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

**ORDER 8300.14**

Effective Date:
XX/XX/XXXX

**SUBJ:** Maintenance and/or Alteration Specification Procedures

## FOREWORD

This order defines the procedures and responsibilities of Federal Aviation Administration (FAA) personnel and designees in reviewing maintenance and/or alteration specifications and what to expect from certificate holders seeking approval of data for specifications resulting in major repairs or alterations.

These procedures apply to all engineering and Flight Standards personnel in the FAA.

ORIGINAL SIGNED by
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James J. Ballough
Director, Flight Standards Service

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## Chapter 1. General Information

**1. Purpose of This Order.** This order defines

- The responsibilities of Federal Aviation Administration (FAA) personnel and designees in reviewing specifications that result in repairs and/or alterations to civil aviation products (aircraft, aircraft engines, propellers and appliances) and articles.

- The procedures to follow when approving the technical data supporting those maintenance and/or alteration specifications that result in major repairs or major alterations.

- What to expect from persons following the procedures in AC 43-XXX—Development and Approval of Maintenance and/or Alteration Specifications.

**a.** This order is not meant:

- To require the re-evaluation of existing major repairs or alterations that have been evaluated and approved under another methodology.

- To replace existing procedures for the development of repetitive major repairs and major alterations. For example, it does not apply to design approval holders and other certificate holders, such as Organization Delegation Authorization holders, air carriers and repair stations that have documented methodologies for developing and approving data in support of maintenance and/or alteration procedures otherwise acceptable or approved by the FAA.

**b.** This order provides a uniform methodology for the FAA (or its designees) to:

- Review, evaluate and approve technical data supporting independently developed maintenance and/or alteration specifications that will result in a major repair or major alteration; and

- To assess whether the maintenance provider has the appropriate housing, facilities, equipment and knowledgeable personnel to properly accomplish the action set forth in the maintenance and/or alteration specifications.

**2. Audience.** Aircraft Certification Service personnel and FAA designees authorized to approve engineering data as required by Title 14 of the Code of Federal Regulations (14 CFR) parts 121, 135 and 145, §§ 121.379(b), 135.437(b), and 145.201(c)(2). FAA Flight Standards Service personnel responsible for ensuring maintenance providers are accomplishing maintenance, preventive maintenance and alteration actions in accordance with parts 43, 121, 135 and 145.

**3. Where You Can Find This Order.** This order may be accessed through Flight Standards Information Management System (FSIMS) at http://fsims.avs.faa.gov. Operators and the public can find this order at http://fsims.faa.gov.

**4. Effective Date.** This order is effective on XXXX, XX, 200X.

**5. How This Order is Organized.** In general, this order is organized by the responsibilities of the certificate holder, cognizant Flight Standards District Office/certificate management office/International Field Office (FSDO/CMO/IFO), Aircraft Certificate Office (ACO), and/or appropriately authorized Designated Engineering Representatives (DER).

**6. Regulations:** The regulations require persons performing maintenance, preventive maintenance or alterations to use methods, techniques and practices acceptable to the FAA. See, 14 CFR § 43.13(a). Normally, these "how-to" instructions are found in the manufacturer's documents, such as maintenance and/or overhaul manuals, aircraft maintenance and structural repair manuals, instructions for continued airworthiness, service bulletins and other documents developed under the certification process. See 14 CFR § 21.50(b) and its referenced sections and appendices.

The regulations also allow a person performing maintenance, preventive maintenance or alterations to perform that work in accordance with independently developed methods, techniques and practices. See 14 CFR § 43.13(a).

14 CFR § 43.13(b) establishes the criteria for ensuring that methods, techniques and practices for performing maintenance, preventive maintenance or alterations are acceptable to the FAA . The instructions must ensure that the work and the materials used return the article to at least its original or properly altered condition.

To determine whether a repair or alteration is minor, it must be shown that it is not major. See 14 CFR § 1.1 for definitions of major and minor repair and alteration. Certificated maintenance providers have been advised of an acceptable method for ascertaining whether a repair or alteration is major or minor in AC 120-77. When the technical data supporting a method, technique or practice needs approval because the result is a major repair or major alteration, the FAA ensures appropriate substantiation and approval through 14 CFR § 21.305(d).

**7. Maintenance and/or Alteration Specifications Will:**

**a.** Provide methods, techniques and/or practices not listed in the current manufacturer's maintenance manual, service bulletin, Instructions for Continued Airworthiness (ICA) or an air carrier's Continuous Airworthiness Maintenance Program (CAMP). These procedures can incorporate a combination of maintenance, preventive maintenance and alteration methods, techniques and practices.

**b.** Explain:

(1) What the specific repair or alteration does,

(2) When the repair or alteration is appropriate,

(3) Whether the result is a major or minor repair or alteration and if major, the action will be substantiated by approved data, and

(4) The required or recommended facilities, equipment (including tools and tooling), materials (including replacement parts),

(5) How the repair and/or alteration will be accomplished, including inspection and test criteria.

**c.** Be used repeatedly as an acceptable method, technique or practice for accomplishing a repair and/or alteration by a specific maintenance entity.

**d.** Result in a methodology for returning a civil aviation product or article to at least its original or properly altered condition.

**e.** Require the technical data to be FAA approved, when accomplishment will result in a major repair or major alteration.

**8. Use of Maintenance and/or Alteration Specifications.**

**a.** 14 CFR § 43.13(a) allows maintenance providers to use methods, techniques and practices to accomplish maintenance, preventive maintenance or alterations that are not contained in a manufacturer's document, provided the procedure is otherwise acceptable to the FAA.

**b.** In order for the method, technique or practice to be acceptable, it must:

- Return the article to its original or properly altered condition; and,

- If the result is a major repair or major alteration, the technical data supporting that determination must be approved by the FAA ACO or a properly authorized designee.

