



Designation: F2449 – 05 (Reapproved 2008)

# Standard Specification for Manufacturer Quality Assurance Program for Light Sport Gyroplane Aircraft<sup>1</sup>

This standard is issued under the fixed designation F2449; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification sets minimum requirements for light sport gyroplane or gyroplane component quality assurance and production acceptance programs.

1.2 This specification applies to light sport gyroplane aircraft seeking civil aviation authority approval in the form of flight certificates, flight permits, or other like documentation. This specification applies to kit and ready to fly aircraft.

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 requirements prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**F2352** Specification for Design and Performance of Light Sport Gyroplane Aircraft

**F2415** Practice for Continued Airworthiness System for Light Sport Gyroplane Aircraft

## 3. Terminology

3.1 *Definitions:*

3.1.1 *LSG (light sport gyroplane)*—used in this specification to refer to both light sport gyroplanes and gyroplane kits.

3.1.2 *LSGA (light sport gyroplane aircraft)*—rotary-wing aircraft designed in accordance with Specification **F2352** that is manufactured and delivered ready to fly.

3.1.3 *LSG kit (light sport gyroplane kit)*—complete or gyroplane or gyroplane accessory designed in accordance with Specification **F2352** that is manufactured and delivered as a kit.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee **F37** on Light Sport Aircraft and is the direct responsibility of Subcommittee **F37.50** on Gyroplane.

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<sup>2</sup> 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.

3.1.4 *manufacturer*—any entity engaged in the production of a LSG.

3.1.5 *permanent record*—where specified in this specification, applicable quality assurance records shall be kept for each LSGA produced for as long as the relative airworthiness certificate remains in effect.

3.1.6 *reserved holding area*—for rejected parts, materials, and assemblies, an area for the containment of rejected non-airworthy items awaiting proper disposition, where such rejected items shall not be distributed for use on a LSGA.

3.1.7 *satellite manufacturing, assembly, and distribution facilities*—refers to facilities being operated by commercial or private entities that, though authorized by the original manufacturer, are not directly associated with or controlled by the original manufacturer.

3.1.8 *secure storage area*—for accepted parts, materials, and assemblies, an area of storage where the preservation of the contents to required design specifications is reasonably assured until distributed for use on a LSGA.

3.2 *Acronyms:*

3.2.1 *AOI*—Aircraft Operating Instructions

3.2.2 *MRB*—Materials Review Board

3.2.3 *QAM*—quality assurance manual; the documentation of the quality assurance program that prescribes the methods of inspections and acceptance criteria

3.2.4 *QAP*—quality assurance program; describes the planned actions used by the manufacturer of a LSGA to verify and ensure the proper production thereof

3.2.5 *QAR*—quality assurance record; the quality assurance record associated with each LSGA produced.

## 4. Significance and Use

4.1 The purpose of this specification is to provide the minimum requirements necessary for the establishment of a quality assurance program for a light sport aircraft manufacturer or component supplier.

## 5. Quality Assurance Program (QAP)

5.1 Manufacturers of LSG shall develop a Quality Assurance Program (QAP) in accordance with the criteria of this specification.

5.2 *Quality Assurance Manual (QAM)*—Each manufacturer shall document the QAP in the form of a Quality Assurance Manual (QAM).

5.3 *Quality Assurance Administration (QAA)*—The manufacturer's administration charged with QAP implementation may include employees, officials, agents, consultants, or assigns. The QAM shall identify the person(s) within the manufacturing QAA.

5.4 *Quality Assurance Record (QAR)*:

5.4.1 The acceptance date, origin, and certifications of materials fabricated into structurally critical LSGA airframe components shall be recorded (see **Note 1**).

**NOTE 1**—The intent of this record is to provide a means for the manufacturer to identify and reduce the number of LSG within a fleet that may be affected by a materials anomaly that would require corrective action, thereby reducing the economic impact of such corrective action. This paragraph should not be construed as a requirement for specific parts traceability.

