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**AC NO:** 00-41

**DATE:** January 31, 1974

# ADVISORY CIRCULAR

## DEPARTMENT OF TRANSPORTATION
## FEDERAL AVIATION ADMINISTRATION

**SUBJECT:** FAA QUALITY SYSTEM CERTIFICATION PROGRAM

1. PURPOSE. This circular provides information concerning the Federal Aviation Administration (FAA) Quality System Certification Program and sets forth acceptable means of compliance with its requirements. It is intended for guidance and information only.

2. BACKGROUND. Certain FAA solicitations for systems and equipment for air traffic control, navigational aids, and ground support equipment now require that each prospective contractor shall submit with his proposal a quality control system plan which conforms to the requirements in the solicitation titled "Quality Control System Plan Requirements" and FAA-STD-013a, "Quality Control Program Requirements," Appendix 1. The conforming quality control system plan will be incorporated into and made a part of the FAA contract awarded to the successful contractor (prime manufacturer). The successful contractor will be issued an FAA Quality Control System Certificate attesting to the fact that his plan is adequate for his own authentication that the product he is to manufacture will be in conformance with the requirements of the FAA contract.

3. PRINCIPLE. The principle served by this circular is, "Quality of a product is achieved through a process that first identifies the design characteristics that are to be built-in to the product and secondly, establishes a control system to assure that those designed-in characteristics are maintained within the specified design limitation."

4. DEFINITIONS. As used herein, the following definitions apply:

   a. Article. A material, part, component, assembly, or appliance which is used in the product delivered by the prime manufacturer, including proprietary articles which were not designed or manufactured by the prime manufacturer.

b. Supplier. Any person who furnishes articles or services to a prime manufacturer which affects the prime manufacturer's product, including proprietary articles which were not designed or manufactured by the prime manufacturer.

c. Design and Manufacturing Characteristic or Defect.

(1) Critical - is a characteristic or defect in the article or end product that judgement and experience indicates could result in hazardous or unsafe conditions for individuals using, maintaining or depending upon the product in the FAA National Aviation System.

(2) Major - is a characteristic or defect, other than critical, which is likely to result in failure, or to reduce materially the usability of the article or end product. It requires FAA engineering analysis of impact on performance worthiness of the article or end product.

(3) Minor - is a characteristic or defect that does not adversely affect safety, durability, reliability, performance, interchangeability of parts or assemblies, weight (where weight is a consideration) or any other basic objective of the equipment specification design requirements.

d. First Deliverable Product. The first, completed deliverable product offered for FAA acceptance which the prime manufacturer has verified by documented results of required inspection and tests to be in conformance with the prime manufacturer's design and the FAA contract and all its specification requirements.

e. Duplicate Deliverable Product. Subsequent completed products, offered for FAA acceptance, that are duplicates of the first deliverable product.

f. FAA Office. The FAA Industrial Division, ALG-400, Logistics Service, 800 Independence Avenue, S. W., Washington, D. C. 20591. This office is responsible for evaluation, audit and inspection of the prime manufacturer's quality control system and related facilities. This office issues the FAA Quality Control System Certificate.

g. Quality Reliability Officer. The FAA Quality Reliability Officer assigned by the FAA Industrial Division to the prime manufacturer's facility.

h. Delegated Authority. A delegation of authority from the prime manufacturer to a supplier. It shall be expressed in writing and shall set forth the extent of the delegation.

i. Quality Control System Certificate. The certificate attests to the fact that the Quality Control System Plan, facilities, methods and controls of the prime manufacturer were demonstrated as being adequate for his authentication that the production, inspection, testing and delivery of the products listed on the Production Limitation Record will be in conformance with the requirements of the Federal Aviation Administration contract.

j. Production Limitation Record. A Production Limitation Record lists the FAA equipment type designation and number of units of the product that the prime manufacturer is authorized to manufacture and deliver under the terms of the prime manufacturer's quality control system certificate issued by FAA. The FAA office issues the Production Limitation Record.

k. Software. The totality of programs and routines used to extend the capabilities of computers, such as compilers, assemblers, narrators, routines, and subroutines as contrasted with "hardware."

5. DISCUSSION. This circular will cover only those elements contained in the FAA solicitation titled "Quality Control System Plan Requirements" and those sections of FAA-STD-013a where further discussion, information, and examples would be helpful.

a. Quality Control System. A quality control system meeting the requirements of the solicitation and FAA-STD-013a, paragraph 2.1 will provide control over all phases of production from the initiation of design through manufacture and preparation for delivery; it will also include control over supplier-furnished articles which are not manufactured by the prime manufacturer. The following paragraphs provide an example of elements of a quality control system which will be an acceptable means of compliance with those requirements.

(1) Organization. The organization of the quality control department will ensure that any decision with regard to workmanship, performance, quality, conformity, safety, materials review, corrective action or any other decision affecting the design characteristics established for the product is not unduly influenced by other considerations. These functions are generally best achieved by having the quality control organization report directly to top management.

(2) Audits. The organization will provide for a comprehensive system of planned and continuous audits to verify compliance by the prime manufacturer with all aspects of the FAA certificated quality control system. Audits are a normal management tool that are utilized not only to evaluate the effectiveness of the prime manufacturer's quality control system but also that of suppliers who have been delegated authority by him to conduct

inspection and tests. The findings of these audits will be reported to the prime manufacturer's top management and the FAA Quality Reliability Officer (QRO).