**c.** Maintenance providers that perform or intend to perform repairs and/or alterations that are not contained in manufacturers' documents on a repetitive basis should be advised to consider developing a maintenance and/or alteration specification. This is particularly applicable when the action will result in a major repair or major alteration.

**d.** The advantage of a maintenance and/or alteration specification is that it helps the maintenance provider plan for and operate under a consistent method authorized by the FAA. This helps to ensure the facility has consistent quality in its independently developed repairs and/or alterations and reduces demand on FAA resources, which improves efficiency for both the agency and the industry.

**e.** Developing a maintenance and/or alteration specification is advisable when the maintenance provider does not or cannot use manufacturer's documents (maintenance and overhaul manuals, instructions for continued airworthiness or service bulletins) to accomplish a maintenance or alteration activity. Some of the reasons that alternative maintenance and/or alteration data are developed include:

(1) Instructions don't exist.

(2) Instructions are not available.

(3) The certificate holder wants to deviate from the established instructions.

(4) The existing instructions are not appropriate for the article. For example, the article was previously repaired or altered and the instructions assume the article was not previously repaired or altered.

**9. The Difference Between a Maintenance/Alteration Specification and a Process Specification.** The two terms are distinguished as follows:

**a. A Maintenance and/or Alteration Specification:** This type of specification is referred to by many names including “repair data”, “maintenance data”, “repair specifications”, “alteration instructions” and other similar terms.

(1) Is a method, technique or practice for accomplishing a repair and/or alteration that is not included in a manufacturer developed document (maintenance or overhaul manual, instructions for continued airworthiness, service bulletin, etc.). It may vary from adding or substituting a particular manufacturer recommended action to developing complete overhaul instructions for an article. One specification may contain information on accomplishing repair and/or alteration actions.

(2) Includes step-by-step (how to) instructions for performing the maintenance and/or alteration actions.

(3) When resulting in a major repair or major alteration, is supported by approved technical data that shows the action returns the article to its original or properly altered condition, i.e., meets the appropriate airworthiness standards for the article after the work described in the specification has been accomplished.

(4) May incorporate by reference one or more process specifications.

**b. A Process Specification:**

(1) Is a written methodology or standard for completing a specific requirement of the step-by-step (how-to) instructions contained in a manufacturer’s maintenance manual, Instructions for Continued Airworthiness, an air carrier or commercial operator’s CAMP or an independently developed maintenance and/or alteration specification. These specifications would include methods or standards for accomplishing welding, heat-treating, plasma spraying and other standard processes referenced in repair and/or alteration instructions.

(2) By itself is not adequate to meet the requirements of this order, because it is not evaluated and limited to a particular article. Maintenance and/or alteration specifications may reference or incorporate process specifications. Examples include:

- American Society for Testing and Materials (ASTM) B 0244, Eddy Current Inspection of Coatings
- American Welding Society (AWS) D1.1, Welding
- Society of Automotive Engineers (SAE) AMSP81728, Plating, Tin-Lead (Electrodeposited)

- MIL-S-13165A, Shot Peening of Ferrous Metal Parts
- AWS C2.23M/C2.23:2003, Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel

(3) Is listed on a repair station's Operations Specifications with limited ratings for specialized services (14 CFR § 145.61(c)).

**10. How a Maintenance and/or Alteration Specification is Approved.**

**a.** A maintenance provider may use and the FSDO/CMO/IFO will accept a maintenance and/or alteration specification for minor repairs or alterations without engineering approval.

**b.** The approval of the data substantiating a maintenance or alteration specification that will result in a major repair or major alteration is accomplished by the FAA ACO or appropriately authorized designees.

**c.** The FAA FSDO/CMO/IFO may be requested to review the maintenance and/or alteration specification by the certificate holder or the FAA ACO to determine whether it is clear and consistent with respect to the step-by-step instructions. During the normal course of surveillance, FAA FSDO/CMO/IFO will ensure that the maintenance provider is using the appropriate housing, facilities, equipment and materials required to perform the maintenance and/or alteration specification properly.

**11. The Responsibilities of the Certificate Holder and FAA in Maintenance and/or Alteration Specifications.**

**a. The Certificate Holder is Responsible for:**

(1) Coordinating activities among and between itself, the FAA ACO/designee and the geographically responsible FSDO/CMO/IFO,

(2) Developing the maintenance and/or alteration specification and ensuring all elements identified in AC XX-XXX—Development and Approval of Maintenance and/or Alteration Specifications are adequately addressed.

(3) Substantiating the validity and applicability of the maintenance and/or alteration specification,

(4) Determining whether the application of the maintenance and/or alteration specification will result in a major or minor repair or alteration and obtaining approval of the substantiating data for those resulting in major repairs or major alterations,

(5) Monitor and updating the maintenance and/or alteration specification, and

(6) Using the maintenance and/or alteration specification within part 43 and under its part 65, 121, 135 or 145 certificate/ratings.

**b. The FAA is Responsible for:**

(1) Working with the certificate holder during any planning phase,

(2) Coordinating between offices within the FAA during planning and evaluation of the maintenance and/or alteration specification,

(3) Ascertaining the certificate holder's capability to use the maintenance and/or alteration specification, and

(4) Evaluating and approving the substantiating data supporting a certificate holder's maintenance and/or alteration specification. This step may be accomplished by appropriately authorized designees unless the specification will result in a major repair or major alteration to a critical/life-limited article, in which case the specification and substantiating data must be reviewed and approved by the ACO.

