aerodrome operators.

2.3.1. The aeronautical information products and services

Transposition of ICAO SARPs

The rules related to aeronautical information products and services in this NPA are those stemming from the upcoming Amendment to ICAO Annex 15 and the new PANS-AIM provisions from chapters 2 to 6. In general, the provisions of (the new) Annex 15 have been transposed in the organisation requirements (AIS.OR) and those of the new PANS-AIM are reflected in the technical requirements (AIS.TR). A careful analysis of the ICAO provisions was made during the development of the rules in order to maintain the ICAO objectives. Therefore, this NPA is closely aligned with the relevant ICAO provisions.

The ICAO common reference system for air navigation

The horizontal, vertical and temporal systems used for air navigation are not only described in ICAO Annexes 4 (aeronautical charts) and 15 (AIS) but also in ICAO Annexes 11 (ATS) and 14 (Aerodromes). It

[7] The first survey was conducted in 2013. Thereafter, the EC organised a workshop on 27 June 2014 where it summarised the current status of implementation by reporting on the Member States' feedback collected in the autumn 2013. The second survey was conducted in October 2015, by EC letter of 10 July 2015, inviting the Member States to provide an accurate description of the situation in the countries as regards compliance with the ADQ Regulation.

is an ICAO transverse provision and, therefore, it is not meant to be applied only by AIS providers but also by any other service provider that needs to use this common reference system for the performance of its duties. Therefore, this NPA introduces the common reference system for all relevant service providers.

Data catalogue

This NPA reproduces the data catalogue developed by ICAO. The data catalogue is a table presenting the scope of data that can be collected and maintained by the AIS providers and provides a common terminology that can be used by organisations involved in the origination of aeronautical data, and by service providers. It is the source of the accuracy and integrity requirements for determination and reporting of aeronautical data to AIS providers and also the source of the resolution and integrity requirements for publication and charting of products including aeronautical data. It details data elements in terms of field names, field types and field definitions and is used as a reference for aeronautical data origination and publication requirements, as applicable. The provision of aeronautical information and aeronautical data in accordance with data set specifications is ensured through the specifications contained in the data catalogue.

The products and services

All the elements of ICAO Annex 15 Chapter 5 on aeronautical information publication (AIP), AIP Supp, AIP amendments, aeronautical information circulars (AIC), aeronautical charts, notice to airmen (NOTAM), digital sets, distribution services and pre-flight information services, have been transposed, together with the related appendices as well as those of Chapter 6 on aeronautical information regulation and control (AIRAC), aeronautical information product updates. The provisions on post-flight information services have not been covered as this is not considered to be an AIS responsibility, as the AIS provider is only the recipient of such information. The responsibility is on either the aerodrome operators or the Member State to make arrangement to ensure that such information is made available to AIS.

A detailed cross-reference table of draft ICAO Annex 15 and PANS-AIM is provided.

2.3.2. Aeronautical data quality

Origination activities by aviation undertakings

This NPA proposes that Member States be responsible for aviation undertakings when they are involved in the origination of aeronautical data. For this purpose, Appendix 1 to Article 3 (Provision of services) is proposed, containing origination requirements for aviation undertakings. These 'data originators' such as geodetic institutes and surveyors are essential actors involved at the very beginning of the aeronautical data chain. Aviation undertakings are entities, persons or organisations, other than the organisations regulated by Regulation (EU) No .../… that are affected by or affect a service delivered by a service provider. They can also be non-aviation entities. They create, modify or delete aeronautical information and aeronautical data for the purpose of aviation. They are not service providers and can therefore not be regulated as such. However, there is a need to ensure that when they originate aeronautical information and aeronautical data, they provide data of sufficient quality.

Origination activities by service providers

Origination activities can also be carried out by service providers. When this is the case, they need to comply with the requirements in ATM/ANS.OR.A.080 Subpart A of Annex III. These requirements are similar to those for aviation undertakings as they are performing the same activity. The scope of ATM/ANS.OR.A.080 is limited to the activity performed by service providers from origination, processing and distribution to the aeronautical services provider. Therefore, this requirement is not applicable to aeronautical information services providers that are covered in Annex VI (Part-AIS).

Data exchange

This NPA proposes a performance-based approach. For the purpose of exchanging aeronautical data, the NPA leaves free the choice of the most suitable model to exchange data, as long as it is globally interoperable between the relevant parties. Practically, this means that the aeronautical information exchange model (AIXM) will have to be used, whilst not imposing a specific version of this model. This provides a more flexible approach compared to the ADQ Regulation which required the specific version 5.1 of the AIXM and is also in line with ICAO Annex 15. The format requirement is not applicable to aviation undertakings but they need to be able to exchange aeronautical data through electronic means. By electronic 'means' (instead of 'connection' in the ADQ Regulation), it is understood that the exchange of aeronautical data may be done by a number of electronic exchanges including email or pdf documents, without any manual interaction with the data itself. This approach is adopted to take into account other possibilities to exchange data than strictly automatic transfer system-to-system connection.

Verification and validation process

This NPA introduces requirements on service providers to ensure that aeronautical data and aeronautical information are verified and validated. Through this mechanism, the protection against accidental or malicious alteration is ensured. The verification and validation processes sufficiently ensure the necessary data protection and that the quality of the aeronautical data is not degraded or, if it is, that there is a suitably high degree of assurance that the degradation will be identified and corrected. Hence, this NPA does not propose the application of a specific cyclic redundancy check (CRC) algorithm for the protection of data. The way how to ensure this data protection is explained in guidance material, underlining that an example of a digital error detection technique may be the use of CRCs. This pragmatic proposal provides a more objective-based approach than the one under the ADQ Regulation and is in line with ICAO Annex 15.

Tools and software

The proposal on 'tools and software' reflects a pragmatic approach, providing proportionality and therefore enabling easy implementation. This NPA proposes to not require aviation undertakings to comply with 'tools and software' requirements, contrary to the ADQ Regulation. This flexible approach reflects the need to focus on the objective rather than on the way each service provider organises itself to attain this objective. For service providers, it only requires, in a very general manner, that service providers must ensure that the tools and software they use do not adversely impact on the quality of such data. The requirement is applicable to service providers and not solely to AIS providers.

2.3.3. Aerodrome operators

Regulation (EU) No 139/2014[8] only contains general provisions (based on ICAO Annex 14) on data quality requirements for aerodrome operators. Because many of the data originators are aerodrome operators, this NPA proposes to align the data quality requirements already included in said Regulation and the related AMC/GM with those developed under this NPA for service providers and organisations involved in data origination. The proposed requirements on data protection, data exchange, metadata are added to the ADR Regulation and are, therefore, a duplication of the requirements proposed by this NPA in order to directly address aerodrome operators. Also, a reference to the data catalogue is made to ensure that aerodrome operators will follow the applicable specifications.

Question to stakeholders

One issue is related to data protection and the reference to the CRC as a mean of protection. Whereas for service providers, the proposed rules limit the protection of the data through the validation and verification process and refer to the CRC mechanism at guidance material level only (in line with the draft ICAO Annex 15), for aerodrome operators, this NPA proposes to keep the reference to the CRC at AMC level in order to be aligned with ICAO Annex 14.

The Agency would like to have the opinion of stakeholders whether they consider that both provisions on data protection should be fully aligned, meaning that for both service providers and aerodrome operators the CRC should be either included at AMC level or at GM level, or if a differential treatment could be kept.

2.3.4. Aeronautical charts

This NPA only reproduces the key elements of ICAO Annex 4. Firstly, some charts have not been included in the proposal: the Electronic Aeronautical Chart Display, the Plotting Chart, the Aeronautical Navigation Chart — ICAO Small Scale, and the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic), mainly because they are effectively not produced in Europe. Secondly, the proposed transposed requirements of ICAO Annex 4 are those limited to the obligation for service providers to make available all the necessary charts, meaning that only the two first paragraphs of each chapter of ICAO Annex 4 (function and availability) have been reproduced. As a mean to comply with the transposed requirements on aeronautical charts, this NPA proposes referring to ICAO Annex 4 as there are, in Europe, different ways to present information in aeronautical charts.

2.3.5. AIS certificate

This NPA proposes modifying the certificate template for AIS services in the current Appendix 1 to Annex II of Regulation (EU).../…. It is now proposed to make the distinction between the different products/services provided under the scope of AIS, in the same way than for the other ATM/ANS services. The table in 3.1.1(3) shows the proposed changes to the current Appendix 1 to Annex II to said Regulation.

[8] Commission Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 44, 14.2.2014).

2.4. Overview of the main changes compared to the ADQ Regulation

In 2.3.2 above, some changes are proposed compared to what is required under the ADQ Regulation. These are due to several considerations: the different scope between the ADQ Regulation (SES framework) and the one in which this NPA has been developed (EASA framework); the necessity to take into account the changes at ICAO level (upcoming 'major' amendment to Annex 15 and PANS-AIM); the Regulation (EU).../…. which already covers some elements of the ADQ Regulation; safety considerations; and the necessity to take into account the current implementation challenges faced by the majority of European Member States and organisations affected by the ADQ Regulation.

This table provides an overview of the main changes proposed:

Subject	ADQ Regulation	EASA approach	NPA
Data originators	Data originators are regulated parties (Article 2(2))	Aviation undertakings to comply with minimum data quality requirements. Responsibility of Member States	Requirements on data origination for: service providers, aerodrome operators, aviation undertakings.
Data set	Detailed common data set specifications in Annex I (Article 4 and Annex I)	Data set specifications not transposed	The ICAO data catalogue covering data sets is reproduced in this NPA.
Data exchange	Detailed technical specifications for the data exchange model (practically equivalent to a given version of AIXM) (Article 5 and Annex II)	Performance-based approach	Exchange model required that is globally interoperable. One mean is to use an aeronautical information exchange model without requiring a given version.
Protection of data	Requirement to protect data through CRC32Q algorithm (Article 9 and Annex VI)	Proportionality approach. Use of the relevant algorithm according to the AISPs capabilities.	Cycling codes or cryptographic techniques required to ensure data protection. Algorithm not defined.
Quality, safety & security management	Detailed requirements for quality, safety and security management in (Article 10 and Annex VII)	Not transposed. Sufficiently covered in ATM/ANS.OR. (management system) in Regulation (EU) ../…)	Not included It ensures consistency throughout the upcoming Regulation (EU) ../…
Conformity & suitability of constituents	Detailed requirements in (article 11 and Annex VIII)	Not transposed The requirements on conformity & suitability of constituents are, at this stage, sufficiently covered through Regulation (EC) No 552/2004.	Not included. It avoids duplication and ensure consistency with existing European regulations.
Formal arrangements	Detailed requirements on the minimum content these formal	Flexibility approach	The content of the formal arrangements in Part C of Annex IV is moved to AMC

	arrangements shall be based on. (Annex IV, Part C)		level. This provides proportionality and flexibility to adapt the appropriate service level agreement depending on the data to be provided.
Tools and software	Requirement applicable to all the parties referred to in the Regulation. (Article 8 and Annex V)	Pragmatic approach	Not applicable at origination level as it is seen as a means to reach the data quality. This eliminates burdensome requirements on originators with no added value on safety.
Data quality (Definition)	Defined in terms of accuracy, integrity and resolution.	Alignment with upcoming new ICAO Annex 15	Defined in terms of accuracy, integrity, resolution, traceability, timeliness, completeness and format.
Security clearance of personnel	All regulated parties to ensure this requirement (Article 13(a))	Requirements already addressed in ATM/ANS.OR.D.010. of Annex III (Part-ATM/ANS.OR) to Regulation (EU) .../...	Not included. Duplication is avoided.

2.5. Proposal to move the ADQ requirements to the EASA regulatory framework

The rules on aeronautical data quality proposed in this NPA have been developed with the objective of providing a proportionate approach and better understanding of the requirements to be met. The objective is to provide enough flexibility, taking into account the implementation difficulties experienced in complying with the ADQ Regulation. In addition, certain aspects of the Regulation can be better addressed through the AMC/GM material, which at the same time ensures that the investments made so far are not compromised.

The rules are expected to ease the overall AIS-AIM implementation, not create any additional costs than those already engaged in the framework of the ADQ Regulation.

Consequently, the Agency considers that it is not adequate to maintain two regulations with several overlapping provisions and therefore proposes the repeal of the ADQ Regulation.

The following provides an overview of the remaining provisions of the ADQ Regulation:

COMMISSION REGULATION (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky

[…]

~~*Article 1* **Subject matter**~~
~~*Article 2* **Scope**~~
Article 3 **Definitions**
~~*Article 4* **Data set**~~
ANNEX I Data set specifications referred to in Article 4

PART A IAIP, aerodrome mapping and electronic obstacle data
PART B Electronic terrain data sets
PART C Metadata

Article 5 **Data exchange**
***ANNEX II* Aeronautical data exchange format requirements referred to in Article 5**
PART A IAIP, aerodrome mapping and electronic obstacle data
PART B Electronic terrain data

Article 6 **Data quality**

Article 7 **Consistency, timeliness and personnel performance**
***ANNEX IV* Data quality requirements referred to in Articles 6 and 7**
PART A Data quality requirements
PART B Evidence requirements
PART C Formal arrangements
PART D Data origination
PART E Data process requirements
PART F Error reporting and rectification requirements

~~*Article 8* **Tools and software requirements**~~
***ANNEX V* Tools and software requirements referred to in Article 8**

~~*Article 9* **Data protection**~~
***ANNEX VI* Data protection requirements referred to in Article 9**

~~*Article 10* **Management requirements**~~
~~***ANNEX VII* Quality, safety and security management requirements referred to in article 10**~~
~~PART A Quality management system~~
~~PART B Safety management objectives~~
~~PART C Security management objectives~~

~~*Article 11* **Conformity or suitability for use of constituents**~~
~~***ANNEX VIII* Requirements for the assessment of the conformity or suitability for use of constituents referred to in Article 11~~**

~~*Article 12* **Verification of systems**~~
~~***ANNEX IX* Conditions referred to in Article 12~~**

~~*Article 13* **Additional requirements**~~
~~*Article 14* **Transitional provisions**~~
~~***ANNEX XI* ICAO differences referred to in Article 14~~**

~~*Article 15* **Entry into force and application**~~

~~***ANNEX III* Provisions referred to in articles and annexes**~~
~~***ANNEX X***~~
~~PART A Requirements for the verification of systems referred to in Article 12(1)~~
~~PART B Requirements for the verification of systems referred to in Article 12(2)~~

A detailed cross-reference table of the ADQ Regulation is provided.

2.6. Applicability of the new proposed rules

In accordance with Regulation …/.., the proposed rules with applicability date of 1 January 2019 would repeal the ADQ Regulation.

Aeronautical data and aeronautical information that are demonstrated to be in compliance with Regulation (EU) No 73/2010 before 1 January 2019 are deemed to be in compliance with the new proposed rules.

2.7. Objectives

The overall objectives of the EASA system are established in Article 2 of the Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 2.

The specific objectives of this proposal are to:

— ensure that aeronautical data and aeronautical information are originated, assembled, edited, formatted, published and finally provided at the required level of quality to the next intended user and for all phases of flight. The quality of the data shall be proportionate to the types of aeronautical actors involved; and

— foster efficient and effective rules considering also the harmonisation with the latest ICAO Annex 15 amendment.

2.8. Summary of the regulatory impact assessment (RIA)

The RIA considers the impact analysis of the below options.

Option 0 — Take no action/baseline scenario. This leaves the situation at it is today and full compliance with the ADQ Regulation continues with the known implementation issues.

Option 1 — The draft rules on data quality are based on a performance-based approach. The rules are adapted to allow for a pragmatic approach.

Option 2 – The draft rules on data quality are founded on prescriptive and technical provisions. The rules are similar to Option 0 in terms of rules content and potential effects.

The preferred option is Option 1 as it allows to maintain an acceptable level of safety while facilitating the implementation of the data quality rules.

The analysis of the impacts of the options suggested above focused mainly on economic impacts.

2.9. Overview of the proposed amendments

This NPA puts forward amendments to:

— Regulation (EU) ../… laying down common requirements for service providers and the oversight in air traffic management and air navigation services and other air traffic management network functions;

— Regulation (EU) No 139/2014; and

— AMC and GM to Authority, Organisation and Operations Requirements for Aerodromes

2.9.1. Proposed amendments to Regulation (EU) .../…

The following amendments are proposed:

Article 3

In Article 3, a new paragraph introduces a requirement for Member States to ensure that aviation undertakings originating data comply with the necessary data origination requirements.

Annex I — Definitions

In Annex I:

— the relevant definitions of ICAO Annex 15 and the ADQ Regulation are added; and

— the definition of 'aviation undertaking' is amended to encompass aerodromes operators.

Annex II — Authority requirements

In Appendix 1 to Annex II (Service provider certificate), the 'scope of service' for the AIS in the certificate is amended to separate the different types of AIS.

Annex III — Organisation requirements

In ATM/ANS.OR.A (Subpart A – General requirements), the following requirements are added:

— *ATM/ANS.OR.A.080 Aeronautical data and aeronautical information*

to cover necessary data quality requirements for ATM/ANS providers when they originate, process and transmit aeronautical data and aeronautical information to the AIS provider.

— *ATM/ANS.OR.A.085 Common reference systems for air navigation*

The use of the horizontal, vertical and temporal reference systems for air navigation is transposed directly from the common reference system provisions in the different ICAO Annexes where they are referred to.

Annex VI — Specific requirements for the provision of aeronautical information services (PART-AIS)

Annex VI is amended to introduce the NPA requirements applicable to AIS providers. The current requirements in AIS.OR.100 (a) and (b) of Regulation (EU) .../… are reflected in the proposal and complemented by the proposed requirements addressed to AIS providers. The current AIS.TR.100 is replaced by the related technical requirements proposed in this NPA. There is, therefore, no need to make reference to relevant ICAO Annexes or to the ADQ Regulation anymore.

Part-AIS is divided into the following categories of provisions:

— General responsibilities of AIS providers, mostly based on draft ICAO Annex 15;

— Data quality requirements, based on the ADQ Regulation and draft ICAO Annex 15;

— Aeronautical information products and services, based on and aligned with draft ICAO Annex 15 and PANS-AIM; and

— Personnel requirements, based on both draft ICAO Annex 15 and the ADQ Regulation.

2.9.2. Proposed amendments to Regulation (EU) No 139/2014

The following amendments with regard to aerodrome operators are proposed:

— *ADR.OR.D.015 Personnel requirements*

This requirement is considered necessary to be applicable also for aerodrome operators in order for their personnel to be properly trained. It is 'mirroring' the similar proposed provision in Part-AIS.

— *ADR.OPS.A.011 Data error detection and authentication*

Data error detection and authentication is not foreseen in Regulation (EU) No 139/2014 and is therefore included in a similar way as in the Regulation (EU) .../… . This requirement is complemented by an AMC. A specific question is addressed to stakeholders in 2.3.3.

— *ADR.OPS.A.012 Data catalogue*

The specifications of the data catalogue should be applicable for aerodrome operators. The necessary reference to the data catalogue is provided rather than repeating it in the aerodrome rules. Please refer to the data catalogue explanations in 2.3.1.

— *ADR.OPS.A.013 Metadata*

This requirement is considered necessary to be applicable also for aerodrome operators, in a way similar to that for service providers.

— *ADR.OPS.A.014 Data exchange*

This requirement is considered necessary to be applicable also for aerodrome operators, in a way similar to that for service providers.

2.9.3. Proposed amendments to AMC and GM to Authority, Organisation and Operations Requirements for Aerodromes

The following amendment is proposed.

AMC1.ADR.OPS.A.010 Data quality requirements

This AMC is amended to add provisions related to error handling and corrective action as well as for formal arrangements. This is now aligned with the similar provisions for service providers. In addition, the paragraphs related to data protection and the reference to CRC32 are deleted to be replaced with the requirement

ADR.OPS.A.011 Data error detection and authentication, referred to above.

2.10. Overview of the proposed amendments in the ATM/ANS rule structure

<table>
<tr><th colspan="5">Regulation (EU) …/… laying down common requirements for service providers and the oversight in air traffic management/air navigation services and other air traffic management network functions</th></tr>
<tr><th>Article 3
Provision of services</th><th>Annex I
DEFINITIONS OF TERMS USED IN ANNEXES II to XIII</th><th>Annex III (Part-ATM/ANS.OR)
Subpart A
ATM/ANS.OR.A (General)</th><th colspan="2">Annex VI (Part-AIS)
Subpart A — OR
Subpart B — TR</th></tr>
<tr>
<td>[Member States shall…]

[When Member States…]

Member States shall ensure that aviation undertakings originating data comply with Appendix 1 to this article.

APPENDIX 1
Requirements for aviation undertakings</td>
<td>For the purposes of this Regulation, the following definitions shall apply:

Identified definitions from ICAO and the ADQ Regulation</td>
<td>ATM/ANS.OR.A.075 Open and transparent provision of services
[…]

ATM/ANS.OR.A.080
Aeronautical data and aeronautical information

ATM/ANS.OR.A.085
Common reference systems for air navigation

APPENDIX 1
Data Catalogue</td>
<td>Section 1
General requirements
Section 2 Data quality requirements
Section 3
Aeronautical information products
Section 4
Distribution and pre-flight information services
Section 5
Aeronautical information products updates
Section 6
Personnel requirements</td>
<td>Section 2 Data quality requirements

Section 3
Aeronautical information products

Section 4
Distribution and pre-flight information services

Section 5
Aeronautical information products updates

APPENDIX 1
AIP Content

APPENDIX 2
NOTAM format

APPENDIX 3
SNOWTAM format

APPENDIX 4
ASHTAM format</td>
</tr>
</table>

3. Proposed amendments

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

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

3.1. Draft regulation (draft opinion)

3.1.1. Proposed amendments to Regulation (EU) …/…

(1) Article 3 is amended as follows:

Article 3 **Provision of services**

1. Member States shall (…)
2. Member States shall (…)
3. Member States shall ensure that aviation undertakings originating aeronautical data comply with Appendix 1 to this article.

APPENDIX 1 TO ARTICLE 3
REQUIREMENTS FOR AVIATION UNDERTAKINGS

1. Scope

This Appendix establishes the requirements to be met by aviation undertakings originating aeronautical information and data.

