



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy

Order
8110.55B

Effective Date:
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SUBJ: How to Evaluate and Accept Processes for Aeronautical Database Suppliers

- 1 **PURPOSE OF THIS ORDER.** This order explains how Federal Aviation Administration (FAA) Aircraft Certification Service staff can evaluate and accept the aeronautical data processes of an applicant who meets the criteria of Advisory Circular (AC) 20-153B, *Acceptance of Aeronautical Data Processes and Associated Databases*. Related reference material is included in Appendix A.
- 2 **AUDIENCE.** All aircraft certification office (ACO) staff involved in issuing design approvals for aircraft systems and equipment.
- 3 **WHERE CAN I FIND THIS ORDER?** This order is located in electronic format at http://www.faa.gov/regulations_policies/orders_notices/.
- 4 **CANCELLATION.** FAA Order 8110.55A, issued on November 15, 2011, is cancelled.
- 5 **SCOPE.** This order describes:
 - FAA procedures for ACO staff to grant acceptance of an applicant's aeronautical data processes when they demonstrate compliance with AC 20-153B using RTCA/DO-200B, *Standards for Processing Aeronautical Data*, for either a Letter of Acceptance (LOA), a database acceptance as part of equipment, or installation design approval under technical standard order authorization (TSOA), type certificate (TC), or supplemental type certificate (STC).
 - FAA procedures for ACO staff to maintain acceptance of an applicant's aeronautical data processes when they have previously demonstrated compliance with AC 20-153A, *Acceptance of Aeronautical Data Processes and Associated Databases*, using RTCA/DO-200A, *Standards for Processing Aeronautical Data*, for an LOA. Maintaining a previous LOA under AC 20-153A, or previous versions, using DO-200A requires any changes to the LOA remain minor as agreed to by the ACO granting the LOA.
 - FAA procedures for ACO staff to process applications for LOA.
 - Evaluation detail to ACO staff for granting acceptance of an applicant's aeronautical data process associated with a TSOA or installation approval.

- Skills, competencies, and procedures for conducting LOA audits and compliance reviews.

Note: For definitions applicable to this guidance, please reference RTCA/DO-200B, Appendix A. Additionally, in this guidance the term “applicant” refers to aeronautical data suppliers (e.g., data service providers, application integrators, etc.), original equipment manufacturers, avionics manufacturers, and operators / end-users demonstrating compliance to RTCA/DO-200B and using this means toward airworthiness and operational approvals.

6 FAA ACCEPTANCE OF AERONAUTICAL DATABASES. There are three separate ways applicants can obtain FAA acceptance of their aeronautical database associated with a technical standard order (TSO), TC, STC, or LOA project utilizing AC 20-153B (see AC 20-153B Figure 2 and Section 9):

Note: It is not necessary for an applicant to obtain FAA acceptance of an aeronautical database when failure to meet the data quality requirements (DQRs) has no safety effect (i.e., routine assurance-level data, Visual Flight Rules (VFR)-only navigation database, etc.).

1. Obtain a database LOA.
2. Associate a database with TSOA (i.e., for a TSO requiring RTCA/DO-200B compliance (or earlier version)).

Note: It may not be necessary for an applicant to obtain a Type 2 LOA for a database associated with a TSOA, but operational use in Instrument Flight Rules (IFR) may require one. Evidence of a Type 2 LOA necessitates no further demonstration for the TSOA (related to the aeronautical database). Otherwise, applicants must address the documentation requirements of AC 20-153B paragraph 9.2.1 as part of their TSO application and with any safety-effect database (i.e., essential and critical assurance-level data) updates since they result in a change to the TSO article without an LOA in place.

3. Associate a database with installation approval (e.g., TC, STC).

Note: We do not expect this approval method to be effective for large data sets or databases needing frequent update. Without an LOA in place, applicants must address the documentation requirements of AC 20-153B paragraph 9.3.1 for any safety-effect database (i.e., essential and critical assurance-level data) updates since they result in a change to the installation approval.

6.1 Obtain a database LOA. Obtaining an FAA LOA substantiates and provides evidence the applicant is following a documented process in the development and transmission of the data, the data meets the DQRs, and the applicant maintains the data quality and communicates deficiencies in the data throughout its lifecycle. We grant a Type 1 or Type 2 LOA, defined in AC 20-153B, to an applicant seeking evidence of compliance to AC 20-153B using RTCA/DO-200B. These LOAs serve as objective evidence supporting operational and airworthiness approval requirements. Paragraphs 7 – 13 of this order provide guidance to follow in evaluating applicants requesting a database LOA. The principal advantage of using a database associated with an LOA is change management. Since all aspects of the data process are administered and maintained under the LOA, no further demonstration is necessary toward the airworthiness approval.

