

Certification Memorandum

Certification of aircraft systems with databases

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1. Introduction

This Certification Memorandum provides guidance regarding the certification of systems which use databases.

1.1. Background

Databases may be used in different aircraft or engine systems and embedded in digital pieces of equipment. The intended function of aircraft systems can be affected by the quality of the data contained in a database. As well, any corruption¹ or error in the format or content of databases, or any incompatibility between databases and aircraft systems may have an impact on safety and should be considered when showing compliance with CS XX.1301/1309 (where applicable following AMC XX.1309) and/or ETSO for those activities which are under responsibility of Type Certificate/Supplemental Type Certificate (TC/STC) and/or ETSOA applicants.

The data origination and processing, and therefore its quality, is in some cases not under full control of the applicant, and therefore cannot be fully covered by an airworthiness approval. However, the process to distribute and produce the database in the specified format, starting from the source data to the final upload to the aircraft or engine system, should ensure that an adequate integrity of the data is maintained.

A relevant case is the aeronautical data (e.g. data provided by ICAO Member States). Organisations processing those data were initially addressed through the EASA Opinion 01/2005, Acceptance of Navigation Database Suppliers, and, more recently, regulated through the Commission Implementing Regulation (EU) No 2017/373, Air Traffic Management/Air Navigation Services. This regulation establishes common requirements for providers of data services that are processing aeronautical data and information for use in aeronautical databases on certified aircraft application/equipment. Particularly, the Type 2 addresses acceptable means of ensuring that the aeronautical data process does not corrupt data, from its origination to its application in the equipment, and it is the recommended means to manage an aeronautical database rather than requiring ETSOA and/or TC/STC change approval at each database update.

The FAA has adopted an equivalent approach as provided in FAA AC 20-153B. However, compared to this Advisory Circular, regulation (EU) No 2017/373 does not address the specific guidance for holders of type design approvals (ETSOA, TC, STC) concerning aeronautical databases in the context of aircraft certification and ETSOA.

This CM is filling the gap and going a step further, by addressing not only aeronautical, but as well other databases, which may benefit from related published standards and recognized means to show compliance with the applicable aircraft certification basis or ETSO. This CM is equivalent with the AC 20-153B guidance in the area affecting the same applicants and scope.

1.2. Whom this Certification Memorandum affects

Applicants in the scope of this CM, as per Part 21, are:

- Applicants for a type-certificate (TC) of an aircraft, or other product like engine, APU or propeller, which will utilize a database,
- Applicants for the approval of major changes to a type-certificate or supplemental type-certificate (STC) procedures, when the change utilizes a database,

¹ in line with the definition of ED-76A/DO-200B, covering either intentional (e.g., malicious act) or unintentional (refer to the Glossary of Terms)



- TC or STC holders that apply for approval of a new function or modification of already certified function, which will utilize a database (new or previously introduced). The new or modified function to be approved may benefit from an ETSO Authorisation² (or equivalent).
- Avionics manufacturers applying for, or holding, an ETSO Authorisation for an equipment with an associated database. They should consider this CM for demonstrating that the article complies with the technical conditions of the applicable ETSO or in supporting the installer (TC or STC holder/applicant).

In the following sections of this CM, the organisations applying for an installation approval (three first bullets above) are referred to as the “TC/STC applicant”, the organisations in the last bullet are referred to as the “ETSOA applicant”, and “applicant” is used when referring generally to any of these organisations. In this way this CM explicitly indicates which activities are relevant to which applicant.

Applicants not in the scope of this CM are:

- Data suppliers applying for Data Provider Certificate regulated through the Commission Implementing Regulation (EU) No 2017/373
- Providers for Electronic Flight Bag (EFB) non-certified software applications with an associated database. Those are not under Part-21 or Part-DAT regulations, although they can use this CM on a voluntary basis.