2. Common reference systems

(a) The World Geodetic System WGS-84 shall be used as the horizontal reference system for data origination.
(b) The mean sea level (MSL) datum shall be used as the vertical reference system for data origination.
(c) The Gregorian calendar and coordinated universal time (UTC) shall be used as the temporal reference systems for data origination.

3. Formal arrangements

(a) Organisations originating data shall establish formal arrangements with:

(1) parties requesting the data; and

(2) when different, those to which the data is delivered.

(b) The formal arrangements shall include, as a minimum:

(1) an unambiguous description of the data that is to be created, modified or deleted;

(2) confirmation of the entity to which the data is to be provided;

(3) the date and time by which the data is to be provided;

(4) the data origination report format to be used; and

(5) the requirement to identify any limitations on the use of data.

4. Data catalogue

Aeronautical data shall be originated in accordance with the data catalogue specified in Appendix 1 to Subpart A of Annex III.

5. Data quality requirements

Data quality requirements shall be complied with at data origination and maintained through to publication to the next intended user.

(a) The order of accuracy for aeronautical data shall be as specified in the data catalogue.

(b) The integrity of aeronautical data shall be maintained throughout the data process from origination to distribution to the next intended user. Based on the integrity classification specified in the data catalogue, procedures shall be put in place so that:

(1) for routine data, corruption is avoided throughout the processing of the data;

(2) for essential data, it is assured that corruption does not occur at any stage of the entire process and additional processes are included, as needed, to address potential risks in the overall system architecture to further assure data integrity at this level; and

(3) for critical data, it is assured that corruption does not occur at any stage of the entire process and additional integrity assurance processes are included to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

(c) The resolution of aeronautical data shall be commensurate with the actual data accuracy.

(d) Traceability of aeronautical data shall be ensured.

(e) Timeliness shall be ensured by including any limits on the effective period with the data elements.

(f) Completeness of the aeronautical data shall be ensured in order to support the intended use.

(g) The format of delivered data shall be adequate to ensure that the data is interpreted in a manner that is consistent with the intent of the data.

6. Data verification and validation

When using aeronautical data to derive or calculate new aeronautical data, the initial data shall be verified and validated, except when provided by an authoritative source.

7. Metadata

(a) Metadata shall be collected and maintained up to the next intended user.

(b) The metadata shall include, as a minimum:

(1) the identification of the organisations or entities performing any action of originating, transmitting or manipulating the data;

(2) the action performed; and

(3) the date and time the action was performed.

8. Data error detection and authentication

(a) Digital data error detection techniques shall be used during the transmission and/or storage of aeronautical data and digital data sets.

(b) Digital data error detection techniques shall apply to all integrity levels of data sets.

(c) The transfer of aeronautical data shall be subject to a suitable authentication process such that recipients are able to confirm that the data or information has been transmitted by an authorised source.

9. Data exchange

Aeronautical data shall be exchanged through electronic means.

10. Error handling requirements

The error handling and corrective action mechanisms shall ensure that:

(a) errors identified during data origination and after data delivery are addressed or resolved;

(b) priority is given to errors in critical and essential aeronautical data.

11. Personnel requirements

Personnel responsible for originating aeronautical data and aeronautical information shall be adequately trained, competent and authorised for the job they are required to do.

(2) Annex I (Definitions) is amended as follows:

ANNEX I
DEFINITIONS FOR TERMS USED IN ANNEXES II TO XIII

The following definitions are added:

[…]

'Aeronautical data' means a representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing;

'Aeronautical information circular (AIC)' means a notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters;

'Aeronautical information management (AIM)' means the dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties;

'Aeronautical information product' means aeronautical data and aeronautical information provided either as digital data sets or as a standardised presentation in paper or electronic media. Aeronautical information products include:

— aeronautical information publication (AIP), including amendments and supplements;

— aeronautical information circular (AIC);

— aeronautical charts;

— notice to airmen (NOTAM); and

— digital data sets;

'Aeronautical information publication (AIP)' means a publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation;

'Aeronautical information service' means a service established by or on behalf of a Member State, within the defined area of coverage responsible for the provision of aeronautical information and data necessary for the safety, regularity, and efficiency of air navigation;

'Aeronautical information services provider' means an organisation responsible for the provision of an aeronautical information service;

'AIP amendment' means permanent changes to the information contained in the AIP;

'AIP supplement' means temporary changes to the information contained in the AIP which are provided by means of special pages;

'Aeronautical information regulation and control' (AIRAC) means a system aimed at advance notification, based on common effective dates, of circumstances that necessitate significant changes in operating practices;

'Assemble' means a process of merging data from multiple sources into a database and establishing a baseline for subsequent processing;

'Cyclic redundancy check (CRC)' means a mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data;

'Completeness (of data)' means the degree of confidence that all of the data needed to support the intended use is provided;

'Data collection surface' means a defined surface intended for the purpose of collecting obstacle or terrain data;

'Data product specification' means a detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party;

'Data set' means identifiable collection of data;

'Data accuracy' means a degree of conformance between the estimated or measured value and the true value;

'Data integrity' means a degree of assurance that aeronautical data and its value has not been lost or altered since the data origination or authorised amendment;

'Data origination' means the creation of a new data item with its associated value, the modification of the value of an existing data item or the deletion of an existing data item;

'Datum' means any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities;

'Feature' means abstraction of real world phenomena;

'Feature attribute' means the characteristic of a feature having a name, a data type and a value domain associated with it;

'Feature type' means a class of real world phenomena with common properties, forming the basic level of classification in a feature catalogue;

'Format (of data)' means a structure of data elements, records and files arranged to meet standards, specifications or data quality requirements;

'Geoid' means the equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents;

'Geoid undulation' means the distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid;

'Heliport' means an aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters;

'Integrity classification (aeronautical data)' means a classification based upon the potential risk resulting from the use of corrupted data, defining routine, essential and critical data;

'International NOTAM office (NOF)' means an office designated by a State for the exchange of NOTAM internationally;

'Manoeuvring area' means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons;

'Metadata' means data about data;

'Movement area' means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron;

'Next intended user' means the entity that receives the aeronautical information from the aeronautical information services provider;

'Position (geographical)' means a set of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the Earth;

'Route stage' means a route or portion of a route flown without an intermediate landing;

'Resolution (of data)' means a number of units or digits to which a measured or calculated value is expressed and used;

'Route stage' means a route or portion of a route flown without an intermediate landing;

'SNOWTAM' means a special series NOTAM given in a standard format providing a surface condition report notifying the presence or cessation of hazardous conditions due to snow, ice, slush, frost or water associated with snow, slush, ice, or frost on the movement area;

'Timeliness (of data)' means the degree of confidence that the data is applicable to the period of its intended use;

'Traceability of data' means the degree that a system or a data product can provide a record of the changes made to that product and thereby enable an audit trail to be followed from the end-user to the data originator;

'Validation' means the process of ensuring that data meets the requirements for the specified application or intended use;

'Verification' means the evaluation of the output of an aeronautical data process to ensure correctness and consistency with respect to the inputs and applicable data standards, rules and conventions used in that process;

[…]

The following definition is amended:

34. 'Aviation undertaking' means an entity, person or organisation, other than the service providers regulated by this Regulation or other than the aerodrome operators regulated by Regulation (EU) No 139/2014 that is affected by or affects a service delivered by a service provider or an aerodrome operator;

(3) Annex II — Appendix 1 'SERVICE PROVIDER CERTIFICATE' (Part-ATM/ANS.AR) is amended as follows:

Services	**Type of Service**	**Scope of Service**	**Limitations***
Aeronautical Information Services (AIS)	Aeronautical information products (including distribution services) ~~AIS~~	~~Provision of the whole AIS~~ Aeronautical information publication (AIP)	
		Aeronautical information circular (AIC)	
		Aeronautical charts	
		NOTAM	
		AIP data set	
		Terrain data sets	
		Obstacle data sets	
		Aerodrome mapping data sets	
		Instrument flight procedure data sets	
	Pre-flight information services	n/a	
Conditions**			

(4) Annex III (Part-ATM/ANS.OR) is amended as follows:

In Annex III, the following points are added in Subpart A:

[…]

ATM/ANS.OR.A.080 Aeronautical data and aeronautical information

When originating, processing or transmitting data to the aeronautical information services provider, service providers shall:

(a) ensure that aeronautical data is determined in accordance with the data catalogue specified in Appendix 1 to this Annex;

(b) meet the following data quality requirements from origination and maintained through to publication to the next intended user:

(1) The accuracy for aeronautical data shall be as specified in the data catalogue.

(2) The integrity of aeronautical data shall be maintained throughout the data process from origination to distribution to the next intended user.

(3) The resolution of aeronautical data shall be commensurate with the actual data accuracy.

(4) Traceability of aeronautical data.

(5) Timeliness of the data, by including any limits on the effective period with the data elements.

(6) Completeness of the aeronautical data, in order to support the intended use.

(7) The format of delivered data which shall be adequate to ensure that the data is interpreted in a manner that is consistent with the intent of the data;

(c) exchange aeronautical data through electronic means;

(d) establish formal arrangements between themselves when exchanging aeronautical data and aeronautical information;

(e) collect metadata for aeronautical data processes and exchange points and maintain them up to the next intended user. The metadata to be collected shall include, as a minimum:

(1) the identification of the organisations or entities performing any action of originating, transmitting or manipulating the data;

(2) the action performed; and

(3) the date and time the action was performed;

(f) ensure that all tools and software used to support or automate aeronautical data and aeronautical information processes perform their functions without adversely impacting on the quality of aeronautical data and aeronautical information;

(g) when requesting a data origination activity, ensure, through formal arrangements, that:

(1) the data is created, modified or deleted in compliance with their instructions;

(2) their instructions contain, as a minimum:

(i) an unambiguous description of the data that is to be created, modified or deleted;

(ii) confirmation of the entity to which the data is to be provided;

(iii) the date and time by which the data is to be provided;

(iv) the data origination report format to be used; and

(v) the requirement to identify any limitation on the use of the data;

(h) ensure that validation and verification techniques are employed throughout the aeronautical data processing chain to ensure that the aeronautical data meets the associated data quality requirements, and that:

(1) the verification ensures that aeronautical data was received without corruption and that the aeronautical data process does not introduce corruption. Verification of received aeronautical data shall involve checks that ensure the integrity of the transmitted data; and

(2) aeronautical data and aeronautical information entered manually are subject to independent verification to identify any errors that may have been introduced;

(i) ensure that digital data error detection techniques are used during the transmission and/or storage of aeronautical data and digital data sets and apply to all integrity levels of data sets;

(j) ensure that the transfer of aeronautical data is subject to a suitable authentication process such that recipients are able to confirm that the data or information has been transmitted by an authorised source;

(k) ensure that errors identified during data origination and after data delivery are addressed or resolved and that priority is given to critical and essential aeronautical data.

ATM/ANS.OR.A.085 Common reference systems for air navigation

For the purpose of air navigation, service providers shall use:

(a) the World Geodetic System — 1984 (WGS-84) as the horizontal reference system.

(b) the mean sea level (MSL) datum as the vertical reference system.

(c) the Gregorian calendar and coordinated universal time (UTC) as the temporal reference systems.

(5) Annex VI (Part-AIS) is amended as follows:

ANNEX VI
SPECIFIC REQUIREMENTS FOR THE PROVISION OF AERONAUTICAL INFORMATION SERVICES

(Part-AIS)
SUBPART A — ADDITIONAL ORGANISATION REQUIREMENTS FOR THE PROVISION OF AERONAUTICAL INFORMATION SERVICES (AIS.OR)

~~**Section 1 — General requirements**~~

~~**AIS.OR.100 Technical and operational competence and capability**~~

~~An aeronautical information services provider shall ensure that information and data are available for operations in a form suitable for:~~

~~flight operating personnel, including flight crew;~~

~~flight planning, flight management systems and flight simulators; and~~

~~air traffic services providers which are responsible for flight information services, aerodrome flight information services and the provision of pre-flight information.~~

~~Aeronautical information services providers shall ensure the integrity of data and confirm the level of accuracy of the information distributed for operations, including the source of such information, before such information is distributed.~~

Section 1 — General requirements

AIS.OR.100 Aeronautical information management

An aeronautical information services provider shall establish information management resources and processes that are adequate to ensure the timely collection, processing, storing, integration, exchange and delivery of quality-assured aeronautical data and aeronautical information within the ATM system.

AIS.OR.105 Responsibilities of aeronautical information services providers

(a) An aeronautical information services provider shall ensure the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

(b) An aeronautical information services provider shall receive, collate or assemble, edit, format, publish, store and distribute aeronautical data and aeronautical information concerning the entire territory of a Member State as well as those areas over the high seas in which the Member State is responsible for the provision of air traffic services.

(c) An aeronautical information services provider shall ensure that aeronautical data and aeronautical information are available for:

(1) personnel involved in flight operations, including flight crews, flight planning, and flight simulators; and

(2) air traffic services providers responsible for flight information service, and the services responsible for pre-flight information.

(d) An aeronautical information services provider shall provide 24-hour services for NOTAM origination and issuance in its area of responsibility and for pre-flight information needed in relation to route stages originating at the aerodrome/heliport in its area of responsibility.

(e) An aeronautical information services provider shall make available to other aeronautical information services providers any aeronautical data and aeronautical information required by them.

(f) An aeronautical information services provider shall ensure that procedures are in place to assess and mitigate safety risks to aviation arising from data and information errors.

(g) An aeronautical information services provider shall clearly indicate that aeronautical data and aeronautical information provided for and on behalf of a Member State are provided under the authority of that Member State, irrespective of the format in which it is provided.

Section 2 — Data quality requirements

AIS.OR.200 General

An aeronautical information services provider shall ensure that:

(a) aeronautical data and aeronautical information are provided in accordance with the specifications laid down in the data catalogue, as specified in Appendix 1 to Annex III to Regulation EU …/…, and the applicable data quality requirements, as specified in AIS.TR.200; and

(b) data quality requirements are maintained from reception through to distribution to the next intended user.

AIS.OR.205 Formal arrangements

An aeronautical information services provider shall ensure that formal arrangements are established:

(a) with all parties transmitting data to them; and

(b) between themselves when exchanging aeronautical information and data.

AIS.OR.210 Exchange of aeronautical data and aeronautical information

An aeronautical information services provider shall ensure that:

(a) the format of aeronautical data is based on an aeronautical information exchange model designed to be globally interoperable; and

(b) aeronautical data is exchanged through electronic means.

AIS.OR.215 Tools and software

An aeronautical information services provider shall ensure that all tools and software used to support or automate aeronautical data and aeronautical information processes perform their functions without adversely impacting on the quality of aeronautical data and aeronautical information.

AIS.OR.220 Verification and validation process

An aeronautical information services provider shall ensure that verification and validation techniques are employed so that the aeronautical data meets the associated data quality requirements specified in AIS.TR.200.

AIS.OR.225 Metadata requirements

An aeronautical information services provider shall collect and retain metadata.

AIS.OR.230 Authentication and data error detection

(a) An aeronautical information services provider shall ensure that:

(1) digital data error detection techniques are used during the transmission and/or storage of aeronautical data and digital data sets; and

(2) digital data error detection techniques apply to all integrity levels of data sets.

(b) The transfer of aeronautical data shall be subject to a suitable authentication process such that recipients are able to confirm that the data or information has been transmitted by an authorised source.

AIS.OR.235 Error reporting and corrective actions

An aeronautical information services provider shall ensure that error reporting, measurement and corrective mechanisms are established and maintained.

AIS.OR.240 Data limitations

An aeronautical information services provider shall identify the aeronautical data and aeronautical information that do not meet the data quality requirements.

AIS.OR.250 Consistency requirement

Where aeronautical data or aeronautical information is duplicated in the AIP of more than one Member State, the aeronautical information services providers responsible for those AIPs shall establish mechanisms to ensure consistency between the duplicated information.

Section 3 — Aeronautical information products

AIS.OR.300 General

An aeronautical information services provider shall ensure that, where aeronautical data and aeronautical information are provided in multiple formats, processes are implemented to ensure data and information consistency between those formats.

Chapter 1 — Aeronautical information in a standardised presentation

AIS.OR.305 Aeronautical information publication (AIP)

An aeronautical information services provider shall issue aeronautical information of lasting character, permanent information and long-duration temporary changes, essential to air navigation as AIP, including AIP amendments and AIP supplements.

AIS.OR.310 AIP amendments

An aeronautical information services provider shall:

(a) provide permanent changes to the AIP as AIP amendments; and

(b) ensure that the AIP is amended or re-issued at such regular intervals as necessary to ensure the information is complete and up to date.

AIS.OR.315 AIP supplements

An aeronautical information services provider shall:

(a) issue temporary changes of long duration — three months or longer — and information of short duration that contains extensive text and/or graphics as AIP supplements;

(b) regularly provide a checklist of the valid AIP supplements;

(c) publish a new AIP supplement as a replacement when an error occurs in an AIP supplement or when the period of validity of an AIP supplement is changed; and

(d) issue a NOTAM when there is not sufficient time for the distribution of an AIP supplement.

AIS.OR.320 Aeronautical information circular (AIC)

(a) An aeronautical information services provider shall issue the following as an AIC:

(1) a long-term forecast of any major change in legislation, regulations, procedures or facilities; or

(2) information of a purely explanatory or advisory nature that affect flight safety; or

(3) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

(b) An aeronautical information services provider shall review the validity of AIC in force at least once a year.

AIS.OR.325 Aeronautical charts

(a) Aerodrome obstacle chart — type A (operating limitations)

An aeronautical information services provider shall:

(1) make available an aerodrome obstacle chart — type A for all aerodromes regularly used by international civil aviation, except for those aerodromes where there are no obstacles in the take-off flight path areas; and

(2) ensure that the aerodrome obstacle chart, in combination with the relevant information published in the AIP, provides the data necessary to enable an operator to comply with the

operating limitations of Subpart C of Part-CAT, Part-NCC, Part-NCO and Part-SPO of Regulation (EU) No 965/2012.

(b) Aerodrome obstacle chart — type B

An aeronautical information services provider shall ensure that when made available, the aerodrome obstacle chart — type B provides information to satisfy the following functions:

(1) the determination of minimum safe altitudes/heights including those for circling procedures;

(2) the determination of procedures for use in the event of an emergency during take-off or landing;

(3) the application of obstacle clearing and marking criteria; and

(4) the provision of source material for aeronautical charts.

(c) Precision approach terrain chart

An aeronautical information services provider shall:

(1) make available a precision approach terrain chart for all precision approach runway categories II and III at aerodromes regularly used by international civil aviation; and

(2) ensure that this chart provides detailed terrain profile information within a defined portion of the final approach, so as to enable aircraft operators to assess the effect of the terrain on decision height determination by the use of radio altimeters.

(d) En route chart

An aeronautical information services provider shall:

(1) make available an en route chart for all areas where flight information regions have been established; and

(2) ensure that the en route chart provides flight crews with the information that will facilitate navigation along ATS routes in compliance with ATS procedures.

(e) Area chart

An aeronautical information services provider shall:

(1) make available an area chart where the ATS routes or position reporting requirements are complex and cannot be adequately shown on an en route chart; and

(2) ensure that this chart provides flight crews with the information that will facilitate the following phases of flight:

(i) the transition between the en route phase and approach to an aerodrome;

(ii) the transition between take-off/missed approach and en route phase of flight; and

(iii) flights through areas of complex ATS routes or airspace structure.

(f) Standard departure chart — instrument (SID)

An aeronautical information services provider shall:

(1) make available a SID chart wherever a SID route has been established and cannot be shown with sufficient clarity on the area chart; and

(2) ensure that this chart provides flight crews with the information that will enable them to comply with the designated SID route from the take-off phase to the en route phase.

(g) Standard arrival chart — instrument (STAR)

An aeronautical information services provider shall:

(1) make available a STAR chart wherever a standard instrument arrival route has been established and cannot be shown with sufficient clarity on the area chart; and

(2) ensure that this chart provides flight crews with the information that will enable them to comply with the designated standard instrument arrival route from the en route phase to the approach phase.

(h) Instrument approach chart

An aeronautical information services provider shall:

(1) make available instrument approach charts for all aerodromes used by international civil aviation where instrument approach procedures have been established; and

(2) ensure that these charts provide flight crews with the information that will enable them to perform an approved instrument approach procedure to the runway of intended landing, including the missed approach procedure and, where applicable, associated holding patterns.

(i) Visual approach chart

An aeronautical information services provider shall:

(1) make available a visual approach chart for all aerodromes used by international civil aviation where:

(i) only limited navigation facilities are available; or

(ii) radio communication facilities are not available; or

(iii) no adequate aeronautical charts of the aerodrome and it surroundings at 1:500 000 or greater scale are available; or

(iv) visual approach procedures have been established; and

(2) ensure that this chart provides flight crews with the information that will enable them to transit from the en route/descent phase to the approach phase of flight to the runway of intended landing by means of visual reference.

(j) Aerodrome/heliport chart

An aeronautical information services provider shall:

(1) make available an aerodrome/heliport chart for all aerodromes and heliports regularly used by international civil aviation; and

(2) ensure that this chart provides flight crews with:

(i) information that facilitates the ground movement of aircraft between the aircraft stand and the runway;

(ii) information that facilitates helicopter movement:

(A) between the final approach and take-off area, the touchdown and lift-off area and the helicopter stand;

(B) along helicopter ground and air taxiways; and

(C) along air transit routes; and

(iii) essential operational information at the aerodrome or heliport.

(k) Aerodrome ground movement chart

Where an aerodrome ground movement chart is provided, an aeronautical information services provider shall ensure that it provides flight crews with detailed information to facilitate the ground movement of aircraft to and from the aircraft stands and the parking or docking of aircraft.

(l) Aircraft parking/docking chart

Where an aircraft parking/docking chart is provided, an aeronautical information services provider shall ensure that it provides flight crews with detailed information to facilitate the ground movement of aircraft between the taxiways and the aircraft stands and the parking or docking of aircraft.

