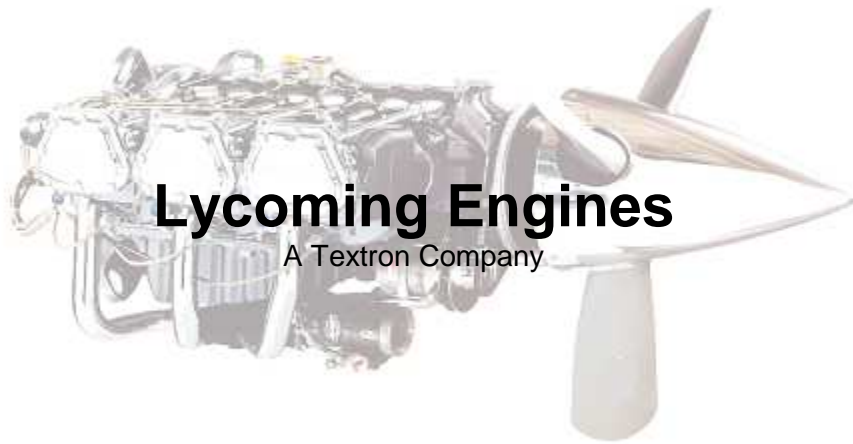


Supplier Quality Assurance Manual

SQA 2000

Revision E



Lycoming Engines

A Textron Company

Revision History

<u>Revision Level</u>	<u>Effective Date</u>	<u>Description</u>
OR	December 1994	Original Release
A	September 1998	<i>Reason:</i> This document replaces SQA 2000, revision OR, dated December 1994. Revisions are made to clarify requirements for suppliers, parallel AS/ISO document by reorganizing sections, and cancel Military Specification references by updating to comparable industry standards.
B	January 2000	<i>Reason:</i> This document replaces SQA 2000, revision A, dated September 1998. Revisions have been made to clarify requirements for Priority parts suppliers and to emphasize process control.
C	January 2006	<i>Reason:</i> This document replaces SQA 2000, revision B, dated January 2000. Revisions have been made to clarify requirements for alignment with AS9100 and Nadcap accreditation for special process suppliers.
D	October 2006	<i>Reason:</i> This document replaces SQA 2000, revision C, dated January 2006. Revisions have been made to clarify requirements in 7.1, 7.2, 17.1 and PO clause 32. Added requirements to 10.1 and added 10.2. Added section 23 and PO Clause 34 to address quality system requirement for suppliers of Thunderbolt Engine. Added PO Clause 35
E	July 2009	<i>Reason:</i> This document replaces SQA 2000, Revision D, dated October 2006. Revisions have been made to clarify requirements in: Para 4.1 and 5.1 reflect the change from 20,000 PPM to 10,000 PPM. Para 7.2 removed Special Process supplier accreditation process info link, Para 7.3 and 7.4, In section 24, changed PO clause 32 and added PO Clause 36, Clarified section 12 and added Form 1064 and instructions. Clarified Section 25 DMR/SDMR instructions. Added LPS 602 to Section 27

This Document has been approved by:
Jay Mankad, Director Quality
Verne Wepener, Director Procurement

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1 Introduction Section

- 1.1 This document contractually applies when referenced on Purchase Orders or contracts issued by Lycoming Engines.
- 1.2 Deviations to the Quality System requirements included herein must be approved by the Lycoming Engines Director of Quality. Requests for deviation shall be documented and submitted to Lycoming Engines Quality.
- 1.3 In the event that the purchase order or contract conflicts with the requirements of this document, the purchase order/contract requirement will supersede this document.
- 1.4 This document establishes Lycoming Engines quality system requirements for Suppliers that design, manufacture and control respective parts and assemblies as well as Suppliers who manufacture products and perform services in accordance with Lycoming's designs and requirements. These Lycoming Engines quality requirements apply to Manufacturers, Distributors, and Special Processors providing parts/services for Lycoming Engines when this document is specified by inclusion on Purchase Order(s) or contract(s) issued by Lycoming Engines.
- 1.5 All written and oral communications with the Supplier as well as the Supplier's specifications, procedures, and reports shall be in English.

2 Supplier Approval

- 2.1 Documented evidence of compliance to this document and successful completion of an on-site Lycoming Engines audit to evaluate a prospective Suppliers' documented quality system is required prior to production for all Manufacturers, Distributors, Special Processors, and Inspection Service Providers who supply engine parts or services that are part of the FAA-approved design.

3 Supplier Re-Approval

- 3.1 Supplier approval shall be re-evaluated at least every three years by Lycoming Engines Quality. Re-approval will be subject to Lycoming Engines Quality analysis regarding the Supplier's quality performance history and/or any significant changes in the Supplier's Quality system.
- 3.2 Changes in the Supplier's management, ownership, location/address, and/or quality system may require Lycoming Engines Quality re-approval. It is the responsibility of the Supplier to provide to Lycoming Engines a written statement of any of these changes. This notification shall be sent to Lycoming Engines Procurement with a copy provided to Lycoming Engines Quality. Upon receipt of this written notification, Lycoming Engines will determine what type of re-approval activities will be required.