(3) Quality Control and Inspection Planning. An effective quality control and inspection planning system will provide the means for selecting and controlling procedures governing methods for:

(a) Classifying design characteristics, related manufacturing processes, services, and the completed product so that the most effective fabrication and process controls will be employed. In addition, the system will provide for a means to identify defects as critical, major, or minor as applied to the contract and its equipment specification requirements.

(b) Selection of appropriate inspection methods, and plans for each article to ensure that all characteristics affecting safety and performance requirements will be inspected, and reinspected as required, to ensure conformity with approved design requirements and elimination of discrepancies from completed products and spare parts.

(c) Ensuring that any nonconforming characteristics which may be in a lot accepted under a statistical quality control plan will not result in an unsafe condition, failure, or materially reduce the suitability of the end product or spare part.

(4) First Deliverable Product and Duplicate Products. The prime manufacturer's quality control organization will perform "in-depth" inspection and test verification of the first deliverable product to determine that all articles in the completed deliverable product, including the deliverable product itself, do, in fact, conform to the contract and all its specification requirements. The first, acceptable deliverable product establishes the base-line configuration.

The prime manufacturer's inspection personnel will inspect and measure all articles of the first deliverable product, including the deliverable product itself, against all the prime manufacturer's approved drawings, test specifications, and other applicable procedures and documents to ensure that all design parameters specified by the FAA contract and the applicable equipment specifications are, in fact achieved.

Further, the prime manufacturer's quality organization will verify all applicable tests on all articles of the first deliverable product including the deliverable product itself to ensure

that the performance requirements are in fact met, and, that these performance requirements are, therefore, achievable on all duplicate deliverable products to follow.

Benefits to be derived from such inspections and tests of the first deliverable product and its component articles are numerous. Examples include savings in manhours due to elimination of unnecessary retrofits, retests and unnecessary component replacements or reconfigurations. In addition, schedule delays will be minimized by such an inspection and test program.

(5) Inspection Personnel. An effective quality control system utilizes well qualified inspectors in sufficient number to ensure that articles, processes, procedures, and the completed products are inspected for conformity to the requirements, specifications, and procedures specified by the design.

(6) Inspection Stations. Inspection stations and the programming of inspections at each stage of production ensures that parts, assemblies, processes, and assembly operations are inspected, and appropriate tests are conducted, in accordance with design requirements and applicable technical materials. Appropriate verification records of these inspections and tests will be maintained.

(7) Production Planning. Production planning is usually achieved through use of fabrication and inspection instructions, shop travelers, check lists, or similar media. Such planning not only provides control over fabrication and assembly operations, but also ensures that necessary inspections and tests will be conducted in the proper sequence, and that articles and processes are in an inspectable condition prior to painting or closure. This system will provide for inspections and tests appropriate to all phases of the production cycle, from raw materials selection through related processes and services into the completed product.

(8) Identification of Inspection Status. A means will be established to properly identify and control articles and services with their inspection status traceable to the responsible inspector. This ensures the use of only those articles and services which are required to meet the prime manufacturer's design and the FAA equipment specification requirements. For example:

(a) Suitable acceptance, rework, or rejection stamps will be placed on articles or, if not practical, stamped tags will be attached to the articles subjected to processing, testing, or inspections, such as heat-treat, welding, flow soldering, and hand soldering, brazing, bonding, hardness

tests, electrical continuity, laboratory analysis, radiographic inspection, ultrasonic inspection, magnetic particle inspection, sub-unit assembly and the like.

(b) Articles which have been accepted as a result of approved material review actions will be so identified by a suitable stamp. Articles which have been reworked to specified drawing configurations will not require special identification.

(c) Articles rejected as being unusable or scrap will be plainly marked and subsequently controlled so as to absolutely preclude their installation on the product or their use as spare parts. Articles becoming obsolete because of engineering changes or other actions will be controlled to preclude unauthorized assembly or installation.

(9) Materials Review. The application of material review procedures is solely for the prime manufacturer's own benefit and use; it will not be used as a routine procedure fostering continued and wide spread submission of products which do not conform to the prime manufacturer's design or the specified FAA requirements. All material review actions will involve critical, major or minor defects as defined in paragraphs 4.c.(1), (2), and (3). Recognizing that a material review procedure is normally of prime importance in any quality control system, it will provide the means for:

(a) Controlling the identification and disposition of damaged and nonconforming articles, including the isolation and scrapping of unusable articles.

(b) Ensuring the submittal of critical and major material review actions to FAA for engineering disposition, and minor material review actions to the FAA Quality Reliability Officer for disposition as they occur.

(c) Corrective action with regard to discrepancies in design or manufacturing procedures, processes, or any other condition which caused the nonconforming articles, and ensuring that all affected and subsequent products and articles will be in conformity with the design requirements.

(d) Maintaining charts or records to show the effectiveness of the corrective action program and to reveal problem areas as they arise.

(10) Records. To preclude misunderstanding concerning inspections and tests conducted by or on behalf of the prime manufacturer and for inspections and tests conducted during manufacture of each article and the end product, the results will be documented and the documentation retained for four years (reference the Federal Procurement Regulations) or as specified in the FAA contract.

(11) Facilities and Equipment. These will be controlled to ensure a quality end product. A minimum of rejection and rework is one good indication that manufacturing facilities, equipment and tooling are properly controlled ensuring production of uniform, duplicate articles and duplicate completed products.

