

Federal Aviation Agency

ADVISORY CIRCULAR



AC NO: 21-6

CERTIFICATION PROCEDURES
FOR PRODUCTS AND PARTS

EFFECTIVE :

5/26/67

SUBJECT : PRODUCTION UNDER TYPE CERTIFICATE ONLY

1. **PURPOSE.** This circular is to provide information concerning Subpart F of Federal Aviation Regulations (FAR) Part 21, and to set forth examples, when necessary, of acceptable means of compliance with its requirements. The material presented herein is for information and guidance only.
2. **CANCELLATION.** Civil Aeronautics Manual (CAM) 1.15-1(b) through 1.15-6, 1.19-1(a), 1.28-1.
3. **REFERENCE.** FAR Part 21.
4. **DEFINITIONS.** As used herein, the following definitions apply:
 - a. **Manufacturer.** The holder or licensee of a type certificate, producing duplicate products in accordance with FAR 21, Subpart F.
 - b. **Supplier.** Any person who furnishes articles or services related to the manufacture of type certificated products.
 - c. **Article.** A material, part, component, assembly, or appliance specified in the type design for use in a type certificated product. (Reference FAR 21.31.)
 - d. **Regional Office.** The Engineering and Manufacturing Branch of the Federal Aviation Administration region in which the manufacturer is located. (In the Western Region, the Aircraft Engineering Division.)
 - e. **District Office.** The FAA Engineering and Manufacturing District Office (EMDO) responsible for evaluation and inspection of the manufacturer's facilities. (In the Western Region, the Aircraft Engineering District Office (AEDO).)
5. **DISCUSSION.** The following paragraphs provide information and examples of acceptable means of compliance with those sections of Subpart F where such information and examples are considered to be helpful.

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- a. FAR 21.121 Applicability. The term "production under a type certificate only" refers to the production of a product by a type certificate holder or his licensee without a related production certificate.
- b. FAR 21.123 Production under type certificate.
- (1) During the six-month period subsequent to the date of issue of the type certificate, each completed product and each article used in the product is subject to FAA inspection. At the end of the six-month period (or anytime during the six-month interval if requested by the manufacturer) the FAA will make a determination as to whether the inspection system is considered acceptable. If considered acceptable, the FAA may thereafter reduce its inspections and increase its reliance on the manufacturer's production inspection system in the determination of the airworthiness of future products..
 - (2) To expedite approval of a production inspection system, the manufacturer should provide the FAA with data describing the inspection and test procedures he uses to comply with FAR 21.123. The descriptive data provides the formal basis for common understanding and approval of the production inspection system, and is normally in manual form. The manual should include, or at least refer to, appropriate company documents used in the quality control of the product. The manual should be submitted to the local Flight Standards Service Engineering and Manufacturing District Office (EMDO) for evaluation. The EMDO will review the manual to determine whether the contents are adequate and provide a clear, complete description of the various systems, tests, procedures, records, and forms which will be the means for compliance with FAR 21.125 through 21.130. When the manual is considered acceptable, the district office will conduct a physical inspection of the various areas of the production inspection system. As individual fabrication and assembly areas, suppliers, procedures, or processes are found satisfactory, they will be approved on a progressive basis. When the total system has been found satisfactory, the FAA regional office issues a letter to the manufacturer approving the production inspection system. Following approval of the production inspection system, FAA inspections will be for the purpose of surveillance of the system to determine that it is being maintained as approved.

- c. FAR 21.125 Production Inspection System: Materials Review Board. The basic requirements for the production inspection system and materials review board are generally self-explanatory as outlined in FAR 21.125, and the following paragraphs provide an example of acceptable compliance.

- (1) Materials Review Board. An effective materials review board is of primary importance in the functioning of an efficient production inspection system, since it controls the inspection, identification, rework, and use of damaged or nonconforming articles, including the isolation or scrapping of unusable articles. The functions of the board are to determine that:
 - (a) Appropriate data is submitted to the FAA for engineering approval, when a materials review board decision results in a change to the product (reference FAR 21, Subpart D).
 - (b) Provisions are made for appropriate corrective action to preclude further discrepancies when the nonconforming, or otherwise unsatisfactory, articles result from deficiencies in manufacturing procedures, processes, design, or any other condition.
 - (c) The records required to be maintained are periodically reviewed and evaluated to determine the effectiveness of the corrective action program and to reveal problem areas as they arise.
- (2) Suppliers. The system established for control of incoming materials and bought or subcontracted parts should provide for inspections and tests of such articles at the supplier's facility by the manufacturer, if the articles cannot or will not be completely inspected upon receipt at the manufacturer's plant.
- (3) Storage and Issuance. A reliable, well-controlled storage and issuance system, for articles used in the product, is a major factor in manufacturing a conforming and safe product. Some of the objectives of such a system are to ensure that:
 - (a) Articles in storage are adequately protected, segregated, and identified;

- (b) Articles subject to deterioration from prolonged storage are periodically reinspected and disposed of as required;
 - (c) Articles being delivered to, or stored in fabrication or shipping areas are protected from damage;
 - (d) All applicable design changes are incorporated prior to release of stored articles for installation in the product;
 - (e) Only those articles which are identified as having passed company inspection are received into and issued from finished stores.
- (4) Processes. The production inspection system should be designed to ensure that each process or related service is performed by trained and qualified personnel, and that temperatures, solutions, curing times, or any other critical factors and equipment are periodically inspected and the inspections documented.
- (5) Planning. The following paragraphs provide an example of an acceptable means of compliance with FAR 21.125(b)(5), which entails the establishment of a planning system that will ensure all required inspections and tests are conducted in the proper sequence, when articles and processes are in an inspectable condition, as established by fabrication and inspection instructions, shop travelers, check lists, or similar media. Such a planning system should provide for establishment and control of inspection procedures which would ensure that each article used in the product is inspected for conformity to the type design. The production inspection system should provide for:
- (a) Classification of design characteristics and related manufacturing defects of all articles, processes, services, and the completed product, so that the most effective fabrication inspection methods and process controls would be used with respect to critical and major characteristics and defects. (Reference FAR 21.93, MIL-STD-105, and MIL-STD-414.)
 - (b) Selection of appropriate inspection methods and plans for each classification to assure that all characteristics affecting safety will be inspected, and reinspected as required, to assure conformity to approved design data.