6.2 Database associated with TSOA.

6.2.1 When a TSO states a requirement for RTCA/DO-200B compliance (or earlier version), use of a database LOA (Type 2) is recommended. No further demonstration is necessary for the TSOA (related to the aeronautical database) when the applicant applies for and obtains a database LOA. If the applicant does not obtain a database LOA, then to gain FAA acceptance of their aeronautical data process, they must address the following as part of the TSO application in order to obtain TSOA:

6.2.1.1 Many FAA TSOs do not specify RTCA/DO-200B for aeronautical database assurance. For TSOs specifying a version prior to RTCA/DO-200B, or not specifying any version of RTCA/DO-200, applicants should use RTCA/DO-200B, or equivalent means (reference AC 20-153B, paragraph 3.1). If an applicant uses RTCA/DO-200B in lieu of a specified earlier version, have the applicant request a deviation in accordance with the requirements of Title 14 of the Code of Federal Regulations (14 CFR) part 21, subpart O.

6.2.1.2 In addition to the documentation submitted as part of the TSO application, the applicant must present documentation for the following:

- Define the DQRs; ensure they are consistent with the intended function of the TSO (see RTCA/DO-200B appendix B).
- Define the verification methods for all data and validation methods for data not coming from authoritative source (reference AC 20-153B, paragraph 11.2.1).
- Define the process, from origination of data through loading the data into the application, of ensuring the quality of the data. Further, the applicant must document how they will maintain these data processes (for all suppliers in the aeronautical data chain) throughout the lifecycle of the installed article.

Note 1: An LOA from a previous data chain participant is evidence the data received meets the agreed DQRs.

Note 2: As part of their process definition for change management, applicants must define the level of system verification testing appropriate for major and minor changes to the items in AC 20-153B paragraph 9.2.1.2 (e.g., DQRs, process documentation, etc.).

- Define the requirements and conditions for updating and verifying the database in the installation instructions.

6.2.2 The AFM supplement or installation instruction must identify any restriction/limitations concerning operating with expired aeronautical databases.

6.2.3 Without a database LOA, database updates with a failure effect other than no safety effect are a change to the TSO article. Additionally, if the applicant does not satisfy the items in AC 20-153B paragraph 9.2.1.2, then the TSOA holder (application integrator) must perform system verification tests to verify the database in the context of the functional software (reference AC 20-115C, *Airborne Software Assurance*, and AC 20-174, *Development of Civil Aircraft and Systems*).

Note: The intent of this paragraph is to allow database approval for applicants who do not seek an LOA or do not meet the items in AC 20-153B paragraph 9.2.1.2, but rather are relying on system verification tests to ensure the quality of the installed database (reference AC 20-153B Figure 2).

6.3 Database associated with installation approval. We do not expect this approval method to be effective for large data sets or databases needing frequent update (e.g., more frequent than one update per year).

6.3.1 There are three types of installed databases: (1) aeronautical databases, (2) airborne system databases, and (3) other databases, which are not part of the type design of the aircraft (e.g., electronic flight bag (EFB) Type A and B, electronic checklist (ECL), user modifiable, etc.). This order provides guidance related to aeronautical databases and highlights the applicant's responsibility for showing compliance to all applicable 14 CFR part 23/25/27/29 sections for installed aeronautical databases. This responsibility is more straightforward within the LOA framework (or if the database is associated with TSOA). However, if the applicant does not obtain an LOA (or if database is not associated with TSOA), then to gain FAA acceptance of their aeronautical data process within the TC or STC design approval, the applicant must address the following at time of installation approval:

- Define the DQRs; ensure they are consistent with the intended function (see RTCA/DO-200B appendix B).

- Define the verification methods for all data and validation methods for data not coming from authoritative source (reference AC 20-153B paragraph 11.2.1).
- Define the process from origination of data through loading the data into the application, of ensuring the quality of the data. Further, the applicant must document how they will maintain these data processes (for all suppliers in the aeronautical data chain) throughout the lifecycle of the aircraft.

Note 1: An applicant may use an LOA from a previous data chain participant as evidence the data they received meets the agreed DQRs.

