



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

Advisory Circular

**SUBJECT: FABRICATION OF AIRCRAFT
PARTS BY MAINTENANCE PERSONNEL**

Date: 3/24/06

AC No: 43-18

Initiated By: AFS-307

Change:

1. PURPOSE.

a. The purpose of this advisory circular (AC) is to ensure that parts fabricated during maintenance and alteration have an equivalent level of safety to those parts produced under the original design holder's production certificate. This AC provides one means of complying with the requirements of Title 14 of the Code of Federal Regulations (14 CFR) part 21 and part 43 for the design and fabrication of parts by persons performing maintenance and alterations using methods, techniques, and practices acceptable to the Administrator. As required by regulation, such parts fabrication and their implementation must be accomplished "in such a manner... that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition."

b. This AC is not mandatory and does not constitute a regulation. It is issued for guidance and to outline one method of compliance with the rules. In lieu of following without deviation the method prescribed herein, a person may elect to follow an alternative method, provided the Federal Aviation Administration (FAA) finds the alternative method to be an acceptable means of complying with the applicable requirements of 14 CFR.

2. REGULATIONS AND GUIDANCE MATERIAL.

a. Regulations. Refer to the following regulations in 14 CFR generally applicable to satisfying or making a finding of compliance.

(1) Part 1, Definitions and Abbreviations.

(2) Part 21, Certification Procedures for Products and Parts.

(3) Part 23, Airworthiness Standards: Normal, Utility, Acrobatic, and Commuter Category Airplanes.

(4) Part 25, Airworthiness Standards: Transport Category Airplanes.

- (5) Part 27, Airworthiness Standards: Normal Category Rotorcraft.
- (6) Part 29, Airworthiness Standards: Transport Category Rotorcraft.
- (7) Part 31, Airworthiness Standards: Manned Free Balloons.
- (8) Part 33, Airworthiness Standards: Aircraft Engines.
- (9) Part 35, Airworthiness Standards: Propellers.
- (10) Part 39, Airworthiness Directives.
- (11) Part 43, Maintenance, Preventive Maintenance, Rebuilding, and Alteration.
- (12) Part 45, Identification and Registration Marking.
- (13) Part 65, Certification: Airmen Other Than Flight Crewmembers.
- (14) Part 91, General Operating and Flight Rules.
- (15) Part 145, Repair Stations.
- (16) Part 183, Representatives of the Administrator.

b. Electronic Guidance Material. The FAA hosts a Web site for publications. We encourage interested persons to access FAA publications at the following URL:
<http://www.faa.gov/RegulatoryAdvisory/index.htm>.

c. Alternate Methods of Obtaining Publications. Copies of the following FAA Orders may be obtained from the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

- (1) Order 8110.42, Parts Manufacturer Approval Procedures.
- (2) Order 8110.46, Major Alterations That Require Supplemental Type Certificates.
- (3) Order 8120.11, Disposition of Scrap or Salvageable Aircraft Parts and Material.
- (4) Order 8130.2, Airworthiness Certification of Aircraft and Related Products.
- (5) Order 8300.10, Airworthiness Inspector's Handbook.
- (6) Order 8120.2, Production Approval and Certificate Management Procedures (appendix 4, Category Parts List).

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d. Advisory Circulars. You may obtain copies of these documents from the U.S. Department of Transportation, Subsequent Distribution Center, SVC-121.23, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785.

- (1) AC 20-62, Eligibility, Quality, and Identification of Aeronautical Replacement Parts.
- (2) AC 21-29, Detecting and Reporting Suspected Unapproved Parts.
- (3) AC 43-9, Maintenance Records.
- (4) AC 43.9-1, Instructions for Completion of FAA Form 337 (OMB NO. 2120-0020), Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance).
- (5) AC 43.13-1B, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair.
- (6) AC 43.13-2A, Acceptable Methods, Techniques, and Practices - Aircraft Alterations.
- (7) AC 43-210, Standardized Procedures for Requesting Field Approval of Data, Major Alterations, and Repairs.
- (8) AC 91-60, The Continued Airworthiness of Older Airplanes.
- (9) AC 120-77, Maintenance and Alteration Data.

