

ESAM, INC.

# QUALITY ASSURANCE PROCUREMENT PROVISIONS

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QAPP's

Rev.	Description of Change	Date
A	Initial Release	10/1/2014
B	Revised QAPP 12 to require written approval	1/20/2016
C	Added QAPP 18.B	5/19/2016
D	Revised QAPP 18.A to 15 years Revised QAPP 25 to include revision controlled fab parts	4/14/2017

## ESAM, Inc Quality Assurance Procurement Provisions (QAPP's)

This document defines restrictions and quality system requirements applicable to suppliers providing hardware or software development or fabrication to ESAM, Inc.

These provisions do not apply to Catalog Items (COTS Commercial Off the Shelf) defined as: Any part or assembly that is contained in a Manufacturer or Distributor catalog, whose configuration is controlled by the Manufacturer and which is offered for sale to the general public.

### 1. PART IDENTIFICATION

The identification method of marking a part shall be in accordance with the applicable specification/drawing requirements.

### 2. RIGHT OF ENTRY

Representatives of ESAM, ESAM's customer, and other regulatory authorities shall have access to supplier's and sub-tier supplier's facilities involved in the order, where they shall have access to all procedures, practices, processes associated documents and records related to quality assurance, quality control, and configuration control. ESAM Quality Assurance representative(s) may elect to conduct inspection either on a random basis or to the extent of 100% inspection. Supplier will be notified if ESAM inspection is to be conducted on specific shipments. No shipments are to be held for ESAM inspection unless notification is received prior to, or at the time of, material being made ready for shipment. The supplier shall notify ESAM in writing of any changes in the location of the supplier's facility. Any change of location by the supplier shall require a full first article inspection on these parts. ESAM reserves the right to determine and verify quality of work, records and material. Such visits shall not preclude subsequent rejection of product and do not absolve the supplier of its product integrity responsibilities.

### 3. QUALITY SYSTEM REQUIREMENTS

Suppliers must maintain a quality system that, at a minimum, complies with ISO9001 (latest revision). When supplier compliance and/or certification to AS9100, ISO9001, AS9110, EASA Part 21, EASA Part 145, or FAA FAR 145 is specified by ESAM, the supplier is responsible to notify the ESAM buyer within 5 working days of any changes in Quality System status, including extensions or reductions in scopes of approval, third party and/or regulatory Quality Approvals that are either gained or withdrawn. The supplier's loss of certification or failure to notify ESAM of their loss of certification could result in being disapproved as a ESAM supplier.

### 4. WORKMANSHIP STANDARD

The materials and workmanship shall conform to the requirements specified in the appropriate specification/drawing. If not specifically identified in the specification or drawing, the following workmanship standards shall apply:

IPC-A-610, Class 2 – for all electrical and electronic assemblies and for PWAs reworked per IPC-7711/7721

IPC-A-600 Class 2 – for Printed Circuit Boards

IPC/WHMA-A-620 Class 2 – for Cable and Wire Harness Assemblies

IPC-7711/7721 – for rework, repair and modification of electronic assemblies and PWAs

### 5. SUPPLIER RESUBMISSION OF REJECTED MATERIAL

Supplier shall notify ESAM of shipment of material from lot(s) previously rejected by ESAM, and such lots shall be clearly identified as "resubmitted" items on the Supplier's shipping document. If the initial rejection resulted in a ESAM SCAR (Supplier Correct Action Report) this number must be referenced on the Supplier's shipping documentation.

### 6. CERTIFICATE OF COMPLIANCE

Certificate of Compliance - The Certificate of Compliance shall be shipped with the product to ESAM. The Certificate of Compliance is a quality record that shall include ESAM part number and drawing revision, Military, Federal, or Industry specification number, purchase order number, quantity, date shipped, manufacturer's name and authorized Quality representative signature. In addition, the supplier shall be able to furnish information on their source(s) of supply that could include items such as serial numbers, lot numbers, heat numbers, batch, date code and cure dates as applicable.