(12) Fabrication and Assembly. It is in the interest of good shop practice leading to a quality product that production areas are so arranged as to provide segregation of manufacturing processes or operations which may adversely affect other operations; for example, separation of precision inspection areas from areas where grinding, cutting, sanding, or painting operations are performed.

(13) Technical Data Control. The use by production and inspection personnel of up-to-date technical documents contributes toward the manufacture of a product which conforms to appropriate design requirements; therefore, it is the normal practice to maintain a technical document control system which ensures that only the correct prime manufacturer's approved drawings, drawing change notices, engineering requirements and quality control and inspection procedures are available to production and inspection personnel. Obsolete drawings and specifications will be promptly removed from production areas.

(14) Software Control. To ensure adequate control over software preparation, configuration and testing, the prime manufacturer's quality control system plan will provide a closed loop system for in-house deficiency reporting and analysis. The system will assure that all deficiencies found in the logic, coding, compiling and testing are reported, analyzed and corrected. Responsibility for analysis will be clearly fixed with a single organizational element in the prime manufacturer's facility. A suspense system will also be maintained to ensure timeliness of analysis and corrective action.

(15) Drawing Change Control. A drawing change control system is an important factor which assists in ensuring that, prior to final acceptance of products or articles, all changes to the design requirements are either incorporated on the applicable drawings, or described in change notices attached to such drawings.

(16) Process Control. The integrity of processes and services utilized in the construction of articles and products is usually dependent upon the skill with which the work is performed, the capabilities of the equipment used, and close control of temperatures, solutions, curing time, or other critical factors. Normally, a system to control all processes and services, such as welding, soldering, brazing, heat treatment, plating, wire-wrap, automatic parts insertion, and radiographic, ultrasonic, or magnetic particle inspection, and the like, ensures that each process is performed by trained and qualified personnel and in accordance with approved specifications containing definitive standards of quality. The system will also ensure that periodic inspection of gauges, solutions, or any critical equipment is controlled and documented.

(17) Instrumentation, Tool and Gauge Control. Instrumentation, tools, gauges, jigs, and fixtures used for precision inspection, process control, and production contribute to the manufacture of uniform products; however, these media have lost their effectiveness when they are inaccurate. To preclude acceptance of nonconforming articles, or rejections due to misfits or improperly controlled processes, a calibration system as specified in MIL-C-45662A incorporates a schedule for inspection and calibration to certified national measurement standards of all inspection tools, gauges, testing equipment, as well as production jigs, fixtures, templates, and the like, which are depended upon as media for inspection. An acceptable schedule will have the inspection intervals established on the basis that such instruments, tools and gauges will be inspected prior to their becoming inaccurate, or requiring adjustment, replacement, or repair. A recordkeeping system will 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 that the next inspection is due, and is

(b) Removed from inspection and shop areas or conspicuously identified to prohibit usage after expiration of the inspection due date if the calibration is not accomplished.

(18) Purchasing and Receiving. An effective purchasing and receiving inspection system is of prime importance in a quality control system as it precludes release to production of nonconforming or unsafe articles procured from outside sources. Such a system will ensure that:

(a) Purchase orders provide specifications or other requirements and in the detail necessary to ensure procurement

of articles or services which meet the requirements of the design.

(b) All incoming articles conform to approved design requirements prior to their acceptance and release to production.

(c) Proprietary articles are of the same design configuration as specified in the acceptable product design. (Reference 5.a.(19)(c).)

(d) Records are maintained of all inspections and tests performed by or for the prime manufacturer in controlling the design configuration and conformity of all supplier-furnished articles.

(e) All articles and related inspection and test records are marked with appropriate acceptance or rejection identification.

(19) Suppliers. Since the prime manufacturer holding an FAA Quality Control System Certificate is primarily responsible for each article used in his product, it is to his advantage to establish a system to ensure conformity to the product design of all articles or services obtained from suppliers. This also includes responsibility over proprietary articles which are not manufactured by the prime manufacturer. Such a system will normally ensure that:

(a) Inspections and tests are extended to include suppliers of articles or services which cannot or will not be completly inspected upon receipt by the prime manufacturer at his approved facilities.

(b) Provisions are made for the evaluation and surveillance of suppliers by the prime manufacturer holding an FAA Quality Control System Certificate when he relies to any degree upon a supplier's quality control system, or has delegated inspection duties to the supplier.

(c) All materials review actions and design changes made by suppliers, including suppliers of articles over which the prime manufacturer holding an FAA Quality Control System Certificate does not exercise design control, are evaluated by the prime manufacturer and approved as applicable in accordance with FAA equipment specification requirements.

(d) Positive control is exercised to ensure conformity to the prime manufacturer's approved design and performance requirements of all articles obtained from suppliers.

(e) Suppliers, to whom the prime manufacturer has delegated authority to make major inspections of parts or assemblies, are formally advised that their facilities, quality system, controls, equipment, personnel, and articles being supplied are subject to evaluation and inspection by the prime manufacturer and the FAA office since, in effect, such suppliers' facilities constitute extensions of the facilities of the prime manufacturer.