(m) World aeronautical chart 1:1 000 000

An aeronautical information services provider shall:

(1) make available the world aeronautical chart 1:1 000 000 unless its operational requirements are effectively satisfied by the aeronautical chart 1:500 000; and

(2) ensure that, when the world aeronautical Chart 1:1 000 000 is provided, that the chart provides the information to satisfy the requirements of visual air navigation.

(n) Aeronautical chart 1:500 000

Where an aeronautical chart 1:500 000 is provided, an aeronautical information services provider shall ensure that it provides the information to satisfy the requirements of visual air navigation for low speed, short- or medium-range operations at low and intermediate altitudes.

(o) Air traffic control (ATC) surveillance minimum altitude chart

Where an ATC surveillance minimum altitude chart is provided, an aeronautical information services provider shall ensure that it provides the information that will enable flight crews to monitor and cross-check altitude assigned by an air traffic controller using an ATS surveillance system.

(p) Chart distribution requirements

An aeronautical information services provider shall ensure that the following aeronautical charts, where made available:

(1) form part of the AIP or are provided separately to recipients of the AIP:

(i) aerodrome obstacle chart — type A;

(ii) aerodrome/heliport chart;

(iii) aerodrome ground movement chart;

(iv) aircraft parking/docking chart;

(v) precision approach terrain chart;

(vi) ATC surveillance minimum altitude chart;

(vii) area chart;

(viii) standard arrival chart — instrument (STAR);

(ix) standard departure chart — instrument (SID);

(x) instrument approach chart;

(xi) visual approach chart; and

(xii) en route chart; and

(2) are provided as part of the aeronautical information products:

(i) aerodrome obstacle chart — type B;

(ii) world aeronautical chart 1:1 000 000; and

(iii) world aeronautical chart 1:500 000.

AIS.OR.330 NOTAM

An aeronautical information services provider shall:

(a) originate and issue promptly a NOTAM whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes, or temporary changes of long duration are made at short notice, except for extensive text and/or graphics;

(b) issue information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations, as a NOTAM;

(c) ensure that international exchange of NOTAM takes place only as mutually agreed between the international NOTAM offices and multinational NOTAM processing units concerned.

Chapter 2 — Digital data sets

AIS.OR.335 General

(a) When provided, an aeronautical information services provider shall ensure that digital data is in the form of the following data sets:

(1) AIP data set;

(2) terrain data sets;

(3) obstacle data sets;

(4) aerodrome mapping data sets; and

(5) instrument flight procedure data sets.

(b) Each data set shall include a minimum set of metadata, as defined in AIS.TR.340 that needs to be provided to the next intended user.

(c) A checklist of valid data sets shall be regularly provided.

AIS.OR.340 Metadata requirements

Each data set shall include metadata.

AIS.OR.345 AIP data set

When provided, an aeronautical information services provider shall ensure that the AIP data set contains the digital representation of aeronautical information of lasting character, including permanent information and long-duration temporary changes, essential to air navigation.

AIS.OR.350 Terrain and obstacle data — general requirements

When made available, an aeronautical information services provider shall ensure that terrain and obstacle data are provided in accordance with AIS.TR.350.

AIS.OR.355 Terrain data sets

Where made available, an aeronautical information services provider shall ensure that terrain data are provided:

(a) for Area 1;

(b) for aerodromes regularly used by international civil aviation, to cover:

(1) Area 2a;

(2) Areas 2b, 2c and 2d for terrain that penetrates the relevant terrain data collection surface;

(3) the take-off flight path area;

(4) an area bounded by the lateral extent of the aerodrome obstacle limitation surfaces;

(5) Area 3;

(6) Area 4 for all runways where precision approach category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess the effect of terrain on decision height determination by use of radio altimeters;

or parts thereof.

AIS.OR.360 Obstacle data sets

Where made available, an aeronautical information services provider shall ensure that obstacle data are provided:

(a) for obstacles in Area 1 whose height is 100 m or higher above ground;

(b) for aerodromes regularly used by international civil aviation, for all obstacles within Area 2 that are assessed as being a hazard to air navigation;

(c) for aerodromes regularly used by international civil aviation, to cover:

(1) Area 2a, for those obstacles that penetrate the relevant obstacle data collection surface;

(2) objects in the take-off flight path area which project above a plane surface having a 1.2 % slope and having a common origin with the take-off flight path area;

(3) penetrations of the aerodrome obstacle limitation surfaces;

(4) Areas 2b, 2c and 2d for obstacles that penetrate the relevant obstacle data collection surfaces;

(5) Area 3 for obstacles that penetrate the relevant obstacle data collection surface; and

(6) Area 4, for all runways where precision approach category II or III operations have been established,

or parts thereof.

AIS.OR.365 Aerodrome mapping data sets

Where made available, an aeronautical information services provider shall ensure that aerodrome mapping data sets are provided in accordance with AIS.TR.365.

AIS.OR.370 Instrument flight procedure data sets

Where made available, an aeronautical information services provider shall ensure that instrument flight procedure data sets are provided in accordance with AIS.TR.370.

Section 4 — Distribution and pre-flight information services

AIS.OR.400 Distribution services

An aeronautical information services provider shall:

(a) distribute aeronautical information products to those users who requested them;

(b) make available AIP, AIP amendments, AIP supplements, NOTAM and AIC by the most expeditious means;

(c) ensure that NOTAM are distributed through the aeronautical fixed service (AFS), whenever practicable;

(d) ensure the exchange of NOTAM between international NOTAM offices and/or multinational NOTAM processing units concerned; and

(e) arrange, as necessary, the issuance and receipt of NOTAM distributed by telecommunication to satisfy operational requirements.

AIS.OR.405 Pre-flight information services

An aeronautical information services provider shall ensure that:

(a) for any aerodrome/heliport regularly used by international civil aviation, aeronautical information relative to the route stages originating at the aerodrome/heliport is made available to flight operations personnel, including flight crews and services responsible for pre-flight information; and

(b) aeronautical information provided for pre-flight planning purposes includes information of operational significance from the elements of the aeronautical information products.

Section 5 — Aeronautical information products updates

AIS.OR.500 General

An aeronautical information services provider shall ensure that aeronautical data and aeronautical information are amended or reissued to keep them up to date.

AIS.OR.505 AIRAC

(a) An aeronautical information services provider shall ensure that information concerning the following circumstances is distributed under the AIRAC system, i.e. basing establishment, withdrawal of or significant changes upon a series of common effective dates at intervals of 28 days, including [XX/XX/2016]:

(1) horizontal and vertical limits, regulations and procedures applicable to:

(i) flight information regions;

(ii) control areas;

(iii) control zones;

(iv) advisory areas;

(v) ATS routes;

(vi) permanent danger, prohibited and restricted areas (including type and periods of activity when known) and ADIZ; and

(vii) permanent areas or routes, or portions thereof, where the possibility of interception exists;

(2) positions, frequencies, call signs, identifiers, known irregularities and maintenance periods of radio navigation aids, and communication and surveillance facilities;

(3) holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures;

(4) transition levels, transition altitudes and minimum sector altitudes;

(5) meteorological facilities (including broadcasts) and procedures;

(6) runways and stopways;

(7) taxiways and aprons;

(8) aerodrome ground operating procedures (including low visibility procedures);

(9) approach and runway lighting; and

(10) aerodrome operating minima if published by a State.

(b) An aeronautical information services provider shall ensure that:

(1) the information notified under the AIRAC system is not changed further for at least another 28 days after the effective date unless the circumstance notified is of a temporary nature and would not persist for the full period;

(2) the information provided under the AIRAC system is distributed/made available so as to reach recipients at least 28 days in advance of the AIRAC effective date; and

(3) implementation dates other than AIRAC effective dates are not used for pre-planned operationally significant changes requiring cartographic work and/or for updating of navigation databases.

AIS.OR.510 NOTAM updates

An aeronautical information services provider shall:

(a) ensure that NOTAM updates are provided in accordance with AIS.TR.510; and

(b) provide a 'Trigger' NOTAM when an AIP amendment or an AIP supplement is published in accordance with AIRAC procedures.

AIS.OR.515 Digital data updates

An aeronautical information services provider shall:

(a) amend or reissue data sets at such regular intervals as may be necessary to keep them up to date;

(b) issue permanent changes and temporary changes of long duration — three months or longer — made available as digital data in the form of a complete data set and/or a sub-set that includes only the differences from the previously issued complete data set.

Section 6 — Personnel requirements

AIS.OR.600 General requirements

An aeronautical information services provider shall ensure that personnel responsible for tasks in the provision of aeronautical data and aeronautical information is:

(a) made aware of and applies:

(1) the requirements for aeronautical information products and services, as specified in Sections 2 to 5; and

(2) the update cycles applicable to the issue of AIP amendments and supplements for the areas for which they are providing aeronautical data or aeronautical information; and

(b) adequately trained, competent and authorised for the job it is required to do.

AIS.OR.605 Language proficiency

An aeronautical information services provider shall ensure that its personnel is proficient in speaking, reading, writing and understanding English, as required for the functions that it is expected to perform.

SUBPART B — TECHNICAL REQUIREMENTS FOR THE PROVISION OF AERONAUTICAL INFORMATION SERVICES (AIS.TR)

~~An aeronautical information services provider shall be able to demonstrate that their working methods and operating procedures are compliant with the standards in the following Annexes to the Convention on International Civil Aviation as far as they are relevant to the provision of aeronautical information services in the airspace concerned:~~

~~Annex 4 on aeronautical charts in its 11th edition of July 2009, including all amendments up to and including No 58; and~~

~~without prejudice to Regulation (EU) No 73/20109, Annex 15 on aeronautical information services in its 14th edition of July 2013, including all amendments up to and including No 38.~~

The following sections are inserted:

Section 2 — Data quality requirements

AIS.TR.200 General

(a) The accuracy for aeronautical data shall be as in the data catalogue, as specified in Appendix 1 to Annex III.

(b) The resolution of aeronautical data shall be commensurate with the actual data accuracy.

(c) The integrity of aeronautical data shall be maintained throughout the data process from reception to distribution to the next intended user. Based on the integrity classification specified in the data catalogue, procedures shall be put in place so that:

(1) for routine data, corruption is avoided throughout the processing of the data;

(2) for essential data, it is assured that corruption does not occur at any stage of the entire process and additional processes are included as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

(3) for critical data, it is assured that corruption does not occur at any stage of the entire process and additional integrity assurance processes are included to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

(d) Traceability of aeronautical data shall be ensured and retained.

(e) Timeliness shall be ensured by including any limits on the effective period with the data elements.

(f) Completeness of the aeronautical data shall be ensured in order to support the intended use.

(g) The format of delivered data shall be adequate to ensure that the data is interpreted in a manner that is consistent with the intended use of the data.

AIS.TR.210 Exchange of aeronautical data and aeronautical information

Except for terrain data, the exchange format of aeronautical data shall:

(a) enable the exchange of data for both individual features and feature collections;

(b) enable the exchange of baseline information as a result of permanent changes; and

(c) be in accordance with the subjects, properties and associations of the data catalogue, and be documented through mapping rules.

[9] Commission Regulation (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky (OJ L 23, 27.1.2010, p. 6).

AIS.TR.220 Verification and validation process

(a) The verification shall ensure:

(1) that aeronautical data was received without corruption;

(2) that the aeronautical data process does not introduce corruption; and

(3) the integrity of the transmitted data.

(b) Aeronautical data and aeronautical information entered manually shall be subject to independent verification to identify any errors that may have been introduced.

AIS.TR.225 Metadata

The metadata to be collected shall include, as a minimum:

(a) the identification of the organisations or entities performing any action of originating, transmitting or manipulating the data;

(b) the action performed; and

(c) the date and time the action was performed.

AIS.TR.235 Error reporting and corrective actions

The error reporting, measurement and corrective mechanisms shall ensure that:

(a) problems identified during origination, production, storage, handling and processing, or those reported by users after publication, are recorded;

(b) all problems reported in relation to the aeronautical data and aeronautical information are analysed by the aeronautical information services provider and the necessary corrective actions are determined;

(c) priority is given to resolution of all errors, inconsistencies and anomalies detected in critical and essential aeronautical data;

(d) affected users are warned of errors by the most effective means, taking into account the integrity level of the aeronautical data and aeronautical information; and

(e) error feedback is facilitated and encouraged.

AIS.TR.240 Data limitations

The identification of data not meeting the data quality requirements shall be made with an annotation or by explicitly providing the quality value.

Section 3 — Aeronautical information products

AIS.TR.300 General

(a) Aeronautical information products intended for international distribution shall include English text for those parts expressed in plain language.

(b) Place names shall be spelt in conformity with local usage, transliterated, when necessary, into the ISO basic Latin alphabet.

(c) ICAO abbreviations shall be used in the aeronautical information services whenever they are appropriate and their use will facilitate distribution of aeronautical data and aeronautical information.

Chapter 1 — Aeronautical information in a standardised presentation

AIS.TR.305 Aeronautical information publication (AIP)

(a) The AIP, AIP amendments and AIP supplements shall be provided on paper and/or as an electronic document 'electronic AIP' (eAIP) that allows for displaying on computer screen and printing on paper.

(b) The AIP shall include:

(1) a statement of the competent authority responsible for the air navigation facilities, services or procedures covered by the AIP;

(2) the general conditions under which the services or facilities are available for international use;

(3) a list of significant differences between the national regulations and practices of the State and the related ICAO Standards, Recommended Practices and Procedures, given in a form that would enable a user to differentiate readily between the requirements of the State and the related ICAO provisions; and

(4) the choice made by a State in each significant case where an alternative course of action is provided for in ICAO Standards, Recommended Practices and Procedures.

(c) The AIP shall contain information relating to, and arranged under, the subject headings listed in Appendix 1 to this Annex.

(d) The issuing State and publishing authority shall be clearly indicated.

(e) When two or more States jointly provide an AIP, these States shall be clearly indicated.

(f) Each AIP shall be self-contained and shall include a table of contents.

(g) An AIP shall be organised in three parts (GEN, ENR and AD), sections and sub-sections, except when the AIP, or a volume of the AIP, is designed to facilitate operational use in flight, in which case the precise format and arrangement may be left to the discretion of the State provided that an adequate table of contents is included.

(h) Each AIP shall be dated.

(i) The date, consisting of the day, month (by name) and year, shall be the publication date and/or the effective date (AIRAC) of the information.

(j) When describing periods of activity, availability or operation, the applicable days and times shall be specified.

(k) Each AIP issued as a printed volume and each page of an AIP issued in loose-leaf form shall be annotated as to indicate clearly:

(1) the territory covered and subdivisions when necessary;

(2) the identification of the issuing State or the joint issuing States and producing organisation (authority); and

(3) page numbers/chart titles.

(l) When provided, the information content of the eAIP and the structure of chapters, sections and sub-sections shall follow the content and structure of the paper AIP.

(m) The method of amendment of the printed volume AIP shall be by means of replacement sheets.

AIS.TR.310 AIP amendments

(a) Any operationally significant changes to the AIP shall be issued under AIRAC and clearly identified as such.

(b) Each AIP amendment shall be allocated a serial number, which shall be consecutive.

(c) When an AIP amendment is issued, it shall include references to the serial number of the NOTAM which have been incorporated into the amendment.

(d) The most current update cycles applicable to AIP amendments shall be made publicly available.

(e) Each AIP amendment shall:

(1) include a checklist giving the current date of each loose-leaf page in the AIP, and the checklist shall carry both the page number and date; and

(2) provide a recapitulation of any outstanding manuscript corrections.

(f) Each AIP amendment page, including the cover sheet, shall:

(1) be identified by an annotation against it in the margin; and

(2) contain a publication date and/or an effective date when applicable.

(g) The AIP amendment regular interval shall be specified in the AIP, Part 1 — General (GEN).

(h) Recourse to hand amendments or hand annotations shall be kept to the minimum; the normal method of amendment shall be by re-issuing or by replacement of pages.

AIS.TR.315 AIP supplements

(a) The AIP supplement shall be provided by means of distinctive pages.

(b) The most current update cycles applicable to AIP supplements shall be made publicly available.

(c) Each AIP supplement shall be allocated a serial number which shall be consecutive and based on the calendar year.

(d) Whenever an AIP supplement is issued as a replacement of a NOTAM, a reference to the series and number of the NOTAM shall be included.

(e) A checklist of valid AIP supplements shall be issued at intervals of not more than one month as part of the checklist of NOTAM and with distribution as for the AIP supplements.

(f) Each AIP supplement page shall show a publication date. Each AIRAC AIP supplement page shall show a publication date and an effective date.

(g) When there is not sufficient time for the distribution of an AIP Supplement, a NOTAM shall be issued.

AIS.TR.320 Aeronautical information *c*ircular (AIC)

(a) The AIC shall be provided on paper and/or as part of the electronic document 'electronic AIP' (eAIP) that allows for displaying on computer screen and printing on paper.

(b) The AIC shall be provided whenever it is desirable to promulgate:

(1) forecasts of important changes in the air navigation procedures, services and facilities provided;

(2) forecasts of implementation of new navigational systems;

(3) significant information arising from aircraft accident/incident investigation which has a bearing on flight safety;

(4) information on regulations relating to the safeguarding of international civil aviation against acts of unlawful interference;

(5) advice on medical matters of special interest to pilots;

(6) warnings to pilots concerning the avoidance of physical hazards;

(7) effect of certain weather phenomena on aircraft operations;

(8) information on new hazards affecting aircraft handling techniques;

(9) regulations relating to the carriage of restricted articles by air;

(10) reference to the requirements of, and publication of changes in, national legislation;

(11) aircrew licensing arrangements;

(12) training of aviation personnel;

(13) application of, or exemption from, requirements in national legislation;

(14) advice on the use and maintenance of specific types of equipment;

(15) actual or planned availability of new or revised editions of aeronautical charts;

(16) carriage of communication equipment;

(17) explanatory information relating to noise abatement;

(18) selected airworthiness directives;

(19) changes in NOTAM series or distribution, new editions of AIP or major changes in their contents, coverage or format;

(20) advance information on the snow plan; and

(21) other information of a similar nature.

(c) The AIC shall not be used for information that qualifies for inclusion in AIP or NOTAM.

(d) The snow plan issued under AD 1.2.2 of the AIP shall be supplemented by seasonal information, to be issued well in advance of the beginning of each winter — not less than one month before the normal onset of winter conditions.

(e) When the AIC is selected by the originating State for international distribution, it shall have the same distribution as the AIP.

(f) Each AIC shall be allocated a serial number which shall be consecutive and based on the calendar year.

(g) In the event that AIC are provided in more than one series, each series shall be separately identified by a letter.

(h) A checklist of AIC currently in force shall be issued at least once a year, with distribution as for the AIC.

(i) A checklist of AIC provided internationally shall be included in the NOTAM checklist.

AIS.TR.325 Aeronautical charts

(a) Aerodrome obstacle chart — type A (operating limitations)

Where a chart is not required because no obstacles exist in the take-off flight path area, a notification to this effect shall be published in the AIP.

(b) En route chart

Separate en route charts shall be made available where different ATS routes, position reporting requirements or lateral limits of flight information regions or control areas exist in different layers of airspace and cannot be shown with sufficient clarity on one chart.

(c) Area chart

Separate area charts shall be made available where the ATS routes or position reporting requirements are different for arrivals and for departures, and these cannot be shown with sufficient clarity on one chart.

(d) Instrument approach chart

Separate instrument approach charts shall be made available when the values for track, time or altitude differ between different categories of aircraft on other than the final approach segment of the instrument approach procedures and the listing of these differences on a single chart could cause clutter or confusion.

AIS.TR.330 NOTAM

(a) A NOTAM shall contain the following information:

(1) establishment of, closure of, or significant changes in operation of aerodrome(s) or heliport(s) or runways;

(2) establishment of, withdrawal of, and significant changes in operation of aeronautical services;

(3) establishment of, withdrawal of, and significant changes in operational capability of radio navigation and air-ground communication services;

(4) unavailability of back-up and secondary systems, having a direct operational impact;

(5) establishment of, withdrawal of, or significant changes made to visual aids;

(6) interruption of or return to operation of major components of aerodrome lighting systems;

(7) establishment of, withdrawal of, or significant changes made to procedures for air navigation services;

(8) occurrence or correction of major defects or impediments in the manoeuvring area;

(9) changes to and limitations on availability of fuel, oil and oxygen;

(10) major changes to search and rescue facilities and services available;

(11) establishment of, withdrawal of, or return to operation of hazard beacons marking obstacles to air navigation;

(12) changes in regulations or EASA operational directives requiring immediate action;

(13) presence of hazards which affect air navigation;

(14) planned laser emissions, laser displays and search lights if pilots' night vision is likely to be impaired;

(15) erecting or removal of, or changes to, obstacles to air navigation in the take-off/climb, missed approach, approach areas and runway strip;

(16) establishment or discontinuance of, including activation or deactivation, as applicable, or changes in the status of prohibited, restricted or danger areas;

(17) establishment or discontinuance of areas or routes, or portions thereof, where the possibility of interception exists and where the maintenance of guard on the VHF emergency frequency 121.5 MHz is required;

(18) allocation, cancellation or change of location indicators;

(19) changes in aerodrome/heliport rescue and firefighting category;

(20) presence or removal of, or significant changes in, hazardous conditions due to snow, slush, ice, radioactive material, toxic chemicals, volcanic ash deposition or water on the movement area;

(21) outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;

(22) forecasts of solar cosmic radiation, where provided;

(23) an operationally significant change in volcanic activity, the location, date and time of volcanic eruptions and/or horizontal and vertical extent of volcanic ash cloud, including direction of movement, flight levels and routes or portions of routes which could be affected;

(24) release into the atmosphere of radioactive materials or toxic chemicals following a nuclear or chemical incident, the location, date and time of the incident, the flight levels and routes, or portions thereof, that could be affected and the direction of movement;

(25) establishment of operations of humanitarian relief missions, together with procedures and/or limitations that affect air navigation;

(26) implementation of short-term contingency measures in cases of disruption, or partial disruption, of air traffic services and related supporting services; and

(27) specific loss of satellite-based navigation systems integrity;

(b) A NOTAM shall not contain the following information:

(1) routine maintenance work on aprons and taxiways that does not affect the safe movement of aircraft;

(2) runway marking work, when aircraft operations can safely be conducted on other available runways, or the equipment used can be removed when necessary;

(3) temporary obstructions in the vicinity of aerodromes/heliports that do not affect the safe operation of aircraft;

(4) partial failure of aerodrome/heliport lighting facilities where such failure does not directly affect aircraft operations;

(5) partial temporary failure of air-ground communications when suitable alternative frequencies are available and are operative;

(6) the lack of apron marshalling services and road traffic closures, limitations and control;

(7) the unserviceability of location, destination or other instruction signs on the aerodrome movement area;

(8) parachuting when in uncontrolled airspace under VFR , when controlled, at promulgated sites or within danger or prohibited areas;

(9) training activities by ground units;

(10) unavailability of back-up and secondary systems if these do not have an operational impact;

(11) limitations to airport facilities or general services with no operational impact;

(12) national regulations not affecting general aviation;

(13) announcement or warnings about possible/potential limitations, without any operational impact;

(14) general reminders on already published information;

(15) availability of equipment for ground units without containing information on the operational impact for airspace and facility users;

(16) information about laser emissions without any operational impact and fireworks below minimum flying heights;

(17) closure of movement area parts in connection with planned work locally coordinated of duration of less than one hour;

(18) closure, changes, unavailability in operation of aerodrome(s)/heliport(s) other than aerodrome(s)/heliport(s) operation hours; and

(19) other non-operational information of a similar temporary nature;

(c) Except as provided for in AIS.TR.330(d) and AIS.TR.330(e), each NOTAM shall contain the information in the order shown in the NOTAM Format in Appendix 2.