**Figure 1-1. Roles of FAA and Certificate Holder in Maintenance/Alteration Specifications**

| Certificate Holders | FSDO/CMO/IFOs | ACOs | Designees |
|---|---|---|---|
| • Determine if a maintenance and/or alteration specification is appropriate.<br>• Coordinate activities among the FSDO/CMO/IFO and ACO/designee.<br>• Develop maintenance and/or alteration specification. Include all applicable elements identified in AC XX-XXX.<br>• Develop data to substantiate the maintenance and/or alteration specification.<br>• Utilize appropriately authorized designees to evaluate and approve maintenance and/or alteration specification substantiation data.<br>• Maintain capabilities in order to use authorized | • Ensure compliance with regulations and procedures.<br>• Help certificate holder in coordinating activities.<br>• Evaluate certificate holder's capability to use its specification.<br>• Coordinate ***as needed*** with ACO for technical review and approval of data used to substantiate maintenance and/or alteration specifications.<br>• **See Ch. 2 for more details.** | • At their discretion, evaluate and approve (or delegate) test plans and/or witness tests.<br>• When requested by the certificate holder or the FSDO/CMO/IFO, evaluate and approve substantiation/ engineering data.<br>• Evaluate and approve, when appropriate, all maintenance and/or alteration specifications affecting life-limited or critical parts.<br>• **See Chapter 3 for more details.** | • When appropriately rated and delegated by ACO:<br>• Evaluate and approve test plans and witness tests.<br>• Evaluate and approve substantiation data.<br>• **See Chapter 4 for more details.** |

maintenance and/or alteration specification.
- Perform periodic review of maintenance and/or alteration specification and revise as needed.

**12. Acronyms.** See Appendix A, List of Acronyms.

**13. Definitions.** See Appendix B, Definitions and Terms.

**14. Related Publications.** See Appendix C, Related Publications.

**15. Suggestions For Improvement.** If you find any deficiencies, need clarification, or want to suggest improvements to this order, send a copy of FAA Form 1320-19, Directive Feedback Information (in writing or electronically), to the Flight Standards Service, Technical Information and Communications Programs Branch, AFS-140, Attention: Directives Management Officer. Form 1320-19 is on the last page of this order. You also may send a copy to the Aircraft Maintenance Division, AFS-300, Attention: Comments to Order 8300.14. Always use Form 1320-19 to follow up each conversation.

**16. Records Management.** For guidance on keeping or disposing of records, refer to FAA Orders 0000.1, FAA Standard Subject Classification System; 1350.14, Records Management; and 1350.15, Records, Organization, Transfer, and Destruction Standards. Or, see your office's Records Management Officer or Directives Management Officer.

**17. Distribution.** Distribute this order to the branch level in Washington headquarters, branch levels of the Flight Standards Service and Aircraft Certification Service; the branch levels of the regional Aircraft Certification Directorates; the Brussels Aircraft Certification Staff; all ACO and all FSDO/CMO/IFO.

## Chapter 2. Flight Standards Certificate-Holding District Office (FSDO/CMO/IFO) Responsibilities

**1. General Responsibilities.** The FSDO/CMO/IFO has several responsibilities for maintenance and/or alteration specifications. In general the responsible ASI:

**a.** Coordinates all activity concerning the maintenance and/or alteration specification authorization within the FAA.

**b.** Provides guidance to the certificate holder.

**c.** When requested by the certificate holder or the ACO/DER, reviews the certificate holder's proposed maintenance and/or alteration specification.

**d.** Evaluates the certificate holder's capabilities.

**2. Coordinate All Activity Within The FAA.** The responsible ASI should help the certificate holder coordinate all aspects for the evaluation and approval of the proposed maintenance and/or alteration specification within the FAA. Instruct the certificate holder to direct all project correspondence to the ASI at the FSDO/CMO/IFO. Likewise, the assigned ASI should be the only person within the FAA communicating directly with the certificate holder unless the assigned ASI determines otherwise. By communicating with one point of contact only, the certificate holder avoids getting conflicting guidance from multiple FAA representatives.

**3. Provide Guidance to Certificate Holder When It Is Developing a Maintenance and/or Alteration Specification.**

**a.** The AC advises the certificate holder to coordinate activities with the FAA through Flight Standard Services. A formal planning process can be beneficial in obtaining FAA data approval in an efficient and timely manner, particularly when:

(1) It is the first time the certificate holder is applying for the approval of data supporting a proposed maintenance and/or alteration specification that will result in a major repair or major alteration that will be used repetitively.

(2) The certificate holder expects to develop maintenance and/or alteration specifications for major repairs and major alterations frequently.

(3) The proposed maintenance and/or alteration specification will involve complex operations.

(4) The proposed maintenance and/or alteration specification will involve a critical or life-limited article.

(5) The certificate holder will be using complex techniques or equipment for the first time.

**b.** The planning phase can be done in a manner that works best for the FAA and the certificate holder, but its recommended that they meet to ensure all issues are adequately addressed and understood. Typically when planning the development and approval of a maintenance and/or alteration specification with the certificate holder:

(1) Establish primary points of contact for the certificate holder, FSDO/CMO/IFO and ACO or designee(s).

(2) Review and explain the AC, this order and what the FAA and the certificate holder can expect to happen.

(3) Discuss the proposed maintenance and/or alteration specification.

(4) Discuss the certificate holder's capabilities to use the maintenance and/or alteration specification. This is an informal discussion of whether the certificate holder is qualified to undertake the proposed maintenance and/or alteration and what capability issues the certificate holder may need to address.

(5) Assess the need for ACO involvement versus using appropriately authorized designee(s). If no designees will be used or if the contemplated maintenance and/or alteration specification is complex and may need the services of more than one designee, the FSDO/CMO/IFO may want to get support from the ACO for the meeting. Additionally, any maintenance and/or alteration specification that will affect a critical or life-limited article must be coordinated with the ACO.

(6) Determine if testing will be necessary to develop the substantiation data supporting the maintenance and/or alteration specification (i.e., show that the maintenance and/or alteration returns the article to its original or properly altered condition). If formal testing is required, discuss:

- Who will approve test plan(s)?
- Who will conform test article(s)?
- Who will witness test(s)?
- What are the pass/fail criteria?

