Designation: F2972 – 15

Standard Specification for Light Sport Aircraft Manufacturer's Quality Assurance System[1]

This standard is issued under the fixed designation F2972; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification establishes the minimum requirements for a quality assurance system for manufacturers of Light Sport Aircraft or Light Sport Aircraft kits, or both.

1.2 This standard applies to aircraft seeking civil aviation authority approval in the form of flight certificates, flight permits, or other like documentation.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E2659 Practice for Certificate Programs

F2839 Practice for Compliance Audits to ASTM Standards on Light Sport Aircraft

3. Terminology

3.1 *Definitions:*

3.1.1 *permanent record, n*—where specified herein, the applicable record shall be kept and shall be accessible as long as airworthiness certificates remain in effect for aircraft produced that relate to the record.

3.1.2 *quality assurance manual (QAM), n*—the documentation of the quality assurance system.

3.1.3 *quality assurance record (QAR), n*—the permanent record of quality assurance associated with each LSA produced.

3.1.4 *quality assurance system (QAS), n*—a system of processes and controls used by a manufacturer to verify and validate that the LSA meets its specified requirement.

3.1.5 *reserved holding area, n*—physical area for isolating items away from normal production processes while awaiting proper disposition.

3.2 *Abbreviations:*

3.2.1 *MRB*—Material Review Board

4. Quality Assurance System

4.1 Manufacturers shall develop and implement a Quality Assurance System (QAS) in accordance with the requirements established within this practice. The elements of the QAS established herein include the following:

4.1.1 Quality Assurance Manual (QAM).

4.1.2 Quality Assurance Record (QAR).

4.1.3 Record of Compliance.

4.1.4 Product Configuration Control, Document Control, and Change Management.

4.1.5 Control of Critical Special Processes and Equipment.

4.1.6 Material Control.

4.1.7 Inspections.

4.1.8 Identification and Handling of Nonconforming Material.

4.1.9 Assignment of QA Duties and Supplier Control.

4.1.10 Audits.

4.2 *Quality Assurance Manual (QAM)*—Each manufacturer shall document their QAS in the form of a Quality Assurance Manual (QAM). The QAM itself and each of the QAS elements included or referenced shall be controlled as production documentation in accordance with 6.0.

4.3 *Quality Assurance Administration (QAA)*—The manufacturer's administration that is charged with the implementation of the QAS may consist of one or more: company employees, company officials, or manufacturer's agents, consultants, or assigns.

4.3.1 The members or roles, or both, of the QAA shall be identified within or by reference from the QAM.

4.3.2 The member(s) of the quality assurance administration authorized to attest compliance of the aircraft to the applicable

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

ASTM standards to any commercial or governmental entity shall be identified within the QAM.

5. Quality Assurance Record (QAR)

5.1 A QAR shall be retained for each LSA produced. Each QAR shall consist of the following, which shall include the LSA serial number and date of manufacture.

5.1.1 Completed final records and checks from the manufacturing and assembly operations. This should include items such as major subassembly sign-offs, critical part sign-offs, whole-system checks, and calibrations as well as aircraft or major subassembly repairs, rework, MRB, or temporary configuration deviation approvals.

5.1.2 Test documentation from the production acceptance testing procedures. This should include items such as checklists or sign-off sheets, or both, showing acceptance and completion of applicable production acceptance test requirements.

5.1.3 A copy of the Manufacturers Statement of Compliance.

5.1.4 The configuration of each aircraft at its point of delivery (for continued operational safety monitoring purposes), including associated parts lists and installed equipment lists.

5.2 A permanent record shall be maintained of the date of acceptance, the origin, and the certifications of materials used in the production of airframe components defined by the manufacturer to be critical to the aircraft structural integrity (see Note 1).

NOTE 1—The intent of this requirement is to provide a means for the manufacturer to identify and reduce the number of in-service aircraft that may be affected by a raw material anomaly requiring corrective action, thereby reducing the economic impact of such corrective action. This requirement should not be construed as a requirement for serial number specific traceability nor a requirement to identify 'critical parts' when none exist.

6. Engineering, Design, and Manufacture

6.1 *Record of Compliance*—The manufacturer shall keep a permanent record of the documentation used to show compliance of each approved aircraft configuration produced to all applicable consensus standards and regulatory requirements in effect at the time of manufacture.

6.2 *Configuration Control and Change Management:*

6.2.1 Revisions to documentation affecting compliance shall be tracked and the change process for developing, reviewing, and incorporating revisions to compliance documentation shall be controlled.

6.2.2 The manufacturer must insure and verify the use of the proper revision of any compliance document.

6.3 *Production Documentation*—The manufacturer shall maintain a permanent record of all production documentation pertinent to product compliance, including revisions. Production documentation shall include, but may not be limited to, the following types of documents:

6.3.1 Parts lists.

6.3.2 Component and assembly engineering drawings (engineering definition).

6.3.3 Manufacturing processes.

6.3.4 Specifications.

6.3.5 Tooling and gage identification.

6.3.6 Aircraft Operating Instructions (AOI) or Pilot's Operating Handbook (POH).

6.3.7 Maintenance manual.

6.3.8 Quality Assurance Manual (QAM).

NOTE 2—Any document or information necessary to show compliance to any part of any consensus standard is pertinent to product compliance and is intended to be documented and controlled as compliance/production documentation in accordance with Section 6.