This guidance provides provisions to take credit for activities covered under ETSO Authorisation (or equivalent TSOA) as well as activities covered under Data Provider Certificate (or equivalent LOA). In the following sections of this CM, when referring to ETSOA or DAT Provider Certificate followed by ‘(or equivalent)’, it should be understood that any equivalent, as established in a bilateral agreement between the European Union and other Countries, is equally acceptable.

1.3. Scope

Databases in the scope of this CM are used in different aircraft or engine systems and embedded in digital pieces of equipment covering, but not limited to:

- data which is not originated by the aircraft or application/equipment manufacturer:
 - aeronautical data, such as ‘navigation’, ‘aerodrome mapping data’, ‘obstacles data’ and ‘terrain data’, needed for the functionality of certified aircraft application(s) and does not form part of its (their) approved type design (TD)
 - data such as magnetic variation, or communication parameters defined by Data Link Service Providers in certified aircraft application(s) that form part of its (their) approved type design
- data originated by the aircraft or application/equipment manufacturer, such as, electronic check list data, aircraft performance parameters, or engine power settings
- other purposes that may include new and novel aeronautical applications, for example, data driven charts

Databases not in the scope of this CM are:

- software artefacts sometimes called databases but usually named as Configuration Files, or Parameter Data Items, such as symbology, bus specifications or configuration data. They can be used to activate or deactivate software components/functions, or to adapt the software computation to the aircraft configuration. These are covered, where applicable, in the EASA AMC 20-115().

² In absence of an ETSO Authorisation, the TC/STC Holder becomes the equipment design approval holder under the Agency regulation.



2. References and Abbreviations

2.1. References

It is intended that the following reference materials be used in conjunction with this Certification Memorandum:

Reference	Title	Code	Issue	Date
CS XX.1301	Function and installation	CS-23	1 - 4	---
CS XX.1309	Equipment, systems and installations	CS-25	1 and up	
CS XX.1529	Instructions for continued airworthiness	CS-27	1 and up	
		CS-29	1 and up	
CS 23.2500 CS 23.2505 CS 23.2510	System and Equipment	CS-23	5 and up	29 March 2017
CS 23.2625	Instructions for continued airworthiness	CS-23	5 and up	29 March 2017
EUROCAE ED-76 / RTCA DO-200	Standards for Processing Aeronautical Data	ED-76/ DO-200	-/A A/B	October 1998 June 2015
Part 21	Annex 1 to Commission Regulation (EU) No 748/2012	Part 21	---	03/08/2012
Commission Implementing Regulation (EU) No 2017/373	Common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight	Part-DAT	---	01/03/2017
ED Decision 2017/001/R	AMC/GM to Regulation (EU) No 2017/373	AMC/GM Part-DAT	---	08/03/2017
EUROCAE ED-12/RTCA DO-178	Software Considerations in Airborne Systems and Equipment Certification and related supplements	ED-12/ DO-178	C	January 2012
EASA AMC 20-115	Airborne Software Development Assurance using EUROCAE ED-12 and RTCA DO-178	AMC 20-115	D	19/10/2017



Reference	Title	Code	Issue	Date
EUROCAE ED-77/ RTCA DO-201	Standards for Aeronautical Information	ED-77/ DO-201	-/A	April 2000
EUROCAE ED-99/ RTCA DO-272	User Requirements for Aerodrome Mapping Information	ED-99/ DO-272	C/D	September 2015
EUROCAE ED-98/ RTCA DO-276	User Requirements for Terrain and Obstacle Data	ED-98/ DO-276	B/C	September 2015

2.2. Abbreviations

AC	Advisory Circular
AMC	Acceptable Means of Compliance
AFM(S)	Aircraft Flight Manual (Supplement)
CM	Certification Memoranda
CRI	Certification Review Item
CRC	Cyclic Redundancy Check
CS	Certification Specification
DQR	Data Quality Requirements
EASA	European Aviation Safety Agency
ETSOA	European Technical Standard Order Authorisation
EU	European Union
FAA	Federal Aviation Administration
GM	Guidance Material
GPWS	Ground Proximity Warning System
ICA	Instructions for Continued Airworthiness
ICAO	International Civil Aviation Organization
IFP	Instrument Flight Procedure
LOA	Letter of Acceptance
NSE	No Safety Effect
RNAV	Area Navigation
RNP AR	Required Navigation Performance Authorisation Required