(7) Ensure the certificate holder establishes a coordinated schedule for all activities necessary to ensure the maintenance and/or alteration specification provides the step-by-step instructions in a consistent and repeatable manner and that any major repairs or major alterations are substantiated by approved technical data (including a schedule for any testing of an article that has undergone the maintenance and/or alteration process.

(8) Schedule follow-up meeting(s) if necessary. Request the certificate holder to develop a summary of the meeting and submit it to the FSDO/CMO/IFO contact(s) for review, comment, and concurrence. This is not required but should be used to eliminate any misunderstandings of expectations, roles, and responsibilities.

**4. Review the Certificate Holder's Maintenance and/or Alteration Specification.** A review of the specification may be requested during its development or can be done during normal surveillance. When reviewing the maintenance and/or alteration specification the ASI should:

**a.** Make sure it meets the definition for a maintenance and/or alteration specification;

**b.** Make sure the maintenance and/or alteration specification includes and appropriately addresses the areas set forth in the AC. While each section is discussed in the AC and below, sections can be combined or set forth is a different order. The reasons that the information is requested are:

(1) **Certificate Holder Information.** This information ensures that the person that will use the specification is identified and that the specification is uniquely identified. This facilitates review of the document and ensures the certificated maintenance provider can identify, track, update and record the data used to accomplish work as required by 14 CFR § 43.9.

(2) **Purpose.** This is a short general description.

(3) **Scope.** This more detailed description of the how, when and where of the specification, including specific application allows the maintenance provider and the individuals following the process to understand when it will be used and equally important, when it cannot be used. It should include statements on:

(a) Whether it is a minor or major repair or alteration;

(b) Whether the specification will impact a critical process, part or life limited article.

(4) **Major/Minor Determination**: This statement helps the certificate holder and the FAA know the extent and nature of the repair or alteration and also ensures that the certificate holder has focused on the necessity of making the determination in order to comply with the regulations.

(5) **Procedure.** The step by step instructions should provide the details necessary for a qualified individual to perform the operation correctly. The AC contains the details recommended; again, the format may vary, but the instructions should be sequential, internally consistent and capable of being reliably repeated.

**c. Special Considerations**. During the development of the specification, the certificate holder should ensure the process developed and used will return the article to at least its original or properly altered condition. In order to make that determination, an assessment of the regulations, current data and pending actions should have been accomplished. The ASI should query the certificate holder to determine whether and/or how the following evaluations were made. The extent of the determination will depend upon the purpose and scope of the specification. Some processes will be extremely simple or be covered by existing guidance, for example, alternative cleaning methods are contemplated by AC 43-205. Other processes will be more difficult to analyze. In all events, the processes should not have been developed in a vacuum and the certificate holder should be able to explain how it evaluated the article and the process that will be applied to it.

(1) The criticality of the process and/or the characteristics of the article as noted in the AC and as required by the regulations. If the ASI has any questions about the evaluation, s/he should contact the directorate for the product or the CMACO.

(2) Existing or proposed ADs. The FAA's Web site is one source of information on existing or proposed ADs. If the ASI has any question about whether there may be issues with the article because of numerous SDRs or other indicators, s/he is encouraged to contact the product directorate and query the standards staff as to whether an AD is being contemplated.

(3) Service difficulties. The SDR database is another source of information on potential problems with the article. The ASI should ascertain whether the certificate holder developed the specification to solve those problems. In any event, the database should have been queried to determine if there are identifiable issues with the article.

(4) Existing ICAs. The certificate holder should have evaluated the specification against the existing and current manufacturer's maintenance and alteration information. The assessment is to determine whether the specification fits appropriately within those instructions and/or if the manufacturer's instructions will still be applicable after the specification is applied to the article.

**d. Substantiation.** The completed process should be validated. In other words, after the steps in the procedure have been completed, the certificate holder should verify that the article is returned to at least its original or properly altered condition. The substantiation is going to vary depending upon the complexity of the process and the criticality of the article. In some cases, simply applying the process and performing a visual inspection will suffice. In other cases, formal flight testing may be required. In all events, the certificate holder should be prepared to describe how it determined the article was returned to at least its original or properly altered condition.

**e. Periodic Review of Maintenance and/or Alteration Specification.** The certificate holder should be made aware that it will be responsible for monitoring the maintained or altered articles and to update the specification if the regulations or requirements for the article change. For example, if an AD affects the article, an AMOC for the specification may be required. If the specification does not result in an article that is returned to at least its original or properly altered condition, corrective action will be necessary to ensure compliance with the regulation. Part 121, 135 and 145 certificate holders should be strongly encouraged to develop a written process for monitoring, reviewing and updating the maintenance and/or alteration specifications. This is particularly important to repair stations that are required to comply with 14 CFR § 145.109(d).

**f. Capabilities.** Certificate holders must have the ability to successfully perform the necessary steps of the maintenance and/or alteration specification. This typically includes the housing and facility requirements, equipment, knowledgeable personnel and material handling and storage requirements, and other factors necessary to follow the maintenance and/or alteration specification. Certificate holders should have addressed any changes in procedures or manuals required by the regulations before implementing the specification. The ASI may ask the certificate holder to demonstrate the maintenance and/or alteration process particularly for complex repairs and/or alterations, repairs and/or alterations affecting life-limited or critical parts, or first time maintenance and/or alteration specification users.

(1) For part 65 certificate holders, ensure compliance with 14 CFR § 43.13;

(2) For part 121 and 135 certificate holders ensure that the manuals required by 14 CFR §§ 121.369 and 135.427 reference or have procedures for developing, approving, monitoring and updating alternative maintenance or alteration information, including specifications.

