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**Document Overview**

This document applies to GE Aviation Systems LLC in Whippany, New Jersey, hereafter referred to as GE Aviation. It establishes quality requirements for the GE Aviation suppliers that provide inventory products, special processes, calibration services, acceptance test equipment and repair station maintenance services. The SQAR is invoked as a Purchase Order (PO) requirement. In the event of conflicting requirements, the PO takes precedence. See the last page for a summary of changes for this revision.

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**1.0 Supplier Approval**

Supplier approval and reassessment is based on review of a supplier’s capability, performance and quality management system. The review and reassessment will involve a supplier questionnaire and, where applicable, on-site visits by GE Aviation. The frequency of visits will depend on the supplier’s status (e.g., Approved, Certified), quality performance, specific product quality issues and QMS certification (e.g., AS9100, ISO 9001).

**2.0 Quality Management System (QMS) Requirements**

GE AVIATION REQUIRES ITS SUPPLIERS TO MAINTAIN A FORMAL QMS COMPLIANT OR REGISTERED TO ONE OF THE FOLLOWING STANDARDS, BASED ON THEIR BUSINESS AND TYPE OF PRODUCT OR SERVICE:

- 2.1 AS9100
- 2.2 ISO 9001
- 2.3 AS9003 (FOR SMALL BUILD/MACHINE TO PRINT ORGANIZATIONS),
- 2.4 AS9120 (FOR DISTRIBUTORS),
- 2.5 FAA REPAIR STATION CERTIFICATE (FOR OUTSOURCED MAINTENANCE PROVIDERS (OMP’S)
- 2.6 NADCAP (FOR SPECIAL PROCESSES)



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- 2.7 When required by our customer contract, GE Aviation will only use suppliers that are certified to AS9100 or ISO 9001 by a recognized RAB agency and will require that those suppliers only use subcontractors meeting this same requirement.
- 2.8 All suppliers shall control documentation and data received from GE Aviation.

### 3.0 Calibration System Requirements

GE AVIATION REQUIRES ITS SUPPLIER TO HAVE A CALIBRATION SYSTEM THAT IS COMPLIANT, AT A MINIMUM, TO ONE OF THE FOLLOWING:

- 3.1 ANSI/NCSL Z-540 (preferred).
- 3.2 ISO 10012.
- 3.3 **GE Aviation-owned Measuring and Test Equipment:** GE Aviation will not recall or monitor the cal status of equipment it loans outside its QMS. When GE Aviation loans equipment to the supplier, the supplier is responsible for (1) entering the equipment in its own calibration recall system, (2) ensuring the equipment is calibrated when using it for product acceptance and (3) covering any costs associated with recalibration. If the supplier opts to have GE Aviation calibrate the equipment, it shall contact the buyer to coordinate the required calibration activities with QA. The supplier is responsible for the cost of calibration, shipping and any repairs related to its neglect of the equipment.

### 4.0 Supplier Status

Every inventory supplier is given a status designation based on the following factors: experience with GE Aviation, quality performance, product or process type, quality management system and supplier type (e.g. manufacturer, distributor). Supplier status is evaluated when awarding new business.

**Unapproved Suppliers** – a status that identifies new or re-qualifying suppliers which have not been evaluated & dispositioned as approved suppliers through the qualification process.

**Approved Suppliers** – a status that identifies suppliers based on capability, complaint quality system, and product quality that may furnish parts or services used in current production.

- ‘Receipts’ Status – an ERP designation for an approved supplier which dictates the frequency requirement for incoming inspection by number of receipts.
- ‘Certified’ Status – an ERP designation for an approved supplier which has no incoming inspection requirements.

**Disapproved Suppliers** – a status that identifies suppliers whose services or products have been discontinued for any of the following:

- (1) Performance that violates contractual agreement or technical requirements
- (2) Failure to respond to delivery requirements
- (3) Persistent poor quality performance.
- (4) Failure to respond to CARs resulting from audit or product discrepancies
- (5) Changes to their capabilities since their original approval was granted
- (6) Insufficient usage as noted in the audit module

NOTE: Where poor quality performance or failure to respond to CARs is determined, QA will recommend supplier removal.



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## 5.0 Inspection

The supplier shall have inspection plans that show the sample size, methods of inspection, descriptions of the attributes inspected and provisions for inspection results. The supplier shall use ANSI/ASQC- Z1.4 (corresponds to MIL-STD-105) when a sampling plan is used, but shall functionally test and final inspect 100% of serialized assemblies (e.g., motors, electronic assemblies, transducers).

- 5.1 **Performance Sensitive Parameter:** The supplier shall perform 100% inspection and record actual values for characteristics noted on the engineering drawing as *Performance Sensitive Parameters*.
- 5.2 **Key Characteristic (KC):** The identification of and requirements for a KC will be specified on the PO.
- 5.3 **Critical Safety Item (CSI):** A CSI, sometimes referred as a Flight Safety Part, is any part, assembly, or installation containing a critical characteristic whose failure, malfunction, or absence could cause loss of or serious damage to the aircraft, and/or serious injury or death to the occupants. The engineering drawing and associated technical data will clearly identify that the item is CSI and will identify the critical characteristics, critical processes, and inspections and other quality assurance requirements.