(d) NOTAM text shall be composed of the significations/uniform abbreviated phraseology assigned to the ICAO NOTAM Code complemented by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language.

(e) All NOTAM shall be issued in English language. If necessary for domestic users, NOTAM may additionally be issued in national language.

(f) Information concerning snow, slush, ice, frost, standing water, or water associated with snow, slush, ice or frost on the movement area shall be disseminated by means of SNOWTAM, and shall contain the information in the order shown in the SNOWTAM Format in Appendix 3.

(g) Information concerning an operationally significant change in volcanic activity, a volcanic eruption and/or volcanic ash cloud shall, when reported by means of an ASHTAM, contain the information in the order shown in the ASHTAM Format in Appendix 4.

(h) When errors occur in a NOTAM, a NOTAM with a new number to replace the erroneous NOTAM shall be issued or the erroneous NOTAM shall be cancelled and a new NOTAM issued.

(i) When a NOTAM is issued that cancels or replaces a previous NOTAM:

(1) the series and number of the previous NOTAM shall be indicated; and

(2) the series, location indicator and subject of both NOTAM shall be the same.

(j) Only one NOTAM shall be cancelled or replaced by a NOTAM.

(k) Each NOTAM shall deal with only one subject and one condition of the subject.

(l) Each NOTAM shall be as brief as possible and compiled so that its meaning is clear without the need to refer to another document.

(m) Each NOTAM shall be transmitted as a single telecommunication message.

(n) A NOTAM containing permanent or temporary information of long duration shall carry appropriate AIP or AIP supplement references.

(o) Location indicators included in the text of a NOTAM shall be those contained in ICAO Doc 7910 (Location Indicators). In no case shall a curtailed form of such indicators be used.

(p) Where no ICAO location indicator is assigned to the location, its place name shall be entered in plain language, spelt in conformity with local usage, transliterated, when necessary, into the ISO basic Latin alphabet.

(q) To each NOTAM shall be allocated a series identified by a letter and a four-digit number followed by a stroke and a two-digit number for the year. The four-digit number shall be consecutive and based on the calendar year.

(r) All NOTAM shall be divided in series based on subject, traffic or location or a combination thereof, depending on end-user needs. NOTAM for aerodromes allowing international air traffic shall be issued in international NOTAM series.

(s) If NOTAM are issued in both English and national language, the NOTAM series shall be organised so that the national language series are equivalents of the English language series in terms of content and numbering.

(t) The content and geographical coverage of each NOTAM series shall be stated in detail in the AIP, GEN 3.

(u) A checklist of valid NOTAM shall be regularly provided.

(v) One checklist NOTAM shall be issued for each series.

(w) A checklist NOTAM shall also refer to the latest AIP amendments, AIP supplements, data sets and at least the internationally distributed AIC.

(x) A checklist NOTAM shall have the same distribution as the actual message series to which they refer and shall be clearly identified as checklist.

(y) Series allocation shall be monitored and if required, appropriate measures shall be taken to assure that no series reaches the maximum possible number of issued NOTAM before the end of a calendar year.

Chapter 2 — Digital data sets

AIS.TR.335 General

(a) A standard for geographic information shall be used as a reference framework.

(b) A description of the available digital data sets shall be provided in the form of data product specification.

(c) A checklist of the available data sets, including their effective and publication dates, shall be made available to allow the users to ensure that current data is being used.

(d) The checklist of data sets shall be made available through the same distribution mechanism as used for the data sets.

AIS.TR.340 Metadata requirements

The minimum metadata for each data set shall include:

(a) the name of the organisations or entities providing the data set;

(b) the date and time when the data set was provided;

(c) validity of the data set; and

(d) any limitations with regard to the use of the data set.

AIS.TR.345 AIP data set

(a) The AIP data set shall include data about the following subjects, with the properties indicated being included, if applicable:

Data subjects	**Associated properties as a minimum**
ATS airspace	type, name, lateral limits, vertical limits, class of airspace
Special activity airspace	type, name, lateral limits, vertical limits, restriction, activation
Route	identifier prefix, flight rules, designator
Route segment	navigation specification, startpoint, endpoint, track, distance, upper limit, lower limit, minimum en route altitude (MEA), minimum obstruction clearance altitude (MOCA), direction of cruising level, reverse direction of cruising level, required navigation performance
Waypoint — en route	reporting requirement, identification, location, formation
Aerodrome/heliport	location indicator, name, designator IATA, served city, certified ICAO, certification date, certification expiration date, control type, field elevation, reference temperature, magnetic variation, airport reference point

Runway	designator, nominal length, nominal width, surface type, strength
Runway direction	designator, true bearing, threshold, take-off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), landing distance available (LDA), rejected TODA
FATO	designation, length, width, threshold point
TLOF	designator, centre point, length, width, surface type
Radio navigation aid	type identification, name, aerodrome served, hours of operation, magnetic variation, frequency/channel, position, elevation, magnetic bearing, true bearing, zero bearing direction

(b) When a property is not defined for a particular occurrence of the subjects listed in (a), the AIP data sub-set shall include an explicit 'not applicable' indication.

AIS.TR.350 Terrain and obstacle data — general requirements

The coverage areas for sets of electronic terrain and obstacle data shall be specified as:

(a) Area 1: the entire territory of a State;

(b) Area 2: within the vicinity of an aerodrome, subdivided as follows:

(1) Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists;

(2) Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15 % to each side;

(3) Area 2c: an area extending outside Areas 2a and 2b at a distance of not more than 10 km from the boundary of Area 2a; and

(4) Area 2d: an area outside the Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing terminal manoeuvring area (TMA) boundary, whichever is nearest;

(c) Area 3: the area bordering an aerodrome movement area that extends horizontally from the edge of a runway to 90 m from the runway centre line and 50 m from the edge of all other parts of the aerodrome movement area; and

(d) Area 4: the area extending 900 m prior to the runway threshold and 60 m each side of the extended runway centre line in the direction of the approach on a precision approach runway, category II or III. [Annex 15, Appendix 1, Terrain and Obstacle data requirements]

AIS.TR.355 Terrain data sets

(a) Terrain data sets shall contain the digital representation of the terrain surface in the form of continuous elevation values at all intersections of a defined grid, referenced to common datum.

(b) A terrain grid shall be angular or linear and shall be of regular or irregular shape.

(c) Sets of terrain data shall include spatial (position and elevation), thematic and temporal aspects for the surface of the Earth containing naturally occurring features, excluding obstacles.

(d) Only one feature type shall be provided.

(e) The terrain feature attributes represent the minimum set of terrain attributes, and those annotated as mandatory shall be recorded in the terrain data set.

(f) Within Areas 2b, 2c and 2d, terrain data shall be collected:

(1) within 10 km from the aerodrome reference point (ARP);

(2) beyond 10 km from the ARP if terrain penetrates the horizontal plane 120 m above the lowest runway elevation.

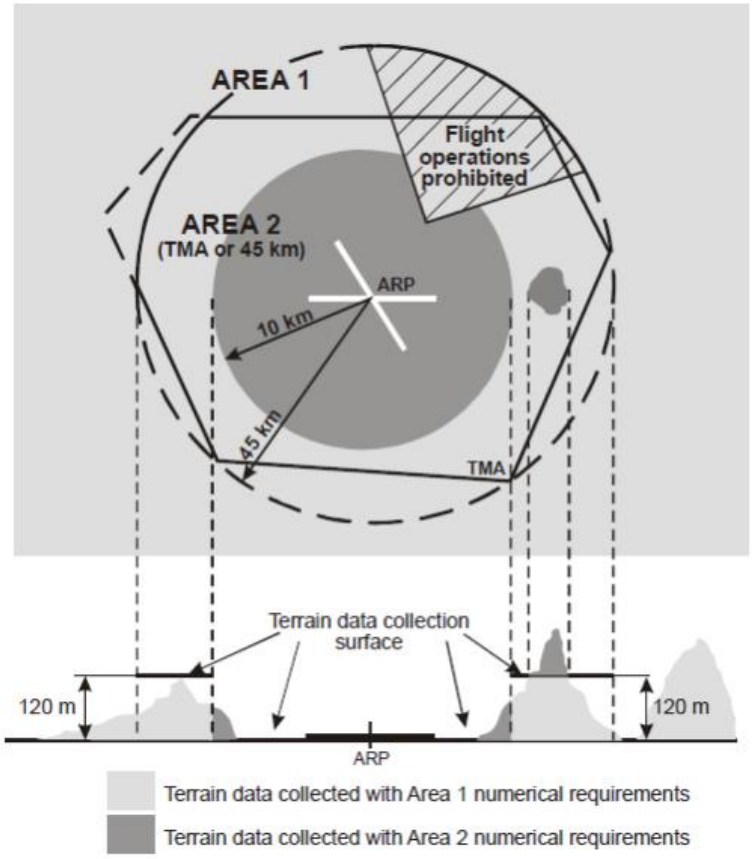
(g) Within the area covered by a 10-km radius from the ARP, terrain data shall comply with the Area 2 numerical requirements.

(h) In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that penetrates the horizontal plane 120 m above the lowest runway elevation shall comply with the Area 2 numerical requirements.

(i) In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that does not penetrate the horizontal plane 120 m above the lowest runway elevation shall comply with the Area 1 numerical requirements.

(j) In those portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, terrain data shall comply with the Area 1 numerical requirements.

(k) Within Area 3, terrain data shall be collected for terrain that extends half metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area.



AIS.TR.360 Obstacle data sets

(a) Obstacle data elements are features that shall be represented in the data sets by points, lines or polygons.

(b) All defined obstacle feature types shall be provided and each of them shall be described.

(c) Obstacle data for Areas 2 and 3 shall be collected in accordance with the following obstacle collection surfaces:

(1) the Area 2a obstacle collection surface has a height of 3 m above the nearest runway elevation measured along the runway centre line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end;

(2) the Area 2b obstacle collection surface has a 1.2% slope extending from the ends of Area 2a at the elevation of the runway end in the direction of departure, with a length of 10 km and a splay of 15% to each side. Obstacles less than 3 m in height above ground need not be collected;

(3) the Area 2c obstacle collection surface has a 1.2% slope extending outside Areas 2a and 2b at a distance of not more than 10 km from the boundary of Area 2a. The initial elevation of Area 2c shall be the elevation of the point of Area 2a at which it commences. Obstacles less than 15 m in height above ground need not be collected; and

(4) the Area 2d obstacle collection surface has a height of 100 m above ground; and

(5) the Area 3 obstacle collection surface extends half-metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area.

(d) In those portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, obstacle data shall be collected and recorded in accordance with the Area 1 numerical requirements.

(e) The obstacle data product specification, supported by geographical coordinates for each aerodrome included within the dataset, shall describe the following areas:

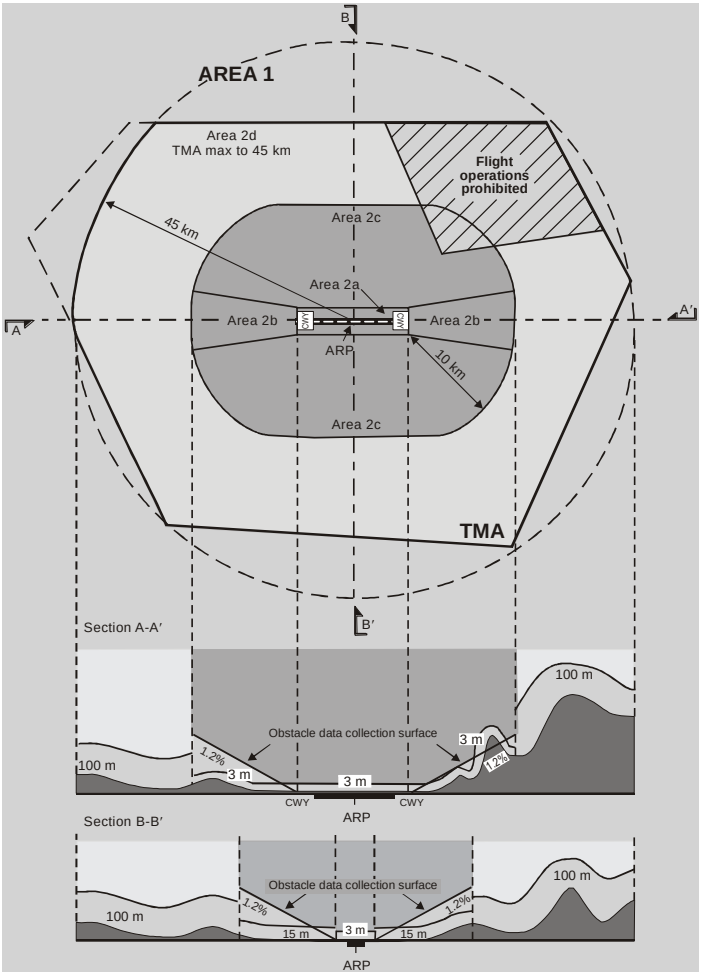
(1) Areas 2a, 2b, 2c and 2d;

(2) the take-off flight path area; and

(3) the obstacle limitation surfaces.

(f) Obstacle data sets shall contain the digital representation of the vertical and horizontal extent of obstacles.

(g) Obstacles shall not be included in terrain data sets.



AIS.TR.365 Aerodrome mapping data sets

(a) Aerodrome mapping data sets shall contain the digital representation of aerodrome features.

(b) Standards for geographic information shall be used as a reference framework.

(c) Aerodrome mapping data products shall be described following the relevant data product specification standard.

(d) The content and structure of aerodrome mapping data sets shall be defined in terms of an application schema and a feature catalogue.

AIS.TR.370 Instrument flight procedure data sets

(a) Instrument flight procedure data sets shall contain the digital representation of instrument flight procedures.

(b) The instrument flight procedure data set shall include data about the following subjects, including all of their properties:

(1) procedure;

(2) procedure segment;

(3) final approach segment;

(4) procedure fix;

(5) procedure holding; and

(6) helicopter procedure specifics.

Section 4 — Distribution and pre-flight information services

AIS.TR.400 Distribution services

(a) The international exchange of ASHTAM, and NOTAM where States continue to use NOTAM for distribution of information on volcanic activity, shall include volcanic ash advisory centres and the world area forecast centres, and shall take account of the requirements of long-range operations.

(b) A predetermined distribution system for NOTAM transmitted on the AFS shall be used whenever possible.

(c) Distribution of NOTAM series other than those distributed internationally shall be granted upon request.

(d) NOTAM shall be prepared in conformity with the relevant provisions of the ICAO communication procedures.

AIS.TR.405 Pre-flight information services

(a) Automated pre-flight information systems shall be used to make aeronautical data and aeronautical information available to operations personnel, including flight crew members, for self-briefing, flight planning and flight information service purposes.

(b) The human–machine interface of such facilities shall ensure easy access in a guided manner to all relevant information/data.

(c) Self-briefing facilities of an automated pre-flight information system shall provide access for consultation as necessary with the aeronautical information service by telephone or other suitable telecommunications means.

(d) Automated pre-flight information systems for the supply of aeronautical data and aeronautical information for self-briefing, flight planning and flight information service shall:

(1) provide for continuous and timely updating of the system database and monitoring of the validity and quality of the aeronautical data stored;

(2) permit access to the system by operations personnel including flight crew members, aeronautical personnel concerned and other aeronautical users through suitable telecommunications means;

(3) ensure provision, in paper copy form, of the aeronautical data and aeronautical information accessed, as required;

(4) use access and interrogation procedures based on abbreviated plain language and ICAO location indicators, as appropriate, or based on a menu-driven user interface or other appropriate mechanism as agreed between the civil aviation authority and operator concerned; and

(5) provide for rapid response to a user request for information.

(e) All NOTAM shall be made available for briefing by default, and content reduction shall be at user's discretion.

Section 5 — Aeronautical information products updates

AIS.TR.500 General

The same update AIRAC cycle shall be applied to the AIP, the AIP amendments, the AIP data set and the instrument flight procedure data sets in order to ensure the coherence of the data items that appear in multiple aeronautical information products.

AIS.TR.505 AIRAC

(a) Information provided under the AIRAC system and published in paper copy or made available on physical media shall be distributed at least 42 days in advance of the effective date.

(b) When information has not been submitted by the AIRAC date, a NIL notification shall be distributed by NOTAM or other suitable means, not later than one cycle before the AIRAC effective date concerned.

AIS.TR.510 NOTAM updates

(a) NOTAM shall be published with sufficient lead time for the affected parties to take any required action, except in the case of unserviceability, volcanic activity, release of radioactive material, toxic chemicals and other events that cannot be foreseen.

(b) NOTAM notifying unserviceability of aids to air navigation, facilities or communication services shall give an estimate of the period of unserviceability or the time at which restoration of service is expected.

(c) Within three months from the issuing of a permanent NOTAM, the information contained in the NOTAM shall be included in the aeronautical information products affected.

(d) Within three months from the issuing of a temporary NOTAM of long duration, the information contained in the NOTAM shall be included in an AIP supplement.

(e) When a NOTAM with estimated end of validity unexpectedly exceeds the three-month period, a replacement NOTAM shall be issued unless the condition is expected to last for a further period of more than three months; in this case, an AIP supplement shall be issued.

(f) A 'Trigger' NOTAM shall give a brief description of the content, the effective date and time, and the reference number of the amendment, datasets or supplement.

(g) A 'Trigger' NOTAM shall come into force on the same effective date and time as the AIP amendment or supplement.

(h) In the case of an AIP amendment, a 'Trigger' NOTAM shall remain valid for a period of fourteen days.

(i) In the case of an AIP supplement that is valid for less than fourteen days, the 'Trigger' NOTAM shall remain valid for the complete validity period of the AIP supplement.

(j) In the case of an AIP supplement that is valid for fourteen days or more, the 'Trigger' NOTAM shall remain valid for at least fourteen days.

AIS.TR.515 Digital data updates

(a) The update interval for the AIP data set and the instrument flight procedure data sets shall be specified in data product specification.

(b) Data sets that have been made available in advance, according to the AIRAC cycle, shall be updated with the non-AIRAC changes that occurred in between the publication and the effective date.

3.1.2. Proposed amendments to Regulation (EU) No 139/2014

The following points are added:

ADR.OR.D.015 Personnel requirements

The aerodrome operator shall ensure that the personnel responsible for tasks in the provision of aeronautical data or aeronautical information are adequately trained, competent and authorised for the job they are required to do.

ADR.OPS.A.011 Data error detection and authentication

(a) The aerodrome operator shall ensure that aeronautical data and aeronautical information are protected in accordance with data error detection, security, and authentication techniques.

(b) The aerodrome operator shall ensure that aeronautical data and aeronautical information are protected against loss or alteration by the application of a data integrity protection mechanism.

ADR.OPS.A.012 Data catalogue

The aerodrome operator shall ensure that aeronautical data is originated in accordance with the data catalogue specified in Appendix 1 to Annex III to Regulation (EU) …/….

ADR.OPS.A.013 Metadata

The metadata shall include, as a minimum, the following items:

(a) the identification of the organisation performing data origination;

(b) the action performed on the data;

(c) the date and time the action was performed; and

(d) details of any limitations on the data.

ADR.OPS.A.014 Data exchange

Aeronautical data shall be exchanged through electronic means.

3.2. Draft AMC and GM (draft decisions)

3.2.1. Proposed amendments to AMC and GM to Regulation .../...

(1) In Annex I, the following new GM is introduced:

GM
ANNEX I
DEFINITIONS OF TERMS USED IN ANNEXES II to XIII

GM1 to Definition XX 'Data product specification'

A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a data set. It may be used for production, sales, end-use or other purpose. Data product specification provides a means by which the content of a data set is precisely specified. A data product specification supports the party generating a data set by providing information as to what exactly should be included within the data set. The content of the data product specification is closely related to the metadata model. The users of the data may determine, by comparing their data product specification with the metadata, how the data may be used in their application and what mitigations, if any, are needed as result of, for example, the quality/completeness of the data.

GM1 to Definition XX 'Integrity classification (aeronautical data)'

Aeronautical data are classified as:

(a) routine data: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;

(b) essential data: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and

(c) critical data: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

(2) In Appendix 1 to Article 3(3), the following new AMC and GM are introduced:

AMC/GM

TO APPENDIX 1 TO ARTICLE 3(3)
REQUIREMENTS FOR AVIATION UNDERTAKINGS

GM1 to 4. Data catalogue

The data catalogue presents the scope of data that can be collected and maintained by the aeronautical information services providers and provides a common terminology that can be used by data originators and service providers.