4 Supplier Performance Monitoring

- 4.1 Lycoming Engines evaluates Supplier performance using a parts-per-million defective (PPM) calculation. $PPM = \text{Number of defective units} / \text{number of units received during a given time period} * 1,000,000$. Performance rates where PPM is less than 10,000 are deemed acceptable. Lycoming Engines may require formal Corrective Action from the supplier when the supplier's PPM exceeds 20,000. Nonconformances indicated on Supplier Discrepant Material Review (SDMR) form, submitted and approved prior to shipment or source inspection will not be included in PPM calculations.

5 Quality Systems Audit and Source Inspection Responsibility

- 5.1 Lycoming Engines is responsible for monitoring Supplier performance to ensure compliance to Quality System requirements. The Supplier is responsible for complying with Quality System requirements noted herein and for meeting Quality performance expectations. Failure to comply with Quality System requirements or to achieve a Quality performance level (PPM) less than 10,000 PPM may result in an on-site audit or additional source inspection oversight, as required, at the Supplier's expense. Lycoming Engines reserves the right to debit Supplier accounts to compensate for inspection or related activities that take place as a result of Lycoming Engines - directed inspections, including source inspections.

Quality System Requirements**6 Manufacturers**

- 6.1 Lycoming Engines requires documented evidence of compliance to the AS9100 Quality Management Systems Standard or equivalent international standard (i.e. EN9100) for all new Suppliers after January 2006. This documented evidence may be in the form of registration by an accredited registrar or by affidavit completed in conjunction with a second-party audit using the AS-9101 assessment or its international standard equivalent. Accredited registrars are those that are approved for registrations to the required aerospace standard and are listed in the International Aerospace Quality Group's (IAQG) OASIS database. Copies of AS-9100 and AS-9101 can be purchased from SAE international at www.sae.org.

7 Special Processors

- 7.1 Lycoming Engines is adopting the Nadcap accreditation process as part of its control methodology for all special process suppliers. Special process suppliers are those who perform any of the special processes listed below on a Lycoming Engines – design – controlled product when the design requires the process to be performed in accordance with an AMS, ASTM, Mil-Std specification or Designated Lycoming Engines Process Specification (LPS).

Special Processes
Non-destructive Inspection (RT, UT, PT and MT)
Chemical processing (plating and anodizing)
Materials testing laboratories (metals testing only)
Heat treating (normalizing, solution heat treating, nitriding, annealing, stress relieving, hardening and tempering, carburizing) and furnace brazing
Fusion welding and torch or induction brazing
Surface enhancement (shot peen)

- 7.2 All new special process providers [after January 2006](#) are required to be Nadcap accredited. Nadcap accredited special process Suppliers will receive preference for new contracts. In addition, special process Suppliers documented quality systems must comply with the Supplemental Quality Requirements outlined in this document.
- 7.3 It is the Supplier's responsibility to: [Submit current Nadcap accreditation certificates to Lycoming Engines Quality; Ensure that Lycoming Engines Quality is notified regarding any change of certification status; And utilize those sub-tier special process suppliers who have been approved by Lycoming Engines and are listed on the Lycoming maintained \(ASPSL\) "Approved Special Process Supplier List"](#).
- 7.4 It is the Supplier's responsibility to keep Lycoming informed as to which special process suppliers they are using and to notify Lycoming Engines in writing when they change from one special process supplier to another. Our database must be kept current to allow us to notify suppliers if issues arise with sub-tier special process suppliers.
- 7.5 Questions regarding special process approval should be directed to Lycoming Engines Quality.

8 Designated Lycoming Engines Process Specifications

- 8.1 Any Supplier contracted to perform to any of the Lycoming Engines Process Specifications (LPS) in Section 27 on Lycoming Engines articles, is required to obtain facilities qualification from Lycoming Engines Quality.

9 Pass Through Distributors

- 9.1 Pass Through Distributors are those Suppliers that procure parts, products or assemblies, and that sell these products to a customer without affecting product characteristics or conformity. Pass Through Distributors must employ a documented quality system that is compliant with the requirements outlined in AS9120 or equivalent international standard (EN9120) and the supplemental quality requirements included in this document.

SUPPLEMENTAL QUALITY REQUIREMENTS

10 General

- 10.1 The Supplier shall guarantee right of access to their facilities and quality related data to regulatory authorities, Lycoming customers, and Lycoming Engines. Access by Lycoming customers shall only be granted with sufficient prior notice to Lycoming Engines and with Lycoming Engines' concurrence. This right of access shall extend to include all sub-tier and raw material Suppliers
- 10.2 The supplier shall flow down to sub-tier suppliers all applicable requirements of this document or other purchase order requirements in the purchasing documents.

11 Quality Records

- 11.1 The Supplier shall establish and maintain a record system to retain quality records for a minimum of six years after product shipment.