The supplier and its sub-tier(s) that perform work on a CSI shall comply with QE-STD-1 Rev D (Oct 1 1996) pertaining to manufacturing planning, audits, critical characteristics, records, certification of personnel, tolerance of measuring and test equipment and serialization. GE Aviation and the U.S. Army Aviation and Missile Command (AMCOM) may opt to perform on-site audits of the supplier and applicable sub-tier(s) prior to issuance of a PO, and periodically thereafter, to verify their compliance with the drawings, manufacturing planning and QE-STD-1.

## 6.0 First Article Inspection (FAI)

FAI per AS9102 Rev A is required on hardware from the 1st qualification or production run of all new products. The supplier, including those that are certified, shall include the FAI report with the product shipment.

- 6.1 **Exceptions and Additional Requirements:** FAI is not required for deliverable software or COTS products (e.g., standard fasteners, shims, bearings, electronic piece parts, paints, adhesives). Additional FAI requirements for PCBs are explained in paragraph 11.8.4.
- 6.2 **Build-to-Print Assemblies:** The completed FAI report shall include FAIs for the assembly, subassemblies, and detail parts, the functional test results, if applicable, and verification of assembly and test operations and tooling, which is not required with product shipment, but should be maintained as a quality record.
- 6.3 **Products Made to a GE Aviation Source/Specification Control Drawing (SCD):** The FAI shall address all SCD requirements and include the same constituent FAIs defined for build-to-print assemblies. The supplier shall maintain the constituent FAIs at its facility as quality records.
- 6.4 **Delta FAI:** A full or partial FAI shall be performed for affected characteristics, for the following events:
  - 6.4.1 Change in the design affecting fit, form or function of the part.
  - 6.4.2 Change in manufacturing source, location, process, inspection method, tooling or materials that can potentially affect fit, form or function.
  - 6.4.3 Change in numerical control program or translation to another media that can potentially affect fit, form or function.
  - 6.4.4 Natural or man-made event that may adversely affect the manufacturing process.



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Supplier Quality Assurance  
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**6.4.5** Lapse in production of two years or as specified by the customer. For the Lockheed Martin HIMARS program (PO prefix **"HM"**) a one-year lapse in production applies.



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## 7.0 GE Aviation Purchasing Information

The supplier shall review all PO requirements, including the Quality Assurance Clauses in the Addendum, and resolve any issues prior to accepting the order. As part of the review, the supplier shall assess its capability, capacity and resources to meet all GE Aviation requirements.

- 7.1** The supplier shall work through the GE Aviation buyer to resolve issues or questions relating to technical, contractual or quality requirements, and performance ratings. **Verbal agreements or instructions shall under no circumstances be construed as approval or authorization to proceed.**
- 7.2** The supplier shall not ship product until it has a signed copy of the GE Aviation purchase order. Note: Signed copies sent by fax are only acceptable in emergency situations; they shall be annotated with "OK to ship on faxed copy," and signed and dated by a GE Aviation Quality Assurance (QA) representative. The GE Aviation buyer will promptly forward the original to the supplier.
- 7.3** **Drawing Revisions:** The supplier must ensure they are working to the drawing revision shown on the PO. Out of date drawings, specs and procedures in its possession shall be removed from points of use.
- 7.4** **GE Aviation Drawings, Specifications and Procedures:** GE Aviation' Engineering Specifications (S Spec) and Manufacturing Engineering Procedures (MEPs) are considered requirements when referenced on our drawings or in the SQAR.
- 7.4.1** Copies of drawings, S Specs and MEPs are available through your buyer.
- 7.4.2** Revisions of S Specs, MEPs and GE Aviation drawings called out in the PO package should be verified through your buyer prior to commencing work.
- 7.5** **Part Revisions:** The part rev on the PO shall match the part rev on the drawing; otherwise the supplier shall hold the parts and notify the buyer for resolution.
- 7.5.1** **Note:** Occasionally the PO revision includes a dash number (e.g., 1-2, 2-2, A-3, B-4). Except for castings, the first alphanumeric character is the part rev, and the dash # is GE Aviation's internal router rev, which should be **excluded** from the shipping document. For a casting, the dash number is a component of the part revision and should be **included** on the shipping document. As a general guideline, the part revision is the same as the drawing revision shown in the upper right corner of most drawings. On tabulated drawings, a part rev is usually shown for each P/N.
- 7.6** **Build-to-Print Assemblies:** The GE Aviation buyer is required to include the latest drawings for all constituent subassemblies and detail parts with the PO.
- 7.7** **Government Purchase Orders (PO):** The Government flow-downs in C64 Terms and Condition of Purchase on the *Doing Business with Systems* website <http://www.geaviationsystems.com/contact/doing-business/> apply to government or military orders. **Note:** Suppliers should be especially thorough in reviewing, understanding and ensuring compliance with the following Federal Acquisition Regulation (FAR) and DOD Federal Acquisition Regulation Supplements (DFARS) - these can have significant financial, legal and product impact to companies in the supply chain:
- FAR 52.211-5 *Material Requirements* – This clause puts restrictions on the use of the following in the performance of Part 15 US Government contracts:
    - Used supplies,
    - Reconditioned supplies,
    - Remanufactured supplies,
    - Unused former Government surplus property.
  - DFARS 252.225-7014 *Preference for Domestic Specialty Metals (With ALT I)*,



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- DFARS 252.225-7016 *Restriction on Acquisition of Ball and Roller Bearings.*