### 7. PACKAGING

Unless otherwise specified on the drawing, the specification, and/or the purchase order, the following requirements are mandatory:

- (a) Prior to packaging, material shall be clean (free from foreign matter). Critical functioning or close tolerance surfaces shall be cleaned to insure removal of corrosion, soil, grease, residues and fingerprints, perspiration or other acid and alkali residues.
- (b) Material not inherently resistant to corrosion shall be inhibited with a suitable medium.
- (c) Material shall be packaged to the extent necessary to provide protection from the hazards of transport, contamination and physical damage encountered in general handling, shelf storage, and issue.
- (d) Applicable ESD packaging shall be used for all items sensitive to electrostatic discharge.
- (e) All packaging material shall be of non-ozone depleting materials; ref. Volume 40 of the Code Of Federal Regulations, Part 82, Clean Air Act, Title VI.
- (f) Fabricated metal, when possible, shall be packaged in cartons of 50 lbs or less.

### 7.A RoHS COMPLIANT PACKAGING

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See attached environmental E-QAPP

### 8. SUPPLIER FAILURE ANALYSIS REQUIRED

As requested by ESAM on specific identified occurrences, the Supplier shall provide a complete failure analysis describing the actual cause of failure including the component failure mechanism. Include corrective action and date code or serial number effectivity to preclude recurrence of this failure mode.

### 9. AGE CONTROL-ELECTRONIC PARTS

The Supplier shall deliver to ESAM only those parts manufactured less than five years prior to date of shipment. This shall be evidenced by date code marking on each individual part when required by the procurement specification or drawing.

Waivers to this requirement shall be submitted to ESAM Purchasing in writing for approval prior to use within ESAM product.

Regardless of the age of the electronic part, the device must solder satisfactorily and meet IPC –A-610 workmanship Class as specified on the engineering drawing. In addition, the device must be functional and meet all of the manufacturer's specifications.

### 10. CALIBRATION SYSTEM

Measurement and test equipment (M&TE) used in the performance of this order shall be calibrated in accordance with ANSI/NCSL Z540-1 or ISO 10012.1. Procedures for periodic calibration, certification, maintenance of tools and equipment, and an action plan, should measuring and/or test equipment be found to be out of calibration, shall be established and followed. In the event M&TE is later found to be out of calibration after its use on ESAM's products, the Supplier shall immediately notify the ESAM Supply Agent. The Supplier shall generate an internal corrective action report (CAR) providing ESAM the Part Numbers and Serial Numbers of all affected products delivered. In addition the details of the out of tolerance condition shall be provided to ESAM's Purchasing Representative.

### 11. RoHS PRODUCT TESTING

ESAM, Inc. reserves the right to **have any advertised RoHS compliant** product tested for RoHS compliance. If product is determined to be **noncompliant it is the responsibility** of the supplier to replace or correct all noncompliant material.

### 12. COUNTERFEIT PARTS PREVENTION

The supplier shall have a program in place to prevent the delivery of counterfeit parts and materials to ESAM. All parts, materials and assemblies (electrical, mechanical, raw material) included in the hardware delivered to ESAM shall be procured only from a franchised distributor, OEM (Original Equipment Manufacturer) or OCM (Original Component Manufacturer). No electronic components shall be purchased through or from Independent Distributors or Brokers without written approval from ESAM. The supplier is responsible for the flow down of this requirement to its sub-tier contractors and their compliance to it. Further guidance on counterfeit parts avoidance can be found in SAE documents AS5553 (Electronics) and AS6174 (Material).

### 13. NONCONFORMING MATERIAL

Nonconforming material supplied under this contract must be processed in accordance with a documented system for the control, material review and disposition of nonconforming material. If, after shipment of product by Supplier to ESAM, the Supplier identifies any actual or potential nonconformity of product supplied to ESAM or to the processes used in the manufacture of product supplied to ESAM, the Supplier shall notify ESAM immediately in writing of any such nonconformity, what product or process was affected, and what corrective action was taken by Supplier to prevent recurrence.

### 14. SUPPLIER DESIGN AND PART, MATERIAL AND PROCESS CHANGE CONTROL

When the design is the supplier's responsibility, the supplier shall not, without prior approval of ESAM (or the purchasing authority for sub-tier manufacturers or suppliers), make any change in hardware, software or programmable logic requirements, high level design, design details or part, material or process that would affect: (a) part number identification, (b) physical or functional interchangeability, (c) repair and overhaul procedures, (d) reliability, (e) safety and (f) RoHS compliance. Copies of the revised drawings shall be forwarded to ESAM. The purchasing authority and ESAM shall approve the change prior to supplier implementation.