GM1 to 2(a) Common reference systems for air navigation
HORIZONTAL REFERENCE SYSTEM — WGS-84

A reference system provides a definition of a co-ordinate system in terms of the position of an origin in space, the orientation of an orthogonal set of Cartesian axes, and a scale. A terrestrial reference system defines a spatial reference system in which positions of points anchored on the Earth's solid surface have coordinates. Examples are: WGS-84, ITRS/European Terrestrial Reference System (ETRS) and national reference systems.

WGS-84 defines, inter alia, a conventional terrestrial reference system, a reference frame and a reference ellipsoid. The system was developed by the United States Department of Defence, together with scientists of other States and institutions. WGS-84 is currently the reference system ICAO requires for geo-referencing aeronautical information.

The WGS-84 co-ordinate system is a right-handed, Earth-fixed orthogonal coordinate system. In the National Imaging and Mapping Agency TR8350.2 — Department of Defense, WGS-84, [RD 30], WGS-84 is characterised as follows:

(a) It is geocentric, the centre of mass being defined for the whole Earth, including oceans and atmosphere;

(b) Its scale is that of the local Earth frame, in the sense of a relativistic theory of gravitation;

(c) Its orientation was initially given by the Bureau International de l'Heure (BIH) orientation of 1984.0; and

(d) Its time evolution in orientation will create no residual global rotation with regard to the crust.

The set of definitions for WGS-84 not only includes a reference system, but also the practical realisation of a reference frame through a set of station co-ordinates. The latest available frame is called 'WGS-84 (G873)', where letter 'G' indicates that the station co-ordinates has been derived by global positioning system (GPS) techniques and the number following 'G' indicates the GPS week number in which these co-ordinates were implemented (January 29, 1997). The accuracy of the station co-ordinates is in the order of 5 cm (1 σ).

Part of the WGS-84 definition is the ellipsoid as a geometric (mathematical) reference surface. Geometric constants of the WGS-84 ellipsoid should be as described in the tables below.

Semi-major axis	a = 6378137.000 m
Reciprocal of Flattening	f = 1/298.257223563
Angular Velocity of the earth	ω = 7292115.0 x 10^{-11} rad/s
Gravitational Constant	GM = (3986004.418 ± 0.008) x 10^{8} m^3/s^2

Table on geometric constants

Semi-minor axis	b = 6356752.3142 m
First eccentricity	e = 8.1819190842622 x 10^{-2}
$(\text{First eccentricity})^2$	e^2= 6.69437999014 x 10^{-3}
Mean Radius of Semi-Axes	R1 = 6371008.7714 m

Table on some of WGS-84 ellipsoid-derived geometric constants

Further explanation and guidance may be found in Annex B (Horizontal reference systems) to EUROCONTROL Specifications for the Origination of Aeronautical Data, Volume 2: Guidance material (EUROCONTROL-SPEC-154, Edition 1.0 of 04/02/2013).

GM2 to 2(a) Common reference systems for air navigation
TEMPORARY NON-COMPLIANCE OF GEOGRAPHICAL CO-ORDINATES

In those particular cases where geographical co-ordinates have been transformed into WGS-84 coordinates by mathematical means and whose accuracy of original field work does not meet the applicable requirements contained in the data catalogue, they should be identified until the time when they can be compliant.

AMC1 to 2(b) Common reference systems for air navigation
VERTICAL REFERENCE SYSTEM

(a) A service provider should use the Earth Gravitational Model — 1996 (EGM-96), as the global gravity model.

(b) At those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation specified in Annex 14, Volumes I and II, on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength), gravity field data should be developed and used. When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, should be provided in the AIP.

GM1 to 2(b) Common reference systems for air navigation
VERTICAL REFERENCE SYSTEM

Further explanation and guidance may be found in Annex C (Vertical reference systems) to EUROCONTROL Specifications for the Origination of Aeronautical Data, Volume 2 (EUROCONTROL-SPEC-154, Edition 1.0 of 04/02/2013).

GM1 to 2(b) Common reference systems for air navigation
MEAN SEA LEVEL

(a) The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.

(b) Gravity-related heights (elevations) are also referred to as 'orthometric heights', while distances of points above the ellipsoid are referred to as 'ellipsoidal heights'.

(c) Global and local geoids differ in their origin: global geoids consider only the long- and middle-wave part of the Earth's gravity field, whilst local geoids also consider the short-wave part of the gravity field. Global geoids are used when consistent orthometric heights, over long distances (continent or earth surveying), are required. Currently, the world's best global geoid model is EGM 200846. It was determined using satellite tracking, gravity anomalies and satellite altimetry. Its accuracy is in the range of ± 0.05 m (oceans) and ± 0.5 m (on land). This accuracy is higher in flat regions than in topographically mountainous terrain, such as the Alps.

(d) For local engineering applications and cadastre-surveying, global geoids are not as accurate as needed. For such applications, local geoid models are calculated. These can only be developed using local field measurements. They offer centimetre accuracy over several hundred kilometres, with a high resolution. Local geoids are not suitable for height comparison over large distances since they are based on different origins and reference heights (different equipotential levels).

Further explanation and guidance may be found in Annex C (Vertical reference systems) to EUROCONTROL Specifications for the Origination of Aeronautical Data, Volume 2: Guidance material (EUROCONTROL-SPEC-154, Edition 1.0 of 04/02/2013).

GM1 to 2(c) Common reference systems for air navigation
TEMPORAL REFERENCE SYSTEM

(a) A value in the time domain is a temporal position measured relative to a temporal reference system.

(b) ISO Standard 8601 specifies the use of the Gregorian calendar and 24-hour local or UTC for information interchange, while ISO Standard 19108 prescribes the Gregorian calendar and UTC as the primary temporal reference system for use with geographic information.

GM1 to 3. Formal arrangements
DATA EXCHANGE

The means for data exchange to be used and its related specifics should be defined by the respective parties in the formal arrangements.

GM1 to 5. Data quality requirements
CONCEPT

Minimum requirements for the processing of aeronautical data may be found in the EUROCAE Document ED-76A, 'Standards for processing aeronautical data', June 2015, which aims to assist aeronautical data chain actors.

GM1 to 5(e) Data quality requirements
TRACEABILITY

Traceability is supported by maintaining the metadata.

GM1 to 6. Data verification and validation
DATA PROCESSING

(a) Validation

(1) Validation is the activity where a data element is checked as having a value that is fully applicable to the identity ascribed to the data element, or where a set of data elements are checked as being acceptable for their intended use.

(2) The application of validation techniques considers the entire aeronautical data chain. This includes the validation performed by prior data chain participants and any requirements levied on the data supplier.

(3) Examples of validation methods include:

(i) Validation by application

One method of validation is to apply data under test conditions. In certain cases, this may not be practical. Validation by application is considered to be the most effective form of validation. For example, flight inspection of final approach segment data prior to publication can be used to ensure that the published data is acceptable.

(ii) Logical consistency

Logical consistency validates by comparing two different data sets or elements and identifying inconsistencies between values based on operative rules (e.g. business rules).

(iii) Semantic consistency

Semantic consistency validates by comparing data to an expected value or range of values for the data characteristics.

(iv) Validation by sampling

Validation by sampling evaluates a representative sample of data and applies statistical analysis to determine the confidence in the data quality.

(b) Verification

(1) Verification is a process for checking the integrity of a data element whereby the data element is compared to another source, either from a different process or from a different point in the same process. While verification cannot ensure that the data is correct, it can be effective to ensure that the data has not been corrupted by the data process.

(2) The application of verification techniques considers only the portion of the aeronautical data chain controlled by the organisation. Yet, verification techniques may be applied at multiple phases of the data processing chain.

(3) Examples of verification techniques include:

(i) Digital error detection techniques

Digital error detection techniques can be used to detect errors during the transmission or storage of data. An example of a digital error detection technique is the use of cyclic redundancy checks (CRCs). Coding techniques can be effective regardless of the transmission media (e.g. computer disks, modem communication, or internet).

Digital data error detection techniques shall apply to all integrity levels of data sets.

(ii) Feedback

Feedback testing is the comparison between the output and input state of a data set.

(iii) Independent redundancy

Independent redundancy testing involves processing the same data through two or more independent processes and comparing the data output of each process.

(iv) Update comparison

Updated data can be compared to its previous version. This comparison can identify all data elements that have changed. The list of changed elements can then be compared to a similar list generated by the supplier. A problem can be detected if an element is identified as changed on one list and not on the other.

GM2 to 6. Data verification and validation
TECHNIQUES

Validation and verification techniques are employed throughout the data processing chain to ensure that the data meets the associated data quality requirements. More explanatory material may be found in ED-76A 'Standards for processing aeronautical data', June 2015.

GM1 to 8. Data error detection and authentication
DEFINING DATA SECURITY REQUIREMENTS

(a) Transmission of data via electronic/digital means (e.g. file transfer protocol (FTP) sites, web downloads, or email) may be subject to malicious attack that can corrupt the integrity of data for its intended use. Provision of means to mitigate the intentional corruption of digitally transmitted data may already exist within the organisational construct and operating procedures of participating entities. This section provides requirements to address data security.

(b) The objective of data security is to ensure that data is received from a known source and that there is no intentional corruption during processing and exchange of data.

(c) Records shall be maintained to show what data security provisions have been implemented.

(d) Provisions supporting this objective may include:

(1) implementation of technical data security measures to provide authentication and prevent intentional corruption during exchange of data (e.g. secure hashes, secure transmissions, digital signatures); and

(2) Implementation of organisational data security measures to protect processing resources and prevent intentional corruption during processing of data.

GM1 to 8. Data error detection and authentication
DATA PROCESSING

More explanation and guidance may be found in Appendix C (Guidance on compliance with data processing requirements) of EUROCAE ED-76A.

GM1 to 9. Data exchange
ELECTRONIC MEANS

The exchange of aeronautical data and aeronautical information may be done by different means including email or pdf documents, without any manual interaction with the data itself.

GM1 to 10. Error handling requirements
GENERAL

(a) The term 'error' is understood as being defective, degraded, lost, misplaced or corrupted data elements, or data elements not meeting stated quality requirements.

(b) Guidance on how to detect, identify, report and address/resolve aeronautical data errors may be found in EUROCAE ED-76A, 'Standards for processing aeronautical data', June 2015.

(3) In Subpart A of Annex III, the following new AMC and GM are introduced:

(…)

GM1 ATM/ANS.OR.A.080 DATA EXCHANGE
ELECTRONIC MEANS

The exchange of aeronautical data and aeronautical information may be done by different means including email or pdf documents, without any manual interaction with the data itself.

AMC1 ATM/ANS.OR.A.080(b) Aeronautical data and aeronautical information
PROCEDURES

Based on the integrity classification specified in the data catalogue, procedures should be put in place so that:

(a) for routine data, corruption is avoided throughout the processing of the data;

(b) for essential data, it is assured that corruption does not occur at any stage of the entire process and additional processes are included, as needed, to address potential risks in the overall system architecture to further assure data integrity at this level; and

(c) for critical data, it is assured that corruption does not occur at any stage of the entire process and additional integrity assurance processes are included to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

AMC1 ATM/ANS.OR.A.080(d) Aeronautical data and aeronautical information
FORMAL ARRANGEMENTS — CONTENT

Formal arrangements should include the following minimum content:

(a) the aeronautical data to be provided;

(b) the data quality requirements for each data item supplied according to the data catalogue;

(c) the method(s) for demonstrating that the data provided conforms with the specified requirements;

(d) the action to be taken in the event of discovery of a data error or inconsistency in any data provided;

(e) the following minimum criteria for notification of data changes:

(1) criteria for determining the timeliness of data provision based on the operational or safety significance of the change;

(2) any prior notice of expected changes; and

(3) the means to be adopted for notification;

(f) the party responsible for documenting data changes;

(g) data exchange details such as format or format change processes;

(h) any limitations on the use of data;

(i) requirements for the production of data origination quality reports;

(j) metadata requirements; and

(k) contingency requirements concerning the continuity of data provision.

AMC1 ATM/ANS.OR.A.080(f) Aeronautical data and aeronautical information
TOOLS

The tools used to support or automate aeronautical data and aeronautical information processes which are implemented fully or partially in software, should:

(a) correctly state what is required by the software in order to satisfy the tool requirements; and

(b) be traceable to the tool requirements referred to in point 2.

AMC2 ATM/ANS.OR.A.080(f) Aeronautical data and aeronautical information
TOOLS AND SOFTWARE — EVIDENCE

(a) In order to prove that software tools do not adversely impact on the quality of data, the potential software contribution to failure conditions should be analysed and a global analysis process of error cases should be chosen e.g. 'Failure Modes and Effects Analysis' (FMEA).

(b) During the software requirements phase, system-level requirements dealing with error cases should be further developed, or detailed, as requirements.

GM1 ATM/ANS.OR.A.080(f) Aeronautical data and aeronautical information
SOFTWARE

(a) A means by which ATM/ANS.OR.A.095 can be met, is through the validation and verification of software applied to a known executable version of the software in its target operating environment.

(b) The validation of software is a process of ensuring that software meets the requirements for the specified application or intended use of the aeronautical data and aeronautical information.

(c) The verification of software is an evaluation of the output of an aeronautical data and/or aeronautical information software development process to ensure correctness and consistency with respect to the inputs and applicable software standards, rules and conventions used in that process.

GM2 ATM/ANS.OR.A.080(f) Aeronautical data and aeronautical information
TOOLS AND SOFTWARE — TOOL QUALIFICATION

Tools (e.g. software) can be used to eliminate, reduce or automate the activities associated with aeronautical data processes. Tool qualification is the process by which assurance is achieved that tools employed will neither introduce errors into the data nor fail to detect an error. When required, tool qualification shall be performed within the context of the tool's intended use, using EUROCAE ED-215/RTCA DO-330 with adaptations provided in EUROCAE ED-76A/RTCA DO-200B, Appendix D.

The objectives of tool qualification are to:

— demonstrate that the tool complies with its requirements; and

— ensure that the tool provides equivalence to any activities that it automates and tool qualification is commensurate with the tool's intended use or the data production process.

(a) Determining requirement for tool qualification

Tools shall be qualified when data processes are eliminated, reduced or automated by the use of the tool without the output being verified. Only tools that have the ability to insert or fail to detect an error in the aeronautical data process require qualification. The following requirements apply equally to tools obtained 'off the shelf' or developed by the data chain participants.

— Each proposal for a new tool or for a modification of an existing tool, shall be reviewed to determine whether the tool is required to undergo qualification; and

— Where a decision is made that qualification is not required, justification for that decision shall be documented.

The tool qualification process may be applied to a single tool, a collection of tools, or one or more functions within a tool. For a tool with multiple functions, if protection between tool functions can be demonstrated, only those functions that are used to eliminate, reduce or automate data processes, and whose outputs are not verified, need to be qualified. Protection is the use of a mechanism to ensure that a tool function cannot adversely impact on another tool function. A tool is qualified where the intention to use the tool is stated in the data processing procedures. A tool is qualified to support data quality, as defined in the DQRs. If a tool is used to provide data compliance with additional or modified DQRs, the need for re-qualification shall be assessed.

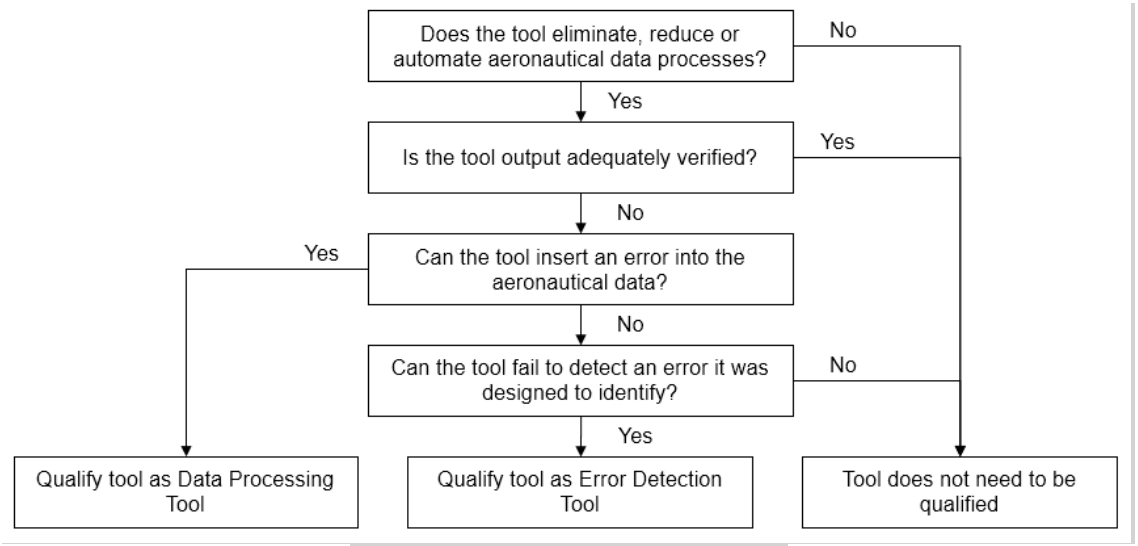


Figure: Criteria for tool qualification

The first question posed is whether or not the tool eliminates, reduces, or automates an activity associated with the aeronautical data chain, which includes any action that is performed to complete an aeronautical data chain functional link. If the answer is yes, the next question is posed, and if no, the tool does not need to be qualified.

The second question is whether or not the activity or resultant output of the tool will be adequately verified by a different qualified tool or a manual process. If the answer is no, the next question is posed, and if yes, the tool does not need to be qualified.

The third question is whether or not the tool has the ability to insert an error into the aeronautical data contained in the database being processed. If the answer is yes, the tool shall be qualified as a data processing tool. If the answer is no, the next question is posed.

The final question posed, for tools that have not yet been identified as needing qualification, is whether or not the tool could theoretically fail to detect an error it was designed to identify. If the answer is yes, the tool shall be qualified as an error detection tool, and if no (which essentially means that the tool was not designed to directly perform modification or verification of any aeronautical data elements), the tool does not need to be qualified. It should be noted that the error detection tool does not need qualification to find any error that may exist in the data, but only errors in the data it is designed to find.

NOTE: The decision to reference EUROCAE ED-215/RTCA DO-330 for RTCA EUROCAE ED-76A/RTCA DO-200B's tool qualification standard is made to specify an actionable set of objectives through which tool qualification rigor can be tied to data process assurance level (DPAL). Additionally, it brings tool qualification methods into alignment with related domains in the aviation software industry.

(b) Determining tool qualification level

When tool qualification is needed, the impact of the tool use in the aeronautical data chain should be assessed in order to determine its tool qualification level (TQL).

The appropriate DPAL and TQL are indicated in the table below. Three levels of tool qualification, TQL-3 to TQL-5, are identified based on the tool use and its potential impact on the aeronautical data chain. TQL-3 is the most rigorous level and TQL-5 is the least rigorous level.

The objectives, activities, and guidance required for each TQL are described in EUROCAE ED-215/RTCA DO-330 with adaptations provided in Appendix D of this standard (TQL-1 and TQL-2 are not invoked).

DPAL	**Data processing tool**	**Error detection tool**
1	TQL-3	TQL-5
2	TQL-4	TQL-5
3	Not required	Not required

(c) Tools previously qualified under EUROCAE ED-76/RTCA DO-200A

If an organisation has tools that were previously qualified under EUROCAE ED-76/RTCA DO-200A and it desires to meet EUROCAE ED-76A/RTCA DO-200B process standards, those tools can continue to be used without additional qualification activities taking place as long as the following conditions are met:

— The tool has not changed since its previous qualification;

— The tool environment has not changed since its previous qualification; and

— The use of the tool to eliminate, reduce or automate activities associated with aeronautical data processes remains the same.

Tools previously qualified under EUROCAE ED-76/RTCA DO-200A that have changed and require requalification after a data supplier has transitioned to meet EUROCAE ED-76A/RTCA DO-200B process standards, shall perform that new qualification based on the following guidelines.

First, the tool is classified as a data processing or error detection tool. Then, the RTCA DO-200B/EUROCAE ED-76A TQL that the tool corresponds to is determined using Section 2.4.5.2. Based on this determination, one of the three following requirements applies:

— For tools categorised as TQL-3, the new tool qualification process shall follow RTCA DO-200B/EUROCAE ED-76A tool qualification standards.

— For tools categorised as TQL-4, the tool qualification process approved under RTCA DO-200A/EUROCAE ED-76 may continue to be used so long as concurrence from the authority granting recognition of compliance with this standard has been obtained/maintained. This concurrence may be granted based on an analysis of the tool addressing one or more of the following concepts:

- configuration management of the tool;
- effectiveness of problem reporting activity for the tool;
- stability and maturity of the tool;
- relevance of tool service history environment;
- actual error rates and tool service history; and
- impact of tool modifications.

If concurrence cannot be achieved or is not desired, EUROCAE ED-76A/RTCA DO-200B tool qualification standards shall be met.

— For tools categorised as TQL-5, the tool qualification process shall follow either EUROCAE ED-76 / RTCA DO-200B tool qualification standards, or the supplier's previous tool qualification process approved under EUROCAE ED-76/RTCA DO-200A.

NOTE: The previous tool qualification data collected using EUROCAE ED-76/RTCA DO-200A tool qualification standards, or a tool's service history, can be used as an alternate method of compliance with some RTCA DO-330/EUROCAE ED-215 objectives if qualification is being performed against EUROCAE ED-76A/RTCA DO-200B standards. EUROCAE ED-215/RTCA DO-330 provides additional information regarding alternative methods for tool qualification.

GM3 ATM/ANS.OR.A.080(f) Aeronautical data and aeronautical information
TOOL AND SOFTWARE

This GM provides guidance on the application of EUROCAE ED-215/RTCA DO-330 to qualified tools in the aeronautical data processing domain.

In the aeronautical data processing domain, EUROCAE ED-215/RTCA DO-330 certification liaison objectives are not applicable.