- 11.2 Corrections to quality records must be recorded, dated and signed in ink or other permanent marking method with the original data being legible and retrievable after the change.

12 First Article Inspection

- 12.1 The Supplier shall perform a first article inspection (FAI) on a part from each first production lot shipment to verify conformance with all engineering characteristics. First article inspections performed by the Supplier shall be recorded on a First Article Conformance Report (FACR) that conforms to the minimum requirements of paragraph 12.2. The FACR shall be retained as a Quality Record at the Supplier's facility and a copy shall be submitted to Lycoming Engines along with the first lot shipment.

- 12.2 At a minimum, the following shall be included on the FACR:

- Drawing dimensions,
- Drawing notes,
- Functional test results,
- Title block requirements, (examples: Marking, hardness, finish, break sharp edges and corners .005 to .015 approx. radius, all specifications, weld filler, brazing materials, etc.)
- The device used to measure each key characteristic when required by PO
- A designation of Acceptance or Rejection

- 12.3 A copy of the Lycoming Engines drawing shall be provided with the drawing characteristics numbered corresponding to the Item Number on the FACR when drawing characteristics excluding notes and title block requirements exceed 25.

13 Conformity Requirements

- 13.1 Requirements for FAA conformity will be communicated through Lycoming Engines Purchase Orders or direct correspondence from Lycoming Engines.

14 Nonconforming Material Control

- 14.1 Lycoming Engines MRB disposition is required when product is found to depart from Purchase Order requirements and cannot be reworked without affecting form, fit, or function.

- 14.2 To obtain Lycoming Engines MRB disposition the Supplier shall initiate a Lycoming Engines SDMR (Form 1120) for articles under Lycoming Engines design control for product that is nonconforming.

- 14.3 Upon receipt of the dispositioned SDMR/DMR, the Supplier shall perform the following:

- 14.3.1 Rework/repair in accordance with instructions documented by Lycoming Engines MRB on the SDMR/DMR.

- 14.3.2 Inspect the reworked/repared articles in accordance with documented procedures. Document this inspection on the SDMR/DMR form.

- 14.3.3 Ship the acceptable articles and include a copy of the completed SDMR/ DMR Form. The applicable SDMR number(s) shall be referenced on the shipping/ certification documentation. Product shall be segregated when shipped and the package shall be marked with the SDMR/DMR number.

15 Latent Defect Reporting

- 15.1 In the event a condition is discovered that affects previously delivered product, Lycoming Engines shall be notified of the condition within 48 hours of discovery. Notification shall be in the form of letters addressed to the attention of Lycoming Engines Quality. These letters must include all pertinent information concerning the condition (i.e. part numbers, serial number, quantities, time frame, description of condition, etc.) and the corrective action taken to prevent recurrence.

16 Delivery Documentation

- 16.1 The Supplier shall provide delivery documentation denoting acceptance for each end-item delivered in accordance with the purchase order/contract. The contents shall include lists of all subcontracted special process suppliers, specification as applicable. This Certification of Conformance must be signed by responsible supplier personnel and shall include the signatory's title and the current date.

- 16.2 A Certificate of Conformance shall be submitted that includes at a minimum:
- Lycoming Engines Part Number
 - Lycoming Engines Part Name
 - Lycoming Engines Drawing Revision Letter
 - Quantity
 - Lycoming Engines Purchase Order and Release Number
 - Suppliers Name
 - Suppliers Address
 - Statement of conformance similar to that on Lycoming Engines Form 725

Where applicable the Certificate of Conformance shall also include:

- Cure Dates
 - Shelf Life
 - Heat Codes
 - Serial Numbers
 - Material or Alloy Specifications
 - Manufacturing Date Codes
 - Special Processes performed as defined in paragraph 7.2.
 - Applicable Special Process Specifications
 - Other information
- 16.3 Lycoming Engines Form 725 may be used for this purpose.

17 Priority Parts

- 17.1 Priority parts are those parts whose manufacturing process must be approved by Lycoming Engines and must then be frozen, with no changes, unless prior approval is obtained by Lycoming Engines (Reference Lycoming Engines' procedure EG-220, Establishing and Maintaining a Priority Parts Process. Copies of this procedure may be obtained from Quality Assurance or Procurement.).

18 Age Sensitive - Life Limited Parts

- 18.1 Parts shall be segregated by manufacturing lot / cure date when shipped to Lycoming Engines.
- 18.2 Each container shall be labeled with Part Number, Revision, Part Name, Quantity, Manufacturer Name, Manufacture Date Code, Lot or Batch number, Cure/Mix date and Expiration date.

19 Document Control

- 19.1 Document control procedures shall be established for Lycoming Engines drawings and specifications. These shall include procedures for periodic review of revision status on the Lycoming Engines internet website. Contact Lycoming Engines Purchasing for access to this website.