3. DEFINITIONS. The following definitions apply for this AC:

a. Acceptable Data. Data is acceptable to the Administrator when used within the context of maintenance, a minor repair, or an alteration if the data substantiates that the product has been returned to its original or properly altered condition. Acceptable data may establish that the fabricated part complies with applicable airworthiness standards (i.e., regulations). When acceptable data is used to substantiate that the article meets the regulatory requirements and will be returned to its original or properly altered condition, it can be considered “acceptable to the Administrator.”

b. Airworthy. The term “airworthy” is not defined in Title 49 of the United States Code (49 U.S.C.), or in 14 CFR; however, a clear understanding of its meaning is essential in making an airworthiness determination. Furthermore, the definition of airworthy applies to type-certificated products (aircraft, aircraft engine, or propeller), and parts thereof. Title 49 U.S.C. section 44704(c) and 14 CFR section 21.183(a), (b), and (c) state that the two conditions that must be met for issuance of an airworthiness certificate are:

- (1) The product must conform to its type certificate (TC). A product conforms to its TC when its configuration and the components installed are as described in the drawings, specifications, and other data that are part of the TC, which includes any Supplemental Type

Certificates (STC), Airworthiness Directives (AD), and field approved alterations incorporated into the product; and

(2) The aircraft (product) must be in a condition for safe operation.

NOTE: If one or more of these conditions are not satisfied, the product would be considered not to be airworthy.

c. Approved Data. Data that has been approved by the FAA and that is used to perform maintenance and alterations on products under 14 CFR part 43. Approved data must be used when performing major repairs and alterations. The FAA approves the data in conjunction with the issuance of a TC, STC, Technical Standard Order Authorization (TSOA), or Parts Manufacturer Approval (PMA). Other forms of approved data include ADs, letters of engineering design approval issued by an FAA Aircraft Certification Office (ACO), maintenance instructions approved by an FAA designated engineering representative (DER), and FAA-approved structural repair manuals (SRM).

NOTE: While technical and other forms of data are approved under the field approval process as declared on Form 337, such approved data may not be sufficiently detailed to allow for fabrication of parts that are intended for use in multiple applications.

d. Certificate Holder. Any person certificated by the FAA and authorized to perform maintenance, preventive maintenance, rebuilding, and alterations as provided in 14 CFR section 43.3. Within the context of this AC, if a certificate holder intends to fabricate a part for maintaining a product he/she may do so only under the provisions (privileges) of his/her certificate.

e. Certificate Management ACO. The ACO responsible for issuing and overseeing the original design or technical approval under TC, STC, TSOA, or PMA of the product or article on which the fabricated part will be installed. The certificate management ACO is also responsible for managing continued airworthiness of a product for as long as it is in service.

f. Critical. A term of significance applied to a part or to a function performed by a part. A critical part performs a function of such significance (critical function) to the aircraft on which it is installed that, if it failed, the airworthiness of the aircraft would be degraded to an extent that would preclude continued safe flight or landing.

g. Consumed. A fabricated part, or portion thereof, is considered consumed in a repair, when it is installed on or within a product or part thereof undergoing maintenance or an alteration, including when a fabricated part is installed into the next higher-level assembly or component part installed or intended to be installed within the product.

h. Design. Consists of all drawings and specifications, which may be summarized on a master drawing list. These are necessary to show the configuration of the part(s) and all information on dimensions, tolerances, materials, processes, and procedures necessary to define

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all characteristics of the part(s), as well as, the airworthiness limitations section of the Instructions for Continued Airworthiness (ICA).

i. Fabrication. An act in which a part/subpart is made (fabricated) and consumed by the fabricator on the product or part thereof in the course of repair in accordance with approved or acceptable data depending on the category classification of the part being fabricated and the applicable regulations. In addition, a maintenance record entry must be made with a description of work performed, date of completion, name of person who performed the work, and a satisfactory signature and FAA certificate number.

