KAMAN
Fuzing & Precision Products

KAMAN AEROSPACE CORPORATION

KAMAN PRECISION PRODUCTS, Inc.
ORLANDO, FL

KAMAN PRECISION PRODUCTS
MIDDLETOWN, CT
COLORADO SPRINGS, CO
TUCSON, AZ

SUPPLIER QUALITY REQUIREMENTS MANUAL

Title	E-Location	Number Control
Supplier Quality Requirements Manual	Policy & Procedure > Quality P&P's	SQRM-1

Originator/Last Revised by:	Approval	Appendix
Singh, Kanwaljit	VP, Quality Assurance, Manager, Supplier Engineering VP, Procurement	A, B, C, D, E

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Flow-down From
Quality Systems Manual in the Quality Requirements Manual

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Blue text indicates the changes for this revision.

Table of Contents

1. Introduction

This manual defines the essential elements of a supplier quality system and the requirements of such a system to assure the quality and on-time delivery of products supplied to Kaman Aerospace Corporation, Kaman Precision Products Middletown, CT and Kaman Precision Products Inc., Orlando, FL.
This document provides a guide for Kaman suppliers but is not intended to supersede any applicable contract or specification requirement. When conflicts occur, the order of precedence shall be:

1. The contract
2. The engineering drawing
3. Specifications called out on the engineering drawing
4. This document

1.1. *Scope*

Effective management for quality shall be clearly prescribed by the supplier. The supplier must assume full responsibility for the quality, delivery and reliability of all materials and services provided to Kaman. The Kaman Purchasing Department is the main communication link between suppliers and other functions within Kaman.

1.2. *Application*

The requirements within this manual are based upon current aerospace / defense industry standards. Kaman suppliers are expected to review, understand and comply with the requirements of the contract and of this manual. In addition, each supplier shall develop and maintain an effective quality system based on defect prevention rather than defect detection and support a continuous improvement program to improve quality, reduce flow time, and produce products at a competitive cost. If the supplier is unable to meet the requirements of this manual, they shall immediately notify the buyer. Kaman Quality and Supply Chain Management shall make the determination to: (a) terminate the business relationship; (b) impose a military specification quality system with on-site surveillance by Kaman representatives and / or (c) impose a quality system that is mutually acceptable to Kaman and Kaman customers.

2. Supplier Approval Process

The quality of our purchased products is a crucial part of the preventive-oriented quality system implemented by Kaman. Several preventative controls have been established to assure that quality and delivery requirements of purchased materials are consistently met. These controls include:

- Supplier Approval
- Supplier Performance Monitoring/Rating
- Part Qualification – Source Substantiation of Engineering (SSE)

2.1. *Supplier Approval*

2.1.1. Self-Survey

- The supplier evaluates their quality system by completing the Supplier Evaluation Questionnaire.
- The form is returned to the attention of the applicable Kaman Buyer or Supplier Quality Engineer. The questionnaire is reviewed and evaluated by Kaman Supplier Quality Engineering.
- The mail in questionnaire is not required for active production hardware suppliers approved before January 1, 2011. Production hardware suppliers approved prior to January 1, 2011 have either supplied proof of a recognized quality system certification, completed and returned a mail-in questionnaire, or demonstrated performance deemed acceptable by past quality and purchasing personnel.
- If the supplier is listed as approved, Kaman Supplier Quality Engineering evaluates the quality rating monthly.
- If the supplier is not approved, the appropriate code is assigned in the database and no purchase orders may be placed with the supplier.
- To gain and maintain approved status, the supplier must maintain a minimum 95% quality rating. Approved supplier status is based on a 6 calendar month average for quality. Kaman reserves the right to intervention actions when quality ratings fall below minimum standards. These interventions include but are not limited to in-process CSI, on-site process evaluation assessments, on-site quality system assessments, written corrective action plans by the supplier, and supplier meetings with Kaman Supply Chain Management at our Middletown, CT or Orlando, FL facility.