- 7.7.1** Government POs will be noted, ***“This is a rated order for national defense use. SQAR requirements for Government orders apply herein.”*** The POs will call out a government sales order number, priority rating and contract number, which must be flowed down to all subcontractors. For multiple orders or multi-year purchases, the PO will call out “Various DOA2.” Current programs to which government requirements apply and their PO number prefixes include BAE APKWS (“**APK**”), Northrop Grumman Fire Scout (“**FS**”) and Global Hawk (“**GH**”), Lockheed Martin HIMARS (“**HM**”) and ILMs (“**LM**”), McDonnell Douglas (“**MD**”), Composite Engineering Inc. (CEI) Skeeter (“**SK**”) and Sikorsky SH60 (“**SR**”).
- 7.7.2** POs prefixed with “**GS**” are for government spares and will be noted, ***“This is a Government spares order. SQAR requirements for government spares apply herein.”*** For these orders suppliers, including those that are certified, shall include all certifications with the product.

## **7.8 European Aviation Safety Agency (EASA) Orders**

- 7.8.1** These POs will be noted, ***“This order invokes European Aviation Safety Agency (EASA) requirements, which are identified in the SQAR.”*** Currently, the only program to which the EASA requirements apply is the Airbus A380 Landing Gear Extension Retraction System (LGERS). PO numbers for A380 LGERS orders will be prefixed with “**LG**,” or for blanket orders, “**BLG**.”
- 7.8.2** **For EASA orders, the supplier must use subcontractors approved by GE Aviation specifically for EASA work.** This excludes POs for raw material and commercial off-the-shelf (COTS) products (see paragraph 6.1). GE Aviation-approved EASA subcontractors and special processors will be listed under the category “EASA WORK” in the GE Aviation Approved Special Processor Listing on <http://geaviationsystems.com/services/approvals/>. The supplier can use the SRMR form (paragraph 13.3) to request the addition of a new EASA subcontractor.
- 7.8.3** See the SQAR paragraphs on *Material Review Procedure, Mandatory Occurrence Reporting and Control of Records* for other EASA requirements that apply to these orders.

- 7.9 ILS Orders:** These purchase orders will be noted, ***“This is an ILS order.”*** Drawings are not supplied with these orders.

- 7.10 Authority Approval Requirements:** GE Aviation will specify on the PO when specific Authority approvals, such as an FAA 8130-3 Airworthiness Approval Tag or EASA Form 1 Authorized Release Certificate, are required with the product.

## **8.0 Supplier’s Purchase Orders**

- 8.1** POs on lower tier suppliers shall clearly describe the product ordered and shall be reviewed and approved for adequacy prior to release.
- 8.2** POs for subcontracted design work must invoke (1) the supplier’s procurement design spec / SCD, where applicable, and (2) quality requirements from the GE Aviation PO that apply to the subcontracted work, including the latest specs.

## **9.0 Material Substitutions**

GE Aviation spec S106, “Preferred Material Standard,” allows material substitutions without a waiver and is referenced in S134, “Standard Machining Practice.” These substitutions are only allowed when the drawing references S134.



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## 10.0 Part Marking and Traceability

Applicable part marking requirements are based on criteria in MIL-STD-130.

- 10.1 All material shall be identified either by bag and tag (smaller parts) or by individual permanent ink stamping (larger parts).
- 10.2 The marking shall include part number, part revision and supplier identification.
- 10.3 **Certified Suppliers** shall also assign a lot number to each shipment and include it on the C of C and the part marking. The lot number shall provide traceability to the supplier's and/or its subcontractor's quality records for the shipped parts.
- 10.4 **Electronic and Printed Circuit Board (PCB) Assemblies:** Unless otherwise specified on the drawing, PCBs shall be serialized per MEP 154, *"Assignment of Serial Numbers to Printed Wiring Board Assemblies and Electronic Module Assemblies."*
- 10.5 Suppliers shall maintain records such that all parts are traceable to the raw material and manufacturing history.

## 11.0 Product Specific Requirements

- 11.1 **Bearings:** The requirements below apply to all ball and roller bearings.
  - 11.1.1 **ABEC Rating:** When an ABEC rating is specified on a drawing, the supplier can provide a bearing with a higher ABEC rating. When a drawing specifies both tolerance limits and an ABEC rating, the tolerance limits take precedence over the ABEC rating, which becomes a reference callout only.
  - 11.1.2 **Lubrication Life:** Bearing lubrication shelf life is five years. Bearings shall have at least 50% of shelf life left from date of shipment. Each container must specify lubrication date. When distributors subcontract re-lubrication, they shall include a lube cert as specified below.
  - 11.1.3 **Certification of Lubrication (Lube Cert.)** is required on all bearings that contain lubricants. They can either be a separate document or part of the C of C, but shall include the following information:
    - 11.1.3.1 **Date** the lubricant was introduced to the bearing.
    - 11.1.3.2 **Lubricant Type.**
    - 11.1.3.3 **Percentage of Fill.**
  - 11.1.4 **Country of Origin:** Bearing suppliers shall identify country of origin on the cert. Bearings shall not be identified as US-made unless they are entirely manufactured in the US, including the fabrication of its components. Distributor shall provide a certificate of compliance with each shipment as a precondition of invoice payment. The C of C shall identify the materials supplied and include the PO #, part number, drawing revision & quantity. All components/parts, etc., must be of new origin. Distributors and warehouses shall assure traceability and flow down of requirements on all purchased products to the source of manufacture and their related acceptance documents. The actual source of all material shall be identified. Serialized parts shall be identified by a serial number, and lot controlled items shall be identified by a lot number. The C of C shall be signed and dated by the Manager/Director of Quality or Designee. Signing of this document acknowledges that the supplier has met all GE Aviation Whippany contractual, design data and other associated requirements for the bearings.