- (c) Selection and control of statistical quality control methods used on noncritical characteristics to assure that any non-conformities or defects which may be in a lot accepted under the plan will not result in an unsafe condition in an end product or spare part.
- (6) Inspection Stations. An effective production inspection system should provide for inspection stations at each major stage of production, to maintain data, technical material, and records which may be required in the performance of inspections or tests at that particular stage of production. To ensure that all articles, processes, procedures, and the complete products are properly inspected, it is also normal procedure to employ a sufficient number of well-qualified inspectors to ensure that all required inspections can be methodically performed, without pressure due to production schedules.
- (7) Inspection Status. Identification of articles with stamps or marks traceable to the individual inspector, when properly controlled, will help ensure that only articles which have been inspected and accepted are used in the finished product. For example;
- (a) Suitable acceptance, rework, or rejection stamps should be placed on articles subjected to processing, testing, and inspections. Such stamps should be applied to articles subjected to heat-treat, welding, soldering, brazing, bonding, hardness tests, proof testing, laboratory analysis, radiographic inspection, ultrasonic inspection, magnetic particle inspection, etc.
 - (b) Articles which have been reworked and accepted as a result of materials review action must be so identified by a suitable stamp.
 - (c) Articles rejected as being unusable or scrap must be plainly marked and subsequently controlled so as to absolutely preclude their installation on the product or their use as spare parts.
- (8) Tool and Gauge Control. An important function of a production inspection system is to provide for inspection and calibration to certified measurement standards, of all inspection tools,

gauges, testing equipment, as well as production jigs, fixtures, templates, etc., which are depended upon as media for inspection. An effective schedule should have the inspection intervals established on the basis that such tools and gauges are inspected prior to their becoming inaccurate, to ensure timely adjustment, replacement, or repair. A record keeping system should ensure that each piece of equipment is:

- (a) Checked prior to first usage and at the proper periodic interval, and marked to indicate the date the next inspection is due; and is,
- (b) Removed from inspection and shop areas or conspicuously identified to preclude usage after expiration of the inspection due date.

d. FAR 21.127 Tests: Aircraft.

- (1) Prior to production flight test of aircraft any items coming under the provisions of Section 21.127(b)(5) should be checked. For example, it is important that:
 - (a) The means provided to level the aircraft are accurate and in conformity with type design data.
 - (b) Each aircraft is weighed to determine the empty weight and center of gravity.
- (2) The flight test procedure and flight check-off form, required to be established and approved under FAR 21.127 should be submitted to the Regional Office for approval, and may be included in the descriptive data discussed under paragraph 5b(3).

e. FAR 21.128 Tests: Aircraft Engines.

- (1) The test equipment used for the test runs should be capable of output determinations of accuracy sufficient to assure that the engine output delivered complies with the official ratings and operating limitations.
- (2) Following the tests prescribed by FAR 21.128, each engine is subject to inspection by the FAA to determine that the engine is in condition for safe operation. Such inspection may also include internal inspection and examination to ensure that no unsafe condition exists. The degree of internal inspections

will normally be determined by the cumulative results of such inspections conducted on the first production engines, and by service experience. The FAA may consider a statistical plan for internal engine inspections, if the manufacturer submits a proposal based on product uniformity, a satisfactory history of previous internal inspections, and service experience.

f. FAR 21.129 Tests: Propellers.

- (1) An acceptable functional test for variable pitch propellers would include 25 complete cycles of the control throughout the propeller pitch and rotational speed ranges. In addition, for feathering and/or reversing propellers, there should be accomplished five cycles of feathering operation and five cycles of reversing operation from the lowest normal pitch to the maximum reverse pitch.
- (2) Following the functional test, each propeller is subject to inspection by the FAA in a similar manner to that described for engines in paragraph 5.e..

g. FAR 21.130 Statement of Conformity. Upon receipt of the statement of conformity, the FAA will inspect the completed product to determine that it conforms to the type design and is in condition for safe operation, prior to issue of an airworthiness certificate in the case of aircraft, or approval by attachment of an Airworthiness Approval Tag, FAA Form 186, in the case of an engine or propeller.

h. General.

- (1) Replacement Articles. The manufacturer producing products under a TC without a related PC may apply for Airworthiness Approval Tags, FAA Form 186, for any article which conforms to the approved design data and is in a condition for safe operation. Such articles produced which are not accompanied by airworthiness approval tags are not considered to be FAA approved articles.
- (2) Designated Manufacturing Inspection Representatives. Following approval of the production inspection system, the manufacturer may obtain the appointment of individuals in his employ as Designated Manufacturing Inspection Representatives (DMIR) for the purpose of issuing airworthiness certificates and/or airworthiness approval tags. (Reference FAR Part 183.)


Director
Flight Standards Service