STC	Supplemental Type Certificate
TC	Type Certificate
TD	Type Design

2.3. Glossary of Terms

From Part-DAT:

‘aerodrome mapping data’ means data collected for the purpose of compiling aerodrome mapping information;

‘aeronautical data’ means a representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing³;

‘aeronautical database’ means a collection of aeronautical data organised and arranged as a structured data set, stored electronically on systems, which is valid for a dedicated period and may be updated;

‘data quality’ means a degree or level of confidence that the provided data meets the user's data requirements in terms of accuracy, resolution, integrity (or equivalent assurance level), traceability, timeliness, completeness, and format;

‘data quality requirements (DQRs)’ means a specification of the characteristics of data (i.e. accuracy, resolution, integrity (or equivalent assurance level), traceability, timeliness, completeness and format) to ensure that the data is compatible with its intended use;

‘guidance material’ means non-binding material developed by the Agency that helps to illustrate the meaning of a requirement or specification and is used to support the interpretation of a Regulation, its implementing rules and AMC; (generalized)

‘obstacle’ means all fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

- are located on an area intended for the surface movement of aircraft; or
- extend above a defined surface intended to protect aircraft in flight; or
- stand outside those defined surfaces and have been assessed as being a hazard to air navigation;

‘tailored data’ means aeronautical data which is provided by the aircraft operator or DAT provider on the aircraft operator's behalf and produced for this aircraft operator for its intended operational use;

‘terrain’ means the surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles;

From ED-76A:

Accuracy - The degree of conformance between the estimated or measured value and its true value.

Assurance Level - The degree of confidence in the process to provide valid/uncorrupted data. This can be categorized into three levels: 1 (critical), 2 (essential), and 3 (routine); with 1 being the highest degree of confidence.

Completeness - The degree of confidence that all of the data needed to support the intended use is provided.

Corruption - A change to previously correct data introduced during processing, storage or transmission that causes the data to no longer be correct.

NOTE: Corruption can be either intentional (e.g., malicious act) or unintentional (e.g., lost data element).

CRC (Cyclic Redundancy Check) - A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

³ Refer also to ED-76A: Data used for aeronautical applications such as navigation, flight planning, flight simulators, terrain awareness, and other purposes (e.g., navigation data, terrain and obstacle data, and aerodrome mapping data).



Error - Defective, degraded, lost, misplaced or corrupted data elements, or data elements not meeting stated quality requirements.

Format (as a structure) - A structure of data elements, records and files arranged to meet standards, specifications or DQRs.

Integrity (of data) - A degree of assurance that aeronautical data and its value has not been lost or altered since the data origination or authorized amendment.

Resolution - A number of units or digits to which a measured or calculated value is expressed and used.

Timeliness - The degree of confidence that the data is applicable to the period of its intended use.

Traceability - The ability of a system or data product to provide a record of the changes made to that product and thereby enables an audit trail to be followed from the end-user to the data originator.

Validation - The activity whereby a data element is checked as having a value that is fully applicable to the identity given to the data element, or a set of data elements is checked as being acceptable for their intended use.

Verification - The evaluation of the outputs of a process to ensure correctness and consistency with respect to the inputs and standards provided to that process.

From ED-12C:

Parameter data item – A set of data that, when in the form of a Parameter Data Item File, influence the behaviour of the software without modifying the Executable Object Code and that is managed as a separate configuration item.

3. Certification of Systems using Databases EASA Policy and Guidance

The Figures in the Appendix A of this CM shows different paths for databases airworthiness approval and provide links to the relevant airworthiness criteria to be considered by the applicant, specifying those aspects which will not be applicable to an ETSOA applicant.