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- 11.2 Parts Made from Castings:** GE Aviation should provide the following PO information.
- 11.2.1** The PO shall state if GE Aviation is supplying the casting and whether the casting drawing is included with the PO or at the supplier's facility.
  - 11.2.2** When the supplier is required to buy the casting, GE Aviation shall include the casting ("C") drawing to the latest revision.
  - 11.2.3** If the engineering drawing is a composite (casting & machining), GE Aviation shall include a separate casting ("C") drawing having the same revision as the composite drawing.
- 11.3 Castings:**
- 11.3.1 Casting Layout:** To ensure that a casting will conform to specification and allow for required machining operations, the supplier shall supply with the shipment either a CMM report acknowledging all blueprint characteristics or a "blued and scribed" representative piece when any of the following events occur:
    - 11.3.1.1** A drawing revision affects the casting or machining dimensions.
    - 11.3.1.2** The casting is produced by a supplier for the first time.
    - 11.3.1.3** The pattern is repaired or replaced.
  - 11.3.2** The piece shall utilize starting points (if any) shown on the drawing and location holes, bores and other features that are to be machined in later.
  - 11.3.3 Casting Repairs:** Weld repair of castings for any reason is **not** permitted unless allowed in the specification for a particular GE Aviation part number.
- 11.4 Limited Shelf-Life Materials (e.g. adhesives, epoxies):** Supplier shall include the manufacturer's shelf life expiration date on the C of C. Distributors shall not advance or modify the manufacturer's expiration date on the C-of-C. Certified Suppliers shall label container with the manufacturer's expiration date.
- 11.4.1** When supplied directly to GE Aviation, the product shall have at least 75% of shelf life left from the date of shipment.
  - 11.4.2** When supplied to GE Aviation through its Vendor Managed Inventory (VMI) service provider, the shelf life shall meet the VMI provider's PO requirements. The VMI provider can re-certify product.
- 11.5 Wire:** Each spool of wire must be marked as follows:
- 11.5.1 Lead Wire:** Mil-Spec number, GE Aviation part number and description.
  - 11.5.2 Magnet Wire:** Mil-Spec number, description and net weight.
- 11.6 Tooling, Fixtures and Test Equipment** will be inspected or validated, as required, at GE Aviation regardless of supplier status. Unless otherwise specified in the PO, the supplier shall support test equipment validation and implement any changes deemed necessary to correct deficiencies identified during the validation.
- 11.7 Gaskets, Seals and O-Rings:** The product shall have at least 50% shelf life left from the date of shipment. Each item shall be individually packaged to prevent damage, contamination and tangling and the packaging shall show the manufacturer's part number and either the expiration or cure date. The supplier shall also abide by any packaging or marking requirements called out on the drawing.
- 11.8 Printed Card Board (PCB) Assemblies:** See paragraph 10.4 for serialization requirements and paragraph 14.4.1 for functional test data requirements for PCB and electronic module assemblies.





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- 11.8.1 Printed Circuit Boards:** PCB shall meet all requirements on the PO and drawing, and shall be fabricated per IPC-6011, 6012 and/or 6013, of a Type and Performance Class specified on the drawing. The board, it's testing and test samples must meet all requirements of IPC-A-600, Class 2 or 3, as appropriate.
- 11.8.2 Solder Mask:** There shall be no solder mask in any board holes unless specified on the PCB fabrication drawing.
- 11.8.3 Modification of Gerber Files:** GE Aviation approval by SRMR is required for (1) any change to PCB Gerber files or (2) removal of via pad solder mask for In Circuit Test (ICT) optimization.
- 11.8.4 Additional FAI Requirements:** Unless otherwise specified, test coupons/micro-sections, solderability samples, micro-section lab reports and electrical test and inspection reports shall accompany the FAI report and be kept on file for subsequent lots. **Note:** The supplier is responsible for ensuring that each electronic component is compliant to the current Material Declaration shown on the GE Aviation bill of material for that component. If the supplier cannot obtain a component, it shall submit an SRMR.
- 11.8.5 Additional Shipping Documents:** The supplier shall provide GE Aviation the following data for each lot of PCBs.
  - 11.8.5.1** Electrical test failure print outs with specific defects (i.e. internal or external opens or shorts);
  - 11.8.5.2** Photo image of one randomly selected, unstressed micro-section and one thermally stressed (TS) micro-section for each date code lot. Micro-sections shall be fabricated from the IPC-2221 AB coupons that utilize the smallest plated hole and associated pad. The actual micro-sections shall be retained by the supplier.