### 15. ESAM DESIGN AND SUPPLIER PART, MATERIAL AND PROCESS CHANGE CONTROL

When a fabricated item supplier (or sub-tier contract manufacturer or supplier) is manufacturing to ESAM's design, no departure from the part, material, process, drawing and/or specification shall be made within this supply chain unless specifically authorized by each sub-tier level supplier's purchasing authority and ESAM's Purchasing representative. In the event the supplier intends to make any part, material, process or critical equipment change (e.g., change or movement of semiconductor, microcircuit or hybrid process equipment) or move manufacturing, processing or testing functions internally or a new subcontractor, the supplier shall submit a transition plan providing all details to their purchasing authority, which shall be flowed up to ESAM for concurrence. ESAM reserves the right to approve all supplier and sub-tier supplier or subcontractor transition plans.

### 16. PWB FAB DATA

Supplier shall complete the following PWB quality reports and test for each homogenous lot delivered as outlined in IPC-6012 or IPC-6018:

- (a) Cross section report, including data, results and pictures. The cross section puck shall not be sent.
- (b) At least one solder sample PWB
- (c) 100% Net List testing data results certification.

PWB suppliers shall provide the items to ESAM with each delivery. Non-PWB suppliers who provide assemblies that incorporate PWBs (e.g. PWAs or flex cables) shall maintain and make the above items available to ESAM upon request.

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### 17. CORRECTIVE ACTION

Supplier shall respond in writing to a request for corrective action made by ESAM or the purchasing authority, if other than ESAM. Corrective action shall be extended to all sub-tier manufacturers and suppliers. For corrective action requested, the supplier shall: 1) consider the details of the recorded non-conformance/corrective action and request clarification if necessary from the initiator of the request; 2) complete and respond to both the containment and whole corrective action requirements within the timeframe indicated on the non-conformance notification providing an effective short term and long term corrective action.

All articles rejected by ESAM or the purchasing authority and subsequently resubmitted by the Supplier to the ESAM or the purchasing authority shall bear adequate identification of such resubmission either on the articles themselves or on the Supplier's shipping document. Reference shall be made to ESAM or the purchasing authority rejection document and evidence given that the causes for rejection have been corrected.

### 18.A SUPPLIER MANAGEMENT OF ESAM PRODUCT DATA RECORDS - FIFTEEN (15) YEARS

Supplier records shall be correctly indexed, legible and stored in a manner permitting easy access, retrieval and protection. Records shall be maintained in a manner that prevents damage or deterioration during the retention period. Retention period for product data for ESAM products is a minimum of fifteen (15) years from the date of shipment or as defined by contract. Suppliers shall have a documented system for records management and retention in accordance with their internal Quality Management System as well as any customer contractual flow down requirements. Quality records include the following but not exhaustive list: Approved Certificates of Conformity, Test Reports, Raw Material Certifications, Special Process Certifications, FAIR's, Route Cards/Travelers, and Calibration Records. This data shall be made available to ESAM upon request, at no extra charge.

### 18.B SUPPLIER MANAGEMENT OF ESAM PRODUCT DATA RECORDS - TWENTY (20) YEARS

Supplier records shall be correctly indexed, legible and stored in a manner permitting easy access, retrieval and protection. Records shall be maintained in a manner that prevents damage or deterioration during the retention period. Retention period for product data for ESAM products is a minimum of twenty (20) years from the date of shipment or as defined by contract. Suppliers shall have a documented system for records management and retention in accordance with their internal Quality Management System as well as any customer contractual flow down requirements. Quality records include the following but not exhaustive list: Approved Certificates of Conformity, Test Reports, Raw Material Certifications, Special Process Certifications, FAIR's, Route Cards/Travelers, and Calibration Records. This data shall be made available to ESAM upon request, at no extra charge.

### 19. SUPPLIER CONTROL

Suppliers, including dealers and distributors, are responsible for ensuring that the applicable requirements of this purchase order are imposed on lower tier procurements for raw material, components or process services being used in the manufacture of products or services being provided.