20 Software Quality Control

- 20.1 Non-deliverable Software Quality Control: The supplier shall provide for records and procedures which control configuration and accuracy of software used to manufacture, test, or inspect product. Software may include, but is not limited to, machine control data, CAD/CAM models, N/C tapes or other computer software. Records to be maintained include as a minimum: Test / Inspection data verifying accuracy of software. Revision Control. Appropriate software security.
- 20.2 Deliverable (airborne) Software Quality Control: In addition to requirements specified in paragraph 20.1, supplier shall utilize the current version of [RTCA](#) (Radio Technical Commission for Aeronautics) DO-178 "Software Consideration in Airborne Systems and Equipment Certification" or comparable as a guide during development, production, inspection and service of airborne software.

21 Control of Lycoming Engines Supplied Product and Tools

- 21.1 Product Control: When applicable, the supplier shall establish and maintain documented procedures to control verification, storage and maintenance of Lycoming Engine supplied product that is provided for incorporation into the suppliers product or for related activities. Any such product that is lost, damaged or is otherwise unsuitable for use shall be recorded and reported to Lycoming Engines.
- 21.2 Tool Control: The supplier is responsible for maintenance and repair of tooling unless otherwise specified by Lycoming Engines Purchasing. The supplier is also responsible for calibration and other actions necessary to assure accuracy and conformance of tooling. Lycoming Engines reserves the right to review Lycoming Engine owned tooling at supplier's facility for its condition.
- 21.2.1 Notification of Tooling Condition: The supplier shall advise, in writing, Lycoming Engines Purchasing and Quality Assurance in advance when the condition of tooling will not allow the production of a part in conformance with quality requirements. The supplier must advise Lycoming Engines Purchasing sufficiently in advance to be able to repair or procure new tooling and assure continuity of part supply without the need for deviation from specifications.

22 Direct Shipment of Lycoming Engines Product to Customers

22.1 Lycoming Engines does not authorize any suppliers to “Direct Ship” to customers. All shipments must be processed through Lycoming Engines Quality System.

23 Suppliers of NLC Parts or Services

23.1 Manufacturers or service providers, regardless of design control, that **only** supply components / services for Experimental Category engines (e.g. Thunderbolt or STC applications) are known as NLC (Non-Lycoming-Certificated engine) suppliers and subject to the following requirements.

23.2 In lieu of SQA 2000 Quality System Requirements, suppliers may be an FAA approved Production Approval Holder or have documented evidence of compliance to [any acceptable Quality Management Systems Standard as determined by the Director Quality at Lycoming Engines](#). NLC suppliers must have the following minimum requirements from AS9100 as part the their Quality System:

- Clause 4.2.2 Quality Manual
- Clause 7.1 Planning of Product Realization
- Clause 7.4.3 Verification of Purchased Product
- Clause 7.5.1 Control of Production and Service Provision
- Clause 8.3 Control of Nonconforming Product

23.3 [No](#) other SQA 2000 requirements apply.

23.4 Prior to the Supplier producing parts that will or could be included on any Lycoming FAA type-certificated engine, the supplier must comply with all SQA 2000 requirements.

24 Purchase order clauses

Clause
Number

Requirement

1 SUPPLIER QUALITY ASSURANCE REQUIREMENTS

The latest revision of SQA-2000 in effect on the date of this Purchase Order applies to this Purchase Order.

3 NON-LYCOMING ENGINES DRAWING REVISION REQUIREMENT

When the Part Number(s) in this PO are not Revision Controlled by Lycoming Engines, then the latest revision in effect on the date of this PO is required. All Certification(s) must include the part revision. Any exception to the latest revision must be Lycoming Engines MRB approved. See SQA-2000 for MRB approval process.

5 LYCOMING ENGINES PROCESS SPECIFICATIONS (LPS)

This PO is for performance of Lycoming Engines Process Specification(s) as listed. The latest Specification Revision(s) in effect on the date of this PO apply. Certification(s) must include Part Number(s), Specification(s) and revision(s) and any/all Drawing notes applicable to Process(es) performed.

6 CASTING/FORGING/SEMI-FINISH PART REQUIREMENTS

Parts on this PO are casting, forging, or partially finished (semi-finished). See Drawing Notes for processing which the Supplier is not responsible to perform. If semi-finished requirements are not specifically expressed in the Drawing Notes and/or in the language of this PO, contact the undersigned Buyer for a PO supplement, which is required to define "-SF" requirements prior to shipment.

7 CERTIFIED SUPPLIER PROGRAM REQUIREMENTS

The requirements of the Certified Supplier Program apply. This privilege may be canceled at any time by Lycoming Engines notification letter.

9 REJECTED PRODUCT

Product on this order was rejected for non-conformance(s) described on rejection document (Discrepant Material Report - DMR). Reference SQA 2000 paragraph 14 for requirements.

10 AIRCRAFT CARBURETOR QUALITY REQUIREMENTS

The latest revision of PO Clause 10 provided under separate cover to your Quality Department applies to this order.