2.1.2. On-Site Assessment

Kaman shall have the option to conduct pre-award and periodic post-award assessments / surveys at any level in the supply chain inclusive of the suppliers' subcontractors. Kaman can assign Supplier Quality Engineering personnel at a suppliers' plant or suppliers' subcontractor to ensure continued compliance to

quality system and product specifications. New suppliers and suppliers producing a new product or a new part number may be subjected to pre-award surveys / assessments. Except where a supplier documents proprietary products or processes and Kaman agrees to the proprietary nature of these products or processes, supplier's and supplier's subcontractor's facilities, contracted products, procedures, and records shall be made available to Kaman Supplier Quality Engineering or an authorized representative to verify that the system or product conforms to Purchase Order, Engineering Drawing and Specification requirements. The supplier is responsible to answer corrective action requests resulting from assessments and surveys by the date stipulated on the corrective action request. The supplier must maintain the minimum standard for quality to remain an approved supplier.

2.2. *Supplier Performance Monitoring / Rating*

Suppliers are rated based upon a 6 calendar month average for quality The minimum rating for approved suppliers is 95%. The quality rating is calculated by the number of non-conforming parts (pieces) received divided by the total lot quantity for each month. A score is calculated for each month and the supplier is evaluated on the six-month average. Allowances are made for months with no activity. To gain and maintain approved status, the supplier must maintain a minimum 95% quality rating. Approved supplier status is based on a six (6) calendar month average for quality. If a supplier's delivery total is $20,000 (twenty-thousand dollars) or greater in the previous six (6) months and / or fails to meet the six (6) month average of 95% quality the suppliers shall be required to submit a corrective action statement. The supplier's ***monthly*** quality score (with considerations for no-activity) shall be monitored by SQE for three months, consecutively. If the monthly scores are equal to or greater than 95%, no further action will be required. If monthly scores fail to meet 95% the Quality Management, SQE Management and Supply Chain Management will make a determination of the following actions that may be taken:

- Supplier submitting a formal correction action presentation during a meeting with Quality, Supplier Quality Engineering and Supply Chain Management at the Kaman facility in Middletown, CT or Orlando, FL.
- Kaman quality system or process audit at the supplier's facility.
- Kaman Source Inspection at the supplier's facility.

2.3. *Part Qualification – Supplier Source Substantiation of Engineering (SSE)*

Selected critical parts must be qualified by part number. Kaman Engineering identifies critical parts by program. When an SSE is required, it shall be so noted on the purchase order or contract. Non-conformances noted during an SSE assessment will require formal corrective action. The corrective action request will be issued from and traceable within the Kaman Quality System. See Appendix B for SSE requirements.

3. Request for Quotation (RFQ)

The supplier shall review the requirements related to the product. This review shall be conducted prior to the suppliers' commitment to supply products to Kaman, and shall ensure that:

- Product requirements are clearly defined and understood.
- The supplier has the ability to meet engineering and purchase order requirements.
- Order requirements are resolved between the supplier and Kaman Purchasing.
- The supplier shall maintain records of the review and actions arising from the review.

4. Contract / Purchase Order Review

The Kaman Purchase Order is an important document that the supplier must be thoroughly familiar with and completely understand. It is the contract to which work must comply. Failure to provide documentation or to meet any Supplier Quality Requirements clause of Appendix A of this document or, if applicable, Vendor Instructions (VI), or Detailed Specifications (DS) shall be reason for rejection of the product, and may delay payment to the supplier. If product requirements are changed, the supplier shall ensure that relevant documents are amended and that relevant personnel are made aware of the changed requirements. The purchase order may contain or make reference to additional documentation, which specify standard requirements for the order. These attachments may include the following:

- Vendor Instruction (VI) / Detailed Specification (DS): These documents are part of the purchase order and contain specific instructions regarding the manufacture, inspection and test of the specified part number.
- Appendix A (Formerly QRP 0541.07 APP A): This document applies to product that is deliverable to Kaman, Middletown, Connecticut or Kaman, Orlando, Florida.

- Engineering Change Request (ECR), Engineering Change Notice (ECN), or Engineering Change Notice (ECO): Documents a change to the drawing, standard, specification, product or process and must be incorporated into the product.
- Kaman Customer Flow Downs: Indicated as an attachment on the purchase order and are required to be flowed down to all levels of the supply chain.