j. Flight Standards District Office (FSDO). The FAA FSDO that has the responsibility for certificate management over the certificate holder that is undertaking the fabrication of the part or part thereof.

k. Parts Categories. Parts are classified into one of three categories, depending on their potential effect on safety. They are listed on a Category Parts List (CPL). Criteria exists for establishing and identifying part categories, as discussed in paragraphs 5d(1) and 6b(1) through (3) of this AC. The criteria details the level of FAA involvement necessary to approve the fabrication of such parts. It also specifies the level of technical data, quality control system, procedures development, and processes necessary to substantiate fabrication of such parts within each category.

l. Project ACO. The ACO responsible for a project, which results in approving data submitted by the fabricator to FAA for fabricating the part. The project ACO may be required to coordinate with the certificate management ACO, depending upon the criticality classification and complexity of the part to be fabricated.

m. Production. An act in which a part is manufactured under 14 CFR part 21 to an approved design or to established industry standard or specification recognized by the United States.

n. Subcontractor. A person providing parts, materials, or related services (welding, plating, machining, etc.) to the certificate holder responsible for fabrication of the part. The subcontractor must be subject to control and surveillance by that certificate holder who is ultimately responsible for the airworthiness of the part and its fabrication processes.

4. BACKGROUND.

a. Maintenance personnel have raised questions and concerns regarding their authority to fabricate aircraft parts during the course of performing maintenance and alterations on a product or part thereof. Typically, such questions center around whether a person needs an approval under 14 CFR part 21 to produce parts for installation on type-certificated products or whether it is permissible to use the maintenance rules outlined in 14 CFR part 43 to fabricate parts for consumption during maintenance or alteration. Previous questions were evaluated against regulatory criteria and answered on a case-by-case basis.

b. It is important to emphasize that design and production rules differ from maintenance and alteration rules. Therefore, it is crucial that the FAA organization responsible for each of these different activities is appropriately involved when acquiring approvals. For example, FSDO inspectors have the necessary knowledge on requirements for maintaining a product, whereas Manufacturing Inspection District Office (MIDO) inspectors possess the expertise and familiarity with the requirements for manufacturing parts and their use of specific materials and processes. Compliance with both the maintenance and manufacturing requirements is the only way a certificate holder can ensure that a fabricated part is airworthy. This AC provides guidance for establishing a system that ensures the same level of safety for parts fabricated under 14 CFR part 43 for maintenance or repair purposes as those produced under the production rules under 14 CFR part 21.

c. Any person who engages in the design, production, operation, maintenance, or alteration of a civil aviation product is responsible for ensuring that the part/product conforms to its approved design and is in condition for safe operation. Therefore, an appropriately rated certificate holder that fabricates a part in the course of performing maintenance or alterations must possess:

(1) Approved design data or data acceptable to the Administrator that is determined by the category classification for the part being fabricated; and

(2) A fabrication quality control system (FQCS) to ensure each fabricated part conforms to its design data and is in a condition for safe operation.

5. FABRICATION UNDER 14 CFR SECTIONS 21.305(d) AND 43.13(a)(b).

a. Many elements affect the nature of the processes and extent of the requirements needed to fabricate parts during the course of performing maintenance and/or an alteration. This includes such elements as: the criticality (application) of the part being fabricated, any processes required for fabrication, sufficiency of design data, equipment necessary for fabrication of the part, and the extent of FAA involvement in data approval to ensure airworthiness requirements are satisfied. Parts design data may be approved under 14 CFR section 21.305(d) and fabricated under 14 CFR section 43.13(a) and (b), providing the fabricator installs the part onto or within the product or part thereof while it is undergoing repair or alteration.