11 AIRCRAFT FUEL INJECTOR QUALITY REQUIREMENTS

The latest revision of PO Clause 11 provided under separate cover to your Quality Department applies to this order.

14 BAR CODE REQUIREMENT

- Shipments on this order are required to have each container identified with Bar Coded Label(s), which must contain the following information at a minimum:
- Complete Part Number as shown in this PO, Lycoming Engines Purchase Order Number, Quantity of Parts in container, Lycoming Engines Supplier Code, Department Destination listed in PO
- Additionally, each labeled container must not have more than one part number enclosed.

15 AGE SENSITIVE PRODUCT LABELING

See paragraph 18, SQA 2000.

Clause

Number Requirement**16 WARRANTY REQUIREMENTS**

Product on this order was due to a Warranty Claim. The Warranty returned product was accompanied by a report of the discrepancy, Warranty Application and Return Material Form 916. Replacement parts must be to the latest Drawing revision. A report of your findings on the returned part(s) must be sent to the attention of the Warranty Administrator and to the attention of the QA Manager.

17 MATERIAL SAFETY DATA SHEETS & HAZARDOUS MATERIAL

Material Safety Data Sheets must accompany each shipment with a copy mailed to Attention of the Safety Department.

Hazardous materials must be properly labeled and identified per 29 CFR 1910.1200.

19 OVER-SHIPMENTS & UNDER-SHIPMENTS

All over & under shipments must be Buyer approved prior to shipment.

22 BAILMENT MATERIAL

The shipper number listed in this Purchase Order describes material(s) for use in completing this order.

24 DELIVERY RELEASE PER SCHEDULE

Shipments are to be made to the release schedule provided by Lycoming Engines.

31 EXPERIMENTAL PRE-PRODUCTION REQUIREMENTS: - Y PARTS

Any part procured for test and possible release for production shall be identified with a Y suffix on the part number. These parts are subject to all SQA 2000 requirements.

32 EXPERIMENTAL TEST PRODUCT REQUIREMENTS : F-XXXX-Y, N-XXXX-Y, AND T-XXXX-Y PARTS

- N-xxxxx-Y: For engineering development/conceptual design parts only, part numbers are assigned sequentially starting with number 10000, have prefix letter "N-" and suffix letter "-Y". Example N-00000-Y. Suppliers of N-xxxx-Y parts are NOT subject to SQA 2000 requirements and these parts cannot be converted or used on any production engine.
- F-xxxx-Y: For Experimental test only (primarily test fixtures), part numbers are assigned sequentially starting with number 5000, have the prefix letter "F" and suffix letter "Y". Example: F-0000_Y. Suppliers of F-xxxx-Y parts are NOT subject to SQA 2000 requirements and these parts cannot be used on any production engine.
- T-xxxx-Y: For Lycoming *Thunderbolt* Engines applications, **Experimental non-certified flight-worthy part**, part numbers are assigned sequentially starting with number 5000, and identified with prefix "T" and suffix "Y". Example: T-0000-Y. Suppliers of T-xxxx-Y parts are subject to SQA 2000 requirements for *Suppliers of NLC Parts and Services* and these NLC parts cannot be used on FAA type-certificated engines.

33 PRIORITY PART PRODUCT REQUIREMENTS APPLY

All or some of the product on this Purchase Order are subject to the requirements of Lycoming Engines Procedure EG-220. Copies of this procedure may be obtained from Lycoming Engines Quality Assurance or Procurement.

34 NLC SUPPLIER REQUIREMENTS APPLY

Requirements defined in paragraph 23 of SQA 2000 apply. These suppliers provide parts or services for Experimental Category engines (e.g. Thunderbolt) or STC applications only.

35 KEY CHARACTERISTICS APPLY

Key Characteristic control required.

36 COMMERCIAL TECHNOLOGY (CT) SUPPLIER

These suppliers provide CT parts only. Minimum supplier quality system requirements are: Quality Manual AS 9100 clause 4.2.2; Planning of Product Realization, AS 9100 clause 7.1; Verification of Purchased Product, AS 9100 clause 7.4.3.; Control of Production and Service Provision AS 9100 clause 7.5.1.; and Control of Nonconforming Material, AS 9100 clause 8.3. The supplier must provide an acceptable Certification of Conformance with all shipments, First Article Conformance Reports as requested, and allow Right of Access per paragraph 10.1 of this document. No other SQA 2000 requirements apply.

70 OVERHAULED PARTS

- “-70” suffix on a Lycoming Engines Purchase Order part number identifies the part being ordered as “OVERHAULED” (with time since overhaul as zero, TSO = 0) as defined by FAA CFR Title 14, part 43 including appendices.
- Certificate of Conformance must include a “-70” suffix on the part number.
- Maintenance Release Tags must clearly indicate “TSO = 0” or “OVERHAULED” (which means overhauled to TSO = 0) and be signed and dated including date overhauled unless same.
- If “OVERHAULED” product data plate is different color than NEW product data plate, insure that the proper color data plate is used.
- A PO supplement is required before new parts (Time Since New, TSN = 0) can be shipped against this PO.
- Maintenance Release Tags for “TESTED ONLY” or “REPAIRED” parts must clearly indicate “TSO = 0” or “TSN = 0”.
- Repaired parts with TSO or TSN greater than zero cannot be shipped against this PO.