Note 2: As part of their process definition for change management, applicants must define the level of system verification testing appropriate for major and minor changes to the items in AC 20-153B paragraph 9.3.1 (e.g., DQRs, process documentation, etc.).

- Define the requirements and conditions for updating and verifying the database within the instructions for continued airworthiness.

6.3.2 The AFM must state any restriction/limitations concerning operating with expired aeronautical databases.

6.3.3 Without a database LOA, we consider database updates to a database with a failure effect other than no safety effect to be a change to the installation approval. Additionally, if the applicant does not satisfy the items in AC 20-153B paragraph 9.3.1, then the design approval holder (application integrator) must perform system verification tests to verify the database in the context of the functional software (reference AC 20-115C and AC 20-174).

Note: The intent of this paragraph is to allow database approval for applicants who do not seek an LOA or do not meet the items in AC 20-153B paragraph 9.3.1, but rather are relying on system verification tests to ensure the quality of the installed database (reference AC 20-153B Figure 2).

7 SKILLS AND TRAINING. Staff assigned to an LOA project should satisfy the following criteria:

7.1 Have a basic level of skill and competency acquired through previous experience or obtained through additional training in at least two of the following areas:

- Audit team leadership or previous audit team participation (e.g., previous LOA audits, internal auditing, quality management auditing, etc.).
- Previous type certification experience using RTCA/DO-200A and/or RTCA/DO-200B.

- Knowledge of basic International Organization for Standardization (ISO) quality management concepts and/or auditor training.
- RTCA/DO-200A or RTCA/DO-200B tool qualification concepts and review methods (experience in tool qualification concepts from RTCA/DO-178C or RTCA/DO-330, *Software Tool Qualification Considerations*, is also acceptable).
- Aircraft Certification Systems Evaluation Program (ACSEP) training or experience.
- Software Engineering Institute Capability Maturity Model (SEI CMM) assessment.

7.1.1 If LOA project staff needs additional training to augment their current technical knowledge and skills, consider the training courses referenced in appendix A, paragraph 1.3 of this order.

8 ESTABLISHING AN FAA LOA FOR AERONAUTICAL DATA SUPPLIERS. An ACO has the following responsibilities toward LOA applications:

8.1 The ACO in the geographic area of the applicant's processing facility should accept the LOA application. The ACO will evaluate the LOA application, make audit preparations, conduct the audit, process the audit results with the applicant, and maintain the LOA.

8.2 If the applicant is located outside the United States, we will not issue an LOA.

Note: Responsible management and process approval authority must be located in the United States for the FAA to issue an LOA. Facilities located outside the United States may place an undue burden on the FAA in administering this policy or the ability to verify compliance, so the ability to demonstrate database production must be verifiable domestically. If observation and demonstration of database production, process, and procedures cannot be exhibited, then data produced outside the United States must be validated.

8.3 Non-U.S. data suppliers may show their data processes meet RTCA/DO-200B, or the direct equivalent EUROCAE ED-76A, to their responsible national authority. Their authority's approval of these processes may be considered acceptable and equivalent to the LOAs in AC 20-153B. Applicants should identify the relevant authority and approval method (for example, a European Aviation Safety Agency LOA) to their data customers. For example, a Type 2 LOA application may involve a Type 1 foreign data supplier. In this case, the FAA verifies the foreign supplier's approval is legitimate and endorses the LOA (see AC 20-153B, appendix 2, paragraphs 7 and 8 of figures 1 and 2).

9 PREPARING FOR THE AUDIT.

9.1 Upon receipt of an initial LOA application, experience has shown at least 30 days is usually needed for staff to review an applicant's application package, conduct audit planning, assemble and schedule an audit team, and develop an audit plan prior to conducting an audit

of the applicant's facility. To schedule the audit, the assigned project engineer will need to assemble an audit team, produce an agenda for the audit with the applicant, and ensure audit team members are able to review the data supplier's application package prior to the audit.

- 9.2 Compose the Audit team.** For a first-time LOA application, the assigned project engineer will compose the audit team, which may include, but is not limited to, ACO engineers, manufacturing inspectors, plus directorate and headquarters staff. A typical audit team usually consists of 2-5 people and should include at least one member familiar with the avionic systems using the data (e.g., navigation), and at least one additional member familiar with RTCA/DO-200B tool qualification and review methods.
- 9.3** Audit team members should review the data supplier's compliance documentation described in RTCA/DO-200B, section 2.2 to verify whether the data quality requirements and processing standards meet AC 20-153B and verify the scope of the data to be covered by the LOA.
- 9.4** Ensure the applicant submitted a statement certifying a quality management system (QMS) is established as required by AC 20-153B and evaluate the data submitted as evidence of compliance.