NOTE: A certificate holder that desires to sell his/her fabricated parts separately (i.e., outside the course of performing maintenance or an alteration) must obtain a PMA (ref. 14 CFR section 21.303(a)).

b. Parts fabrication must be performed within the privileges and limitations of the certificate holder's FAA authorization and ratings, and in accordance with his/her established quality control system.

c. When a subcontractor is used in the fabrication process, the certificate holder under whose surveillance the fabrication occurs must control the design, manufacture, and quality of the part. The work performed by the subcontractor must be documented to support a determination of

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conformance to the purchase order requirements and substantiated by a maintenance record. The documentation must describe any special processes. Subcontractors must be subject to control and audit by the certificate holder fabricating the part for return to service.

d. Procedures for addressing the criteria recommended in paragraph 5d(1) through (6) below must be documented and recorded in a manual or similar type of document, easily understood, and readily available to the person(s) fabricating the part(s).

(1) Required data must include the following, dependent on the category of the part as defined in paragraph 6.

(a) For Category 1 and Category 2 Parts:

i. Drawings and specifications necessary to show the configuration of the fabricated part.

ii. Information on materials, dimensions, and processes (including special manufacturing processes) necessary to define the structural strength or other critical characteristics of the fabricated part.

iii. Inspection and test procedures.

iv. Substantiating data (test reports, analysis, computations, and assessments) necessary to show that the design data used to fabricate the part for a repair or alteration meets the applicable airworthiness standards and that no detrimental consequences will result in degradation to the next higher-level subassembly or assembly, or to the product.

v. Airworthiness limitations, as applicable.

vi. ICA/maintenance instructions if the application for design approval is sought for a product or article in which the fabricated part is eligible for installation, was filed on or after January 28, 1981.

vii. Fabricated part marking.

(b) For Category 3 Parts:

i. Data adequate to substantiate that the fabricated part as consumed within the repair or during the alteration returns the product to its original or properly altered condition, e.g., AC 43.13, Service Bulletins, Component Maintenance Manual (CMM), service history, or prior service experience, etc., in accordance with 14 CFR section 43.13(b).

NOTE: All fabrication repairs of parts must be accomplished in accordance with methods, techniques, and practices acceptable to the Administrator in accordance with 14 CFR section 43.13(a).

(2) Fabrication Quality Control System (FQCS). In order to substantiate and demonstrate that a part being fabricated during the course of performing maintenance conforms to the approved design data and is in condition for safe operation, quality control system procedures should be established for ensuring all processes and requirements necessary to fabricate the product or part thereof are identified and adhered to. The depth and detail of the fabrication quality control system depends on the complexity and category classification of the part being fabricated. The following are recommended elements that could be addressed in the fabricator's quality control system:

(a) Materials and services used in the fabrication process should be properly identified and inspected to ensure that they conform to the applicable design data, including their physical and chemical properties, and other characteristics affecting airworthiness.

(b) A list of the parts fabricated by nomenclature and part number.

(c) Name and location of any fabrication subcontractor(s) involved must be included in the quality control system, or recorded and maintained separately, and must be made available to the FAA upon request. The methods used to qualify subcontractors and to control the design and quality of the finished part should also be addressed within the quality control system.

(d) Materials used in such fabrication that may be subject to damage or deterioration (e.g., composite material, shelf life-limited, sealants, etc.,) must be suitably stored, documented and adequately protected.

(e) Processes affecting the quality and safety of the finished product must be accomplished in accordance with acceptable specifications by trained and qualified personnel.

(f) Fabrication methods used, including any special fabrication processes, must be adequately controlled and contain instructions such as acceptable methods, techniques, and practices for performing the work, and be documented as established by the quality control system.

(g) Specifications used must have definitive and verifiable standards for evaluating airworthiness, including in-process inspections, as appropriate, and a final inspection before the part's release for use in a repair or alteration.

(h) All part fabrication and inspection data must be current and readily available to fabrication inspection personnel and FAA inspectors.

(i) Changes to design data must be evaluated by the certificate holder before being incorporated into the finished part in accordance with the requirements outlined in Appendix 1.