85 REBUILT PARTS

- “-85” suffix on a Lycoming Engines Purchase Order part number identifies the part being ordered as “REBUILT” (with time since rebuild as zero, TT = 0) as defined by FAA CFR Title 14, part 43 including appendices.
- Data plates must include a “-85” suffix on the part number or “-85” must be permanently marked adjacent to the part marking.
- Certificate of Conformance must include a “-85” suffix on the part number.
- Maintenance Release Tags must clearly indicate “TT = 0” or “REBUILT” (which means rebuilt to TT = 0) and be signed and dated including the date rebuilt unless it is the same.
- If the “REBUILT” product data plate is a different color than the NEW product data plate, please insure that the proper color data plate is used.
- A PO supplement is required before new parts (Time Since New, TSN=0) can be shipped against this PO.
- Maintenance Release Tags for “TESTED ONLY” or “REPAIRED” parts must clearly indicate “TSR = 0” or “TSN = 0”.
- Repaired parts with TSR or TSN greater than zero cannot be shipped against this PO.

25 DMR/SDMR (Form 1120) instructions and exhibit

Block	Responsibility	Description
1.	Initiator	Page Number
2.	Initiator	Total Number of pages
3.	Printer	Pre-assigned and preprinted form serial number.
4.	Initiator	Enter the Part Number
5.	Initiator	Enter Part Name
6.	Initiator	Enter the Revision Letter.
7.	Initiator	Enter the Total Quantity of parts discrepant on DMR.
8.	Initiator	Enter the Quality vendor code as appropriate.
9.	Initiator	Enter the supplier name.
10.	Initiator	Enter the item number identifying each different requirement .
11.	Initiator	Serial number or match number or date code if identified on the part.
12.	Initiator	Enter PO Release Line (Receiving Inspection
13.	Initiator	Enter the Quantity of parts having this nonconformance.
14.	Initiator	Enter the visual, drawing or specification requirement including associated tolerance.
15.	Initiator	Enter the actual condition and location which deviates from the requirement.
16.	Lycoming Engines MRB/PRB Engineer	Enter the disposition Code
17.	Initiator/Inspector	Initiator/Inspector Signature and Date signed in appropriate block
18.	Appropriate Quality Supervision	Signature and date after review of document
19.	Lycoming Engines Engineer	Enter item Number of the nonconformance if required by disposition code.
20.	Lycoming Engines Engineer	Enter the specific repair/rework instructions and any comments if required by disposition code.
21.	Supplier Operator	Enter accept /reject quantity, and stamp, signature, or clock number of the person performing the work and date unless recorded on the rework / repair routing attached to the DMR.
22.	Supplier Inspector	Enter accept /reject quantity, and stamp, signature or clock number of the inspector performing the inspection and date unless recorded on the rework / repair routing attached to the DMR.
23.	Lycoming Engines MRB Engineer / MRB Quality Rep / PRB Engineer	Signature and date of MRB/PRB Engineer/Quality Rep completing blocks 16 and 20. When MRB Engineer signs, the MRB Quality Rep must sign. Disposition / Signatures and required work are required prior shipment of parts to Lycoming.
24.	Resp Person	Enter item number
25.	Resp Person	Enter the root cause and corrective action(s)
26.	Resp Person	Signature and date of person filling in blocks 24 and 25.

LYCOMING										Discrepant Material Report (DMR)			1 of 2	DMR # 3		
Part number 4		Part name 5			6	Last Op or Engine Serial #		7	C	Resp Dept or Resp Supplier Code 8	Supplier name 9					
Item #	Serial or Match # or date code	PO Rel & line or Lot / Job #	Item Quantity	Requirement (Drawing or Specification)				Actual			Disposition					
10	11	12	13	14				15			16					
Part number																
Item #	Serial or Match # or date code															
Initiating Dept		Initiator Signature and Date 17			Inspector Signature and Date		Lycoming or Supplier Quality Supervision and date 18		RTS Qty:	Scrap Ticket #:	Scrap Qty:					
Instructions / Comments: Lycoming use only										Rework / Repair Completed						
Item #	19				20				Operator	Inspector	Acc Qty	Rej Qty	Ident/ date	Acc Qty	Rej Qty	Ident/ date
21	22															
Initiating Dept																
Instructions		Lycoming MRB Engineer's Signature and Date 23			Lycoming MRB Quality Representative's Signature and Date 23			Lycoming PBR Engineer's Signature and Date 23			Return to Department:					
Item #	Corrective Action Statement or # required for Disposition 3 or 6 and SDMRs <input type="checkbox"/> Response not required															
24	25															
Lycoming MRB		Signature of person responsible 26			Corrective Action and Date		Charge#	Est. Hrs.	RMA #	S Number		VS Number				
Item #	Disposition codes and signature requirements:	MRB Signatures Required on Disposition:				Accept as is (1) Repair (6) -non standard may disposition (2) or (3) or standard (6)										
		Inspection supervisor signature may only disposition:				Obvious scrap (3) Sort or Re-inspect (9)										
		PRB Signatures Required on Disposition:				Rework (2) Standard Repair (6) may disposition (3)										
Signature of		Form No 1120 (Rev. 3/04)														
Note: Supplier to reference this DMR number on all invoices and copy with each shipment must be separate from any other lot of material. If entire nonconforming lot is not shipped as one lot, each lot must be kept separate and identified as above.		Date	Invoice #	Unit Price	Freight 1	Freight 2	Grand Total	Distributions	Ship to	Address	Ship Via	Approval	Return to Supplier Authorization- Returned for Nonconformances shown above	Replacement PO #		