10 STEPS FOR AUDITING THE FACILITY.

- 10.1** Examine the applicant's facility before issuing an LOA. The initial audit should be conducted at the applicant's facility, but subsequent audits may be off-site or accomplished with documentation review. This audit should be conducted at the applicant's facilities where database processing takes place to ensure the applicant meets the criteria of AC 20-153B.
- 10.2** Base the audits on how the applicant demonstrates compliance with AC 20-153B and RTCA/DO-200B objectives focusing on areas having higher risk of producing erroneous data. RTCA/DO-200B section 3 highlights the use of an audit as the means of demonstrating compliance. For an applicant maintaining LOAs compliant to AC 20-153A, or previous versions, using RTCA/DO-200A, utilize the objectives documented from the original compliance under AC 20-153A, or previous versions.
- 10.3** Send a letter to the applicant notifying them of a facility audit no less than 15 working days before the audit. The letter should explain the audit's expectations and objectives, and inform the applicant what staff must be on site during the audit.
- 10.4** Evaluate the interfaces between data originators, type design holders, airline operators (if applicable), and any end-user. Audit the means by which recipients tell the originator they received erroneous or inconsistent data. Evaluate the applicant's procedures for rapid and effective corrective action.
- 10.4.1** Where questionable data cannot be resolved, audit the applicant's method for handling this issue. Make sure the applicant has effective controls to prevent the release of an unsafe product, and the impact of questionable data to end-users is communicated.

- 10.4.2 For interfaces with type design holders, audit the communication procedures to ensure the equipment type design holders communicate to applicants about compatibility issues and constraints between equipment and their databases.
- 10.4.3 For airline operators and end-user applicants, audit the procedures to learn how the operator or end-user handles originated (e.g., tailored) data, and whether they have procedures for confirming the data comes from an authoritative source or is validated sufficiently.

10.5 Audit the Objectives, Procedures, and Reports. Auditors look for objective evidence of how each compliance requirement is accomplished and the corresponding reference showing where in the applicant's documentation the evidence is found. The compliance plan submitted by the applicant includes a completed RTCA/DO-200B compliance matrix (see RTCA/DO-200B, appendix F), as well as a completed objectives matrix found in appendix 3 of AC 20-153B (to cover AC 20-153B objectives). Auditors use these matrices to determine how and where RTCA/DO-200B and AC 20-153B objectives are met. At the end of each day, the lead auditor should meet with the facility managers, report and discuss any issues, and set the agenda for the next day's assessment. Compile and issue the final audit report prior to leaving the applicant's facility. The final audit report lists audit findings to the objectives of RTCA/DO-200B, appendix F and appendix 3 of AC 20-153B and use the following classifications in descending order of severity:

- **Non-Compliances – NC** (must be fixed prior to issuance or may result in suspension of LOA),
- **Deficiencies – D** (requires agreed upon timeline prior to issuance of LOA or further action), and
- **Observations – O** (professional judgment, opinion, or issues for highlight and suggestion).

The final audit report should also list or discuss:

- **Special emphasis items** (i.e., taskings, required follow-ups, clarification actions, etc.),
- **Corrective actions**, and
- **Recommendations for FAA acceptance or conditions required for acceptance.**

10.6 The lead FAA auditor and facility leader sign the report, and the auditor files it in the project folder.

11 RECORDING AND DISTRIBUTING THE LOA.

- 11.1** New LOA numbers should follow the numbering convention for existing projects. The number should be unique for each LOA holder and carried on all subsequent supplements to it. One means to number is to compose with the prefix "LOA," followed by a format similar to those used for Supplemental Type Certificates (STCs), a four-digit number (unique to each LOA), and add two alpha digits to identify the project ACO (see FAA Order 8110.4C, *Type Certification*, appendix 1, figure 5). To illustrate: "LOA0018LA" represents the 18th LOA issued by the Los Angeles ACO. After reviewing the applicant's aeronautical data process and QMS, an ACO representative will sign the LOA affirming FAA acceptance of the aeronautical data process. See AC 20-153B, appendix 2 for samples of Type 1 and 2 LOAs.
- 11.2** Prepare the acceptance letter for all initial LOAs and the transmittal letter for all subsequent LOAs, in triplicate. Give the original to the applicant. Keep one copy at the issuing office and send one copy to the Systems and Equipment Standards Branch (AIR-130), 470 L'Enfant Plaza, Suite 4102, Washington, DC 20024.