## 12.0 Special Processes

- 12.1 GE Aviation Approved Special Processor List (ASPL):** Suppliers are required to use Special Processors from GE Aviation ASPL found at: <http://geaviationsystems.com/services/approvals/>. The ASPL is subject to change – please check the list before proceeding.
- 12.2 Our Customer's ASPL** shall be used when invoked on the GE Aviation PO.
  - 12.2.1 Northrop Grumman (NG) Build-to-Print Programs:** When the NG drawing cites a process specification that also appears on the NG ASPL, the supplier shall ensure its processing source is listed on the NG ASPL for that process specification. The NG ASPL can be accessed at <https://oasisext.myngc.com/sympreg/aspl/aspl.asp>. The process spec revision in effect at the time of PO release shall apply. Current Northrop Grumman programs to which this requirement applies and their PO number prefixes are Fire Scout ("FS") and Global Hawk ("GH").
- 12.3 Exceptions:** The following types of products do not require use of GE Aviation' or its customers' ASPLs:
  - 12.3.1** Catalog items.
  - 12.3.2** Items purchased to AN, MS or NAS specifications.
  - 12.3.3** Nameplates.
  - 12.3.4** Bearings.
  - 12.3.5** Proprietary items built to GE Aviation SCD, except where the SCD calls out a special process.



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- 12.4 Heat Treat Samples:** When gears, shafts or other steel parts require case hardening or nitriding, the supplier shall send a heat treat sample with the shipment. Exception: Certified suppliers shall retain the sample at their facility.
- 12.5 Black Oxide:** Parts requiring black oxide that are hardened shall be subjected to hydrogen embrittlement relief.
- 12.5.1** Black oxide shall be performed per drawing requirement for all government spares (“GS”) orders.
- 12.5.2** TD79 shall be followed for non-government orders where black oxide is specified on the drawing.
- 13.0 Non-Conformance Control and Material Review**
- 13.1 Nonconforming Material** must be identified, documented, segregated (where practical), evaluated and dispositioned to prevent its unintended release or use.
- 13.2 Material Review Procedure:** Suppliers must review the drawings and specifications and resolve all issues prior to accepting the purchase order.
- 13.2.1 Preliminary Material Review Authority:** Unless otherwise specified, the supplier’s authority for disposition of non-conformances is limited to rework, return-to-supplier and scrap, as follows:
- 13.2.1.1 Rework:** Restore product back to drawing or spec compliance.
- 13.2.1.2 Return-to-Supplier:** Return discrepant subcontractor product for subsequent rework or replacement.
- 13.2.1.3 Scrap:** Permanent removal and destruction of product found to be unfit for use. Scrap product shall be physically mutilated such that it is unusable for its originally intended use and cannot be reworked to provide the appearance of being serviceable.
- 13.2.2 Material Review Authority:** Except for EASA work, suppliers that produce product of proprietary design or to a GE Aviation specification can perform dispositions of use-as-is and repair, as long as there is no affect on any GE Aviation requirement. Any use-as-is or repair disposition that affects a GE Aviation drawing, specification or PO requirement shall be submitted to GE Aviation on an SRMR form as described in paragraph 13.3.
- 13.2.2.1 For EASA work,** no supplier has material review authority; all use-as-is and repair dispositions, including those that don’t affect a GE Aviation requirement, must be submitted to GE Aviation for approval.
- 13.3 Supplier Request for Material Review (SRMR)** form is available on our website. The supplier should complete it electronically and email it as instructed on the form.
- 13.3.1** The supplier shall not ship discrepant material unless approved by GE Aviation on an SRMR. The supplier shall include the SRMR number on the C of C and a copy of the approved SRMR with the shipment. Certified Suppliers are not required to send the SRMR with the shipment.
- 13.3.2** The supplier shall adhere to quantity limits specified for use-as-is or repair dispositions. Parts shipped in excess of these quantities will be rejected and returned, and the rejection charged against the supplier’s rating.
- 13.3.3** Waiver and deviation requests and approvals that are verbally communicated, sent as written notes, emails, marked drawings or forms other than an SRMR, are not official and will result in avoidable rejections, waste and a decline in the supplier’s quality rating.



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**13.3.4 Exception:** Parts being made for engineering development models that have no potential for acceptance testing, qualification testing or shipment to GE Aviation's customers typically require rapid design alterations and therefore are sometimes exempt from the formal waiver process. GE Aviation will indicate this exemption on the PO when it applies.

**13.4 Reporting of Failures, Malfunctions & Defects:** The FAA, foreign Civil Aviation Authorities (e.g. EASA), U.S. Government Procurement Contracting Officers (PCO), GE Aviation and its customers require notification of any: (1) defect of a hazardous or potentially hazardous nature that endangers, or if not corrected, would endanger the aircraft, its occupants or any other person or property; (2) nonconformity that affects form, fit, function, reliability or safety in a product already delivered. If the supplier determines that it has shipped a product with such a defect, it shall immediately send GE Aviation QA a notification that includes the defect description, item identification (i.e., part, serial, lot number); quantities delivered and related corrective action. Telephone reports must be followed up in writing.

#### 14.0 Shipping Documentation

The supplier shall submit with each shipment the following: (1) a certificate of conformance stating that the items furnished to GE Aviation are in conformance to the purchase order and design data requirements applicable to the items being delivered, and (2) a copy of the manufacturer's C of C. Any recognized aerospace, military and/or industry standard, when imposed by the drawing, specification or purchase order, must be specifically stated and form a part of the certification. Process certifications are required for all suppliers performing special processing and shall state that the process has been performed to the drawing requirements.

Parts without correct documentation are subject to rejection. All certifications must show the part number, quantity, process being performed, specifications, revision number, the certifying signature and a legibly printed name and title of the person signing the certification. The supplier shall notify GE Aviation prior to shipment if a specification has been replaced, suspended or updated. The supplier shall list the specification as shown on the drawing and the replacement specs with their current revision.