(3) For part 145 certificate holders ensure that:

(a) The accomplishment of the specification is within the ratings and Operations Specifications and if the certificate holder has a limited rating, that the article is appropriately listed on the capability list;

(b) Any change to housing is appropriately coordinated per 14 CFR § 145.105;

(c) Any change to facilities is appropriately updated in the certificate holders manual per 14 CFR 145.209(c);

(d) The certificate holder must have the equipment and materials identified in the specification available and under the certificate holder's control when performing the work. Any calibrated equipment is appropriately covered under the procedure required by 14 CFR § 145.211(1)(viii);

(e) Personnel requirements have been evaluated and any training has been accomplished and recorded as required by the certificate holder's approved training manual required under 14 CFR § 145.163(b)-(c).

(f) Any change to contracted maintenance functions is approved per 14 CFR § 145.217(a)(2)(i);

(g) The certificate holder has developed appropriate travelers, routers or other documents that ensure compliance with 14 CFR § 43.9(a)(3) and any requirements of the certificate holder's repair station and/or quality manual(s) with respect to 14 CFR § 145.219;

(h) The documents and data required to complete the maintenance and/or alteration specification are available. This includes any documents or data referenced in the specification. The certificate holder has a method for ensuring its maintenance and/or alteration specifications are maintained in a current condition as required by 14 CFR 145.109(d)(7).

(i) The certificate holder has a methodology for ensuring compliance with 14 CFR § 145.205 when it uses alternative maintenance and/or alteration specifications. The air carrier or commercial operator may have developed an evaluation process for accepting minor repairss and/or alterations, but most will require a separate evaluation of any maintenance or alteration data that results in a major repair or major alteration.

**g. Incomplete Specifications.** Whenever the ASI believes the contents of a maintenance and/or alteration specification is incomplete or inadequate to make a determination of compliance with the applicable regulations, notify the certificate holder with the specific

inadequacies. Ask the certificate holder to supply the missing information or supplement the inadequate information.

**5. Coordinate With the ACO for Engineering Support.**

**a.** When the FSDO/CMO/IFO receives a proposed maintenance and/or alteration specification that will result in a major repair or major alteration that has not been approved by a designee, the FSDO/CMO/IFO will forward the specification to the ACO to evaluate within 72 hours of receipt. Before sending it to the ACO:

(1) Verify that the proposed maintenance and/or alteration specification adequately addresses each of the areas identified in the AC.

(2) Verify that the certificate holder has evaluated the special considerations as explained in AC 43-XXX.

**b.** When the FSDO/CMO/IFO reviews a maintenance and/or alteration specification that has been approved by an appropriately authorized designee, the FSDO/CMO/IFO should verify that the certificate holder confirmed the designee's authority by obtaining a copy of that authorization or the ASI confirm the designee's authority through the ACO.

**c.** The FSDO/CMO/IFO can expect the designee and/or the ACO to make a comprehensive engineering evaluation of the maintenance and/or alteration specification to ensure compliance with all applicable CFRs. This includes evaluating any interaction between different engineering disciplines that may have been overlooked by the certificate holder.

**d.** FSDO/CMO/IFOs must forward all maintenance and/or alteration specifications affecting critical/life-limted parts to the ACO for evaluation within 72 hours of receipt.

**e.** If the ACO communicates any deficiencies regarding the maintenance and/or alteration specification, the FSDO/CMO/IFO must communicate those items to the certificate holder in a timely manner.

# Chapter 3. Aircraft Certification Office (ACO) Responsibilities

## 1. Support the FSDO/CMO/IFO.

**a. Review Data.** At the request of the FSDO/CMO/IFO, an ACO reviews the certificate holder's maintenance and/or alteration specification to determine if the article will meet the applicable airworthiness standards after the action has been accomplished and the substantiation data submitted adequately supports that finding. Seek FAA expertise from other ACOs, directorates, and CSTAs as needed. During this review:

(1) Verify acceptable service history of the original article and if any corrective actions involving design change are being pursued.

(2) Verify the eligibility for installation on type certificated products.

(3) Verify that the result of the maintenance and/or alteration specification meets airworthiness requirements applicable to the product into which the article will be installed.

(4) Verify the data is adequate to fabricate part(s) to be consumed in the repair or alteration, if needed.

(5) Review all differences between the technical requirements for the original part in a comparably repaired or altered condition and the repaired or altered part. Assess the technical justification for any differences and associated impacts on the next higher assembly and product.

(6) Review and approve test plans and reports and/or witness tests as necessary and at your discretion. If a test plan, report and/or witnessing is determined to be required to develop data to substantiate the ability of the specification to return the article to at least its original or properly altered requirements, the duty may be delegated. If delegated, a clear understanding of the requirements and expectations must be communicated.

(7) Ensure the certificate holder's substantiating data show compliance with applicable airworthiness standards.

**b. Critical/Life-Limited Articles.**

(1) Determine whether the maintenance and/or alteration specification affects critical/life-limited articles. If the certificate holder did not identify the maintenance and/or alteration specification as affecting critical parts, inform the FSDO/CMO/IFO. The FSDO/CMO/IFO must then notify the certificate holder and arrange for further discussion if necessary between the certificate holder and the FAA to resolve the issue.

(2) Designees may be used to support the substantiation of the specification, however, the ACO must evaluate any specification affecting critical/life-limited articles (see paragraph 4).

(3) Coordinate proposed maintenance and/or alteration specifications for critical/life-limited articles with the Certificate Management ACO (CMACO) to verify if the specification and substantiating data is complete before approving the substantiating data.