(f) Articles obtained from foreign suppliers are under the same degree of control that is exercised over domestic suppliers. An undue burden on the FAA office may exist whenever the prime manufacturer performs, or he has suppliers perform, any of his quality control and inspection and test functions outside the U. S. Under such circumstances, the evaluation and approval of design changes and the evaluation, approval and subsequent surveillance of suppliers, may create an undue burden on the FAA office in administering the FAA Quality Control System Certificate. The determination of whether or not an undue burden exists will be made by the FAA office in each case. FAA surveillance of materials, parts, and articles which can be inspected in the U.S. is not considered to be an undue burden provided the prime manufacturer completely inspects such articles for conformity and condition in the U.S. and such inspections are programmed in his FAA approved quality control system and inspection checklists. When a foreign supplier is being considered, the prime manufacturer will contact the FAA office to determine whether or not it will require the performance of any FAA duties at a foreign supplier's facilities and if it does whether it will result in an undue burden being placed on the FAA office. If such FAA duties will be required, an acceptable means of relieving the undue burden must be found, or it may be necessary for the prime manufacturer to perform all required functions in the U.S. so that the FAA office can carry out its responsibilities.

(20) Storage and Issuance. Experience has shown that a reliable, well-controlled storage and issuance system is a major factor in production of a conforming and safe product. Such a system will normally ensure:

(a) Identification, segregation, and protection of articles

in storage;

(b) Periodic reinspection and disposition of materials subject to deterioration from prolonged storage;

(c) Protection from damage of articles being delivered to fabrication or shipping areas while stored in fabrication areas prior to use.

(d) Incorporation of all applicable design changes prior to release of stored articles for installation in the product.

(e) That only those articles which are identified as having passed the prime manufacturer's inspection are received into and issued from finished stores.

(21) Modular-Unit, Sub-Unit, Final Assembly, Inspection and Tests

(a) Modular-unit and sub-unit as well as the final assembly inspections and tests are of particular importance, since, together with quality control exercised throughout the design and manufacturing cycle, it is at these points that the conformance, operation and safety of the product are ultimately determined. An acceptable quality control system will, therefore, incorporate procedures to ensure that:

(1) There is modular-unit and sub-unit inspection and testing in addition to each completed product being subjected to a final inspection and test for completeness, adjustments, safety, calibration, markings, placards, and the like, in accordance with the applicable configuration of the prime manufacturer's approved design. Also, that each completed product is inspected for freedom from damage, contamination, and for safe operating condition.

(2) Internal inspection as necessary will be conducted to determine that the product is in condition for safe operation. The degree of such inspection may be based on a statistical sampling plan, evidence of product uniformity, a satisfactory history of previous internal inspections, and service experience.

(3) Each completed product will be functionally tested in accordance with the FAA contract requirements.

(22) Packing, Preservation and Shipping. A system established to control the packing, preservation, and condition of the end product and spare articles normally incorporates procedures which ensure that:

(a) The end product and spare articles conform to the applicable design and have not exceeded their shelf life limits.

(b) Prior to shipment of the end product and spare articles, all required modifications are accomplished in accordance with applicable design changes, service letters or other specification changes.

(c) The end product and spare articles will be adequately preserved and packed in a manner to preclude deterioration or damage in shipment - especially internal damage not readily detectable by inspection for condition upon receipt.

b. FAA Quality Control System Plan Requirements, Prime Manufacturer.

(1) The plan required to be submitted for approval under this requirement shall be submitted as specified in the solicitation.

(2) In general, the following paragraphs provide an example of acceptable compliance:

(a) The material will be arranged in manual form, with a suitable index, and with chapters covering each element of the prime manufacturer's facilities that affect the design.

(b) A typical, simplified flow chart showing correlation of the design and manufacture of the product to quality control; including purchasing, supplier control, receiving, in-process and final inspection stations.

(c) The descriptive material will, normally, include all of the items discussed under paragraph 5a of this circular.

(d) When references to other company documents or material are utilized, the manual will briefly summarize the procedure, method, or system which is referenced. Any such referenced material becomes part of the quality control system approved by the FAA.

(e) Preparatory to shipping, a checklist will be prepared to determine that all articles including spare parts, software and documentation required for the product are accounted for.

(f) The inclusion of supplementary material such as the following is normally considered helpful in showing acceptable compliance:

1 A workmanship standard which provides clear examples of the type and quality of acceptable work performance, e.g., solder joints, harness layout, printed circuit boards, subassembly, assembly and like areas where the workmanship of the article or end product is more nearly controlled by the worker than by fixed tooling, dies or similar fixtures.

2 Samples of all inspection and acceptance forms and checklists for articles and completed products, together with a brief outline of instructions for their use.

3 Imprints of the various inspection and process stamps, and their meaning.

4 A schedule of inspection and calibration intervals for production jigs and fixtures, precision inspection tools, testing equipment, including gauges, and recording equipment used in controlling processes.

5 A listing of manufacturing processes which are relied upon to assure quality, conformity, and safety of the completed product.

(3) An acceptable means of compliance with the requirements under this certification program for a prime manufacturer to delegate inspection and test authority, as cited in paragraphs 4.h and 5.(19)(e), will be to provide in his quality control system manual a sample of such delegated authority. The manual will include a description of the means used to monitor and control both domestic and foreign suppliers. Such description will include an up-to-date list of such suppliers and provisions for adding additional suppliers as the production matures and develops. Each supplier delegated inspection and test authority will be identified by name, address, nomenclature of articles or services, drawing numbers, approved drawing changes, and any other pertinent information, for example:

(a) Preliminary materials review and design change authority granted.

(b) Quality control inspection and testing functions delegated to both proprietary and non-proprietary suppliers regardless of who designed or owns the design of the article.

(c) Surveillance exercised by the prime manufacturer at first and lower tier suppliers.

c. Changes in the Quality Control System.