Copies of Kaman QRP requirements can be found on the Kaman website: http://www.kaman.com/fuzing-precision-products/supplier and as specified on the purchase order, or obtained from the Kaman Purchasing Representative.

5. Manufacturing Control and Work Instructions

5.1. Manufacturing Document Instruction

The supplier shall assure that work affecting quality shall be prescribed in clear and complete documented instructions. The suppliers' system shall provide for quality assurance involvement in planning of the aspects of manufacture including procurement, manufacturing engineering, fabrication, assembly, test and packaging. Planning shall include assuring that work instructions, which clearly communicate requirements, and, wherever appropriate, pictures, drawings, or sketches are included. The suppliers' system shall include provision for the documentation of planning activities.

5.2. Manufacturing Document Control

The supplier shall provide documentation control, including change configuration management of work instructions, manufacturing records, and inspection and test records to preclude unauthorized changes and provide adequate verification of accuracy.

6. Manufacturing Traceability and Inspection Status

6.1. Trace and Inspect Status

The supplier shall establish a positive system for indicating the manufacturing status and inspection status of raw material, products in production and finished stores. Manufacturing and inspection status may be indicated by methods such as part markings, part travelers, marked containers or inspection records.

6.2. Characteristics

The supplier shall produce product characteristics to minimize the combined production labor and machine cost and the cost of quality losses such as scrap, rework and repair. The use of statistical tools such as machine capability studies and statistical process control are encouraged to establish and maintain a robust process. If SPC is required for a given process, it shall be included in the purchase order quality requirements.

7. Inspection and Test

7.1. *Environmental Control*

The supplier shall ensure the environment for performance of inspections and test is adequate in respect to temperature, humidity, vibration, lighting, water and air supply, and any other factors that could affect the accuracy of inspection and test results.

7.2. *Inspection Instructions*

The supplier shall provide written instruction for manufacture / inspection / test of supplier fabricated and purchased materials. Inspection and test instructions shall be prepared for each part number and include as a minimum a description of all engineering characteristics (including notes), fixtures and gages used, the quantity inspected, the quantity accepted, quantity rejected, lot quantity, sample size as required and inspection stamp or inspectors initials.

7.3. *First Piece Inspection (FPI)*

First piece inspection is the verification of a given operation or process. When specified on the purchase order as a quality requirement, (reference Appendix A, section A.20 and A.21) first piece inspection shall be

performed as soon as practical in the production process and prior to producing the balance of the lot. First piece inspection shall be performed prior to any subsequent operation, which may obscure the engineering characteristic. First piece inspection is required for each process set-up and when the supplier incorporates an engineering change, revises the tooling, implements new tooling, implements a change in processes or is a new supplier for the part number.

7.4. *First Article Inspection (FAI)*

First Article Inspection (FAI) is a one-time verification of all engineering drawing characteristics, including drawing notes of a given part number. FAI is applicable when specified on the purchase order as a quality requirement (Reference Appendix A, section A.11 and A.11A). FAI is performed on a randomly selected part or parts from a build lot, which is 100% complete to the purchase order and engineering drawing requirements. When assemblies and sub-assemblies are subject to FAI, each part and process within the assembly or sub-assembly shall have a separate FAI, additionally, an FAI shall be performed on the completed assembly or sub-assembly. The supplier shall complete the First Article Inspections using AS 9102 First Article Inspection Report Forms 1, 2, and 3. The forms are available on the Kaman Fuzing website http://www.kaman.com/fuzing-precision-products/supplier Forms other than those maintained on the Kaman website may be used, however they must contain all "Required" and "Conditionally Required" information, and have the same field reference numbers. Kaman reserves the right to witness First Article Inspection at any point in the supply chain. Upon notification to the supplier, the Kaman customer(s) shall be allowed access to the supplier's facility to jointly witness the FAI with the Kaman representative. The supplier shall contact the applicable Kaman Buyer and advise that a part is ready for FAI. The supplier shall furnish the part number, purchase order number and lot quantity.