**2. Evaluate the Data Package.** Review the AC and applicable airworthiness requirements to see what should be in an certificate holder's maintenance and/or alteration specification and data package. Ensure it includes substantiation data adequate to show compliance with the applicable airworthiness standard requirement(s). The data package can include, but is not limited to, the following:

**a. The Maintenance and/or Alteration Specification.** The AC requires that the specification contain information necessary to explain the purpose, scope and details of performing the steps necessary to accomplish the action properly. The requirements should be clear and contain process specifications and other information necessary to return the article to at least its original or properly altered condition. The inspection and repair/alteration steps should be sufficient to ensure that the completed process is controlled and when accomplished, will return the article to a condition within the required design parameters. While the methods, techniques and practices contained in the specification will not be approved, they must be reviewed from an engineering point of view to ensure that the processes delineated are adequate. The required information for some articles may include routing sheets, tooling requirements, process sheets, material handling and storage, and inspection requirements the FAA deems necessary to ensure consistent repeatability.

**b. Drawings and Specifications.** Certificate holders should provide copies of any drawings and specifications that shows the configuration of the article. These drawings and specifications should address dimensions and tolerances, materials, and processes that define the structural strength and design characteristics of the article. Drawings normally will not be necessary for maintenance and/or alteration specifications that do not include fabrication requirements; however, process specifications, dimensions, tolerances and materials should be included in the procedure.

(1) When parts are fabricated for use in the repair and/or alteration, carefully review source control drawings to determine if the certificate holder has proper control over a fabricated article's configuration and fabrication. Ensure the certificate holder submitted all applicable detail drawings and specifications. These drawings and specifications are particularly important when evaluating the sources listed on source control drawings.

(2) Establish that the certificate holder has submitted sufficient data to fabricate conforming articles before issuing approval of the engineering aspects.

**c. Test Plans and Test Results.** The certificate holder may need to perform tests to demonstrate that a repair or alteration done in accordance with the maintenance and/or alteration specification will result in the article complying with the applicable airworthiness standards. The testing can be informal or formal and range from functional equivalency determinations to component to flight. Simple, non-critical parts may need little or no testing. When testing is required that the FAA chooses to witness, the certificate holder must develop a test plan approved by the FAA or a designee.

(1) The test plan:

(a) Describes the purpose of the test,

(b) Lists the specific airworthiness standard requirements and a description of how the certificate holder expects to show compliance,

(c) Is used to ensure orderly and complete testing is accomplished, and typically includes sections on:

*1.* Safety control,

*2.* Control of procedures, and

*3.* Conditions and duration.

(d) Describes the items to be tested and lists all equipment necessary to conduct the test, and typically includes sections on:

*1.* Physical and functional description of the test article and setup,

*2.* Number of test units, and

*3.* Test unit identification.

(e) Describes how the equipment is to be calibrated (when calibration is required) and approved before the test,

(f) Describes the instrumentation and equipment necessary to measure and record the results of the test,

(g) Lists required conformities of the test article and test setup,

(h) Includes a test procedure written in a step-by-step format,

(i) Defines the pass/fail criteria, and

(j) Describes who will witness the test.

(2) The test results report describes:

(a) Any deviations from the test plan for the test setup and their effect on the test,

(b) How and when the test equipment was last calibrated,

(c) Any nonconformities found with the test article(s) and their effect on the test,

(d) Any deviations from the test plan for the step-by-step test procedure and their effect on the test,

(e) The performance of the test article using observation, post-test inspection, physical measurement, electronically recorded data, photos, video, etc.,

(f) Whether or not the test article(s) passed or failed each criteria defined in the test plan,

(g) Any anomalies that might have an effect on the outcome of the test, and

(h) Who witnessed the test and made the pass/fail evaluation.

**3. Considerations for Reverse Engineering.** If a maintenance and/or alteration specification includes substantiating data based on reverse engineering, the certificate holder should have determined the performance and durability of an acceptable repaired, overhauled or undamaged original article. This can be done using comparative test and analysis as follows:

**a. Comparative Test and Analysis.** This method entails analyses and tests of the original article and the article repaired or altered in accordance with the proposed maintenance and/or alteration specification. The evaluation of the original article must be based upon a known condition—the original article can be repaired, overhauled, appropriately altered or new. The purpose of the evaluation is to determine whether the maintenance and/or alteration specification will return the article to a condition that is within the design's technical requirements.

(1) Expect the certificate holder to demonstrate that the functional design of the proposed repair or alteration returns the article to at least its original or properly altered condition as established by the airworthiness standard (design) requirements for the original article.

(2) The criticality of the article and the complexity of its design will dictate the rigor of the comparative analysis and the extent of testing.

(3) Side-by-side testing of an article that has been processed in accordance with the proposed maintenance and/or alteration specification and an original article in a known, confirmed condition under the same procedures and conditions provides the standard for evaluation.

(4) The results of the analyses and tests will note any differences and provide sound technical justifications for these differences.

(5) Simple, non-critical parts might not require the same level of evaluation by test and analysis to determine performance and durability as other articles. Indeed, it would be rare that a maintenance and/or alteration specification that applies to a simple, non-critical part will result in a major repair or major alteration that must be supported by approved technical data.

**b. Reverse Engineering for Fabricated Parts.** Some repairs and/or alterations may rely on fabricating replacement parts using reverse engineering. The certificate holder must select the processes and techniques that are appropriate to the article's complexity. Reverse engineering alone may be enough to duplicate simple parts. However, complex articles may need other substantiating information to show equivalency. The certificate holder should have considered and the ACO should evaluate the following:

(1) Typically samples are new, unused articles from approved and traceable sources (i.e., have documentation that establishes the articles were produced by a PAH, for example, purchase

orders, FAA airworthiness tag, and so on). The sample size will vary with design complexity and key attributes that define the article. The sample should correctly represent the essential characteristics of a design. The essential characteristics include nominal dimensions, tolerances, material properties, fabrication processes, and so on. Sampling used parts can provide some characteristics that do not deteriorate during use, such as material composition, grain size, grain flow, and depth of case hardening. Ensure the certificate holder substantiated the validity of its approach.