The following terms from EUROCAE ED-215/RTCA DO-330 are changed to the aeronautical data processing domain. They are applicable to the intent of EUROCAE ED-76A/RTCA DO-200B, Appendix D:

— Certification credit — replaced by the general statement 'satisfaction of the applicable RTCA DO-200B/EUROCAE ED-76A objectives';

— Certification authority — should be understood as approval authority (See EUROCAE ED-76A/RTCA DO-200B, Section 2.5.1);

— Applicant — identifies the entity seeking compliance with EUROCAE ED-76A/RTCA DO-200B requirements; and

— Terms such as 'software life cycle', 'software processes', 'software plans', and 'software' are used. They refer to the product life cycle, processes, plans, and domain where the tool will be used in the software domain. In the context of this standard, the term 'software" should be understood as 'aeronautical databases', and 'software life cycle processes' should be understood as 'aeronautical data processes'.

TQL-1 and TQL-2 are not invoked as they have been assessed as not applicable to the aeronautical data processing domain.

Tool development standards (e.g. tool requirements standards, tool design standards, and tool coding standards), as defined in EUROCAE ED-215/RTCA DO-330, are not required under the aeronautical data processing domain.

GM4 ATM/ANS.OR.A.080(f) Aeronautical data and aeronautical information
TOOL AND SOFTWARE — PROCESSING ADAPTATIONS

Tables:

— summarising the objectives adapted from EUROCAE ED-215/RTCA DO-330 by showing the applicability of each objective by TQL;

— whether the objective is to be implemented with independence;

— the output which results from satisfying the objective;

— and the control category for each tool life cycle data item,

may be found in Appendix D.2 to ED-76A (EUROCAE ED-215/RTCA DO-330 OBJECTIVES AERONAUTICAL DATA PROCESSING ADAPTATIONS)

GM1 ATM/ANS.OR.A.080(h) Aeronautical data and aeronautical information
VALIDATION AND VERIFICATION

(a) Validation

(1) Validation is the activity where a data element is checked as having a value that is fully applicable to the identity ascribed to the data element, or where a set of data elements are checked as being acceptable for their intended use.

(2) The application of validation techniques considers the entire aeronautical data chain. This includes the validation performed by prior data chain participants and any requirements levied on the data supplier.

(3) Examples of validation methods include:

(i) Validation by application

One method of validation is to apply data under test conditions. In certain cases, this may not be practical. Validation by application is considered to be the most effective form of validation. For example, flight inspection of final approach segment data prior to publication can be used to ensure that the published data is acceptable.

(ii) Logical consistency

Logical consistency validates by comparing two different data sets or elements and identifying inconsistencies between values based on operative rules (e.g. business rules).

(iii) Semantic consistency

Semantic consistency validates by comparing data to an expected value or range of values for the data characteristics.

(iv) Validation by sampling

Validation by sampling evaluates a representative sample of data and applies statistical analysis to determine the confidence in the data quality.

(b) Verification

(1) Verification is a process for checking the integrity of a data element whereby the data element is compared to another source, either from a different process or from a different point in the same process. While verification cannot ensure that the data is correct, it can be effective to ensure that the data has not been corrupted by the data process.

(2) The application of verification techniques considers only the portion of the aeronautical data chain controlled by the organisation. Yet, verification techniques may be applied at multiple phases of the data processing chain.

(3) Examples of verification techniques include:

(i) Digital error detection techniques

Digital error detection techniques can be used to detect errors during the transmission or storage of data. An example of a digital error detection technique is the use of cyclic redundancy checks (CRCs). Coding techniques can be effective regardless of the transmission media (e.g. computer disks, modem communication, or internet).

Digital data error detection techniques shall apply to all integrity levels of data sets.

(ii) Feedback

Feedback testing is the comparison between the output and input state of a data set.

(iii) Independent redundancy

Independent redundancy testing involves processing the same data through two or more independent processes and comparing the data output of each process.

(iv) Update comparison

Updated data can be compared to its previous version. This comparison can identify all data elements that have changed. The list of changed elements can then be compared to a similar list generated by the supplier. A problem can be detected if an element is identified as changed on one list and not on the other.

GM2 ATM/ANS.OR.A.080(h) Aeronautical data and aeronautical information
VALIDATION AND VERIFICATION TECHNIQUES

Validation and verification techniques are employed throughout the data processing chain to ensure that the data meets the associated DQRs. More explanatory material may be found in ED-76A 'Standards for processing aeronautical data'.

GM1 ATM/ANS.OR.A.085(a) Common reference systems for air navigation
HORIZONTAL REFERENCE SYSTEM — WGS-84

A reference system provides a definition of a co-ordinate system in terms of the position of an origin in space, the orientation of an orthogonal set of Cartesian axes, and a scale. A terrestrial reference system defines a spatial reference system in which positions of points anchored on the Earth's solid surface have coordinates. Examples are WGS-84, ITRS/European Terrestrial Reference System (ETRS) and national reference systems.

WGS-84 defines, inter alia, a conventional terrestrial reference system, a reference frame and a reference ellipsoid. The system was developed by the United States Department of Defence, together with scientists of other States and institutions. WGS-84 is currently the reference system ICAO requires for geo-referencing aeronautical information.

The WGS-84 co-ordinate system is a right-handed, Earth-fixed orthogonal coordinate system. In the National Imaging and Mapping Agency TR8350.2 — Department of Defense, WGS-84, [RD 30], WGS-84 is characterised as follows:

(a) It is geocentric, the centre of mass being defined for the whole Earth, including oceans and atmosphere;

(b) Its scale is that of the local Earth frame, in the sense of a relativistic theory of gravitation;

(c) Its orientation was initially given by the Bureau International de l'Heure (BIH) orientation of 1984.0; and

(d) Its time evolution in orientation will create no residual global rotation with regards to the crust.

The set of definitions for WGS-84 not only includes a reference system, but also the practical realisation of a reference frame through a set of station co-ordinates. The latest available frame is called 'WGS-84 (G873)', where letter 'G' indicates that the station co-ordinates has been derived by global positioning system (GPS) techniques and the number following 'G' indicates the GPS week number in which these co-ordinates were implemented (January 29, 1997). The accuracy of the station co-ordinates is in the order of 5 cm (1σ).

Part of the WGS-84 definition is the ellipsoid as a geometric (mathematical) reference surface. Geometric constants of the WGS-84 ellipsoid should be as described in the tables below.

Semi-major axis	a = 6378137.000 m
Reciprocal of Flattening	f = 1/298.257223563
Angular Velocity of the earth	$\omega = 7292115.0 \times 10^{-11}$ rad/s
Gravitational Constant	GM = $(3986004.418 \pm 0.008) \times 10^{8}$ m^3/s^2

Table on geometric constants

Semi-minor axis	b = 6356752.3142 m
First eccentricity	$e = 8.1819190842622 \times 10^{-2}$
(First eccentricity)^2	$e^2 = 6.69437999014 \times 10^{-3}$
Mean Radius of Semi-Axes	R1 = 6371008.7714 m

Table on some of WGS-84 ellipsoid-derived geometric constants

Further explanation and guidance may be found in Annex B (Horizontal reference systems) to EUROCONTROL Specifications for the Origination of Aeronautical Data, Volume 2: Guidance material (EUROCONTROL-SPEC-154, Edition 1.0 of 04/02/2013)

GM2 ATM/ANS.OR.A.085(a) Common reference systems for air navigation
TEMPORARY NON-COMPLIANCE OF GEOGRAPHICAL COORDINATES

In those particular cases where geographical coordinates have been transformed into WGS-84 coordinates by mathematical means and whose accuracy of original field work does not meet the applicable requirements contained in the data catalogue, they should be identified until the time when they can be compliant.

AMC1 ATM/ANS.OR.A.085(b) Common reference systems for air navigation
VERTICAL REFERENCE SYSTEM

(a) A service provider should use the Earth Gravitational Model — 1996 (EGM-96), as the global gravity model.

(b) At those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation specified in Annex 14, Volumes I and II, on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength), gravity field data should be developed and used. When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, should be provided in the AIP.

GM1 ATM/ANS.OR.A.085(b) Common reference systems for air navigation
MEAN SEA LEVEL

(a) The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.

(b) Gravity-related heights (elevations) are also referred to as 'orthometric heights', while distances of points above the ellipsoid are referred to as 'ellipsoidal heights'.

(c) Global and local geoids differ in their origin: global geoids consider only the long- and middle-wave part of the Earth's gravity field, whilst local geoids also consider the short-wave part of the gravity field. Global geoids are used when consistent orthometric heights, over long distances (continent or earth surveying), are required. Currently, the world's best global geoid model is EGM 200846. It was determined using satellite tracking, gravity anomalies and satellite altimetry. Its accuracy is in the range of ± 0.05 m (oceans) and ± 0.5 m (on land). This accuracy is higher in flat regions than in topographically mountainous terrain, such as the Alps.

(d) For local engineering applications and cadastre-surveying, global geoids are not as accurate as needed. For such applications, local geoid models are calculated. These can only be developed using local field measurements. They offer centimetre accuracy over several hundred kilometres, with a high resolution. Local geoids are not suitable for height comparison over large distances since they are based on different origins and reference heights (different equipotential levels).

Further explanation and guidance may be found in Annex C (Vertical reference systems) to EUROCONTROL Specifications for the Origination of Aeronautical Data, Volume 2: Guidance material (EUROCONTROL-SPEC-154, Edition 1.0 of 04/02/2013)

GM1 ATM/ANS.OR.A.085(c) Common reference systems for air navigation
TEMPORAL REFERENCE SYSTEM

(a) A value in the time domain is a temporal position measured relative to a temporal reference system.

(b) ISO Standard 8601 specifies the use of the Gregorian calendar and 24-hour local or UTC for information interchange, while ISO Standard 19108 prescribes the Gregorian calendar and UTC as the primary temporal reference system for use with geographic information.

(4) In Annex VI, the following new AMC and GM are introduced:

General introduction

In ICAO Annex 15, as well as in the PANS-AIM, multiple references to ICAO Doc 8126 (Aeronautical Information Services Manual) are made. This ED Decision proposes a generic reference to ICAO Doc 8126 to support the material contained in Part-AIS of Regulation (EU) …./…. This is to avoid duplicating several instances of guidance material (GM) referring to ICAO Doc 8126.

GM1 to Annex VI — Part-AIS
ICAO DOC 8126

Guidance material on the organisation and operation of aeronautical information services is contained in ICAO Doc 8126 (Aeronautical Information Services Manual).

SUBPART A — ADDITIONAL ORGANISATION REQUIREMENTS FOR THE PROVISION OF AERONAUTICAL INFORMATION SERVICES (AIS.OR)

Section 1 —Data quality requirements

GM1 AIS.OR.105 Responsibilities of aeronautical information services providers
GENERAL

An aeronautical information services provider obtains aeronautical data and aeronautical information to enable it to provide pre-flight information service and to meet the need for in-flight information from:

(a) the aeronautical information services of other States;

(b) other sources that may be available.

Section 2 —Data quality requirements

AMC1 AIS.OR.200 General
AUTOMATION

(a) In order to meet the data quality requirements, automation should enable digital aeronautical data exchange between aeronautical information services providers.

(b) Automation systems implemented for processing aeronautical data and aeronautical information should ensure traceability of the performed actions.

AMC1 AIS.OR.200 General
AUTOMATED DATA PROCESS

Where processes or parts of processes used in the origination, production, storage, handling, processing, transfer and distribution of aeronautical data and aeronautical information are subject to automation they should be:

(a) automated to a level commensurate with the context of the data process;

(b) automated to optimise the allocation and interaction of human and machine to achieve a high degree of safety and quality benefits of the process;

(c) designed to avoid the introduction of data errors; and

(d) designed to detect errors in received/input data.

GM1 AIS.OR.200 General
DATA CATALOGUE

The data catalogue presents the scope of data that can be collected and maintained by the aeronautical information services providers and provides a common terminology that can be used by data originators and service providers.

AMC1 AIS.OR.205 Formal arrangements
CONTENT

Formal arrangements should include the following minimum content:

(a) the aeronautical data to be provided;

(b) the data quality requirements for each data item supplied according to the data catalogue;

(c) the method(s) for demonstrating that the data provided conforms with the specified requirements;

(d) the action to be taken in the event of discovery of a data error or inconsistency in any data provided;

(e) the following minimum criteria for notification of data changes:

(1) criteria for determining the timeliness of data provision based on the operational or safety significance of the change;

(2) any prior notice of expected changes; and

(3) the means to be adopted for notification;

(f) the party responsible for documenting data changes;

(g) data exchange details such as format or format change processes;

(h) any limitations on the use of data;

(i) requirements for the production of data origination quality reports ;

(j) metadata requirements; and

(k) contingency requirements concerning the continuity of data provision.

AMC1 AIS.OR.210(a) Exchange of aeronautical data and aeronautical information
EXCHANGE MODEL

An aeronautical information services provider should use an aeronautical information exchange model that describes the features and their properties (attributes and associations) within the AIM domain and includes an XML schema.

GM1 AIS.OR.210(b) Exchange of aeronautical data and information
ELECTRONIC MEANS

The exchange of aeronautical data and aeronautical information may be done by a number of electronic exchanges including email or pdf documents, without any manual interaction with the data itself.

GM1 AIS.OR.225 Metadata
PERSONAL DATA

When collecting metadata, the protection of individuals with regard to the processing of personal data and on the free movement of such data apply, in accordance with Directive 95/46/EC on Data protection.

AMC1 AIS.OR.235 Error reporting and corrective action
ISO 9001 CERTIFICATE FOR AERONAUTICAL INFORMATION SERVICES PROVIDERS

AN EN ISO 9001 certificate, issued by an appropriately accredited organisation, addressing all the elements required in this Part should be considered as a sufficient means of compliance for aeronautical information services providers.

AMC1 AIS.OR.250 Consistency requirement

The aeronautical information services provider should establish mechanisms to ensure that:

(a) previous coordination and explicit agreement with the service providers responsible for the AIPs of the Member States concerned is reached before introducing changes in published border or cross-border data and information (e.g. designated points used in route segments, cross-border areas/airspaces, cross-border entities); and

(b) periodic reviews are performed to detect inconsistencies between the AIPs of the Member States concerned.

GM1 AIS.OR.250 Consistency requirement

(a) In order on one hand to facilitate the identification of the need and the previous coordination and agreement and on the other hand to define the scope of the periodic review, the service provider might identify and maintain a list of the data items and information which should be subject to coordination, for the reference and use by its operational staff.

(b) For the purpose of establishing periodic reviews, the service provider might rely on agreements established with other aeronautical information services providers.

Section 3 — Aeronautical information products

GM1 to Section 3 — Aeronautical information products
OPERATING PROCEDURE FOR AIS STATIC DATA

Further detailed explanation with regard to aeronautical information products can be found in the 'Operating Procedure for AIS Static Data - Procedure for the Provision of Originated Data to the AIS' developed by EUROCONTROL, Edition 2.0 of 17 July 2009.

AMC1 AIS.OR.325 Aeronautical charts
GENERAL

Aeronautical charts should be produced in accordance with the specifications contained in ICAO Annex 4, in its 11th edition of July 2009.

AMC2 AIS.OR.325(a), (b) and (c) Aeronautical charts
AERODROME OBSTACLE CHART — ELECTRONIC

(a) As an alternative to aerodrome obstacle chart type A, aerodrome obstacle chart type B and precision approach terrain chart, aeronautical information services provider may make available an electronic aerodrome obstacle chart for all aerodromes regularly used by international civil aviation.

(b) If provided, the electronic aerodrome obstacle chart should provide the data necessary to:

(1) enable an aircraft operator to comply with the operating limitations of Subpart C of Part-CAT, Part-NCC, Part-NCO and Part-SPO of Regulation (EU) No 965/2012, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by developing aircraft operating limitations analysis;

(2) support instrument procedure design (including circling procedures);

(3) support aerodrome obstacle restriction and removal; and

(4) produce other aeronautical charts.

(c) An aeronautical information services provider should make available the electronic aerodrome obstacle charts it provides in hard-copy format upon request.

AMC1 AIS.OR.330 NOTAM
USE OF OPADD

An aeronautical information services provider should originate and issue NOTAM in accordance with the 'EUROCONTROL Guidelines — Operating Procedures for AIS Dynamic Data (OPADD), Edition 4.0, 17 April 2015.

GM1 AIS.OR.335(a) General
DATA SET

A data subject may appear in multiple data sets.

Chapter 2 — Digital data

GM1 AIS.OR.340 AIP data set
PURPOSE

The purpose of the AIP data set is to support the initial transition of the ATM domain towards the use of digital data sets instead of paper products. Therefore, its scope is defined considering the likelihood that the data contained in this set is actually being used in digital format by service providers, air traffic control (ATC) and instrument flight rules (IFR)/visual flight rules (VFR) airspace users.

GM2 AIS.OR.340 AIP data set
CONTENT

The aeronautical AIP data set includes relevant AIP amendment and AIP supplement information.

GM1 to AIS.OR.350, AIS.OR.355, AIS.OR.360 Terrain and obstacle data
GENERAL

Useful information for those organisations involved in the origination, processing and provision of electronic terrain and obstacle data, from the point at which the need for origination is identified through to the point when the State makes it available in accordance with the requirements of ICAO Annex 15, can be found in the EUROCONTROL 'Terrain and Obstacle Data Manual' (November 2015, Edition 2.1).

In addition, the EUROCAE Document ED-98C 'User Requirements For Terrain And Obstacle Data' (October 2015) provides guidance for data gathering by data originators, for data processing by data integrators, for implementation by system designers, and for end use by the aviation community (e.g. air carriers, air traffic services, procedure designers).

AMC1 AIS.TR.350 Terrain and Obstacle data — general requirements

Where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant, the length of area 4 should be extended to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

AMC1 AIS.OR.355 Terrain data sets
ADDITIONAL TERRAIN DATA

Where additional terrain data is collected to meet other aeronautical requirements, the terrain data sets should be expanded to include this additional data.

AMC1 AIS.OR.360 Obstacle data sets
ADDITIONAL OBSTACLE DATA

Where additional obstacle data are collected to meet other aeronautical requirements, the obstacle data sets should be expanded to include these additional data.

GM1 AIS.TR.365 Aerodrome mapping data sets
AERODROME FEATURES

Aerodrome features consist of attributes and geometries, which are characterised as points, lines or polygons. Examples include runway thresholds, taxiway guidance lines and parking stand areas.

Section 4 — Distribution and pre-flight information services

AMC1 AIS.TR.400 Distribution services
GENERAL

The exchange of NOTAM between international NOTAM offices and/or multinational NOTAM processing units should cover the needs of operations personnel including flight crew members.

GM1 AIS.OR.400(a) Distribution services
DISTRIBUTION OF NOTAM

Global communication networks and web services may be employed for the provision of aeronautical information products.

GM1 AIS.OR.400(b) Distribution services
DISTRIBUTION OF AIP PRODUCTS

(a) Distribution to the next intended user differs in the delivery method applied which may either be:

(1) physical distribution — the means by which aeronautical data and aeronautical information distribution is achieved through the delivery of a physical package, such as postal services; or

(2) direct electronic distribution — the means by which aeronautical data and aeronautical information distribution is achieved automatically through the use of a direct electronic connection between the AIS and the next intended user.

(b) Different delivery methods and data media may require different procedures to ensure the required data quality.

(c) Further guidance on digital dataset distribution can be found in the ICAO Doc 10039 (Manual on system wide information management (SWIM) concept).

GM1 AIS.OR.400(c) Distribution services
DISTRIBUTION OF NOTAM

Further information on the distribution of NOTAM by an aeronautical information services provider may be found in the 'EUROCONTROL Guidelines — Operating Procedures for AIS Dynamic Data (OPADD)', Edition 4.0, 17 April 2015.

GM1 AIS.OR.400(d) Distribution services
DISTRIBUTION OF NOTAM

A selective distribution list should be used when practicable.

GM1 AIS.OR.400(d) Distribution of services
SNOWTAM

Arrangements may be made for direct exchange of SNOWTAM between aerodromes/heliports.

GM1 AIS.OR.405(b) Pre-flight information services
INFORMATION OF OPERATIONAL SIGNIFICANCE

(a) Pre-flight information may be provided as a verbal briefing or a self-briefing.

(b) Geographic coverage for pre-flight information services should be determined and periodically reviewed. In general, the coverage zone should be limited to the flight information region (FIR) within which the aerodrome/heliport is located, the FIR(s) adjacent thereto, and all air route or portion of route flown without an intermediate landing, originating at the aerodrome/heliport and extending beyond the FIR(s) mentioned.

(c) The elements of the aeronautical information products may be limited to national publications and when practicable, those of immediately adjacent States, provided a complete library of aeronautical information is available at a central location and means of direct communications are available with that library.

(d) A recapitulation of valid NOTAM of operational significance and other information of urgent character can be made available to flight crews in the form of plain-language pre-flight information bulletins (PIB).

(e) Guidance on the preparation of pre-flight information services and PIB may be found in Chapter 8 of ICAO Doc 8126 (Aeronautical Information Services Manual) and in Chapter 7 of the 'EUROCONTROL Guidelines — Operating Procedures for AIS Dynamic Data (OPADD)', Edition 4.0, 17 April 2015.

Section 5 — Aeronautical information products updates

GM1 AIS.OR.505(a) AIRAC
STATIC DATA PROCEDURES (SDP)

Further explanations with regard to the application of the AIRAC system can be found in the 'Operating procedure for AIS static data — procedure for the provision of originated data to the AIS' developed by the European organisation for the safety of air navigation – EUROCONTROL, Edition 2.0, 17 July 2009.

GM2 AIS.OR.505(a) AIRAC
USE OF AIRAC SYSTEM

The AIRAC may be used for the provision of information relating to the establishment and withdrawal of, and premeditated significant changes in, the circumstances listed below:

(a) Position, height and lighting of navigational obstacles.

(b) Hours of service of aerodromes, facilities and services.

(c) Customs, immigration and health services.

(d) Temporary danger, prohibited and restricted areas and navigational hazards, military exercises and mass movements of aircraft.

(e) Temporary areas or routes or portions thereof where the possibility of interception exists.