26 Lycoming Engines Form 725 Exhibit

Certificate of Conformance

Part Number		Part Name		Revision
Quantity	Serial Number(s) (if applicable)			
Supplier Name		Address		
PO/Supplement #	Lycoming Engines Supplied Product? Yes _____ No _____	DMR Number if applicable, attach copy		
As required: Cure Date / Lot identification / Heat and/or Melt Code				
Special Process Supplier Name and address – specification Number and Revision or Copy of Appropriate Cert _____				
<p><i>This is to certify that the above identified item(s) conform in all respects including Physical and Chemical Tests, Special Processes, Functional and Inspection Tests as required per applicable type certification data as applied to Lycoming Engines Purchase Orders, specifications and drawings and that quality evidence (records) are on file within our facility subject to review at any reasonable time. These records will be maintained a minimum of six years from this date. We further certify that no changes have been incorporated into this/these units or product, which has not been authorized by Lycoming Engines.</i></p> <p><i>We also certify that all personnel, equipment and processes where and when required are properly qualified and/or certified in accordance with the latest applicable specifications and requirements and that any operations or processes performed outside our facility are adequately inspected and under our control at all times.</i></p> <p><i>This certification will accompany the product identified. The container shall be marked in accordance with SQA 2000. No other copies are required.</i></p>				
_____		_____		_____
Signature		Title		Date

27 LPS processes which require Lycoming Engines approval

LPS No.	Title
101	Copper Plating
102	Cadmium Plating
103	Tin Plating
108	Chromium Plating
112	Anodic Treatment of Aluminum and Aluminum Alloys – Chromic Acid Process
129	Protective Treatment – Application of Enamel Paint and Zinc Chromate Primer (Air Dry or Bake)
139	Immersion Tin Plating for Aluminum and Aluminum Alloys
144	Anodic Treatment of Aluminum and Aluminum Alloys Sulfuric Acid Process
355	Aluminum Painting – Elevated Temperature Application
356	Fusion Welding
357	Soldering Process, General Specification for
366	Nitriding of Aircraft Parts
378	Magnesium Alloys Chemical Treatment
453	Lead Plating
467	Processing of Carburized Parts
468	Heat Treatment of Steels
471	Impregnation – Aluminum and Magnesium Castings
476	Welding Rework of Lycoming Castings
479	Peening of Aluminum Castings
480	Peening of Magnesium Castings
481	Phosphate Coating for Steel Parts (Parko-Lubrizing)
482	Iron Phosphate Coating for Steel
483	Steel Forgings – General Requirements for
492	Aircraft Engine Cylinder Porous Channel Type Chrome Plating
496	Stress Relief and Straightening of Crankshafts
498	Black Oxide Treatment of Steel
543	Mechanical Cleaning, Pickling and Passivation, Process for Stainless Steels
544	Temper Etch
545	Procedure for Shot Peening Connecting Rod Bolts
547	Inspection – Magnetic Particle
550	Shot Peening
552	Electron Beam Welding Process and Requirements for Low Alloy Steel
557	Radiographic Inspection
561	Penetrant Inspection, Method of
566	Hot Isostatic Pressing Procedure for Aluminum Alloy Casting
574	Chemical Conversion Coatings on Aluminum Alloys
575	Resin Coating – Oil and Corrosion Resistant, Application Process for
588	Specification for Chromium Plating, Porous
591	Resistance Hot Upset Machine
592	Testing and Rejection Criteria for Crankshaft Material Fracture Surface Inspection Using Charpy Samples from Prolong
596	Process Requirements for Crankshaft Forgings
597	Induction Forge Heater Control
599	Process Requirements for Cylinder Head Castings
602	Process Requirements for Piston Forgings

28 Form 1064 – First Article Conformance Report (RFCA)

28.1 Scope

28.1.1 Applicable to all parts supplied to Lycoming whether purchased directly or indirectly through an intermediate supplier, when SQA 2000 is applicable.