(2) Variations in the sample measurements and accepted engineering practices determine the tolerances in part dimensions. The resulting tolerances for the fabricated part should not exceed the minimum and maximum dimensions measured on the sampled approved parts. Exceeding these limits will require additional substantiation.

(3) Various tests and documentation from the PAH or supplier define the material composition of a part. The fabricated part materials must be equivalent to the materials for the original part including the base part, any subparts, added welds, and coatings. A qualified laboratory can provide thorough destructive testing for at least the following information:

(a) Composition of each material in the part,

(b) Material properties (for example, strength and fatigue characteristics, hardness, grain structure),

(c) Form of material (for example, casting, forging, bar stock, sheet), and

(d) Use of special processes (for example, nitriding, heat treat, shot peening) and resulting effect on material properties.

(4) The mass properties of a part can be significant to its function and impact on the next higher assembly and/or the product. When an assessment on the next higher assembly and product is needed, the reverse engineering process should compare these properties. The assessment accounts for weight differences between the proposed and the original article to ensure the absence of detrimental effects.

**4. Approve or Disapprove Substantiating Data and Notify the FSDO/CMO/IFO.** After finding that the substantiation data is adequate to establish that the correct application of the maintenance and/or alteration specification will result in a repair or alteration that is compliant with applicable airworthiness CFRs, notify the FSDO/CMO/IFO and return the data package to them.

**a.** The package must be reviewed and approved or denied within 30 days of receipt from the FSDO/CMO/IFO. Indicate approval of the substantiating data by signing a document that specifies the information on the title page of the maintenance and/or alteration specification.

**b.** If the data is not adequate, provide the FSDO/CMO/IFO with the specific inadequacies with appropriate regulatory references. If the certificate holder does not provide or resolve the inadequacies, return the maintenance and/or alteration specification with a cover memorandum describing the inadequacies to the FSDO/CMO/IFO for resolution by the certificate holder.

## Chapter 4. Designated Engineering Representatives and Other Designees

**1. Designee's Role in the Maintenance and/or Alteration Specification Process.** Organizations and DERs have the authority to approve the substantiating data supporting maintenance and/or alteration specifications within their authority and limitations.

**2. Use of DERs**. The FAA defines DER limitations in Order 8110.37, Designated Engineering Representative (DER) Guidance Handbook. An appropriately authorized DER can be used in the following ways:

**a.** Make findings to specific CFRs and approve substantiating data to support a maintenance and/or alteration specification.

**b.** Evaluate compliance findings and data approval for all engineering aspects normally reserved for the ACO.

**3. Responsibilities of the Designee.** The Designee is responsible for:

**a.** Evaluating the maintenance and/or alteration specification to ensure the processes and procedures are clearly delineated and will return the article to at least its original or properly altered condition.

**b.** Coordinating with the ACO to determine any tests the ACO chooses to witness or delegate to the DER.

**c.** For those tests delegated by the ACO to the designee to witness:

(1) Evaluating and approving test plans *except* when the proposed maintenance and/or alteration specification affects:

(a) Critical/life-limited articles, or

(b) Any other critical aspect the the ACO determines it will evaluate.

(2) Coordinating and ensuring test article conformity is accomplished.

(3) Witnessing tests.

(4) Evaluating test results, preparing reports and making findings.

**d.** Signing a document that clearly indicates the data that was approved and lists the specific regulations with which it was found to comply. The signature declares the engineering and other substantiation data is adequate and complete. It signifies that when the maintenance and/or alteration specification is applied properly, the result will meet all applicable CFRs.

**e.** The designee should inform the certificate holder that signature by an appropriately authorized designee is not approval to use the maintenance and/or alteration specification but an approval of the engineering data. Authorization to use the specification comes from the certificate and capability of the maintenance provider.

**f.** Acting as an advisor for maintenance and/or alteration specification technical issues between FAA and the certificate holder. However the FSDO/CMO/IFO remains the focal point of contact and all communications are through it.

## Appendix A. Acronyms

| | |
|---|---|
| **14 CFR** | Title 14 of the Code of Federal Regulations |
| **AC** | Advisory Circular |
| **ACO** | Aircraft Certification Office |
| **AD** | Airworthiness Directive |
| **ALS** | Airworthiness Limitation Section |
| **AMOC** | Alternative Means of Compliance |
| **ASI** | Aviation Safety Inspector |
| **CFR** | Code of Federal Regulations |
| **CMACO** | Certificate Management ACO |
| **CMO** | Certificate Management Office |
| **CSTA** | Chief Scientific Technical Advisor |
| **DER** | Designated Engineering Representative |
| **FAA** | Federal Aviation Administration |
| **FSDO** | Flight Standards District Office |
| **ICA** | Instructions for Continued Airworthiness |
| **IFO** | International Field Office (Flight Standards Service) |
| **ODA** | Organization Designation Authorization |
| **PAH** | Production Approval Holder |
| **PC** | Production Certificate |
| **PMA** | Parts Manufacturer Approval |
| **P/N** | Part Number |
| **SPAS** | Safety Performance Analysis System |
| **STC** | Supplemental Type Certificate |
| **TC** | Type Certificate |
| **TCDS** | Type Certificate Data Sheet |
| **TSO** | Technical Standard Order |

## Appendix B. Definitions and Terms

When following procedures in this order, the following definitions and terms apply:

**Article,** means an aircraft, airframe, aircraft engine, propeller, appliance, or component part. See 14 CFR § 145.3.

**Approved Data,** substantiating data that is evaluated and found to establish compliance with applicable and enumerated airworthiness standard requirements and thereafter approved by the FAA. See AC 120-77 for examples of approved data. (FAA approval may be issued by the Aircraft Certification Service, the holder of an appropriately authorized organizational delegation or by an appropriately authorized Designated Engineering Representative (DER).)