GM3 AIS.OR.505(a) AIRAC
ADVANCE NOTIFICATION OF MAJOR CHANGES

Whenever major changes are planned and where advance notice is desirable and possible, information may be distributed and/or made available by the aeronautical information services provider, whenever practicable, so as to reach recipients at least 56 days in advance of the AIRAC effective date. This may apply to the establishment of, and premeditated major changes in the circumstances listed below, as well as to other major changes if deemed necessary:

(a) New aerodromes for international IFR operations;

(b) New runways for IFR operations at international aerodromes;

(c) Design and structure of the ATS route network;

(d) Design and structure of a set of terminal procedures (including change of procedure bearings due to magnetic variation change);

(e) Circumstances listed in AIS.OR.505(a)(10) if the entire State or any significant portion thereof is affected or if cross-border coordination is required.

AMC1 AIS.OR.515 Digital data updates
GENERAL

(a) When made available as a completely re-issued data set, the differences from the previously issued complete data set should be indicated.

(b) When temporary changes of short duration are made available as digital data (Digital NOTAM), they should use the same aeronautical information model as the complete data set.

Section 6 —Personnel requirements

GM1 AIS.OR.600 General requirements
TRAINING

Guidance material concerning training methodology to ensure the competency of personnel is contained in the aeronautical information management training development manual (ICAO Doc 9991).

SUBPART B — TECHNICAL REQUIREMENTS FOR THE PROVISION OF AERONAUTICAL INFORMATION SERVICES (AIS.TR)

Section 2 — General requirements

GM1 to Section 2 — General requirements
ED-76A

The quality of data is a degree or level of confidence that the data provided meets the requirements of the user. Minimum requirements for the processing of aeronautical data may be found in the EUROCAE Document ED-76A, which aims to assist aeronautical data chain actors and authorities in meeting their responsibilities. It is intended to be used by organisations seeking approval of the method(s) they use to process or manipulate data.

Reference is made to EUROCAE Document ED-76A (Standards for Processing Aeronautical Data), June 2015.

GM1 AIS.TR.200(b) General
RESOLUTION

The resolution of the data contained in the database may be the same or finer than the publication resolution.

AMC1 AIS.TR.210 Exchange of aeronautical data and aeronautical information
EXCHANGE MODELS

(a) The aeronautical information model used should encompass the aeronautical data and aeronautical information to be exchanged.

(b) The aeronautical information model used should:

(1) use the unified modelling language (UML) to describe the aeronautical information features and their properties, associations and data types;

(2) include data value constraints and data verification rules;

(3) include provisions for metadata; and

(4) include a temporality model to enable capturing the evolution of the properties of an aeronautical information feature during its life cycle.

(c) The aeronautical data exchange model used should:

(1) apply a commonly used data encoding format;

(2) cover all the classes, attributes, data types and associations of the aeronautical information model; and

(3) provide an extension mechanism by which groups of users can extend the properties of existing features and add new features which do not adversely affect global standardisation.

AMC2 AIS.TR.210 Exchange of aeronautical data and aeronautical information
ELECTRONIC TERRAIN DATA

Electronic terrain data should be provided in a common format compliant with ISO 19107:2003 — Geographic information — Spatial schema (Edition 1 — 8.5.2003) and 19136:2007 — Geographic information — Geography Mark-up Language (GML) (Edition 1 — 23.8.2007).

GM1 AIS.TR.210 Exchange of aeronautical data and aeronautical information
ENABLING EXCHANGE

The intent of using a commonly used data encoding format is to ensure interoperability of aeronautical data exchange between agencies and organisations involved in the data processing chain.

Examples of commonly used data encoding formats include extensible markup language (XML), geography markup language (GML), and JavaScript object notation (JSON).

GM2 AIS.TR.210 Exchange of aeronautical data and aeronautical information
AIXM

The aeronautical information exchange model (AIXM) is designed to enable the management and distribution of aeronautical information services data in digital format.

More information on the AIXM may be found under http://www.aixm.aero.

AMC1 AIS.TR.220 Verification and validation process
GENERAL

(a) The process should define the means used to:

(1) confirm that the data has been received without corruption;

(2) ensure that stored data is protected from corruption; and

(3) confirm that originated data has not been corrupted prior to being stored.

(b) The process should define the:

(1) action to be taken when data fails a verification or validation check;

(2) tools required for the verification and validation process;

(3) methods used to verify received data;

(4) methods by which data quality is preserved;

(5) method by which the user is assured that delivered data meets the data quality requirements; and

(6) methods to be used to provide the user with the ability to verify that the data received by the user has not been corrupted.

GM1 AIS.TR.220 Verification and validation process
GENERAL

(a) Validation

Validation is the activity where a data element is checked as having a value that is fully applicable to the identity ascribed to the data element, or a set of data elements is checked as being acceptable for their intended use.

The application of validation techniques considers the entire aeronautical data chain. This includes the validation performed by prior data chain participants and any requirements levied on the data supplier.

Examples of validation methods include:

(1) Validation by Application: one method of validation is to apply data under test conditions. In certain cases, this may not be practical. Validation by application is considered to be the most effective form of validation. For example, flight inspection of final approach segment data prior to publication can be used to ensure that the published data is acceptable.

(2) Logical Consistency: validates by comparing two different data sets or elements and identifying inconsistencies between values based on operative rules (e.g. business rules).

(3) Semantic Consistency: validates by comparing data to an expected value or range of values for the data characteristics.

(4) Validation by Sampling: evaluates a representative sample of data and applies statistical analysis to determine the confidence in the data quality.

(b) Verification

Verification is a process for checking the integrity of a data element whereby the data element is compared to another source, either from a different process or from a different point in the same process. While verification cannot ensure that the data is correct, it can be effective to ensure the data has not been corrupted by the data process.

The application of verification techniques considers only the portion of the aeronautical data chain controlled by the organisation. Yet, verification techniques may be applied at multiple phases of the data processing chain.

Examples of verification techniques include:

(1) Digital Error Detection Techniques can be used to detect errors during the transmission or storage of data. An example of a digital error detection technique is the use of cyclic redundancy checks (CRCs). Coding techniques can be effective regardless of the transmission media (e.g. computer disks, modem communication, or internet).

(2) Feedback testing is the comparison of a data set between its output and input state.

(3) Independent Redundancy testing involves processing the same data through two or more independent processes and comparing the data output of each process.

(4) Update Comparison: updated data can be compared to its previous version. This comparison can identify all data elements that have changed. The list of changed elements can then be compared

to a similar list generated by the supplier. A problem can be detected if an element is identified as changed on one list and not on the other.

GM1 AIS.TR.225 Metadata
ISO

Further explanation on the schema required for describing geographic information and services by means of metadata may be found in the International Organisation for Standardisation, ISO 19115:2014 — Geographic information — Metadata, Part I. It provides information about the identification, the extent, the quality, the spatial and temporal aspects, the content, the spatial reference, the portrayal, distribution, and other properties of digital geographic data and services.

GM1 AIS.TR.240 Data limitations
ANNOTATION

(a) The objective of such an annotation is to notify the users of the AIP including its data that specific quality requirements are not met and may, therefore, compel limitations in the operational use of the relevant data.

(b) More explanation and guidance may be found in the EUROCONTROL 'Guidelines for the Annotation of data not compliant with Commission Regulation (EU) No 73/2010 (ADQ)', Edition 1.0, 11 November 2014.

Section 3 — Aeronautical information products

AMC1 AIS.TR.305 Aeronautical information publication (AIP)
ELECTRONIC FORM

The eAIP, eAIP amendments and eAIP supplements should be provided according to the 'EUROCONTROL Specification for the Electronic Aeronautical Information Publication (eAIP)', Edition 2.1, 6 October 2015.

AMC1 AIS.TR.305 Aeronautical information publication (AIP)
LOCATION FORMAT

When listing locations, the city or town should be given in capital letters followed, where the facility is an aerodrome/heliport or is located at an aerodrome/heliport, by an oblique stroke and the name of the aerodrome/heliport in smaller capital letters or lower-case letters. Unless otherwise indicated, the list should be in alphabetical order.

GM1 AIS.TR.305 Aeronautical information publication (AIP)
LANGUAGE

If an AIP is issued in more than one language, a bilingual or multilingual edition may assist in the interpretation of questionable text.

AMC1 AIS.TR.305(a) Aeronautical information publication (AIP)
PRINTED AIP

A system of page numbering adaptable to the addition or deletion of sheets should be adopted. The page number should include:

(a) an identification of the part of the AIP;

(b) the section; and

(c) subsection, as applicable,

(d) thus creating a separate set of numbers for each subject (e.g. GEN 2.1-3, ENR 4.1-1 or AD 2.2-3).

AMC2 AIS.TR.305(a) Aeronautical information publication (AIP)
ELECTRONIC AIP

When provided, the eAIP should be available on a physical distribution medium, such as cd, dvd, etc. and/or online on the internet.

GM1 AIS.TR.305(a) Aeronautical information publication (AIP)
PRINTED AIP

(a) If it is necessary by reason of bulk or for convenience, to publish an AIP in two or more parts or volumes, each of them will indicate that the remainder of the information is to be found in the other part(s) or volume(s).

(b) When the AIP is provided in more than one volume, each volume should include:

(1) a preface;

(2) a record of AIP amendments;

(3) a record of AIP supplements;

(4) a checklist of AIP pages; and

(5) a list of current hand amendments.

(c) When the AIP is published as one volume, the above-mentioned subsections should appear only in Part 1 — GEN and the annotation ‘not applicable’ should be entered against each of these subsections in Parts 2 and 3.

GM2 AIS.TR.305(a) Aeronautical information publication (AIP)
FORM OF AIP

When the AIP is issued as a printed volume, it may be published in loose-leaf form unless the complete publication is reissued at frequent intervals.

AMC1 AIS.TR.305(c) Aeronautical information publication (AIP)
LOCATION

In the indication of the geographical coordinates of a location:

(a) the latitude should be given first;

(b) symbols for degrees, minutes or seconds should be omitted;

(c) two digits should always be used in expressing values of less than 10 degrees of latitude; and

(d) three digits should always be used in expressing values of less than 100 degrees of longitude.

GM1 AIS.TR.305(c) Aeronautical information publication (AIP)
CHARTS, MAPS OR DIAGRAMS

(a) Charts, maps or diagrams should be used, when appropriate, to complement or as a substitute for the tabulations or text of the AIP.

(b) Where appropriate, charts produced in conformity with AIS.OR.325 may be used to fulfil this requirement.

GM2 AIS.TR.305(c) Aeronautical information publication (AIP)
AIP DATA SET

When the AIP data set is provided, the following sections of the AIP may be left blank and a reference to the data set availability shall be provided:

(a) ENR 2.1 FIR, UIR, TMA;

(b) ENR 3.1 Lower ATS routes;

(c) ENR 3.2 Upper ATS routes;

(d) ENR 3.3 Area navigation (RNAV) routes;

(e) ENR 3.4 Helicopter routes;

(f) ENR 3.5 Other routes;

(g) ENR 3.6 En route holding;

(h) ENR 4.1 Radio navigation aids — en route;

(i) ENR 4.4 Name-code designators for significant points;

(j) ENR 4.5 Aeronautical ground lights — en route;

(k) ENR 5.1 Prohibited, restricted and danger areas;

(l) ENR 5.2 Military exercise and training areas and air defence identification zone (ADIZ);

(m) ENR 5.3.1 Other activities of a dangerous nature;

(n) ENR 5.5 Aerial sporting and recreational activities;

(o) AD 2.19 Radio navigation and landing aids; and

(p) AD 3.18 Radio navigation and landing aids.

AMC1 AIS.TR.310(f) AIP amendments
EFFECTIVE TIME

When an effective time other than 0000 UTC is used, the effective time should also be indicated.

GM1 AIS.TR.315 AIP supplements
TEMPORARY CHANGES

(a) Since the AIP is subject to frequent change, provisions exist for its continual updating. In addition, changes of a temporary nature affecting the contents of an AIP are often required to cater for unexpected circumstances or, in some cases, planned modifications to a service/facility.

(b) The purpose of an AIP supplement is to bring to the attention of users both temporary changes of long duration (three months or longer) and information of short duration containing extensive text or graphics which affect one or more parts of the AIP.

AMC1 AIS.TR.320 AIC
ELECTRONIC FORM

When AIC are provided as part of the 'electronic AIP", they should comply with the 'EUROCONTROL Specification for the Electronic Aeronautical Information Publication (eAIP)', Edition 2.1, 6 October 2015.

GM1 AIS.TR.320(a) AIC
PRINTED AIC

(a) Differentiation and identification of AIC topics according to subjects using colour coding should be practised where the numbers of AIC in force are sufficient to make identification in this form necessary.

(b) It is recommended that AIC be colour-coded by subject where there are sufficient circulars in force to warrant such identification, e.g.:

(1) white — administrative;

(2) yellow — ATC;

(3) pink — safety;

(4) mauve — danger area map; and

(5) green — maps/charts.

GM2 AIS.TR.320(d) AIC
SNOW PLAN INFORMATION

The snow plan issued under AD 1.2.2 of the AIP may contain information such as that listed below:

(a) a list of aerodromes/heliports where snow clearance is expected to be performed during the coming winter:

(1) in accordance with the runway and taxiway systems; or

(2) planned snow clearing, deviating from the runway system (length, width and number of runways, affected taxiways and aprons or portions thereof);

(b) information concerning any centre designated to coordinate information on the current state of progress of clearance and on the current state of runways, taxiways and aprons;

(c) a division of the aerodromes/heliports into SNOWTAM distribution lists in order to avoid excessive NOTAM distribution;

(d) an indication, as necessary, of minor changes to the standing snow plan;

(e) a descriptive list of clearance equipment; and

(f) a listing of what will be considered as the minimum critical snow bank to be reported at each aerodrome/heliport at which reporting will commence.

AMC1 AIS.TR.330 NOTAM
USE OF OPADD

The origination and issuing of NOTAM should be in accordance with the 'EUROCONTROL Guidelines — Operating Procedures for AIS Dynamic Data (OPADD)', Edition 4.0, 17 April 2015.

GM1 AIS.TR.330(b) NOTAM
NOTAM CODE

The ICAO NOTAM Code together with significations/uniform abbreviated phraseology, and ICAO Abbreviations are those contained in ICAO Doc 8400 (PANS-ABC).

GM1 AIS.TR.330(u) NOTAM
CHECKLIST

The checklist NOTAM may include the checklist of SUP.

Chapter 2 — Digital data sets

GM1 AIS.TR.335(a) General
ISO SERIES

(a) The ISO 19100 series of standards for geographic information may be used as a reference framework.

(b) ISO Standard 19131 specifies the requirements and outline of data product specifications for geographic information. This is intended to facilitate and support the use and exchange of digital data sets between data providers and data users.

GM1 AIS.TR.335(b) General
DESCRIPTION OF AVAILABLE DATA SET

(a) The data product specification enables air navigation users to evaluate the products and determine whether they fulfil the requirements for their intended use (application).

(b) This may include an overview, specification scope, data product identification, data content and structure, reference system, data quality, data capture, data maintenance, data portrayal, data product delivery, additional information, and metadata.

GM1 AIS.TR.345(a) AIP data set
CONTENT

The AIP data set includes the relevant AIP amendment and SUP information.

GM1 to AIS.TR.350, AIS.TR.355, AIS.TR.360 Terrain and obstacle data
REFERENCES

Useful information for those organisations involved in the origination, processing and provision of electronic terrain and obstacle data, from the point at which the need for origination is identified through to the point

when the State makes it available in accordance with the requirements of ICAO Annex 15, can be found in the EUROCONTROL 'Terrain and Obstacle Data Manual' (November 2015, Edition 2.1).

In addition, the EUROCAE Document ED-98C (October 2015) provides guidance for data gathering by data originators, for data processing by data integrators, for implementation by system designers, and for end use by the aviation community (e.g. air carriers, air traffic services, procedure designers).

GM1 to AIS.TR.350, AIS.TR.355, AIS.TR.360 Terrain and obstacle data
NAVIGATION APPLICATIONS

(a) Terrain and obstacle data are intended to be used in the following air navigation applications:

(1) ground proximity warning system with forward-looking terrain avoidance function and minimum safe altitude warning (MSAW) system;

(2) determination of contingency procedures for use in the event of an emergency during a missed approach or take-off;

(3) aircraft operating limitations analysis;

(4) instrument procedure design (including circling procedure);

(5) determination of en route 'drift-down' procedure and en route emergency landing location;

(6) advanced surface movement guidance and control system (A-SMGCS); and

(7) aeronautical chart production and on-board databases.

(b) The data may also be used in other applications such as flight simulator and synthetic vision systems, and may assist in determining the height restriction or removal of obstacles that pose a hazard to air navigation.

AMC1 AIS.TR.355(d) Terrain data set
ATTRIBUTES

Each of defined obstacle feature types should be described according to the following list of mandatory attributes:

Terrain attribute	Mandatory/optional
Area of coverage	Mandatory
Data originator identifier	Mandatory
Data source identifier	Mandatory
Acquisition method	Mandatory
Post spacing	Mandatory
Horizontal reference system	Mandatory
Horizontal resolution	Mandatory
Horizontal accuracy	Mandatory
Horizontal confidence level	Mandatory

Horizontal position	Mandatory
Elevation	Mandatory
Elevation reference	Mandatory
Vertical reference system	Mandatory
Vertical resolution	Mandatory
Vertical accuracy	Mandatory
Vertical confidence level	Mandatory
Surface type	Optional
Recorded surface	Mandatory
Penetration level	Optional
Known variations	Optional
Integrity	Mandatory
Date and time stamp	Mandatory
Unit of measurement used	Mandatory

GM2 AIS.TR.360 Obstacle data set
GENERAL

When the obstacle data set is provided, the following sections of the AIP may be left blank and a reference to the data set availability should be provided:

(a) ENR 5.4 Air navigation obstacles ;

(b) AD 2.10 Aerodrome obstacles; and

(c) AD 3.10 Heliport obstacles.

AMC1 AIS.TR.360(b) Obstacle data set
ATTRIBUTES

Each of the defined obstacle feature types should be described according to the following list of mandatory attributes:

Obstacle attribute	Mandatory/optional
Area of coverage	Mandatory
Data originator identifier	Mandatory
Data source identifier	Mandatory
Obstacle identifier	Mandatory
Horizontal accuracy	Mandatory

Horizontal confidence level	Mandatory
Horizontal position	Mandatory
Horizontal resolution	Mandatory
Horizontal extent	Mandatory
Horizontal reference system	Mandatory
Elevation	Mandatory
Height	Optional
Vertical accuracy	Mandatory
Vertical confidence level	Mandatory
Vertical resolution	Mandatory
Vertical reference system	Mandatory
Obstacle type	Mandatory
Geometry type	Mandatory
Integrity	Mandatory
Date and time stamp	Mandatory
Unit of measurement used	Mandatory
Operations	Optional
Effectivity	Optional
Lighting	Mandatory
Marking	Mandatory

GM1 AIS.TR.365 Aerodrome mapping data sets
COMPLEMENTARY GUIDANCE

Further information concerning minimum requirements and reference material applicable to the content, origination, publication, and updating of aerodrome mapping information may be found in EUROCAE Documents ED-99D 'User requirement for aerodrome mapping information', October 2015, and ED-119C 'Interchange standards for terrain, obstacle and aerodrome mapping data', October 2015.

GM1 AIS.TR.365(a) Aerodrome mapping data sets
ADDITIONAL DATA

Aerodrome mapping data may be supported by electronic terrain and obstacle data for Area 3 in order to ensure consistency and quality of all geographical data related to the aerodrome.

GM2 AIS.TR.365(a) Aerodrome mapping data sets
COMMON ACQUISITION TECHNIQUES

Electronic terrain and obstacle data pertaining to Area 3 and aerodrome mapping data may be originated using common acquisition techniques and managed within a single geographic information system (GIS).

METADATA

Metadata elements applicable to aerodrome mapping data are contained in EUROCAE Document ED-119C 'Interchange standards for terrain, obstacle and aerodrome mapping data', October 2015.

GM1 AIS.TR.365(d) Aerodrome mapping data sets
ISO REFERENCE

ISO Standard 19109 contains rules for application schema, while ISO Standard 19110 describes the feature cataloguing methodology for geographic information.

Section 4 — Distribution and pre-flight information services

GM1 AIS.TR.400(b) Distribution services
NOTAM

(a) The predetermined distribution system provides for incoming NOTAM (including SNOWTAM and ASHTAM) to be channelled through the AFS direct to designated addressees predetermined by the receiving country concerned while concurrently being routed to the international NOTAM office for checking and control purposes.

(b) The addressee indicators for those designated addressees are constituted as follows:

(1) First and second letters:

The first two letters of the location indicator for the AFS communication centre associated with the relevant international NOTAM office of the receiving country.

(2) Third and fourth letters:

The letters 'ZZ' indicating a requirement for special distribution.

(3) Fifth letter:

The fifth letter differentiating between NOTAM (letter 'N'), SNOWTAM (letter 'S'), and ASHTAM (letter 'V').

(4) Sixth and seventh letters:

The sixth and seventh letters, each taken from the series A to Z, denoting the national and/or international distribution list(s) to be used by the receiving AFS centre.

The fifth, sixth and seventh letters replace the three-letter designator YNY which, in the normal distribution system, denotes an international NOTAM office.

(5) Eighth letter:

The eighth position letter shall be the filler letter 'X' to complete the eight-letter addressee indicator.

(c) States are to inform the States from which they receive NOTAM of the sixth and seventh letters to be used under different circumstances to ensure proper routing.

GM1 AIS.TR.405(a) Pre-flight information services
AUTOMATION

(a) Automated pre-flight information systems providing a harmonised, common point of access by operations personnel, including flight crew members and other aeronautical personnel concerned, to aeronautical information and meteorological information should be established by an agreement between the competent authority for civil aviation or service provider and the competent authority for meteorological services or service provider.

(b) Where automated pre-flight information systems are used to provide the harmonised, common point of access by operations personnel, including flight crew members and other aeronautical personnel concerned, to aeronautical data, aeronautical information and meteorological information, the competent authority for civil aviation or the service provider to which the authority to provide service has been delegated, remain responsible for the quality and timeliness of the aeronautical data and aeronautical information provided by means of such a system.

(c) The meteorological service provider concerned remains responsible for the quality of the meteorological information provided by means of such a system in accordance with Part-MET.