Supplier shall provide the FAI report to Kaman in the following manner:

1. Send a copy of the FAI Report to: KPP.Quality@Kaman.com
   a. The FAI Report must also include:
      i. All certifications for parts, material and special processes.
      ii. Supplier's Certificate of Conformance.
      iii. If FAI source witness is required then refer to SQRM-1, Appendix A, Para A.11.B.
2. Once FAI Report is received via the above email address, Kaman QE will review the data. If acceptable, the QE will sign the FAI customer approval field on page one of the FAI and will email the signed cover sheet back to supplier as acceptance.
   a. The supplier is then directed upon receipt of the signed cover sheet to ship the Production Hardware to Kaman along with the signed FAI cover sheet
   b. The Supplier should also identify and segregate the FAI Unit from the rest of the shipment lot.

7.5. *Sample Plan Inspection*

Sample plans other than as prescribed in ASQ Z1.4 or Z1.9 require written approval from Kaman Supplier Quality Engineering. The supplier shall not use any sample plan with an acceptance level greater than zero.

7.6. *Correlation of Inspection Measurements*

When requested by Kaman, suppliers shall provide samples and data for correlation of their inspection techniques with those of Kaman. Accuracy of the correlation shall be as agreed upon by Kaman Quality Engineering and the supplier. Supplier shall take timely corrective action when correlation is unsatisfactory and such action is requested by Kaman.

7.7. *Kaman / Customer Source Inspection (CSI)*

When Kaman source inspection is required; it shall be noted in the quality assurance clauses of the Purchase Order, Vendor Instruction (VI) or Detailed Specification (DS). Reference Appendix A, section A.3. Suppliers shall contact the Kaman Purchasing Representative named on the Purchase Order to arrange for source inspection. Suppliers located within the State of Connecticut or Florida shall provide a minimum of three (3) working days advanced notice for source inspection. Suppliers located outside the State of Connecticut or Florida shall provide a minimum of ten (10) working days advance notice. When source inspection is required the supplier shall not ship product until authorized by a completed Source Inspection and Test Surveillance Record signed by a Kaman Supplier Quality Engineer or designee. A copy of the source inspection record shall accompany the shipment. Source inspection may be waived at the discretion of Kaman. If waived, a copy of a Source Inspection Waiver signed by Kaman Quality Engineering or Supplier Quality Engineering must accompany the shipment.

7.8. *Government Source Inspection (GSI)*

When government source inspection is required, it shall be noted in the quality assurance clauses of the purchase order, Vendor Instruction (VI) or Detailed Specification (DS). Reference Appendix A, section A.2. The supplier is responsible for contacting their local Defense Contracts Management Agency (DCMA) office to arrange for government source inspection.

7.9. *Visual Inspection*

Supplier shall ensure that each individual performing visual inspection has an eye examination at intervals of not greater than one year and that, if necessary or if correction is prescribed, each individual uses the required corrective lenses when performing required visual inspections.

7.9.1. Packaging

The supplier shall package parts in accordance with drawing and purchase order requirements. In the absence of specific packing requirements the supplier shall assure parts are packaged as to maintain product integrity. Packaging containers shall be appropriate to the product and prevent product damage during shipping and handling.

7.10. *Electrostatic Sensitive Device (ESD) Control*

Semiconductor devices that are considered electrostatic sensitive include but not limited to; diodes, transistors, IC's, hybrids, microcircuits and resistor networks. When ESD controls are required, it shall be noted in the quality assurance clauses of the purchase order or Supplier Instruction. When a product is defined as ESD sensitive, work shall be performed at ESD protected workstations. Exceptions taken by the supplier require written approval from Kaman Supplier Quality Engineering. ESD protected workstations shall meet the requirements of EOS – ESD S-20.20.

7.11. *Control of Non-Conforming Product*

The supplier shall ensure that product which does not conform to engineering and specification requirements is identified and controlled to prevent its unintended use or delivery. Using the Suppliers Request for Variation form (SRV form QAF 05-12), the supplier shall immediately notify Kaman in writing of all defects that include:

- Deviations from the drawing, specification or standard prior to manufacture.
- Defects discovered after manufacture shall be identified in writing using the Suppliers Request for Variation (SRV form QAF 05-12).