(j) Rejected materials must be segregated and identified in such a manner as to preclude further use.

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(k) Fabrication and inspection records associated with the part must be retained in accordance with regulatory requirements.

(3) **Part Marking.** Except as noted below, fabricated parts must be clearly identified with an additional permanent and legible marking.

(a) The marking must include the following:

(1) The name, trademark, or symbol of the FAA certificate holder (fabricator) under whose control the fabrication occurred;

(2) A unique part number that clearly distinguishes the fabricated part; and

(3) The original manufacturer's part number if removed as a result of the fabrication.

(b) Critical parts must be marked in accordance with 14 CFR section 45.14. This part marking provides traceability for subsequent operators and maintenance providers to the source of the fabricated part.

NOTE: In cases where it is impractical to mark the fabricated part without compromising the airworthiness (integrity) of the part, the marking information should be included in the maintenance records for the part or part thereof.

(4) **ICA.** Under 14 CFR section 21.50, design approval holders are required to develop and distribute information essential to continued airworthiness of their parts and/or products. Typically, these instructions are included in maintenance and overhaul manuals to describe the methods, techniques, and practices for performing inspections, maintenance, preventive maintenance, and alterations to ensure that the affected products are maintained in an airworthy condition. Certain sections of the ICA, and any changes to those sections, (e.g., airworthiness limitations, wiring diagrams, or SRM revisions) require FAA approval.

(a) When parts are fabricated during the course of performing maintenance, the fabricator must address the following ICA requirements that may be applicable to the fabricated part(s).

i. Determine whether the existing ICA for the original part is sufficient to ensure the fabricated part continues to meet all airworthiness requirements.

ii. In cases where the original part manufacturer's ICA has been determined to be inadequate, the fabricator must develop its own ICA to ensure continued airworthiness of the fabricated or affected part.

iii. When it is necessary to develop a new ICA, current inspection criteria essential to the airworthiness of the part(s) must be maintained and kept current.

iv. When the certificate holder develops its own ICA, it must be provided with the part and made available to any other person requesting the ICA for maintaining the fabricated parts.

v. Revision control for the ICA must be maintained to ensure it remains applicable. This is particularly important when changes are made to the original product and the ICAs were changed to accommodate installation of a fabricated part.

NOTE: Each Aircraft Certification Service Directorate has an established Aircraft Evaluation Group (AEG) that is part of Flight Standards Service (AFS) and is directly responsible for the operational and maintenance aspects of the certification process.

(5) Fabrication of Multiple Parts. A quantity of identical parts bearing the same part number may be fabricated at the same time, providing they will be consumed in later repairs by the certificate holder that fabricated those parts. Controls should be in place to prevent separate sales of these specific parts (i.e., sales to other persons independent of the repair). If a certificate holder desires to sell its fabricated part(s) separately, it must obtain a PMA. The fabrication of multiple parts is not to be used as a means to circumvent the requirements of 14 CFR section 21.303(a).

(6) Recordkeeping. Fabrication of a part in accordance with this AC is subject to the maintenance recordkeeping provisions of 14 CFR section 43.9. A recordkeeping system should be established for documenting fabricated parts containing sufficient information to determine the airworthiness status of the part. Information contained in the maintenance record entry could include a description of work performed, date of work completion, person approving return-to-service, current status of any ADs, current inspection status, and current status of life-limited parts. These maintenance records should be retained with the aircraft records.

(7) Destruction of Replaced Material. Material replaced by the fabricated part should be mutilated/destroyed beyond any possibility of repair or reassembly and should not be retained for future use.

6. DETERMINING PART CATEGORY.

a. Criticality Level -- Category Parts List.

(1) The FAA's Aircraft Certification Service (AIR) uses Order 8120.2, Production Approval and Certificate Management Procedures (appendix 4, Category Parts List), in combination with other factors, to determine a part's criticality level. The Category Parts List (CPL) classifies parts into one of three categories depending on their effect on safety. The CPL list is regularly updated and maintained in electronic format on the Aircraft Certification Service's Web site by AIR based on input from each of the four Aircraft Certification Directorates.