(1) An acceptable means of compliance with the notification of change requirement is to notify the FAA office of those changes falling within the scope of the FAA approved Quality Control System. This notification requires submission of:

(a) The revised quality control system plan material and supplementary information as may be required for review by the FAA office.

(b) Similarly, a change in suppliers or in delegations to suppliers may result in changes to the prime manufacturer's approved quality control system. When it does, the prime manufacturer is required to notify immediately the FAA office in writing of the change and its affect on the inspection, conformity, or performance characteristics of the deliverable product. As a result a new FAA evaluation and approval may be necessary. When a new evaluation is not required the FAA office will notify the prime manufacturer by consent to the change, and the information furnished will be filed with the record in the FAA office.

d. Production Limitation Record. The Production Limitation Record (PLR), reference paragraph 4.j., is the principle means of identifying each specific product and the quantities thereof that a prime manufacturer is authorized to manufacture and deliver under the terms of an FAA Certificated Quality Control System. The PLR is dated and issued by the FAA office at the same time that the quality control system certificate is issued.

(1) The FAA office may issue a superseding production limitation record when the prime manufacturer holding an FAA certificated quality control system plan makes application to add a new product, and his amended quality control system plan is approved. The superseding production limitation record will automatically include the existing product or products.

e. Amendment of the Prime Manufacturer's Quality Control System Certificate for use with Multiple Products.

(1) The requirements for a Quality Control System Certificate for an additional product line(s) are the same as for the original except that only amendments to the existing certificated system need be submitted for approval which are peculiar to the additional product line.

f. Cancellation of an FAA Quality Control System Certificate.

(1) Within 30 days after delivery of completed products as well as spare articles has ceased, the prime manufacturer's FAA Quality Control System Certificate is automatically cancelled.

(2) If the prime manufacturer ceases to manufacture the products, but continues to manufacture spare articles, his FAA Quality Control System Certificate does not require amendment.

g. Evaluation, Audits and Tests.

(1) After receipt of the prospective contractor's Technical Proposal and Quality Control System Plan by the Contracting Officer in response to the FAA solicitation (reference paragraph 5.b.(1)) and following the preliminary analysis of the prospective contractor's quality control system plan and material by the Chairman, Technical Evaluation Team and the FAA office, the latter may convene a Quality Control System Analysis Team (QCSAT) at the prospective contractor's facilities to make a further evaluation of his qualifications. The prospective contractor will be formally advised as to the extent of his assistance needed in the quality control system analysis team activities. The findings and recommendations of the FAA office and the QCSAT will be documented and consolidated by the Chairman, Technical Evaluation Team with his analysis of the technical proposal and given to the FAA Contracting Officer.

(2) Following award of the contract and issuance of a Quality Control System Certificate, the FAA office may conduct periodic audits and evaluations of the prime manufacturer's quality control system, design and production facilities; it may make spot inspections and tests of individual articles and completed products, review related records and conduct other investigations as necessary to determine that the prime manufacturer's quality control system remains in compliance with the original requirements for the FAA certificate. If such inspections or tests disclose that any part of the system which was previously approved does not fully meet the applicable requirements, the FAA office may request changes to the quality control system to remedy the deficiency.

(a) The FAA considers that inspection stamps, signature, or any other evidence of inspection approval, placed on inspection records, test reports, or physical articles is documentation that the article, process, or manufacturing operation has been accepted by the prime manufacturer.

(b) If an article has passed through a point officially desig-

nated for inspection, the omission of any required stamps or signatures, which were designated to be applied at that point to the physical article, inspection records, or test report, may be considered a noncompliance with the approved quality control system plan requirements.

h. Display. Since the Production Limitation Record (PLR) is part of the FAA approved Quality Control System Certificate, it should be displayed with the certificate. The prime manufacturer may make copies of the certificate and PLR for display in offices of outlying plants which are part of the main manufacturing facilities.

i. Responsibility of the Prime Manufacturer.

(1) The holder of an FAA Quality Control System Certificate has basic responsibility for controlling the manufacture of completed products and replacement or modification parts in conformity with his FAA approved quality control system. Although this responsibility never changes, he may be relieved of some of the burden of inspection and testing duties when he:

(a) Uses products manufactured under another person's FAA approved quality control system.

(b) Delegates specific inspection and testing to suppliers of proprietary or nonproprietary articles.

(2) Even though the prime manufacturer holding an FAA Quality Control System Certificate may be relieved of some of the burdens of inspection and testing when a supplier holds an FAA Quality Control System Certificate, the prime manufacturer remains responsible for controlling the design, physical configuration, and safe operating condition of the articles or products furnished by such a supplier. One means of exercising such control is to utilize articles or products whose specific design configurations were found to comply with the applicable FAA equipment specification requirements, as substantiated during the type test program, and by requiring that all changes made by a supplier, to the design or the physical product or article, are submitted to the prime manufacturer for evaluation and approval. The prime manufacturer is responsible for obtaining FAA approval of materials review actions and other design changes including those made to supplier-furnished proprietary articles which would also result in a change to his design or to his products during the life of the FAA certificate. A supplier who holds an FAA Quality Control System Certificate is also responsible when articles or services furnished by him:

(a) Do not conform to the supplier's or prime manufacturer's approved design.

(b) Were not manufactured and controlled in accordance with the supplier's FAA approved quality control system.

(c) Contain any other defects which normally would not be found by the prime manufacturer in conducting his receiving inspections and functional tests which would result in a non-compliant or unsafe product.