The supplier shall identify the root cause of the non-conformance and implement corrective action to eliminate non-conformances. Due to the negative impact non-conforming product has on the Kaman business flow; non-conforming shipments, or product presented for Kaman source inspection and found to be non-conforming, will result in cost considerations charged back to the supplier.

7.11.1. Suppliers' Request for Variation

The supplier may submit a Suppliers Request for Variation (SRV form QAF 05-12) when a non-conformance is discovered. The supplier shall state the engineering characteristic, engineering drawing zone, and the actual non-conforming condition of the characteristic. The root cause of the non-conformance and corrective action taken to eliminate the non-conformance is required. The supplier shall submit the SRV to the appropriate Kaman contact listed on page 3 of the SRV form. Kaman will assign an SRV number to the form, disposition the non-conformance and return the form to the supplier. The supplier may not ship non-conforming product without an approved SRV disposition signed by Kaman Quality, Kaman Engineering and, if applicable, Defense Contract Management Agency (DCMA) representative. The supplier shall segregate and identify the non-conforming product with the SRV number. The approved SRV shall accompany the parts shipment. The SRV form QAF 05-12 is available on the Kaman website:

http://www.kaman.com/fuzing-precision-products/supplier

NOTE 1: To facilitate production, a pre-approved copy of Kaman's SRV form QAF 05-12 may be provided to allow use of redline drawings. Approval from Design Engineering, Manufacturing Engineering and Quality Engineering must be present on the form, otherwise authorization-to-proceed (ATP) is not valid.

NOTE 2: Conditions for use of the SRV (QAF 05-12) form are inclusive as the purchase order must reflect the 'proposed' revision and the associated engineering change request (ECR) or engineering change order (ECO) must be processed with the new, updated drawing released prior to acceptance of parts at Kaman.

7.11.2. Rework and Repair

The supplier shall establish a documented system to ensure that characteristics that may be affected by rework or repair operations are re-inspected after these operations. Repair operations (operations which are outside the scope of the engineering drawing or specification) shall not be implemented without prior written approval from Kaman and if applicable, DCMA. If non-conforming product is received by Kaman and a rework or repair procedure is approved, Kaman and the supplier may determine that Kaman may undertake the procedure in order to preserve delivery commitments to the end customer. In these situations, Kaman may elect to charge the supplier back for time incurred for the rework or repair procedure. If the supplier agrees to Kaman rework this will, in no way, infringe on the suppliers warranty requirements reflected in the purchase order.

7.11.3. Corrective and Preventive Action

The supplier shall determine action to eliminate the causes of potential nonconformities in order to prevent their occurrence. Preventive actions shall be appropriate to the effects of potential problems.

Preventive action may include analysis of data from:
a. Internal non-conforming reports
b. Customer complaints
c. Customer quality and delivery rating reports
d. Internal audits
e. Customer audits
f. Third party audits

8. Use of Sub-Tier and Sub-Sub-Tier Suppliers

The supplier, in his purchasing documents to all sub-tiers, shall flow down the Kaman purchase order requirements and the Kaman quality requirements specified on the Kaman purchase order inclusive of all Kaman customer flow-downs that are included on the purchase order.

When the use of special process sub-tier suppliers is restricted to those specifically approved by Kaman or Customer directed or Kaman customer, it shall be noted in the quality requirements section of the purchase order, Vendor Instruction (VI) or Detailed Specification (DS). Reference Appendix A, section A.22 The list of Kaman or Kaman customer or Customer approved special process suppliers is available on the Kaman web site: http://www.kaman.com/fuzing-precision-products/supplier

The supplier shall establish and implement inspection and audit activities to periodically validate certificates of conformance and test reports for raw material. The supplier shall establish and implement the inspection or other activities necessary to ensure that all purchased products and services meet specification and purchase requirements. Verification activities may include test reports, statistical records, source inspection at the suppliers' facility or inspection of products and services upon receipt. Purchased products and services must not be used or processed until verification to specification and purchase requirements is completed. All inspection and audit results shall be maintained by the supplier and made available to Kaman upon request. Inspection and audit results are also subject to review by Kaman representatives during on-site visits to the suppliers' facility.

9. Control of Supplier, Kaman, Customer or Government Property

The supplier shall exercise care with Kaman or Government supplied property while it is under the suppliers control or being used by the supplier.