12 POST LOA ACTIVITY.

- 12.1** An ACO may have to reevaluate an applicant's QMS when an LOA holder transfers their data production facilities, including supplier facilities delegated with major inspection functions, or when an LOA holder expands operations to include more production facilities at other locations.
- 12.2** An LOA is not transferable to another person, company, or location. While actual production and distribution of databases may be done by a third party under license or contract, the responsibility for the terms, conditions, and processes of a particular LOA remain with the holder of the LOA.
- 12.3** The ACO project engineer should inspect the LOA holder's facilities periodically to ensure the holder continues to meet the criteria of RTCA/DO-200B and AC 20-153B objectives.
- 12.4** The ACO can revoke the LOA at any time if the LOA holder does not resolve outstanding deficiencies from an audit report, comply with the specified terms and conditions of their LOA, or satisfactorily remedy non-compliance issues within an agreed timeframe.
- 12.5** The ACO should formally terminate an LOA when surrendered or withdrawn by the holder. Send the original response letter to the applicant, keep one copy at the issuing office, and send one copy to the Systems and Equipment Standards Branch (AIR-130).

13 USE OF DESIGNATED ENGINEERING REPRESENTATIVES (DERs) IN LOA PROJECTS.

- 13.1** DERs do not have authority to issue LOAs for the aeronautical data process or to alter the issued LOA. However, the use of systems and equipment DERs is encouraged and when authorized they may:

- Recommend approval of LOA changes to add or remove compatible avionics identified in the LOA, and
 - Evaluate and recommend approval of data process, quality management, and tool qualification documentation.
- 13.2** Any use of DERs or organizational delegation must be approved by the ACO as part of the Project Specific Certification Plan (PSCP).
- 14** **AUTHORITY TO CHANGE THIS ORDER.** The issuance, revision, or cancellation of the material in this order is the responsibility of the Design, Manufacturing, & Airworthiness Division (AIR-100).
- 15** **SUGGESTIONS FOR IMPROVEMENT.** If you find deficiencies, need clarification or want to suggest improvements to this order, send FAA Form 1320-19, *Directive Feedback Information*, (written or electronically) to the Aircraft Certification Service, Administrative Services Branch, AIR-510, Attention: Directives Management Officer. You can also send a copy to the Design, Manufacturing & Airworthiness Division (AIR-100), 950 L'Enfant Plaza, 5th Floor, Washington, DC 20024, Attention: Comments to Order 8110.55. If you urgently need an interpretation, you can contact the Systems and Equipment Standards Branch, AIR-130 at 202-267-9013, or Systems and Equipment Standards Branch (AIR-130), 470 L'Enfant Plaza, Suite 4102, Washington, DC 20024. Always use Form 1320-19 to follow up each verbal conversation.
- 16** **RECORDS MANAGEMENT.** See Order 0000.1, *FAA Standard Subject Classification System*; Order 1350.14, *Records Management*; and Order 1350.15, *Records, Organization, Transfer, and Destruction Standards*, or see your office Records Management Officer/Directives Management Officer for guidance on retaining or disposing of records.



Susan J. M. Cabler
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APPENDIX A**References**

- 1 RELATED REFERENCES.** All references to FAA documents in this order are to the current version.
- 1.1 FAA ACs.** Locate copies in electronic format at www.faa.gov/regulations_policies/advisory_circulars/.
- 1.1.1 AC 20-115C, *Airborne Software Assurance*.
- 1.1.2 AC 20-153B, *Acceptance of Aeronautical Data Processes and Associated Databases*.
- 1.1.3 AC 20-174, *Development of Civil Aircraft and Systems*.
- 1.2 FAA Orders.** Locate copies in electronic format at http://www.faa.gov/regulations_policies/orders_notices/.
- 1.2.1 FAA Order 0000.1, *FAA Standard Subject Classification System*.
- 1.2.2 FAA Order 1350.14, *Records Management*.
- 1.2.3 FAA Order 1350.15, *Records, Organization, Transfer, and Destruction Standards*.
- 1.2.4 FAA Order 8110.4C, *Type Certification*.
- 1.2.5 FAA Order 8110.37E, *Designated Engineering Representative (DER) Guidance Handbook*.
- 1.2.6 FAA Order 8110.49, *Software Approval Guidelines*.
- 1.3 FAA Training Courses.** Locate online courses, training registration, and training history at <https://elms.dot.gov/>.
- 1.3.1 FAA Course 27200036, *Letter of Acceptance (LOA) Audit for Project Engineers*.
- 1.3.2 FAA Course 30030006, *Lead Auditor – Quality Management System (QMS)*.
- 1.3.3 FAA Course 28463, *Basic Compliance Auditing for AVS Personnel*.
- 1.3.4 FAA Course 24915, *ISO Internal Auditor Course*.
- 1.3.5 FAA Course 21030, *Software Fundamentals*.
- 1.3.6 FAA Course 21045, *Software Job Functions*.