(3) Completed products are considered to be ready for FAA acceptance and delivery when the prime manufacturer's inspection and tests, including those inspection and tests required to be performed in accordance with FAA approved test procedures, have been completed, recorded and validated in compliance with the FAA approved quality control system and the prime manufacturer certifies to the FAA Quality Reliability Officer that the product conforms to the requirements of the FAA contract.

During the life of the contract corrective action will be automatically required to resolve and remedy deficiencies. Failure of the prime manufacturer to maintain and operate the certificated quality control system will lead to suspension or revocation of the certificate and may lead to termination of the FAA contract for default.

The information and guidance contained in this Advisory Circular will also be used by FAA to measure the adequacy of other prospective contractors' proposed quality control and inspection system plans which will be required by other FAA type procurements. These measures will be applied during the pre-contract award evaluation phase to assist in making the determination of "Responsible Prospective Contractors" as required by the Federal Procurement Regulations (FPR) Sub-part 1-1.12.

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Acting Director, Logistics Service

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
STANDARD

FAA-STD-013a
03/04/70

# QUALITY CONTROL PROGRAM REQUIREMENTS

## FOREWORD

It is the aim of the Federal Aviation Administration to procure the equipment and services necessary to accomplish its mission at the minimum cost in terms of money, material and manpower.

This standard has been prepared to provide common, general requirements for contractor quality programs to ensure the required quality of FAA systems and equipments used for air traffic control and navigational aids.

## QUALITY CONTROL PROGRAM REQUIREMENTS

### 1. SCOPE

1.1 Scope.- This standard establishes requirements for contractors' quality control programs. These requirements pertain to the inspections, tests and records necessary to substantiate product compliance with contract specification requirements. All inspections and tests required by the contract are to be fully integrated and timely scheduled with all other contractor effort.

1.2 Relation to detail requirements.- The quality control program requirements set forth in this standard shall apply on FAA contracts for systems and equipments when specified in the contract schedule or bid request. These requirements shall be satisfied in addition to all detail requirements specified in the system, equipment or component specifications.

### 2. REQUIREMENTS

2.1 Quality control program requirements.- The contractor shall provide and maintain a quality control program which fulfills the requirements of this standard and Specification MIL-I-45208A, Inspection Systems Requirements. The contractors' quality control program shall be a scheduled and controlled plan of events integrating all necessary inspections and tests required to substantiate product quality during design, development, purchasing, subcontracting, manufacture, fabrication, processes, assembly, acceptance, packaging, and shipping; and, when required by the contract, site installa-

tion. The contractor shall perform or have performed the inspections and tests required to substantiate product configuration and conformance to drawings, specifications and contract requirements and shall also perform or have performed all inspections and tests otherwise required by the contract.

2.2 Procedures and forms

2.2.1 Test methods.- The contractor shall prepare the necessary lists of tests, acceptance test procedures, and test data forms. Test procedures shall be complete and in sufficient detail to permit evaluation of their adequacy in demonstrating compliance with specification performance requirements without recourse to physical examination of the test facility. Test procedures shall include block diagrams of the test set-up identifying all connection points, test points, and controls. Supplementary descriptive information shall be furnished on any special test equipment or fixtures utilized in the test and shall include drawings, theory of operation, and analysis of measurement accuracy, as appropriate. The test procedure and data forms shall provide for the recording of all observed data and all intermediate steps of mathematical calculations which may be involved in determination of the final measurement. All data shall be quantitative and each final entry shall be in units directly comparable to the specification limits.

2.2.2 Approval of test methods.- Four copies of the proposed lists of tests, test procedures, and blank test data forms shall be furnished to the Government as follows: three copies to the contracting officer or his designated technical representative and one copy to the resident FAA quality assurance representative if assigned, otherwise forwarded to the Federal Aviation Administration Contracting Officer, or his designated technical representative. Copies shall be furnished at least 30 days in advance of the contractor's scheduled date for testing to allow the Government time to review and evaluate. One copy will be returned to the contractor, either with a statement that the proposed methods and forms are approved by the Government for use by the quality assurance representative, or with a statement pointing out deficiencies to the proposed methods and forms. In the event of the latter, the contractor shall resubmit his revised methods and forms. The approved forms shall be used for preparation of the test data sheets for the testing of all products on the contract. The Government reserves the right to waive Government inspection. If Government inspection is waived, the contractor shall nevertheless perform all of the required tests utilizing the Government approved test procedures and furnish certified test data recorded on the approved forms (see 2.3). The test data must substantiate that the product meets contract requirements and shall include the statement, "This certifies that this product fully meets all technical requirements of the contract," and be dated and signed by a responsible contractor official. Certified test data copies shall be furnished as specified for regular test data in 2.3. Shipment shall not be made until the contractor receives written Government approval of the test

data.

2.3 Product acceptance test data forms.- The contractor shall prepare test data forms of each product subjected to test. Separate forms shall be prepared for each test classification. The title page for each set of test data forms shall show the product name, type designation and serial number, specification number and date, and, the contract number and date. The individual test form shall indicate, for each test, the applicable specification, paragraph number and the performance limits stated therein. The original test data form shall be signed by the contractor's test man and countersigned as witnessed by the FAA quality assurance representative.

Copies may be made by use of carbon paper, or by means of a duplicating process. All copies of a given sheet shall carry identical test data. Blank forms shall be typed, lettered by mechanical means, or printed. Two copies of all test data are required. One copy shall accompany the product tested. The second copy shall be furnished to the FAA quality assurance representative. If no FAA quality assurance representative is present, the second copy shall be forwarded to the Federal Aviation Administration Contracting Officer, or his designated technical representative. (NOTE: One extra copy of test data is required with the first product tested).