For distributors and warehouses, these requirements apply without exception, and include traceability and flow down of requirements on all purchased products to the sources of manufacture and their related acceptance documents. In addition, material from different manufacturing sources shall be stored in a manner such that the material does not become intermixed and the manufacturing source and material identity is maintained at all times.

**14.1 Certificates of Compliance (C of C):** C of Cs are required on all shipments and shall include the following:

**14.1.1** Supplier's name, address.

**14.1.2** Date of shipment.

**14.1.3** GE Aviation PO number.

**14.1.4** Part number, revision and nomenclature listed on the PO. (If the PO lists both the supplier's and GE Aviation' part numbers, list the GE Aviation number.)

**14.1.5** Quantity

**14.1.6** Signature and title of the certifying person or authorized representative.

**14.1.7** Statement of conformance to the PO-invoked specs and requirements. Example: *"This certifies that the above supplies are of the quality called for, and are in all respects in accordance with the applicable drawings, specifications, PO..."* Avoid statements like *"to the best of our knowledge."*





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**14.3.1.9** When drawing specifies, inclusion of radiographs with test report.

**14.3.2 Exceptions:** The same exceptions listed in paragraph 14.2.2 apply here.

**14.3.3 Certified Suppliers** shall archive special process certs at their facility as quality records and include the special process specification, special processor's name and PO number (for the special process) on the product C of C. However, for **Government Spares ("GS")** orders they shall include the special process certificates with the shipment.



#### 14.4 Additional Shipping Documentation

- 14.4.1 Functional Test Data:** A copy of the completed and signed (or stamped) test report shall accompany each product that requires functional testing, including product from certified suppliers. These products, which include motors, CCAs, transducers, shall be serialized. When assemblies have constituent components that require testing, the test data for each component shall be included. When GE Aviation returns nonconforming product to the supplier for rework, the supplier shall retest the product after rework and return it with a copy of the new test data.
- 14.4.2** Additional shipping documents required for bearings and PCB assemblies are listed in paragraphs 11.1 and 11.8.5, respectively.
- 14.4.3 Authority Approval Document:** An Authority approval document (e.g. FAA 8130-3), shall be included with the product when specified on the PO.
- 14.4.4** Distributors and warehouses shall assure traceability and flow down of requirements on all purchased products to the sources of manufacture and their related acceptance documents. The actual source of all material shall be identified. Material from different manufacturing sources shall be stored in a manner such that the material does not become intermixed and the manufacturing source and material identity is maintained at all times.

Distributors and warehouses shall not modify, rework or repair material in-house or by subcontracting unless approval is obtained from the Purchaser or the rework is performed by the actual manufacturing source of the material.

#### 15.0 Preservation of Product

Packaging and preservation must ensure that deliveries are free from damage, corrosion and other forms of deterioration. The supplier shall define and clearly indicate on the package any special storage or environmental requirements.

- 15.1 Electrostatic Discharge (ESD) Control:** Suppliers that provide ESD sensitive products shall protect parts, assemblies and equipment from the effects of ESD per the requirements of MIL-STD-1686 or ANSI/ESD S20.20-1999.

#### 16.0 Control of Records

Quality records must be legible, readily retrievable and stored in a suitable environment that provides minimal risk of damage or deterioration and prevents loss. In the event of contract termination, insolvency, or upon request, all quality records pertaining to the contract must be surrendered to GE Aviation. Unless otherwise specified in the PO or SQAR, the following quality records shall be retained for seven (7) years:

##### 16.1 Quality Records

- 16.1.1** GE Aviation Purchase Orders
- 16.1.2** First Article Inspection Reports
- 16.1.3** In-Process / Final Inspection and Test Results
- 16.1.4** Completed Manufacturing/Fabrication Documents (e.g., travelers, routers)
- 16.1.5** Traceability and Serialization
- 16.1.6** Calibrations



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**16.1.7** Material Nonconformance including disposition, cause & corrective action.

**16.1.8** Certifications

**16.1.8.1** Certificates of Compliance

**16.1.8.2** Special Process Certifications

**16.1.8.3** Certificates of Analysis

**16.1.8.4** Certificates of Lubrication

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

**16.3** Records may be stored electronically (e.g., computer image files) provided the storage media is capable of maintaining data integrity for the full retention period.

**16.4** Records shall be available to GE Aviation, its customers or regulatory agencies upon request.

**16.5** The supplier shall maintain quality records such that all parts are traceable to the raw material and the manufacturing history of the parts.

**16.6** **For Hamilton Sundstrand and Sikorsky programs, quality records must be retained for ten (10) years.** This requirement applies to all records created after November 1, 2006. Current programs to which these requirements apply and their PO number prefixes include the Hamilton-Airbus A380 (“AB”), Hamilton-Boeing/Hamilton-Embraer (“H” & “HS”), Sikorsky SH60 (“SR”) and Sikorsky H-92 (“SH” & “BSH”).

**16.7** **For Hawker Beechcraft programs, First Article Inspection records must be retained for fifteen (15) years.** This requirement applies to all records created after January 1, 2009. Current programs to which these requirements apply and their PO number prefixes include the Melco actuators (“M” & “BM”).