28.2 Applicable Documents

28.2.1 Supplier Quality Assurance 2000

28.3 Supplier Reporting Requirements

28.3.1 FACR(s) are to ensure evaluation and conformity to all Lycoming purchase order and Lycoming drawing requirements. Therefore FACR(s) must include the following:

28.3.2 A copy of a Lycoming print with the print requirements numbered corresponding to the item numbers on the FACR when the drawing contains in excess of 25 characteristics excluding title block and note requirements.

28.3.3 All Lycoming print notes, specifications, characteristics and dimensions must be accounted for (measurable characteristics and dimensions must include the applicable tolerance.)

28.3.4 All Lycoming print title block requirements must be accounted for (examples: Marking, hardness, finish, break sharp edges and corners .005 to .015 approx. radius, all specifications, weld filler, brazing materials, etc.)

28.3.5 Copies of raw material certifications and copies of certifications from suppliers who perform sub-tier special processes and NDT for you in addition to accounting for these raw materials, special processes and NDT (whether any/all are in-house or sub-tier) on Form 1064.

28.3.6 Parts with nonconformances to Lycoming requirements may not ship unless submitted and Lycoming approved on a DMR (Form 1120) and noted on the FACR when applicable.

28.3.7 The FACR is mandatory on the initial shipment of hardware and thereafter as required by, SQA-2000. Lycoming may direct additional FACR's on a periodic basis; and a partial or full FACR may be required if there is a characteristic or requirement change.

28.3.7.1 If FACRs are required for "tab drawing" parts or parts that are significantly similar, and a fully documented FACR has been submitted, a delta FACR for subsequent part numbers may reference the initial FACR and denote only those items that are different.

28.3.7.2 When requested by the QE, a delta FACR for drawing revision changes will be submitted.

28.4 Supplier Responsibilities

28.4.1 Suppliers are responsible for:

28.4.2 Performing a first article inspection in accordance with this instruction.

28.4.3 Preparing, authenticating and transmitting the FACR and supporting documentation per the instruction contained herein.

28.4.4 Maintaining a copy of the FACR on file including all supporting documentation, and certifications.

28.5 Preparing The FACR

28.5.1 Complete the FACR (Form 1064) as described below.

Block	Description
1	PART NUMBER - Enter the Lycoming part number.
2	REVISION - Enter the Lycoming drawing revision.
3	PART NAME - Enter the Lycoming part name as it appears on the drawing.
4	SUPPLIER NAME AND ADDRESS - Enter the name and address of the facility producing the item.
5	SUPPLIER CODE - Enter the Lycoming Quality assigned supplier code of the facility producing the item.
6	ITEM NO. - Enter the sequential number (1 through 9999) you have assigned to each and every requirement/characteristic. Where appropriate, show this number on supporting data and paperwork, e.g. drawings (when drawing characteristics greater than 25), specifications, or purchase orders; to identify the source of the characteristics/ requirement.
7	REQUIREMENT/CHARACTERISTIC – Enter requirement/note/dimension/characteristic as defined in paragraph 1 of this instruction.
8	B/P ZONE - Enter the Lycoming print drawing zone. If not applicable, enter N/A.
9	FIRST ARTICLE RESULTS - Enter actual variable measurement or range for variable characteristics. For attributes, indicate compliance with the attribute (for example, if requirement is "mark per AS478-15A1", an acceptable result would be "laser marked per AS478-15A1".) When a characteristic is inspected by a gage or fixture and it is impractical to obtain an actual measurement, the calibrated gage or fixture number shall be recorded. A characteristic inaccessible at final inspection may receive first article inspection at an in-process location where it is accessible, in lieu of disassembly/ destruction. Where characteristics of components or assemblies are covered under supplier designed control and not delineated on Lycoming drawings a first article inspection, similar to that described above, should be conducted by the supplier and records maintained. The word "conforms" or similar non-specific entries are unacceptable when a more specific reference to paragraphs, test parameters, and dimensions can be made.
10	ACC / DMR - Enter Acc (Accept) or DMR # as applicable. Enter the DMR Number used when requesting Lycoming MRB Approval.
* 11	PROCESS/MACHINE Indicate process/machine creating the final result (not how item was measured), e.g. "Sub-tier name", "CNC machine #". If result is produced by a sub-tier supplier, enter the supplier's name. Method used to measure the final result shall be recorded here for key characteristics when called out on the Purchase Order.
* 12	PROCESS TOLERANCE/CAPABILITY – Indicate parameters/range within which the process will be maintained. Circle entry in red, if its process capability exceeds the stated requirement/characteristic and associated tolerances.
* 13	Measurement Method – Indicate level of in-process control (how the process will be monitored for compliance) including appropriate inspection/test levels, e.g. "X Bar, R Charts, 5 pcs/hr".
14	FINAL INSP LEVEL - Indicate the level/frequency to which conformance to the requirement/ characteristic will be monitored prior to shipment.
15	Enter the Signature of the person reviewing this FACR and the Date the FACR was completed. This needs to be entered only on page 1 of the FACR.

* Only when specifically required by Lycoming QA or Purchase Order