6.4 *Special Processes*—A system shall be implemented to control all special processes and services related to the production of airframe components considered by the manufacturer to be critical to the structural integrity of the LSA, such as welding, brazing, heat treatment, plating, structural composites, adhesive bonding, and so forth. The system shall ensure that each process and service is performed in accordance with approved specifications containing definitive standards of quality, and that periodic inspection and calibration of measuring and test equipment, solutions, or any critical equipment is controlled and documented.

7. Material Control

7.1 Material control procedures shall be in effect so that materials, processes, and components, including raw materials, are in accordance with the manufacturer's applicable specifications.

7.2 Purchasing personnel must use an established procurement procedure that ensures that requirements for all items ordered are clearly specified.

7.3 Receiving procedures shall be in effect so that incoming material and components are checked against applicable specifications.

7.4 A procedure shall be in effect so that material in stock can be properly identified for future use.

7.5 For outsourced processes or manufacturing/fabrication, the supplier shall provide verification that the work or item meets the LSA manufacturers' specifications.

8. Inspections

8.1 Manufacturers shall implement and document a system of inspections to verify conformity of product to all applicable engineering requirements and production specifications.

8.2 Conforming, non-conforming, in-process, and items awaiting inspection must be separated or clearly distinguishable.

8.3 *Receiving Inspection*—Incoming items provided by outside vendors shall be inspected for conformity to applicable specifications.

8.4 Conforming items shall be distributed as required for immediate use or placed in a secure storage area for future use.

8.5 Items found to be nonconforming shall either be evaluated by a Material Review Board (MRB) in accordance with Section 9 or rejected in accordance with 9.2.

8.6 Sampling plans may be utilized so that full inspection of every part is not required, provided that adequate controls are in place on underlying processes or supply sources to provide assurance of conformity.

9. Material Review Board and Non-Conforming Items

9.1 A Material Review Board (MRB) may be established by the manufacturer to determine the disposition of non-conforming items, and shall consist of one or more manufacturer designated technical representatives.

9.1.1 MRB representatives shall be identified within the QAM.

9.1.2 If analysis, additional inspection, functional checks, repair, rework, and so forth assures that an item meets all of the relevant design requirements, the MRB may authorize its use in the production of a LSA. Otherwise, the item must be rejected in accordance with 9.2.

9.1.3 The manufacturer shall keep a permanent record showing the disposition of non-conforming items that have been evaluated by the MRB.

9.2 A process for disposing of items found to be unusable due to damage, shelf life limits, dimensional, or other variations must be defined and implemented. A rejected item must be mutilated, disposed of, or sufficiently marked as rejected to ensure that it is not used in the production of a LSA. A rejected component may be placed in a reserved holding area for future disposition or disposal.

10. Assignment of QA Duties and Responsibilities

10.1 Manufacturers may assign QA duties and responsibilities to outside parties for the purpose of establishing satellite manufacturing, assembly, distribution facilities, contract manufacturing/ processing, or a combination thereof.

10.2 In the case of assignment, the manufacturer retains overall QA responsibility for the accomplishment of these activities.

10.3 All assignment authorizations must be documented within the QAM.

11. Audits

11.1 Manufacturers shall conduct an audit of their QAS using a documented audit program prior to the initial delivery of a new model and at least annually thereafter. Practice F2839 may be used to establish minimum requirements of the program.

11.2 A record shall be maintained of all annual audits.

11.3 Any determination of non-compliance shall be resolved and a revision to the QAS shall be made if necessary to address any anomalies found.

12. Competence and Training

12.1 Any member of the QAA, identified in the QAM per 4.3.2, must have completed, with documented records, a standards training program within the preceding four years. The training program must leave the student with an understanding of:

12.1.1 Whether there is adequate substantiation to show compliance to the applicable standards set forth in the ASTM standards for LSA. Note that there is no requirement for the training to train personnel to validate every compliance element of every category of aircraft.

12.1.2 The requirements to obtain LSA certification, inclusive of design, performance, quality, and continued operational safety.

12.1.3 The various materials that must be provided with the sale of an ASTM compliant aircraft.

12.1.4 The responsibilities and duties of an ASTM compliant aircraft manufacturer.

12.2 Acceptable means of compliance to these requirements are:

12.2.1 The Light Sport Aircraft course and personnel certificate training program offered by ASTM International.

12.2.2 Another training program, either internal or external, meeting the requirements of Practice E2659 and the requirements given in this section and audited by an accredited third party.

12.2.3 Another program equivalent to 12.2.1 or 12.2.2.

NOTE 3—Equivalency per 12.2.3 may include programs such as: *(1)* Internal training programs embedded within an ISO 9001 or AS/EN 9100 approved system; *(2)* training programs developed under the supervision of a relevant CAA.

13. Keywords

13.1 compliance; Light Sport Aircraft; LSA; quality; quality assurance