GM1 AIS.TR.405(e) Pre-flight information services
NOTAM

Although miscellaneous NOTAM is regarded not subject for a briefing but available on request, all NOTAM are to be provided for briefing by default and content reduction should be at user's discretion.

Section 5 — Aeronautical information products updates

AMC1 AIS.TR.510(a) NOTAM updates
ADVANCE NOTICE

(a) At least seven days' advance notice should be given of the activation of established danger, restricted or prohibited areas and of activities requiring temporary airspace restrictions other than for emergency operations.

(b) Notice of any subsequent cancellation of the activities or any reduction of the hours of activity or the dimensions of the airspace should be given as soon as possible.

GM1 AIS.TR.510(a) NOTAM updates
ADVANCE NOTICE

Whenever possible, at least 24 hours' advance notice is desirable, to permit timely completion of the notification process and to facilitate airspace utilisation planning.

3.2.2. Proposed amendment to the AMC and GM to Authority, Organisation and Operations Requirements for Aerodromes

AMC1 ADR.OPS.A.010 Data quality requirements
GENERAL REQUIREMENTS

(…)

~~(g) Protection of electronic aeronautical data while stored or in transit, should be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity level of critical, and essential aeronautical data as classified in (a)(1) and (a)(2) above, a 32- or 24-bit CRC algorithm should apply respectively.~~
~~(h) To achieve protection of the integrity level of routine aeronautical data as classified in (a)(3) above, a 16-bit CRC algorithm should apply.~~

(g) Where processes or parts of processes used in the origination, production, storage, handling, processing, transfer and distribution of aeronautical data and aeronautical information are subject to automation they should be:

(1) automated to a level commensurate with the context of the data process;

(2) automated to optimise the allocation and interaction of human and machine to achieve a high degree of safety and quality benefits of the process;

(3) designed to avoid the introduction of data errors; and

(4) designed to detect errors in received/input data.

(h) The error handling and corrective action mechanisms should ensure that:

(1) errors identified during data origination and after data delivery are addressed or resolved; and

(2) priority and urgency are given to errors in critical and essential aeronautical data.

(…)

***NOTE**: The following tables are deleted:*

~~Table 1 – Latitude and longitude~~
~~Table 2 – Elevation/Altitude/Height~~
~~Table 3 – Declination and magnetic variation~~
~~Table 4 – Bearing~~
~~Table 5 – Length/distance/dimension~~

AMC2 ADR.OPS.A.010 Data quality requirements
FORMAL ARRANGEMENTS

(…)

(c) Content of formal arrangements

Such formal arrangements should include the following minimum content:

(1) the ~~scope of~~ aeronautical data or aeronautical information to be provided;

(2) the quality ~~accuracy, resolution, and integrity~~ requirements for each data item supplied according to the data catalogue;

(3) the ~~required~~ methods for demonstrating that the data provided conforms with the specified requirements;

(4) the ~~nature of~~ action to be taken in the event of discovery of a data error or inconsistency in any data provided;

(5) the following minimum criteria for notification of data changes:

(i) criteria for determining the timeliness of data provision based on the operational or safety significance of the change;

(ii) any prior notice of expected changes;

(iii) the means to be adopted for notification;

(6) the party responsible for documenting data changes;

(7) the means to resolve any potential ambiguities caused where different formats are used to data exchange details such as format or format change processes aeronautical data or aeronautical information;

(8) any limitations on the use of data;

(9) requirements for the production of quality reports by data providers to facilitate verification of data quality by the data users;

(10) metadata requirements; and

(11) contingency requirements concerning the continuity of data provision.

(…)

AMC1.OPS.A.011 Data error detection and authentication
CRC

The data protection mechanism for digital data sets shall offer, at the minimum, an equivalent level of protection as a 32-bit cyclic redundancy check (CRC).

4. Regulatory impact assessment (RIA)

This RIA focuses only on the issues related to aeronautical data quality. With regard to the transposed provisions of ICAO Annex 15 and PANS-AIM, no significant controversial issues were raised and the impact of said provisions is very low.

4.1. Issues to be addressed

Since 2013, the implementation of the ADQ Regulation has been subject to significant delays in most of the Member States because of two main factors: the high cost of implementation and the many regulatory requirements which are open to interpretation, or are even unachievable (e.g. addressing data originators and aerodromes). The EC's latest survey, conducted in October 2015, showed that for a very large majority of the Member States, full compliance with the requirements to be met by the implementation dates of respectively 1 July 2013 and 1 July 2014 have not been met.

Issues related to the cost of implementation

One significant obstacle to meeting the requirements of the ADQ Regulation relates to the implementation costs. Said Regulation requires the implementation of two detailed technical means: the use of an aeronautical information exchange model prescribing its technical characteristics, and the use of a specific CRC (32Q) for data protection. These technical means represent high costs.

The results of the October 2015 survey launched by the EC highlighted the costs to implement the ADQ Regulation in relation to the obligation to acquire new or other necessary systems or equipment to exchange data and to protect them. The following general challenges were pointed out in the result of the survey:

— 'The compliance with the full ADQ requirements with all data to a specified deadline is very costly and demanding';

— 'The implementation of this Regulation is financially demanding for all parties involved';

— 'Data exchange format is delayed because of the need to purchase and implement new technical system';

— 'Costly and time consuming implementation';

— 'Budget constraints to meet some requirements of the ADQ Regulation, mainly in terms of acquisition of the appropriate tools, upgrades to the existing ones and their constituents, new field surveys and training';

— 'Financial implication of ADQ implementation difficult to anticipate';

— 'Call for an increase of the awareness and knowledge of ADQ with a flexible management of implementation cost/timeline'.

Overview of the ADQ implementation cost/burden issues

Issues	**Description**
Investment/costs	• Implementation is time-consuming • Lack of available resources • Anticipation of costs • Budget constraints • Cost of implementation
Aeronautical information exchange model with detailed prescriptions	• Implementation/upgrade costs
Data protection	• cost • Lack of industry solution (off-the-shelf)
Personnel	• Lack of sufficient personnel

(source: ADQ compliance table — European Commission, October 2015 survey outcome)

Issues related to regulatory aspects

Since the entry into force of the ADQ Regulation, the affected organisations pointed out the complexity of the rule and the detailed technical provisions. Also, Member States, AIS providers and data originators, such as aerodrome operators, surveyors and geodetic institutes(including some outside the scope of the aeronautical information regulatory framework), are affected by requirements that are considered challenging to comply with or disproportionate for them. The survey pointed out the risk of such stakeholders no longer wishing to participate in AIS-related tasks, thus creating gaps in the data coverage or service provision (e.g. geodetic institutes). These entities need to be supported and encouraged in the ADQ Regulation implementation, in particular when the ADQ Regulation extends the data quality management to such entities (surveyors, instrument flight procedure designers, digital terrain or digital obstacle data owners). The scope is very wide, and partly goes beyond the scope of the national supervisory authorities (NSAs), casting thus doubt on the effectiveness of the Regulation as the NSAs cannot perform effective oversight unless they establish additional legal instruments in order to expand the oversight competences to those parties.

Overview of the regulatory ADQ implementation issues

Issues	**Description**
Data originators	• Difficulty to deal with the high number of originators • Difficulty to identify originators outside aviation • Compliance of data originators with the rules
Lack of legal clarity	• Unavailability of guidance • Data scope of ADQ • National legislation needed • Complexity of regulation • Legal interpretation
Processes	• Formal arrangements • Difficult compliance with management system for small providers

4.1.1. Safety risk assessment

This rulemaking task is not directly driven by safety events occurred in the past. However, the criticality of the aeronautical data and aeronautical information is considered as an essential element to ensuring safe flight operations. Aeronautical data integrity requirements are based upon the potential risk resulting from the corruption of data and upon the use to which the data element is provided up to the end-user. Furthermore, lack of harmonisation of aeronautical data quality in Europe contributes to the risk resulting from aeronautical data and aeronautical information errors.

The provisions of the ADQ Regulation are to be implemented to ensure the provision of quality-assured aeronautical data and aeronautical information. With the expected growth of the number of aircraft flying in Europe, it is recognised that the ADQ Regulation provides a means of achieving demonstrable levels of quality for aeronautical data and information and provides the ability to determine the origin, verification, validation, validity, accuracy, and integrity, at all stages from origination through to publication in the AIP and beyond. The support for data quality in the provision of aeronautical information is considered as an absolute necessity by the aviation community in order to meet the required level of safety and the user requirements, as well as in order to enable key modern ATM applications (PBN, airspace management, etc.) and to support interoperability. There is a need for the rules in order to achieve quality-assured aeronautical data and aeronautical information and data of a demonstrable level of quality that can be readily exchanged between EU States and user/stakeholder systems. It is unlikely that the SES objectives can be realised without quality aeronautical data and aeronautical information that are needed to support new concepts of ATM in the future.

4.1.2. Who is affected?

— ATM/ANS providers;

— Member States;

— competent authorities;

— data originators;

— aerodrome operators.

4.1.3. How could the issue/problem evolve?

In case no further action is taken, the risks described in 4.1.1 may continue. The issues identified in the ToR and in the present RIA would remain unaddressed. There would be no improvement in the current rules regarding the implementation due to issues addressed in 4.1. Opportunities for the overall improvements in this area in terms of enhanced data quality would be missed. The possibilities to improve the efficiency and the effectiveness of the provision of aeronautical data and aeronautical information would remain limited. More and more organisations would be tempted to not keep up with the evolution of the new technologies seeking ways to delay the implementation of the ADQ Regulation, thus formally not complying with said Regulation.

4.2. Objectives

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Section 4.1.

The specific objectives of this proposal are to:

— ensure that aeronautical data and aeronautical information are originated, assembled, edited, formatted, published and finally provided at the required level of quality to the next intended user and for all phases of flight. The quality of the data shall be proportionate to the types of aeronautical actors involved; and

— foster efficient and effective rules considering also the harmonisation with the latest ICAO Annex 15 amendment.

4.3. Policy options

Table 1: Selected policy options

Option No	*Short title*	**Description**
0	No rulemaking	Baseline option (no change in rules; risks remain as outlined in the issue analysis).
1	Performance-based rulemaking	The draft rules on data quality are founded on a performance-based approach.
2	Prescriptive rulemaking	Rules on data quality founded on prescriptive and technical provisions.

The policy option 2 on 'prescriptive rulemaking' was discarded at an early stage of the analysis. This option proposed draft rules on data quality founded on prescriptive and technical provisions. It entailed the transposition of the ADQ Regulation into the EASA regulatory framework. It was, therefore, very similar to Option 0 in terms of rules content and potential effects. Option 2 is thus not subject to an impact analysis in 4.4 below.

4.4. Analysis of impacts

4.4.1. Safety impact

Option 0 — No rulemaking

The current situation remains. The support for the aeronautical data quality is considered as an absolute necessity by the aviation community in order to reach the required level of safety. Therefore, without guaranteeing effective implementation of the current rules on data quality, this option has a potential impact on safety.

Option 1 — Performance-based rules on data quality

Under this option, the provisions of the ADQ Regulation are transposed into the EASA regulatory framework and alleviations to requirements are provided in several areas based on compensating and mitigating factors, which aim at ensuring an acceptable level of safety, whereas on some other areas, it is believed that safety could be improved by common understanding and clarity to all stakeholders. Therefore, this option is considered to have a positive impact in terms of safety.

4.4.2. Environmental impact

All three options are neutral from the environmental perspective.

4.4.3. Social impact

From a social perspective, no major impacts are expected.

4.4.4. Economic impact

When assessing the economic impacts of the options, the outcome of the October 2015 survey of the EC was taken into consideration (see section 4.1).

Option 0 — No rulemaking

The economic impact is highly negative for all the parties affected by the ADQ Regulation.

Air navigation service providers (ANSPs)	**Investments.** For some ANSPs, the financial impact of the ADQ Regulation is estimated at costs of EUR 10–20 million[10]. For many, these requirements are difficult to implement because of the costs that cannot be covered. The constraints on the exchange model imposed by the ADQ Regulation have a negative economic impact because they entail the development or the purchase of new software/hardware and the maintenance of it. The requirement to use the CRC32Q for data protection has a significant impact on the ANSPs' budget as they will need to change or adapt their existing data protection system. **Processes.** ANSPs have to identify within their operational procedures the list of data originators and the data they are responsible for, and establish working arrangements with them to define and establish the evidence needed to guarantee the compliance with the quality requirements. **Staff resources.** Manpower, technicians, contractor (or sub-contractor) personnel will be needed to install and maintain new technologies. ANSPs have to put in place dedicated training programmes.
Data originators	**Investments.** The obligation related to a specific aeronautical information exchange model to be used as well as the CRC32Q algorithm is highly problematic as data originators have limited financial and resources capabilities. Their budgets are often not in line with the necessary activities required by the Regulation and their resources are very tight. **Processes.** Data originators have to establish formal arrangements with whomever they exchange data with and need to do this according to a long list of requirements that could be met. To do this though, time and process efforts not always adapted to their business are required. They have to implement requirements that are not always necessary and this has a negative impact on costs for such organisations. In addition, for many data originators, the requirement to establish and maintain a quite rigid management system constitutes a very burdensome obligation. Some data originators are not always deeply involved in AIS-AIM but are still required to comply with a detailed set of technical provisions.
Member States	The impact is related to human, financial and technical resources for the oversight of the organisations affected by the ADQ Regulation: — Need to put in place a national legal framework for the origination of aeronautical data, e.g. formal arrangements, method to use the reference

[10] Source: Summary Report of the European Commission — Workshop on the Implementation of Regulation (EU) No 73/2010 (Quality of Aeronautical Data and Aeronautical Information – ADQ) – 23 June 2014

	systems, obstacle data input. — Need to ensure that all stakeholders, including data originators, such as obstacle owners, surveyors, geodetic institutes, are aware of and apply the Regulation.

Option 1 — Performance-based rules on data quality

This option would greatly limit the costs of implementing new technologies since the provisions of exchange model and data protection are performance-based. This option ensures that the objectives of the ADQ Regulation are maintained, thus securing the investments done so far.

AISPs& service providers	**Investments.** ATM/ANS service providers are not required to exchange data using a specific version of an aeronautical information exchange model as long as the exchange of data is globally interoperable between the relevant parties. This option mitigates the economic impact as it allows AISPs to adapt and smoothly prepare for the future. With regard to the protection of data, AISPs have the possibility not to use the CRC32Q algorithm for the protection but to choose another protection mechanism that suitably meets the required protection performance. **Processes.** ATM/ANS service providers have to identify within their operational procedures the list of data originators and the data they are responsible for and establish working arrangements with them to define and establish the evidence needed to guarantee the compliance with the quality requirements. **Staff resources.** Manpower, technicians, contractor (or sub-contractor) personnel will be needed. ATM/ANS service providers have to put in place dedicated training programmes.
Data originators	CRC32Q is not mandatory. Tools and software requirements are not mandatory. For aviation undertakings, the principle is to have objective-based rules. The requirements are more adapted to their origination activities.
Member States	Member States will still need to be aware of the number and kind of aviation undertakings that are active. However, clearer rules and proportionate requirements are expected to make the Member States' oversight tasks more effective.

Open question to stakeholders

Additionally, stakeholders are kindly invited to provide data on administrative cost impacts introduced by these draft rules and any other quantitative information they may find necessary to bring to the attention of the Agency.

As a result, the relevant parts of the RIA might be adjusted on a case-by-case basis.

4.4.5. General aviation and proportionality issues

General aviation impacts are not relevant in the framework of this RIA.

Option 0 — No rulemaking

The implementation of the ADQ Regulation requires significant efforts, both in terms of finance and personnel. This option requires all the affected parties to follow common stringent rules without taking into consideration their specific needs. The data quality requirements are the same regardless of the size and the contribution of the affected organisations, i.e. small contributors to the AIS/AIM domain must comply with the 'full package' of the ADQ Regulation. It generates administrative, technological and thus financial burden on all those involved in the origination and provision of aeronautical data and aeronautical information. The implementation of the ADQ Regulation is affected by the efforts needed from the involvement of numerous interdependent stakeholders. In addition, the burden remains on the affected organisations. It is perceived as more restrictive than necessary to produce the desired result, which is to ensure interoperability of aeronautical data and aeronautical information.

Option 1 — Performance-based rules on data quality

The proposal is considered to be adapted to all the actors involved in the data chain (up to publication) and would give the relief needed while maintaining an adequate level of safety. This option ensures that the requirements are suitable to achieve the desired objective and that they do not go beyond what is necessary in order to achieve this objective. Contrary to the current detailed requirements, the proposal is now objective-based while giving the necessary flexibility through the developed means of compliance.

4.4.6. Impact on 'better regulation' and harmonisation

Option 0 — No rulemaking

One of the objectives of the ADQ Regulation is to support the interoperability of aeronautical data and aeronautical information. Consequently, a harmonised implementation of said Regulation across Europe is recognised as being necessary. Nevertheless, many affected organisations have highlighted the lack of clarity and the risk of different and misleading interpretations of the ADQ Regulation. Its complexity has led to multiple interpretations. Furthermore, significant delays in implementation could continue if no additional means of compliance with the Regulation are developed, thus maintaining the difficulty in the harmonised implementation of the data quality provisions. The ADQ Regulation therefore contains complex requirements that are difficult to understand for those who need to implement it.

Option 1 — Performance-based rules on data quality

The proposed data quality requirements are expected to have a positive impact on and improve the harmonised rule application, in particular to bring further clarity in implementation The right balance between implementing rules and AMCs has been determined and the Agency opted for including detailed provisions on most of the data quality requirements methods and techniques at the level of AMCs, complemented with the necessary guidance material to support implementation.

In particular, this proposal aims at ensuring 'resilience' of the new rules in times where progress in digital data provisions and exchange open the way to a wide range of technical alternatives. This flexibility provided to the organisations concerned to meet or exceed the safety objectives defined at implementing rule level, depending on their particular organisation, business model and type of infrastructure (but still guaranteeing an high level of data quality) supports the objectives of 'better regulation'. Specific safeguards, determined in line with performance-based principles, have been

defined to ensure that the adoption of new technologies will not lower the standards as required by the ADQ Regulation.

Furthermore, the interface between Regulation (EU) No 139/2014 on aerodrome operators — who are data originators — is ensured with the inclusion of similar data quality requirements in said Regulation related to origination purposes. This alignment between both Regulation (EU) No 139/2014 and this proposal eliminates the gap between the ADQ Regulation and the EASA AMC for the ADR Regulation. Therefore, harmonisation is properly ensured.

4.5. Comparison and conclusion

4.5.1. Comparison of options

Table 3 — Final scores of the qualitative impact

	Option 0	**Option 1**
	Baseline	**Propose data quality requirements**
SAFETY	**0**	**+**
ENVIRONMENTAL	**Not applicable**	**Not applicable**
SOCIAL	**Not applicable**	**Not applicable**
ECONOMIC	**-**	**+**
GA & PROPORTIONALITY	**-**	**+**
BETTER REGULATION & HARMONISATION	**-**	**+**
TOTAL	**-/0**	**+**

Reviewing each of the options proposed, the following conclusions can be drawn: the impact of the regulatory proposal is positive and has no negative impact either on safety or on economic issues. Taking into account the implementation of the ADQ Regulation on data quality requirements, the benefit of the proposal is seen as positive in the sense that the draft set of rules propose better regulation, simplification of the regulatory approach and regulatory coherence. The implementation of aeronautical data quality requirements will be easier to manage with the proposed rules. The implementation of the proposed rules on aeronautical data quality does not incur any additional costs to those required under the ADQ Regulation.

Therefore, Option 1 ensures fulfilling the necessary safety objectives at a minimum cost and administrative burden while making sure it delivers tangible and sustainable benefits for all those organisations that will be affected by the proposal. The proposal builds on the ADQ Regulation implementation experience whilst being easier to implement.

4.5.2. Monitoring and evaluation

Monitoring is a continuous and systematic process of data collection and analysis about the implementation/application of a rule/activity. It generates factual information for future possible evaluations and impact assessments and helps identifying actual implementation problems. With respect to this proposal, the Agency would suggest to monitor:

— the extent to which data originator comply with minimum data quality including the new requirements ;

— the extent to which the data set specifications from the ICAO data catalogue have been transposed;

— the interoperability of aeronautical information exchange model and costs involvement by affected stakeholders

The monitoring could occur in terms collecting and analysing data from different available sources via several tools e.g. conducting surveys. The responsible actors for collecting and providing the data could be further specified in the implementation phase.

5. References

5.1. Affected regulations

— Regulation (EU) No …/… laying down common requirements for service providers and the oversight in air traffic management and air navigation services and other air traffic management network functions.

— Commission Implementing Regulation (EU) No 1034/2011 of 17 October 2011 on safety oversight in air traffic management and air navigation services and amending Regulation (EU) No 691/2010 (OJ L 271, 18.10.2011, p. 15).

— Commission Implementing Regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services and amending Regulations (EC) No 482/2008 and (EU) No 691/2010 (OJ L 271, 18.10.2011, p. 23).

— Commission Regulation (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky (OJ L 23, 27.1.2010, p. 6).

5.2. Affected AMC and GM

Decision 2014/012/R of the Executive Director of the Agency of 27 February 2014 adopting Acceptable Means of Compliance and Guidance Material to Regulation (EU) No 139/2014 'AMC/GM for Aerodromes – Initial Issue'

5.3. Reference documents

— ICAO Annex 15 — Aeronautical Information Services (latest amendment still to be adopted)

— Doc 9674 - WGS 84 Manual

— ICAO Annex 4 — Aeronautical charts

— ICAO Doc 8126 — Aeronautical Information Services Manual

— Pans-AIM (still to be adopted)

— Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1).

6. Appendices

The following appendices are introduced:

— In Annex VI (Part-AIS):

- Appendix 1 — CONTENTS OF THE AERONAUTICAL INFORMATION PUBLICATION (AIP)
- Appendix 2 — NOTAM FORMAT
- Appendix 3 — SNOWTAM FORMAT
- Appendix 4 — ASHTAM FORMAT

— In Annex III (Part-ATM/ANS.OR):

- Appendix 1 — Data catalogue

These appendices are not reproduced in this document as they would hinder readability of this NPA given that they contain numerous pages. However, the reader may consult them on the EASA webpage.