- 1.4 RTCA, Inc. Documents.** Order RTCA documents from RTCA, Inc., 1150 18th Street NW, Suite 910, Washington, D.C. 20036. Telephone: (202) 833-9339. Order copies online at <http://www.rtca.org>.
- 1.4.1 RTCA/DO-178B, *Software Considerations in Airborne Systems and Equipment Certification*, dated December 1, 1992, and its equivalent, European Organization for Civil Aviation Equipment (EUROCAE) document ED-12B, *Software Considerations in Airborne Systems and Equipment Certification*.
- 1.4.2 RTCA/DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*, dated December 13, 2011, and its equivalent, European Organization for Civil Aviation Equipment (EUROCAE) document ED-12C, *Software Considerations in Airborne Systems and Equipment Certification*.
- 1.4.3 RTCA/DO-200A, *Standards for Processing Aeronautical Data*, dated September 28, 1998, and its equivalent, EUROCAE document ED-76, *Standards for Processing Aeronautical Data*.
- 1.4.4 RTCA/DO-200B, *Standards for Processing Aeronautical Data*, dated June 18, 2015, and its equivalent, EUROCAE document ED-76A, *Standards for Processing Aeronautical Data*.
- 1.4.5 RTCA/DO-201A, *Standards for Aeronautical Information*, dated April 19, 2000, and its equivalent, EUROCAE document ED-77, *Standards for Aeronautical Information*.
- 1.4.6 RTCA/DO-236C Change 1, *Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation*, dated September 23, 2014.
- 1.4.7 RTCA/DO-254, *Design Assurance Guidance for Airborne Electronic Hardware*, dated April 19, 2000.
- 1.4.8 RTCA/DO-272D, *User Requirements for Aerodrome Mapping Information*, dated September 22, 2015, and its equivalent, EUROCAE document ED-99C, *User Requirements for Aerodrome Mapping Information*.
- 1.4.9 RTCA/DO-283B, *Minimum Operational Performance Standards for Required Navigation Performance for Area Navigation*, dated December 15, 2015.
- 1.4.10 RTCA/DO-276C, *User Requirements for Terrain and Obstacle Data*, dated September 22, 2015, and its equivalent, EUROCAE document ED-98B, *User Requirements for Terrain and Obstacle Data*.
- 1.4.11 RTCA/DO-291C, *Interchange Standards for Terrain, Obstacle and Aerodrome Mapping Data*, dated September 22, 2015, and its equivalent, EUROCAE document ED-119B, *Interchange Standards for Terrain, Obstacle and Aerodrome Mapping Data*.
- 1.4.12 RTCA/DO-330, *Software Tool Qualification Considerations*, dated December 13, 2011.

1.5 Society of Automotive Engineers (SAE) International Documents. Order SAE documents from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Telephone (724) 776-4970, fax (724) 776-0790. Order copies online at <http://www.sae.org>.

1.5.1 ARP 4754A, *Guidelines for Development of Civil Aircraft and Systems*.

1.5.2 ARP 4761, *Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment*.

1.6 Airlines Electronic Engineering Committee (AEEC), ARINC, Inc. Documents. Order ARINC documents from ARINC Incorporated, 2551 Riva Rd., Annapolis, MD, 21401. Telephone +1 800-633-6882, fax +1 410-956-5465. Order copies online at www.arinc.com.

1.6.1 ARINC Specification 424, *Standard, Navigation System Data Base*.

1.6.2 ARINC Specification 816, *Embedded interchange Format for Airport Mapping Database*.