### 20. SPECIAL PROCESSING

Special processing is defined as the manufacturing step or process where the end item or result cannot be physically or visually inspected post processing such as some types of material plating. ESAM approved special process suppliers shall be used on all ESAM design authority hardware, unless otherwise directed by an ESAM supplemental quality requirement. The use of a ESAM approved supplier does not relieve the supplier from responsibility to furnish acceptable supplies. Any special processing step(s) must be identified on the Certificate of Compliance. ESAM and ESAM's customer have the right of entry to the subcontractor facilities in order to assess the special process(s) being used to manufacture the end item and to verify the quality of work and material. The seller shall provide Certificate of Compliance that contains the name, specification number, type, and class of the material or process specified in the appropriate specification/drawing as stated in QAPP #6.

Special processes being performed are subject to:

- (a) The requirements being clearly specified for any special process operation, including associated equipment and.
- (b) The special process(s) being qualified prior to use.
- (c) The Supplier controlling all applicable aspects of special processes, as defined by the process specifications, including special process changes.
- (d) The Supplier defining the significant operations and parameters in the process to be controlled during production.
- (e) Records being maintained for qualified processes, equipment and personnel, as appropriate, in accordance with QAPP 18.

### 21. REQUIREMENTS FOR FABRICATION OF CABLE AND WIRE HARNESS ASSEMBLIES

Acceptability requirements for cable and wire harness assemblies provided on this order shall be per IPC/WHMA-A-620, Requirements and Acceptance for Cable and Wire Harness Assemblies. Suppliers shall certify operators/inspectors to this specification (exceptions shall be approved in writing by ESAM.)

All cable/wire harness acceptance tests shall be performed using the appropriate mating connector or appropriate mating pins. No probing of pins is allowed (i.e. use of non-mating connectors/pins).

All mechanical crimp connections shall be verified as satisfactory by a crimp pull test, industry-accepted "go/no go" gauging of crimp tool and crimp barrel measurements. Crimp pull tests shall be conducted on crimp samples only, and not be performed on deliverable hardware. Supplier shall keep records of these tests as part of their product records and maintain as defined in QAPP 18.. These records may be reviewed by ESAM upon request.

### 22. KEY PERFORMANCE CHARACTERISTIC

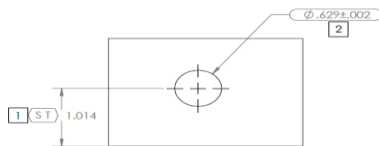
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When a “Key Performance Characteristic” is identified in the software or programmable logic requirements, the supplier must provide measurement data to ESAM via soft copy format in a MS Excel spreadsheet or MS document for each release. The supplier shall only provide software / programmable logic that meets “Key Performance Characteristic” requirements unless otherwise directed by ESAM. “Key Performance Characteristics” are identified in the Purchase Order and/or determined by the completion of the System Requirements Review (SRR). The remaining paragraphs are applicable to hardware.

When a “Key Performance Characteristic” is identified on the drawing/specification by the symbol ST (Statistical Tolerance - see symbol below), the supplier must provide tabular measurement data to ESAM via soft copy format in a MS Excel spreadsheet. Sample size for these measurement data must be taken on at least 30 items chosen randomly throughout the lot. If the lot size is < 30 items, then 100% measurement data is required. The supplier shall calculate Cpk for this measurement data and verify the Cpk index is  $\geq 1.33$  unless otherwise specified on the engineering drawing. ESAM shall require the supplier to only provide material to ESAM with a Cpk  $\geq 1.33$  for all flagged Key Performance Characteristics unless otherwise directed by ESAM. A softcopy of the data shall be sent to ESAM's Quality Organization. The supplier shall list in the subject line of the email, “Cpk data for P/N XXX, ESAM PO Number YYY, and PO Line item number ZZZ”. Alternatively, the supplier shall upload the data to a ESAM provided ftp site, with notification provided to ESAM's Quality Organization. If a Key Performance Characteristic is < 1.33, the supplier shall notify ESAM's Quality Organization and request approval via a formal deviation or other agreed upon means before the material can be shipped to ESAM.



When a “Key Performance Characteristic” is identified on the drawing/specification within an oval (as shown below) the supplier must provide tabular measurement data to ESAM via soft copy format in a MS Excel spreadsheet. Sample size for these measurement data must be taken on at least 30 items chosen randomly throughout the lot. If the lot size is < 30 items, then 100% measurement data is required. A softcopy of the data shall be sent to ESAM's Quality Organization. The supplier shall list in the subject line of the email, “KPC data for P/N XXX, ESAM PO Number YYY, and PO Line item number ZZZ”. The Supplier shall verify that all KPC dimensions are within tolerance.