**Critical,** is a class of parts, characteristics, processes, maintenance procedures, or inspections where a failure, omission, or non-conformance may cause significant degradation of the airworthiness of a product during all phases of operation.

**Critical Part,** means a part the failure of which could have a catastrophic effect upon the product and for which critical characteristics have been identified during the certification process which must be controlled to ensure the required level of integrity.

**Design Data,** are the drawings and specifications that show the article's configuration and all information on dimensions, tolerances, materials, processes, and procedures necessary to define an article's characteristics. A master drawing list is the summary of these drawing and specifications. The design can also include the ALS of the ICA.

**Elementary operations** are processes that are documented and consistently repeatable.

**Life-limited Part,** is a part for which a mandatory replacement limit is specified in the type design, ICA or the maintenance manual. See 14 CFR § 43.10. (Life limits and changes to life limits can be established by AD, which impose mandatory changes to type design.)

**Major Alteration,** is an alteration not listed in the aircraft, aircraft engine, or propeller specifications:

(1) That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

(2) That is not done according to accepted practices or cannot be done by elementary operations. See 14 CFR § 1.1.

**Major repair**, is a repair:

(1) That, if improperly done, might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

(2) That is not done according to accepted practices or cannot be done by elementary operations. See 14 CFR § 1.1.

**Metrics,** are a system of parameters or ways of quantitative and periodic assessment of a process that is to be measured, along with the procedures to carry out such measurement and the procedures for interpretation of the assessment. Metrics are usually specialized by the subject area, in which case they are valid only within the defined domain.

**Minor alteration**, is an alteration other than a major alteration. See 14 CFR § 1.1.

**Minor repair**, is a repair other than a major repair. See 14 CFR § 1.1.

**Person,** is an individual, firm, partnership, corporation, company, association, joint-stock association, or governmental entity. It includes a trustee, receiver, assignee, or similar representative of any of them. See 14 CFR § 1.1.

**Product,** is an aircraft, aircraft engine, or propeller. See 14 CFR § 21.1(b).

**Production Approval Holder (PAH),** is the holder of a production certificate, approved production inspection system, PMA, or TSO authorization.

**Quality System,** is an organizational structure with responsibilities, procedures, processes, and resources that implements a management method that determines and enforces quality requirements. A quality system can encompass both quality control and quality assurance.

**Source Control Drawing,** is a drawing used to purchase controlled articles and/or materials. The purchase of materials from manufacturers other than those listed on the drawing must be evaluated for equivalency of design and production qualities to those required by the approved design.

**Safety Performance Analysis System (SPAS),** is the FAA's primary source of comprehensive, integrated safety information used by inspectors, analysts, and managers in developing and adjusting field surveillance, investigation, and other oversight programs.

**Substantiating Data,** design and/or technical data used to obtain approved data (show that an article complies with applicable airworthiness standard requirements (e.g., specific paragraphs or sections of part 25 or 33)).

**Supplier,** is any person or organization contracted to provide aviation products, parts, appliances, materials, or services to the manufacturer of a product or associated components.

**Technical Data,** design data, airworthiness limitations, and any other verifiable engineering data necessary to determine applicable airworthiness standard requirements, noise characteristics, fuel venting and exhaust emissions (if any). It also includes engineering information, such as test data analyses, engineering handbooks or approved military or industry specifications, operational and service experience, repair and alteration experience, reliability data, and other documented factual information that can be shown to be directly apply to the article. (It will be developed from evaluating the effect of the step-by-step procedures or work instructions associated with the maintenance and/or alteration on the article.)

## Appendix C. Related Publications

**1. Code of Federal Regulations (CFR).** You can get copies of 14 CFR sections from the Superintendent of Documents, Government Printing Office, P.O. Box 37154, Pittsburgh, PA 15250-7954. Telephone (202) 512-1800; fax (202) 512-2250. You can also get copies online at www.gpoaccess.gov/cfr/.

**2. FAA Orders.** You can get copies of the following orders from the FAA's Flight Standards Information Management System (FSIMS) http://fsims.gov.

**a.** Order 8100.8, Designee Management Handbook.

**b.** Order 8110.37, Designated Engineering Representative (DER) handbook.

**3. FAA Advisory Circulars (AC).** You can get copies of the following orders from the FAA's Regulatory and Guidance Library (RGL) at www.airweb.faa.gov/rgl.

**a.** AC 43-18, Fabricating Aircraft Parts by Maintenance Personnel.

**b.** AC 120-77, Maintenance and Alteration Data.

**4. U.S. Military Documents.** Order copies of MIL-STD-1916, DOD Preferred Methods for Acceptance of Product, dated April 1, 1996, from the Department of Defense Single Stock Point, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5098. Telephone (215) 697-2179, fax (215) 697-1462. You can also order copies online at http://dodssp.daps.dla.mil/.

**5. American National Standards Institute (ANSI) and American Society for Quality (ASQ).** Order copies of ANSI/ASQC Z1.9-2003, Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming, dated December 18, 2003, from the American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203. Telephone (414) 272-8575, fax (414) 272-1734. You can also order copies online at www.asq.org.

U.S. Department of
Transportation
**Federal Aviation
Administration**

## Directive Feedback Information

Please submit any written comments or recommendations for improving this directive, or suggest new items or subjects to be added to it. Also, if you find an error, please tell us about it,

Subject: Order 8300.14

To: Directive Management Officer, AFS-140

*(Please check all appropriate line items)*

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows: *(attach separate sheet if necessary)*

☐ In a future change to this directive, please include coverage on the following subject *(briefly describe what you want added):*

☐ Other comments:

☐ I would like to discuss the above. Please contact me.

Submitted by: _____Date: _____

FTS Telephone Number: _____ Routing Symbol: _____

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