3.1. GENERAL PROCESS

This section provides guidance to applicants on the general aspects which are common, independently of the nature of the data, and applicants selected methodology to address related databases.

3.1.1. Identification of Databases

This paragraph addresses the STEP 1 of the Appendix A flow chart.

One or more databases may be necessary for the good functioning of new equipment or applications.

The ETSOA applicant has to identify the databases to be stored in the equipment, and if applicable, databases which are necessary for the good functioning of the equipment but stored externally.

In the case of the Type Certificate (TC)/Supplemental Type Certificate (STC) applicant, some databases may be new in the Type Design (TD) (loaded into the new hardware to be installed), but for changes to already approved TD, there could be a new equipment, system or application accessing the information in one or more databases loaded in an already certified equipment, system or application. The TC/STC applicant has to identify in both cases all the databases used.

The compliance documentation will contain a list and a description of all databases, the criticality associated to the data according to section 3.1.2, categorization of all the databases, according to the two categories defined in 3.1.3, and the process to be followed for the cases covered under 3.2.

The TC/STC applicant is responsible for identifying all equipment, systems and applications making use of each new database. It is important to consider those activities which are sizing the database requirements. The data process assurance level and other data quality requirements (e.g. data accuracy) will be driven by the most demanding application. In particular the database definition and generation process should be



consistent with the tightest requirements associated to malfunction or availability effects caused by the data at aircraft or engine level (refer to 3.1.2).

3.1.2. Safety Assessment

This paragraph addresses the STEP 2 of the Appendix A flow chart.

For TC/STC applicants, the safety assessment defined in CS XX.1309, CS 23.2510 and associated AMC XX.1309 and AMC to CS 23.2510 should include the determination of the failure condition criticality associated to errors in the database (e.g. data error, incorrect format or missing data). The risk of misbehaviour or loss of a function, due to a data error should be assessed as part of the process.

For ETSOA applicants, the possible effects at system/equipment level are to be consistent with the ETSO stated failure classifications, or in absence of this information and for non-ETSO functions, the failure classifications is to be established by the ETSOA applicant.

The required assurance level for the data process should be identified, based on the overall system architecture through allocation of risk. Since integrity of a process cannot be numerically quantified, the integrity requirement may be defined by a quality assurance level. For the particular case of aeronautical data, but extensible to other databases, ED-76/DO-200 Appendix B provides guidance on the determination of the assurance level. The applicant should ensure that the database specification is consistent with the conclusions of the System Safety Assessment.

For TC/STC applicants, when the equipment installed is approved through an ETSO Authorisation and the ETSO assumptions are consistent with the possible effects at system and product level, the applicant does not need to further assess the effect of database errors or define the required assurance level for the data.

When it is concluded as result of this analysis that a database contains only routine data (i.e. any discrepancy or error has No Safety Effect (NSE) on the operational use of the data), compliance with the criteria in this CM is not required but the applicant is recommended to provide guidelines for operators (TC/STC applicant) or for installers (ETSO applicant) on the use of NSE databases.

3.1.3. Database Category

This paragraph addresses the STEP 3 of the Appendix A flow chart.

The applicant should categorize each database according to the following criteria.

3.1.3.1. Databases with full airworthiness approval

These are databases which are embedded in digital equipment and certified as part of it (under ETSOA and/or under TC/STC, as applicable). These databases may be controlled by their own part numbers or by the equipment part number, but they require a design change approval for the equipment and/or aircraft/engine at each database update.

In principle, all databases for which the applicant can retain full control of the source data (e.g. aircraft model performance database) should normally be part of the type and/or ETSO design and should follow a full airworthiness approval process.

Acceptable procedures and interpretative material for the airworthiness approval of such databases are specified in section 3.2 below.