5.4.2 Manufacturer maintains a Quality Assurance Record (QAR) for each LSG produced. Each QAR consists of:

5.4.2.1 Applicable final inspection records, check, and test documentation from the production acceptance procedures (see Section 8),

5.4.2.2 A copy of the Manufacturers Statement of Compliance, and

5.4.2.3 The aircraft configuration at delivery point including associated parts lists and installed equipment lists for continued safety monitoring.

**NOTE 2**—Each item in 5.4.1 includes the LSG serial number and manufacturing date.

5.5 *Quality Assurance Revisions*—A system shall be implemented to ensure that only the latest revisions to the QAM are in use.

5.6 *Quality Assurance Audits*—The manufacturer shall conduct an annual QAP audit. The manufacturer maintains audit records. The manufacturer resolves any non-compliance issues found in the QAP audit and makes revisions to the QAM where appropriate.

## 6. Engineering and Manufacture

6.1 *Compliance Record*—The manufacturer records and keeps design compliance documentation for each configuration of light sport gyroplane aircraft or product manufactured in accordance with Specification **F2352**. Each record shall consist of the following.

6.1.1 A description of the configuration, including installed equipment list and associated parts, and

6.1.2 The current revision of required documentation provided with the aircraft.

6.2 *Configuration Control*—All LSG configurations in production must have a Compliance Record for the current Specification **F2352**.

6.3 *Production Documentation*—The manufacturer maintains a production documentation record including any revisions. Examples of production documentation include:

6.3.1 Parts lists,

6.3.2 Process routes,

6.3.3 Component and assembly drawings,

6.3.4 Manufacturing instructions and specifications, and

6.3.5 Tooling and gage drawings.

6.4 *Special Processes*—The QAP controls all special processes and services used to produce structurally critical LSGA airframe components, such as welding, brazing, heat treatment, plating, structural composites, adhesives bonding, and so forth. Each process and service must be in accordance with appropriate recorded specifications detailing quality standards and requirements for periodic inspection of solutions, gages, and other critical equipment.

## 7. Quality Assurance Inspections

7.1 Manufacturers implement and document an inspection procedure verifying product conformity to production specifications in accordance with 6.1.

7.1.1 Conforming, non-conforming, and items awaiting inspection must be separated or clearly distinguishable. Items found nonconforming are evaluated by a Material Review Board (MRB) in accordance with 7.4 or rejected in accordance with 7.5.

7.2 *Receiving Inspection*—The manufacturer implements a purchase procedure that ensures clear specification of all items ordered. Items from outside vendors are inspected for conformance to specifications immediately when received.

7.3 *Acceptance of Conforming Items*—Conforming items are distributed as required or placed in a secure storage area for future use.

7.4 *Evaluation of Non-Conforming Items by a Materials Review Board*—A Materials Review Board (MRB) may determine the nature of non-conforming items. The MRB consists of one or more manufacturer-designated technical representatives. The QAM identifies all MRB representatives. If analysis, additional inspection, functional checks, repair, rework, adaptation, and so forth assure item meets design requirements, the MRB may authorize usage of the item. If not, the item is rejected in accordance with 7.5. The manufacturer keeps a permanent record on the nature of non-conforming items evaluated and accepted by the MRB.

7.5 *Rejection of Non-Conforming Items*—The manufacturer documents and implements a process for disposing of non-conformance items. Examples of how an item may be deemed non-conformant includes damage, shelf life-limits, and other deviations. Otherwise serviceable but non-conforming items may be returned to the supplier. Unserviceable items must be mutilated, destroyed, or sufficiently marked as rejected. This process must ensure the item can no longer be used on any aircraft. The item can be held in a reserved area prior to disposal.

## 8. Production Acceptance

**NOTE 3**—The following criteria should not be construed as requirements for specific features to be included on a LSGA. When a requirement specifies a feature that does not exist on a LSGA, the requirement does not apply.

8.1 *Final Inspections*—Manufacturer shall verify and record that a shop order for each LSGA produced has been completed prior to conducting the following production acceptance procedures.