**16.8** **For EASA work, essential records must be retained for the life the equipment is in service plus two years.** Essential records include material certs, lower tier supplier and subcontractor certificates of conformity, manufacturing and assembly documentation, X-ray films, release certificates and any records associated with the product design data, calculations and certs. GE Aviation’ approval must be obtained prior to the disposal of these records.

## **17.0 Right of Access**

Suppliers shall permit access and provide facilities and assistance, as necessary, to GE Aviation, its customers, the Government, or other regulatory agencies, to enable them, initially and periodically, to evaluate the supplier's facilities, procedures, records, process controls and products at all times and places during manufacture, for conformance with requirements, regulations and applicable specifications.

## **18.0 Training**

Suppliers shall ensure (1) personnel performing activities affecting quality are suitably trained and competent, (2) personnel performing assigned tasks are qualified on the basis of appropriate education, training and/or experience and (3) all personnel are given the appropriate authority to carry out their allocated tasks.

## **19.0 Problem Solving Techniques**

GE Aviation highly encourages its suppliers to use problem-solving techniques such as 5 Whys, Cause and Effect (Fishbone) diagrams, Pareto diagrams and process flow charts to analyze the root cause of product escapes.



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20.0 Help from GE Aviation

We have a continuing effort to prevent waste. Feel free to contact us for clarification and assistance in meeting any of these requirements. The GE Aviation Quality Assurance contact list is on our website <http://geaviationsystems.com/services/approvals/>.

Table 1 – Program Specific Quality Requirements

GE Aviation Customer, Program & PO Prefix			Applicable SQAR Paragraph ( X indicates applicability)					
			7.7 Comply with Government Flow Downs (FAR, DFARS)	7.8.2 Use GE Aviation- Approved Suppliers	12.2 Use Prime's ASPL	Record Retention		
						16.6 10 Yrs	16.7 15 Yrs (FAI Only)	16.8 Service Life + 2 Yrs
Airbus	A380 LGERS	"LG" "BLG"		X				X
Boeing	McDonnell Douglas F15	"MD"	X					
BAE	APKWS	"APK"	X					
CEi	Skeeter	"SK"	X					
Government	Spares	"GS"	X					
Hamilton	Airbus A380	"AB"				X		
	Boeing 777/ Embraer ERJ 190	"H" "HS"				X		
Hawker Beechcraft	Melco Actuators	"M" "BM"					X	
Lockheed Martin	HIMARS	"HM"	X					
	ILMS	"LM"	X					
Northrop Grumman	Fire Scout	"FS"	X		X			
	Global Hawk	"GH"	X		X			
	Legacy Actuators	"NG"	X					
Sikorsky	SH60	"SR"	X			X		
	H-92	"SH"	X			X		



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**Change Summary for Rev 4-26-2011**

- Added to paragraph 6.4.5, for the Lockheed Martin HIMARS program (PO prefix “HM”), that a one-year lapse in production applies.
- In paragraph 7.0, added reference to the Quality Assurance Clauses in the addendum that was added to the SQAR.
- In paragraph 7.7, updated the website location and description of where the purchase terms and conditions are located. The new website location is <http://www.geaviationsystems.com/contact/doing-business/>.
- Added BAE APKWS program to paragraph 7.7.1 and table 1.
- In paragraph 12.2.1, updated the website link for the Northrop Grumman special processors to <https://oasisext.myngc.com/sympreq/aspl/aspl.asp>.
- Added detailed description of requirements for certificates of conformance to paragraph 14.0.
- Added paragraph 14.4.4 applicable to distributors and warehouses.
- Changed website for GE Aviation Whippany documents (e.g. SQAR, ASPL, and SRMR) from <http://www.geaviationsystems.com/About/Locations/North-America/Whippany/index.asp> to <http://geaviationsystems.com/services/approvals/>.

**Change Summary for Rev 2-12-2010**

- Added a table of contents.
- Added paragraph 7.10 *Authority Approval Requirements*.
- Reworded paragraph 13.4 to add reference to the FAA, foreign CAAs and U.S. Government PCOs. Changed heading to *Reporting of Failures, Malfunctions and Defects*. The requirements to the supplier did not change.
- Added paragraph 14.4.3 *Authority Approval Document*.

APPROVALS		
John Fedel	Supplier Quality	Signature on file.
Bill Bondi	Production and Service Quality	Signature on file.
Alan Vogel	Site Quality Leader	Signature on file.



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## Addendum Quality Clause as specified on Purchase Orders

**Quality Assurance Clauses** – Specific Quality Assurance Clauses are identified on your Purchase Order and are listed below in numerical order. Supplier is responsible for meeting all requirements of referenced QA clauses per the Purchase Order.

**QA1 – ORDER ACKNOWLEDGEMENT** (Ref. SQAR section 7.0 paragraph 7.2)

SUPPLIER SHALL REVIEW ALL PURCHASE ORDER REQUIREMENTS AND RETURN A SIGNED COPY OF THE PO WITH A CONFIRMED SHIP DATE UNLESS OTHERWISE DIRECTED.