3.1.3.2. Databases without airworthiness approval

When the source data is not controlled by the applicant or when databases are needing frequent update, it could be impractical to grant to such database a full airworthiness approval and including them formally in the type definition of the aircraft/engine, or to be approved as part of the ETSOA equipment. Yet, some safety precautions and limitations need to be identified, as part of the type certification by the installer applicant



or as part of the equipment guidance by the ETSOA applicant. Some specific considerations are provided in 3.3 below.

3.2. CRITERIA FOR DATABASE WITH AIRWORTHINESS APPROVAL

For each database subject to an airworthiness approval, the applicant should propose one of the following approval processes to be followed, or alternative means for EASA review. EASA will decide if the proposed approval process is consistent with the nature and the complexity of the database.

This approval method may not be effective for databases needing frequent update (e.g., more frequent than one update per year). In these cases, for aeronautical databases and also when the ETSO states a requirement for ED-76/DO-200 compliance, the use of the DAT Provider Type 2 (or equivalent) is recommended (refer to 3.3.1). Otherwise, the update to a database with a failure effect other than NSE will be a change to the approved design (TC/STC/ETSOA). Revisions of the databases under 3.2 should follow an airworthiness approval process.

There are four possible cases or generally accepted processes for databases under 3.1.3.1 category:

- Case 1: Database covered under ETSO Authorisation (or equivalent)
- Case 2: ED-12/DO-178 approval process.
- Case 3: ED-76/DO-200 approval process.
- Case 4: Specific approval process for low complexity databases. In this case, the applicant can use a simple method to ensure the quality of the installed database (e.g. complete verification and validation of the data, system tests to qualify the data in the context of the certified application, etc.)

The proposed approval process should be identified in the relevant certification programme (reference to Part 21 21.A.20, 21.A.605). Whatever the approval process chosen, the applicant should document a compliance statement.

3.2.1. Case 1: Database covered under ETSO Authorisation (ETSOA)

This paragraph is applicable to the TC/STC applicant installing an equipment with ETSOA (or equivalent). ETSO applicants may consider this material to support the TC/STC applicant needs.

The equipment or application to be installed may benefit from the ETSO Authorisation (or equivalent) activities. In this case, the TC/STC applicant can take credit from this authorisation to demonstrate that the installation complies with the applicable certification specifications for the product. However, the TC/STC applicant should:

- Demonstrate that the equipment or application has been installed and is intended to be used in the aircraft according to the instructions and limitations provided by the ETSOA (or equivalent) holder and therefore the database specification and associated data quality and processing assurance level, as defined by the ETSOA (or equivalent) holder, are appropriate without changes;

or

- Identify the areas which may be impacted by the particularities of the system as installed in the product, and its impact on the definition of the databases. For example, the TC/STC applicant may need the content of a database to be appropriate for the performance of the aircraft, or impose requirements to ensure there is no confusing information presented to flight crews due to the cockpit arrangement (e.g. legacy cockpits with limited display capabilities).

In the first bullet case, if the equipment or application ETSOA (or equivalent) holder has followed the database approval guidance provided in case 2, 3 or 4 below, then the compliance finding for these aspects of the installation would be covered by the ETSO Authorisation (or equivalent) and it is not under the direct responsibility of the installer.



When the particularity of the installation requires specific or limited database content, more stringent quality or assurance level, or additional limitations, the TC/STC applicant remains responsible to ensure that the content and quality of the database is appropriate.

Consideration should be given to the applicable aspects of section 3.4. In particular, as part of the compliance documentation, the TC/STC applicant should give consideration (when applicable) to potential necessary inputs to the:

- Aircraft Flight Manual (AFM) (refer to 3.4.2)
- Instructions for Continued Airworthiness (ICA) (refer to 3.4.5)

One possible example of the impact on the AFM is the necessity to transpose limitations at equipment level into operational limitations in the AFM (e.g. only for use during taxi) or to address through ICA the necessity to update the database content periodically (e.g. magnetic variation tables).

3.2.2. Case 2: Database qualified with the software following ED-12/DO-178

No specific guidance is provided for the ED-12/DO-178 approval process, since EASA AMC 20-115 (latest revision) should be followed where this approval process is retained.