2.4 Measuring and test equipment.- The contractor shall provide and maintain all measuring and test equipment in accordance with MIL-C-45662A.

## 3. DOCUMENTS

3.1 Military Specifications.-

MIL-C-45662A - Calibration System Requirements

MIL-I-45208A - Inspection System Requirements

(Single copies of Military specifications may be requested by mail or telephone from U. S. Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pa. 19120 (for telephone requests call 215/697-3321, 8 a.m. to 4:30 p.m., Mon. through Fri.). Not more than five items may be ordered on a single request; the Invitation for Bid or Contract Number shall be cited where applicable.)

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**CHANGE**

**AC NO:** 00-41 CHG 1

**DATE:** May 20, 1974

# ADVISORY CIRCULAR

## DEPARTMENT OF TRANSPORTATION
## FEDERAL AVIATION ADMINISTRATION

**SUBJECT:** CHG 1 TO AC 00-41, SUBJ: FAA QUALITY SYSTEM CERTIFICATION PROGRAM

1. PURPOSE. This change accomplishes the following:

   a. It clarifies the requirement for the prime manufacturer's Quality Control System Plan to be a self-contained document independent of detailed operating procedures. The latter are the sole responsibility of the prime manufacturer and they are not incorporated into the ensuing contract. (Reference paragraph 5.b.(2)(d)).

   b. It adds paragraphs 2.5 and 3.1 to Appendix 1 which were inadvertently omitted in the original Advisory Circular.

2. PAGE CONTROL CHART.

| Remove Pages | Dated | Insert Pages | Dated |
|---|---|---|---|
| 11 | 1/31/74 | 11 | 1/31/74 |
| 12 | 1/31/74 | 12 | 5/20/74 |
| 13 | 1/31/74 | 13 | 5/20/74 |
| 14 | 1/31/74 | 14 | 1/31/74 |
| 14-1 | 1/31/74 | 14-1 | 1/31/74 |
| Appendix 1 3 | | Appendix 1 3 | 5/20/74 |

R. F. FRAKES
Acting Director, Logistics Service

Initiated by: ALG-400

in storage;

(b) Periodic reinspection and disposition of materials subject to deterioration from prolonged storage;

(c) Protection from damage of articles being delivered to fabrication or shipping areas while stored in fabrication areas prior to use.

(d) Incorporation of all applicable design changes prior to release of stored articles for installation in the product.

(e) That only those articles which are identified as having passed the prime manufacturer's inspection are received into and issued from finished stores.

(21) Modular-Unit, Sub-Unit, Final Assembly, Inspection and Tests

(a) Modular-unit and sub-unit as well as the final assembly inspections and tests are of particular importance, since, together with quality control exercised throughout the design and manufacturing cycle, it is at these points that the conformance, operation and safety of the product are ultimately determined. An acceptable quality control system will, therefore, incorporate procedures to ensure that:

(1) There is modular-unit and sub-unit inspection and testing in addition to each completed product being subjected to a final inspection and test for completeness, adjustments, safety, calibration, markings, placards, and the like, in accordance with the applicable configuration of the prime manufacturer's approved design. Also, that each completed product is inspected for freedom from damage, contamination, and for safe operating condition.

(2) Internal inspection as necessary will be conducted to determine that the product is in condition for safe operation. The degree of such inspection may be based on a statistical sampling plan, evidence of product uniformity, a satisfactory history of previous internal inspections, and service experience.

(3) Each completed product will be functionally tested in accordance with the FAA contract requirements.

(22) Packing, Preservation and Shipping. A system established to control the packing, preservation, and condition of the end product and spare articles normally incorporates procedures which ensure that:

(a) The end product and spare articles conform to the applicable design and have not exceeded their shelf life limits.

(b) Prior to shipment of the end product and spare articles, all required modifications are accomplished in accordance with applicable design changes, service letters or other specification changes.

(c) The end product and spare articles will be adequately preserved and packed in a manner to preclude deterioration or damage in shipment - especially internal damage not readily detectable by inspection for condition upon receipt.

b. FAA Quality Control System Plan Requirements, Prime Manufacturer.

(1) The plan required to be submitted for approval under this requirement shall be submitted as specified in the solicitation.

(2) In general, the following paragraphs provide an example of acceptable compliance:

(a) The material will be arranged in manual form, with a suitable index, and with chapters covering each element of the prime manufacturer's facilities that affect the design.

(b) A typical, simplified flow chart showing correlation of the design and manufacture of the product to quality control; including purchasing, supplier control, receiving, in-process and final inspection stations.

(c) The descriptive material will, normally, include all of the items discussed under paragraph 5.a. of this circular.