### 23. FOREIGN OBJECT DEBRIS (FOD) / FOREIGN OBJECT ELIMINATION (FOE)

All suppliers involved in the manufacturing and material handling of ESAM products, whether Engineering builds, New Product Introduction builds (i.e., prototypes), Pre-Production builds or Production builds shall have a FOD/FOE program in place. This shall be clearly identified by supplier process documentation and training records.

### 24. INSPECTION SYSTEM

Suppliers shall develop inspection procedures and maintain records of inspection. Records shall include evidence of inspection for all attributes (e.g. first article inspection, acceptance test data) of products / processes supplied to ESAM, show the product has been inspected and/or tested during all stages of manufacturing, identify the name of the individual (i.e. with stamps, etc.) who certified the results, and where applicable include the results of the inspections and tests.

### 25. TRAVELERS

Suppliers shall maintain a traveler or equivalent control mechanism that directs procedures appropriate for the control of quality and configuration through all stages of production. For revision controlled fabricated parts when ESAM changes P/Ns, dash numbers, or P/N revisions and there is work in process (WIP) for a given contract, the rework instructions must be submitted in writing to the ESAM Purchasing representative to obtain ESAM Engineering approval prior to rework.

### 26. STATISTICAL TECHNIQUES

Suppliers are responsible for understanding and reducing variation within processes, and are encouraged to use control-charting techniques. When control charting is not performed, sample inspection of all attributes shall be performed to ANSI/ASQ Z1.4 (MIL-STD-105), Level II 1.0 AQL, c = 0, BS6001 Part 1 in the US; ISO 2859-1 in the UK, or an equivalent plan approved by ESAM. Suppliers using sample (incl. ESAM approved) inspection plans are not relieved from the responsibility for all attributes on the part/assembly.

### 27. PROHIBITED SOURCES

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ESAM suppliers and/or sub-tier suppliers are prohibited from using any source listed on the US government Excluded Parties List System (EPLS) (ref. <https://www.epls.gov/>) in the production of products to be delivered to ESAM.

### **28. RESPONSIBILITY FOR COMFORMANCE**

Acceptance of product shall not be used as evidence of effective control of quality by the supplier, and shall not absolve the supplier of responsibility for acceptable products or preclude subsequent rejection by ESAM customers.

### **29. INDUSTRY SPECIFICATIONS AND STANDARDS**

For all Military, Federal, and Industry specifications and standards, the supplier shall comply with the revision in effect at the time the ESAM purchase order is issued. ESAM reserves the right to request a different revision that would be specified on the purchase order.

### **30. TRAINING**

Suppliers shall ensure that all personnel performing activities on ESAM product affecting quality have been suitably trained. Personnel performing assigned tasks must be qualified on the basis of appropriate education, training, and/or experience. The supplier shall ensure that training records are maintained and available upon request.

### **31. ELECTROSTATIC DISCHARGE (ESD) CONTROL PROGRAM**

The seller shall maintain a documented Electrostatic Discharge (ESD) protection program that meets the requirements of an appropriate national, military, or industry standard. Manufacturing suppliers shall have an ESD control program, which precludes ESD damage during all phases of fabrication/testing/handling, storage, and packaging for delivery. Non-manufacturing distributors shall handle, store, package and identify such items under an ESD control program which ensures continuation of the manufacturer's ESD control program. Shipping containers and packing slips shall have prominent marking/identification, which identifies contents as ESD sensitive.

### **32. PART SUBSTITUTIONS PROHIBITED**

Part and/or material substitutions for items stated on the design requirements are not allowed, unless noted on the purchase contract or the drawing. Any deviations from the drawing, specifications, and/or purchase document requirements shall have written authorization from ESAM with documentation of the ESAM approval included in the shipping documents package.

### **33. OBSOLETE PARTS PROHIBITED**

There shall be no parts used in the design that are known to be obsolete by the original manufacturer. The supplier shall notify ESAM of any impending parts obsolescence for evaluation.

### **34. ENVIRONMENTAL QUALITY ASSURANCE PROCUREMENT PROVISIONS**

See environmental E-QAPP