Consideration should be given to the applicable aspects of section 3.4 (refer to 3.4.2 and 3.4.5).

3.2.3. Case 3: Database following ED-76/DO-200

The applicant has to consider that the ED-76/DO-200, Standards for Processing Aeronautical Data, was written in order to address specifically the needs of aeronautical data. The applicant may consider whether these standards (or relevant part of it) may be appropriate for other databases.

The applicant should ensure that the following items are established and documented as part of the compliance documentation (refer to ED-76/DO-200, section 2.2):

- Define DQRs (refer to 3.4.1 or ED-76, section 2.3 and Appendix B);
- Define the verification methods for the data and validation methods for data not coming from authoritative source (ED-76 Appendix C);
- Define the data process techniques and procedures documented and maintained through the lifecycle of the aircraft (including tools used and when necessary their qualification);
- Define the requirements and conditions for updating and verifying the database within the ICAs.
- Data security provisions (refer to section 2.4.6 of ED-76A)

And consideration should be given to the additional aspects of section 3.4, when applicable.

3.2.4. Case 4: Low Complexity Database

The applicant can use an alternate method to ED-76/DO-200 or ED-12/DO-178 if the database could be demonstrated as a “low complexity” database. Low complexity means that the structure of the database is simple.

For a low complexity database, the applicant should demonstrate in particular that each of the elements or records of the database can be validated and fully covered through basic equipment verification (e.g. as per section 3.4.4). Full database content should be validated and verified by the applicant.

Therefore, the applicant should clearly define in the certification documentation the approval process and/or demonstration methods that will be used for this case.



3.3. CRITERIA FOR DATABASE WITHOUT AIRWORTHINESS APPROVAL

For the databases that are not approved through the airworthiness process (not part of the type design or ETSO design) but that can impact aircraft safety, the applicant should consider whether the database is containing aeronautical data or not.

3.3.1. Aeronautical Database

For aeronautical databases containing other than Assurance Level 3 or routine data (NSE), the Type 2 DAT provider certificate, or equivalent, is mandatory per Article 6 of Regulation (EU) No 2017/373 since 1 January 2019.

NOTE: There is a possible exception for aircraft certified for visual flight rules (VFR) operation only and their installed systems applications/equipment. Refer to Part DAT GM1 DAT.OR.100 (b) (3).

When this Type 2 DAT provider certificate (holder may be the equipment manufacturer, but not necessarily) is already available, the responsibility of the TC/STC applicant is limited to:

- Ensure that the database specification and associated Data Quality Requirements are defined in accordance to the activities outlined in sections 3.4.1, 3.4.3, 3.4.4 and 3.4.5, by ensuring that the Type 2 DAT certificate holder is aware of any additional requirement identified based on the installation peculiarities, the in-service experience, continued airworthiness, or the certification of new applications using the data.

For example, the STC/TC applicant may impose requirements to ensure there is no confusing information presented to flight crews due to the cockpit arrangement (e.g. legacy cockpits with limited display capabilities) or kind of operations the aircraft is not certified to. Instrument flight procedures that are not supported should not be accessible to the flight crew. When not inhibited by other means (e.g., strapping, software, etc.), those procedures are removed from the navigation database. For example, if the aircraft has not been certified to conduct RNP AR operations, RNP AR IFPs are removed from the database.

- Include a disclaimer in the relevant documentation (aircraft flight manual or other EASA approved document associated to the type certificate).

Example of disclaimer: The airworthiness approval of [equipment XXX] is based on using a [database XXX] from a provider with a Type 2 Data Provider Certificate (or an equivalent means of compliance) and the operator / end-user verifying the database release statement.

An EASA DAT Type 2 certificate of the database provider may be a suitable means to ensure that the database conforms to the specification, provided that the DAT certification covers the suitable specification document (DQRs). All equipment using the data need to be listed within the Type 2 DAT provider certificate Field 5 (refer to Part-DAT AMC1 DAT.OR.105 (a) (2)).