* (d) Preparatory to shipping, a checklist will be prepared to determine that all articles including spare parts, software and documentation required for the product are accounted for. *

* (e) When references to other company documents or material are utilized, the manual will briefly summarize the procedure, method, or system which is referenced. To clearly identify responsibility for, and assure flexibility of such referenced documents which describe internal operating procedures, a statement similar to the following shall be included in the plan:

"All internal operating controls and procedures, written and physical, used to purchase, fabricate, manufacture and deliver articles, products and services under the Quality Control System Plan are the sole responsibility of the prime manufacturer, and they shall be changed or modified

by the prime manufacturer, as required, to ensure that the articles, products and services delivered to the FAA shall be in compliance with the contract and all its specification requirements." *

(f) The inclusion of sample material such as the following is normally considered helpful in showing acceptable compliance:

* 1 Examples of workmanship standards which provide clear description of the type and quality of acceptable work performance, e.g., solder joints, harness layout, printed circuit boards, subassembly, assembly and like areas where the workmanship of the article or end product is more nearly controlled by the worker than by fixed tooling, dies or similar fixtures. *

* 2 Samples of significant and frequently used inspection and acceptance forms and checklists for articles and completed products, together with a brief outline of instructions for their use. *

3 Imprints of the various inspection and process stamps, and their meaning.

* 4 Examples of schedules of inspection and calibration intervals for production jigs and fixtures, precision inspection tools, testing equipment, including gauges, and recording equipment used in controlling processes, together with the criteria for change. *

5 A listing of manufacturing processes which are relied upon to assure quality, conformity, and safety of the completed product.

(3) An acceptable means of compliance with the requirements under this certification program for a prime manufacturer to delegate inspection and test authority, as cited in paragraphs 4.h and 5.(19)(e), will be to provide in his quality control system manual a sample of such delegated authority. The manual will include a description of the means used to monitor and control both domestic and foreign suppliers. Such description will include an up-to-date list of such suppliers and provisions for adding additional suppliers as the production matures and develops. Each supplier delegated inspection and test authority will be identified by name, address, nomenclature of articles or services, drawing numbers, approved drawing changes, and any other pertinent information, for example:

(a) Preliminary materials review and design change authority granted.

(b) Quality control, inspection and testing functions delegated to both proprietary and non-proprietary suppliers regardless of who designed or owns the design of the article.

(c) Surveillance exercised by the prime manufacturer at first and lower tier suppliers.

c. Changes in the Quality Control System.

(1) An acceptable means of compliance with the notification of change requirement is to notify the FAA office of those changes falling within the scope of the FAA approved Quality Control System. This notification requires submission of:

(a) The revised quality control system plan material and supplementary information as may be required for review by the FAA office.

(b) Similarly, a change in suppliers or in delegations to suppliers may result in changes to the prime manufacturer's approved quality control system. When it does, the prime manufacturer is required to notify immediately the FAA office in writing of the change and its affect on the inspection, conformity, or performance characteristics of the deliverable product. As a result a new FAA evaluation and approval may be necessary. When a new evaluation is not required the FAA office will notify the prime manufacturer by consent to the change, and the information furnished will be filed with the record in the FAA office.

d. Production Limitation Record. The Production Limitation Record (PLR), reference paragraph 4.j., is the principle means of identifying each specific product and the quantities thereof that a prime manufacturer is authorized to manufacture and delivery under the terms of an FAA Certificated Quality Control System. The PLR is dated and issued by the FAA office at the same time that the quality control system certificate is issued.

(1) The FAA office may issue a superseding production limitation record when the prime manufacturer holding an FAA certificated quality control system plan makes application to add a new product, and his amended quality control system plan is approved. The superseding production limitation record will automatically include the existing product or products.

e. Amendment of the Prime Manufacturer's Quality Control System Certificate for use with Multiple Products.

(1) The requirements for a Quality Control System Certificate for an additional product line(s) are the same as for the original except that only amendments to the existing certificated system need be submitted for approval which are peculiar to the additional product line.

data.

2.3 Product acceptance test data forms. - The contractor shall prepare test data forms of each product subjected to test. Separate forms shall be prepared for each test classification. The title page for each set of test data forms shall show the product name, type designation and serial number, specification number and date, and, the contract number and date. The individual test form shall indicate, for each test, the applicable specification, paragraph number and the performance limits stated therein. The original test data form shall be signed by the contractor's test man and countersigned as witnessed by the FAA quality assurance representative.

Copies may be made by use of carbon paper, or by means of a duplicating process. All copies of a given sheet shall carry identical test data. Blank forms shall be typed, lettered by mechanical means, or printed. Two copies of all test data are required. One copy shall accompany the product tested. The second copy shall be furnished to the FAA quality assurance representative. If no FAA quality assurance representative is present, the second copy shall be forwarded to the Federal Aviation Administration Contracting Officer, or his designated technical representative. (NOTE: One extra copy of test data is required with the first product tested).

2.4 Measuring and test equipment. - The contractor shall provide and maintain all measuring and test equipment in accordance with MIL-C-45662A.

* 2.5 Facilities for FAA quality assurance reprsentatives. - The contractor shall provide sufficient office space for the FAA Quality Reliability Officer and his staff to perform his required duties. File cabinets, suitable desks, typewriters, and chairs, all in good repair and other miscellaneous office equipment, if required, shall be supplied by the contractor. Secretarial help shall also be provided for typing Inspection Reports (FAA Form 256). A telephone shall be provided at each desk and may be connected to the same line. The cost of long distance telephone calls placed by the FAA Quality Reliability Officer will be borne by the Government. *

3. DOCUMENTS

* 3.1 Applicable documents. - The following publications, form a part of this standard. *

3.1.1 Military Specifications. -

MIL-C-45662A - Calibration System Requirements .

MIL-I-45208A - Inspection System Requirements .

(Single copies of Military specifications may be requested by mail or telephone from U.S. Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pa.19120 (for telephone requests call 215/697-3321, 8 a.m. to 4:30 p.m., Mon. through Fri.). No more than five items may be ordered on a single request; The Invitation for Bid or Contract Number should be cited where applicable.)

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