**QA2 – CHANGES** (Ref. SQAR section 6.0 paragraph 6.4)

SUPPLIER SHALL NOT MAKE ANY CHANGES TO THE PROCESSES OR MATERIAL SPECIFIED UNDER THE PURCHASE ORDER. SUPPLIER SHALL NOTIFY GE AVIATION IN WRITING PRIOR TO ANY PROPOSED CHANGES TO SUPPLIER CONTROL DESIGN, PARTS, MATERIALS, FABRICATION METHODS OR PROCESSES THAT MAY AFFECT FUNCTION, INTERCHANGEABILITY OR RELIABILITY OF HARDWARE DELIVERED TO GE AVIATION.

**QA3 – NON CONFORMING MATERIAL & LATENT DEFECT NOTIFICATION** (Ref. SQAR section 13.0 paragraph 13.1)

THE SUPPLIER SHALL NOT SHIP OR MAKE ANY UNAUTHORIZED REPAIRS TO PRODUCT WITH THE INTENT OF DELIVERING MATERIAL THAT DOES NOT FULLY MEET PO OR PRODUCT SPECIFICATION REQUIREMENTS. THE SUPPLIER SHALL NOTIFY GE AVIATION QUALITY ENGINEERING OF POTENTIAL NONCONFORMANCES PRIOR TO SHIPMENT, **VIA THE SRMR PROCESS**. SHIPPING NONCONFORMING MATERIAL WITHOUT WRITTEN PRIOR APPROVAL MAY DISQUALIFY SUPPLIER FROM ADDITIONAL PROCUREMENT OR FUTURE ORDERS.

**QA4 - CERTIFICATE OF CONFORMANCE** (Ref. SQAR section 14.0)

THE SUPPLIER SHALL SUBMIT WITH EACH SHIPMENT THE FOLLOWING: (1) A CERTIFICATE OF CONFORMANCE STATING THAT THE ITEMS FURNISHED TO GE AVIATION ARE IN CONFORMANCE TO THE PURCHASE ORDER AND DESIGN DATA REQUIREMENTS APPLICABLE TO THE ITEMS BEING DELIVERED, AND (2) A COPY OF THE MANUFACTURER'S C OF C. ANY RECOGNIZED AEROSPACE, MILITARY AND/OR INDUSTRY STANDARD, WHEN IMPOSED BY THE DRAWING, SPECIFICATION OR PURCHASE ORDER, MUST BE SPECIFICALLY STATED AND FORM A PART OF THE CERTIFICATION. PROCESS CERTIFICATIONS ARE REQUIRED FOR ALL SUPPLIERS PERFORMING SPECIAL PROCESSING AND SHALL STATE THAT THE PROCESS HAS BEEN PERFORMED TO THE DRAWING REQUIREMENTS.

PARTS WITHOUT CORRECT DOCUMENTATION ARE SUBJECT TO REJECTION. ALL CERTIFICATIONS MUST SHOW THE PART NUMBER, QUANTITY, PROCESS BEING PERFORMED, SPECIFICATIONS, REVISION NUMBER, THE CERTIFYING SIGNATURE AND A LEGIBLY PRINTED NAME AND TITLE OF THE PERSON SIGNING THE CERTIFICATION. THE SUPPLIER SHALL NOTIFY GE AVIATION PRIOR TO SHIPMENT IF A SPECIFICATION HAS BEEN REPLACED, SUSPENDED OR UPDATED. THE SUPPLIER SHALL LIST THE SPECIFICATION AS SHOWN ON THE DRAWING AND THE REPLACEMENT SPECS WITH THEIR CURRENT REVISION.

FOR DISTRIBUTORS AND WAREHOUSES, THESE REQUIREMENTS APPLY WITHOUT EXCEPTION, AND INCLUDE TRACEABILITY AND FLOW DOWN OF REQUIREMENTS ON ALL PURCHASED PRODUCTS TO THE SOURCES OF MANUFACTURE AND THEIR RELATED ACCEPTANCE DOCUMENTS. IN ADDITION, MATERIAL FROM DIFFERENT MANUFACTURING SOURCES SHALL BE STORED IN A MANNER SUCH THAT THE MATERIAL DOES NOT BECOME INTERMIXED AND THE MANUFACTURING SOURCE AND MATERIAL IDENTITY IS MAINTAINED AT ALL TIMES.

A SIGNATURE ON THE CERTIFICATE / DOCUMENT IS A STATEMENT THAT ALL PURCHASE ORDER REQUIREMENTS WERE MET IN FULL, INCLUDING ALL REQUIRED SUB-TIER FLOW DOWNS, WHEN APPLICABLE.



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**QA5 - QUALITY SYSTEM REQUIREMENTS** (Ref. SQAR #section 2.0)

GE AVIATION REQUIRES ITS SUPPLIERS TO MAINTAIN A FORMAL QMS COMPLIANT OR REGISTERED TO ONE OF THE FOLLOWING STANDARDS, BASED ON THEIR BUSINESS AND TYPE OF PRODUCT OR SERVICE:

- A) AS9100
- B) ISO 9001
- C) AS9003 (FOR SMALL BUILD/MACHINE TO PRINT ORGANIZATIONS),
- D) AS9120 (FOR DISTRIBUTORS),
- E) FAA REPAIR STATION CERTIFICATE (FOR OUTSOURCED MAINTENANCE PROVIDERS (OMP'S)
- F) NADCAP (FOR SPECIAL PROCESSES)

IN ADDITION, GE AVIATION REQUIRES ITS SUPPLIER TO HAVE A CALIBRATION SYSTEM THAT IS COMPLIANT, AT MINIMUM, TO ANSI Z-540 OR ISO 10012.