For aeronautical databases containing only Assurance Level 3 (routine) data, the Type 2 DAT certificate is not required but the TC/STC applicant is recommended to provide guidelines for operators on the use of the database.



3.3.2. Other Databases

This CM contains generic criteria and does not cover all kind of specific cases which would be very dependent on the nature of the data. One particular example could be an Electronic Check List application with an associated database that can be modified by the operator without airworthiness approval⁴.

EASA may establish specific criteria through a Certification Review Item (CRI), adapted to the specificities of each project, to address particular cases. When the database can be modified by the operator/end-user, the applicant should define, as necessary in the compliance documentation, the methods and mitigation means, defining the operator responsibility for those changes, and ensuring that there is no airworthiness impact. This would normally require to develop specific guidelines for the operator.

The use of a tool, and associated suitable practical means, may help to ensure that the database comply with its specifications and will be compatible with the associated system(s). Guidance provided in section 2.4.5 of ED-76A/DO-200B is considered as an adequate mean to ensure that tools, that have the ability to insert or can fail to detect an error in the database, are developed with an adequate level of confidence.

Consideration should be given to the additional aspects of section 3.4, when applicable.

3.4. GENERAL CRITERIA

The criteria in this section are to be considered when referenced in the previous sections.

3.4.1. Database Specification

The term database specification is used here as generic and applicable to any kind of data. The aeronautical data DQRs and associated standards (refer to 3.4.1.1) may be not suitable for some databases. This database specification is to document all aspects necessary to ensure the quality of the data.

The applicant should ensure availability of a detailed database specifications document, which:

- would be approved as part of the product type design, and would contribute to the demonstration of compliance with Certification Specifications (CS XX.1301, XX.1309, CS 23.2500, CS 23.2505 and CS 23.2510) for the relevant systems, or
- Would be approved as part of the ETSO design, and would contribute to the demonstration of compliance with the ETSO.

In particular, data dependencies (refer to ED-76A Appendix B, section B.1.7.1) should be defined in terms of the ability of the data to satisfy the requirements for its safe application in the system where the database is intended to be used.

The applicant has to consider that any change in the associated equipment or applications, or certification of new functions using the data, can result in change to the database specification.

3.4.1.1. Define Data Quality Requirements

The quality of the data and the way it is processed should be characterised by Data Quality Requirements (DQR), refer to ED-76/DO-200 section 2.3. Ultimately, DQRs are to be agreed and coordinated with the involved parties (refer to part-DAT DAT.OR.105 (a) (1) if there is a DAT Type 2 provider), to determine the compatibility of these DQRs with the intended use. The DQRs should be under configuration control.

If available, a Type 2 DAT provider certification or ETSOA (or equivalent) may provide sufficient evidence that the DQRs are specified, and appropriate to meet the intended functions for standardized use and operations

⁴ A checklist database certified as per section 3.2 is not an example here



(like equipment certified for RNAV operations or GPWS). In some cases, standards such as ED-77/ DO-201, ED-98/DO-276, or ED-99/DO-272 provide guidance for defining the data quality requirements.

For other cases, DQRs are to be determined at time of airworthiness approval, in particular, the DQRs need to be re-examined (reviewed and adjusted) for operations not previously addressed (e.g. low RNP operations) or if data is being used for new or novel functionality compared to what was previously certified (e.g. overlay of terrain on attitude indicator).

The TC/STC applicant remains ultimately responsible that DQRs are defined, including a change control process. If DQRs are defined and assessed under ETSO Authorisation, the TC/STC applicant should have access to the equipment supplier's document if necessary, refer to 3.2.1.

Where the new functionality foresees the use of aeronautical data which is not from authoritative source (i.e. data not published by ICAO member states, organizations not formally recognized by State authority, tailored data), either the first data provider that accepts the data coming from a non-authoritative source is validating the data, or for tailored data this responsibility remains with the operator/end-user. This latter should be reflected in the AFM, as appropriate, refer to 3.4.2.