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(2) When used in the context of this AC, this CPL is a means to determine the criticality category of the part and the level of AIR involvement needed in the design data approval process for certificate holders fabricating parts.

NOTE: No part, or fabricated part thereof, that is the subject of an AD can be installed on an aircraft without complying with the AD or obtaining an Alternative Method of Compliance (AMOC) approval from the responsible ACO.

b. Part Categories.

(1) **Category 1 Part.** A fabricated part, the failure of which could prevent continued safe flight and landing; resulting consequences could reduce safety margins, degrade performance, or cause loss of capability to conduct certain flight operations.

(a) **Design Issues.** A Category 1 part is a part intended to be consumed within a major repair or major alteration. The certificating ACO, through the geographic ACO, must approve the design data. The list of data to be submitted to the ACO can be found in paragraph 5d(1)(a). The ACO will make the determination of necessary data for development and submittal based on each circumstance. In the case of a Category 1 part, a DER may only “recommend approval” of the design data.

(b) **Fabrication Issues.** The certificate holder is responsible for ensuring all aspects of the FQCS are addressed and satisfied. The guidelines provided in paragraph 5d(2) should be used to develop the FQCS for compliance.

(2) **Category 2 Part.** A fabricated part, the failure of which would not prevent continued safe flight and landing, but would reduce the capability of the aircraft or the ability of the flightcrew to cope with adverse operating conditions or subsequent failures.

(a) **Design Issues.** A Category 2 part is a part intended to be consumed within a major repair or major alteration. Design data is required to be approved by the geographic ACO or appropriately authorized DER. The list of required data to be submitted to the ACO or the DER for approval can be found in paragraph 5d(1)(a).

(b) **Fabrication Issues.** The certificate holder is responsible for ensuring all aspects of the FQCS are addressed and satisfied. The guidelines provided in paragraph 5d(2) should be used to develop the FQCS for compliance.

(3) **Category 3 Part.** A fabricated part, the failure of which would have no effect on the continued safe flight and landing of the aircraft.

(a) **Design Issues.** The fabrication of a Category 3 part will generally require only acceptable data. Fabrication of this type of part will typically result in no involvement by AIR unless the Flight Standards Service aviation safety inspector (ASI) requests assistance.

(b) Fabrication Issues. The certificate holder is responsible for ensuring all aspects of the FQCS are addressed and satisfied. The guidelines provided in Appendix 1 should be used to develop the fabrication quality control system for compliance with paragraph 5d(2).

NOTE: A summary of the certificate holder requirements for data based on the category of the part can be found in Appendix 1 of this AC.

ORIGINAL SIGNED by

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Appendix 1**APPENDIX 1.****Summary of Requirements for Certificate Holders Seeking to Fabricate Parts Pursuant to Title 14 of the Federal Code of Regulations (14 CFR) Part 21 and Part 43**

Fabrication Part Category	Fabrication Quality Control System (FQCS)	Required Manual Procedures	ACO Design Data Approval	DER Approval Authority	FSDO Review Of FQCS
1	Yes	Yes	Yes Certificating ACO through the Geographical ACO	(Recommend Approval only)	Yes
2	Yes	Yes	Yes Geographic ACO	Yes	Yes
3	Yes	Yes	Only Acceptable Data is Required For this Category, ACO intervention only on request by AFS	Yes, But not required	Yes

Fabrication part categories used in this AC were derived from FAA Order 8120.2, Production Approval and Certificate Management Procedures.

Category 1 Part: A fabricated part, the failure of which could prevent continued safe flight and landing; resulting consequences could reduce safety margins, degrade performance, or cause loss of capability to conduct certain flight operations.

Category 2 Part: A fabricated part, the failure of which would not prevent continued safe flight and landing, but would reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions or subsequent failures.

Category 3 Part: A fabricated part the failure of which would have no effect on the continued safe flight and landing of the aircraft.