3.4.2. Aircraft Flight Manual

The AFM(S) or other EASA approved document should contain all appropriate limitations or restrictions concerning the use of the equipment and applications or associated databases (e.g. expiration, prohibited operations, etc.).

This disclaimer should state that the aircraft systems have been approved for use under the condition that the databases are compliant with the relevant specification document, or for aeronautical data, by receiving the database through DAT Provider Type 2 (or equivalent).

3.4.3. Compatibility

This section is not applicable for databases covered under airworthiness approval (section 3.2).

The compliance documentation should define the system function and any dependencies on the data, and indicate whether mitigation means are implemented to ensure that the operational software does not use data from databases if the data is corrupted (e.g. CRC) or not compliant with specified formats or parameter ranges. These mitigation means (if applicable) should be documented, i.e. automatic detection mechanisms to ensure compatibility.

For these databases not covered under airworthiness approval, installation/update instructions may be documented in operator's manuals as determined to be appropriate by the applicant.

In the case of data covered by Type 2 DAT provider (or equivalent), the applicant should include for each database a list of systems using the data. If any system is not in the already identified compatible configuration (e.g. the Type 2 DAT provider certificate Field 5 per Part-DAT AMC1 DAT.OR.105 (a) (2), including part/model numbers (hardware, software), the certification documentation should include data and demonstrate (e.g., using system verification tests, sampling checks, etc.) that the DQRs are consistent with the intended function of the associated equipment (see 3.4.1). One example is a STC applicant certifying a runway overrun alerting system using the airport database of an already certified moving map. This is basically done through an appropriate arrangement of the applicant with the original equipment manufacturer (OEM) or the Type 2 DAT certificate (or equivalent) holder at time of first certification or when proposing additions to the compatible equipment list.

The applicant may support the Type 2 DAT certificate (or equivalent) holder in performing sampling checks (e.g., via simulation, test bench environment, etc.) to confirm continued compatibility (refer to part-DAT AMC1 DAT.TR.100 (a) (1)). The purpose of the sampling checks should be to detect issues before release to service, assess potential improvement of the functioning of the equipment/application, adapt DQRs where necessary, etc. Section C.2.3.3 of ED-76A contains guidance on sampling.



3.4.4. Certification Testing

Equipment or applications using a database have to be shown to function properly when the loaded database is compliant with the defined DQRs. When testing is proposed for certification purposes, the applicant should perform these activities with representative databases.

For databases under 3.2, when relying on system tests to ensure the quality of the installed database, the testing must show that the equipment functions as intended for all the capabilities/options supported by the database.

3.4.5. Instructions for Continued Airworthiness

This section is only applicable for databases covered under airworthiness approval (section 3.2).

TC/STC applicants/holders should also define instructions for continued airworthiness relevant to databases covered under airworthiness approval, especially addressing their validity when it is limited to a period of time (e.g. magnetic variation table). Minimum scheduled maintenance tasks, if required, for securing the continued airworthiness of the system and installation are identified and published as part of the CS XX.1529/CS 23.2625 compliance.

For those databases that are time limited, the maintenance procedures necessary to update the database or suitable AFM limitations must be identified. In particular, means should be provided to check the database validity, and to inform the operator about:

- When the database needs to be updated.
- How this update is to be implemented.

For databases that have the capability of being loaded with data loaders or portable devices, any considerations and required precautions associated with the loading process, including those established by the ETSOA holder, have to be properly reflected in the ICA documentation.

4. Remarks

1. Comments or suggestions regarding this EASA Certification Memorandum should be referred to the Certification Policy and Safety Information Department, Certification Directorate, EASA. E-mail CM@easa.europa.eu.
2. For any question concerning the technical content of this EASA Certification Memorandum, please contact:

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Appendix A – Databases Airworthiness Approval Flow Chart