Upon receipt, the supplier shall inspect for identification, general condition, completeness, and proper quantity, type, size or grade. Perform functional testing, where applicable, prior to further processing or installation to ensure conformance to specifications.

The supplier shall immediately report damaged, malfunctioning or otherwise unacceptable items to Kaman Purchasing.

After the acceptability determination, the supplier shall provide for identification and protection, periodic inspections (calibration) and controls necessary to ensure against damage or deterioration during handling or storage. The supplier shall perform a visual inspection prior to each use.
Suppliers involved with Government bailed property shall establish procedures describing the requirements for initial and periodic inspections, adequate storage and protection and maintenance of such equipment. Inspection and maintenance records must be maintained.

10. Availability and Applicability of Specifications

The supplier shall be responsible for obtaining applicable Government and Industry specifications (e.g. Military Specifications, Aerospace Material Specifications, and American National Standards) including necessary documents for use by sub-tiers, and from their respective sources. Kaman Specifications or other applicable Kaman data stipulated on the Kaman Purchase Order that have not been previously furnished, shall be promptly requested from the Kaman Purchasing Department.

11. Control of Drawings, Standards and Specifications

The supplier shall establish and maintain a system for the control of drawings, engineering changes, and other configuration control data and specifications, which ensure that product produced for Kaman is processed in accordance with Purchase Order Requirements.

11.1. *A documented procedure shall be established to define the controls needed to:*

a. Approve documents for adequacy prior to use.
b. Review and update as necessary and re-approve documents, including internal manufacturing and inspection / test instructions.
c. Ensure that changes and the current revision status of documents are identified
d. Ensure that relevant versions of applicable documents are available at points of use.
e. Ensure that documents remain legible and readily identifiable.
f. Ensure that documents of external origin are identified and their distribution controlled.
g. Prevent the unintended use of obsolete documents and apply suitable identification to them if they are to be retained for any purpose.

12. Control of Measuring and Test Equipment

The supplier shall determine the measuring and test equipment needed to provide evidence of conformity of product to the applicable specifications. The supplier shall establish and maintain a documented procedure in compliance with ANSI – Z540 or ISO 10012-1 for the control of measuring and test equipment. Measuring and test equipment shall:

a. Be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to NIST or international standards. Where no such standards exist, the basis used for calibration or verification shall be recorded.
b. Be adjusted or re-adjusted as necessary.
c. Be identified to enable the calibration status to be determined.
d. Be safeguarded from adjustments that would invalidate the measurement result.
e. Be protected from damage and deterioration during handling, maintenance and storage.

Records of calibration shall be maintained. When equipment is found not to conform to requirements, the supplier shall take appropriate action on the equipment and shall notify Kaman Purchasing Department of shipped product, which may have been affected.

13. Records Retention

Records, which provide evidence of conformity to requirements and the effective operation of the quality management system, shall be maintained for a minimum of ten (10) years unless otherwise specified by the purchase order or regulatory requirement following completion of the order. The supplier shall not discard or destroy records following the ten (10) year period without written approval from Kaman. Records shall remain legible, readily identifiable and retrievable. Records include radiographic film and documents that indicate the quality requirements on which the suppliers final acceptance of the product is based and those documents that record completion and / or results of inspections / tests which satisfy each of the quality requirements. Inspection records shall as a minimum indicate the nature of the observations together with the number of observations made, the number and type of deficiencies found, the acceptability of product and the action taken on deficiencies.

The supplier shall retrieve and make available records requested by Kaman within twenty four (24) hours after the request.

14. Foreign Object Damage / Debris (FOD) Control

The supplier shall establish and maintain an effective Foreign Object Damage / Debris Prevention Program (FOD). The program shall be proportional to the sensitivity of the design of the products(s) to FOD, as well as to the FOD generating potential of the manufacturing methods. The written policies and procedures developed by the supplier shall be subject to review by Kaman and disapproval if the policies and procedures do not meet their objectives or fail to meet specific Kaman purchase order quality clauses. The supplier shall establish methods and facilities for identifying, handling, and storing articles to ensure against damage, deterioration or substitution during manufacture, storage and shipment.

For components, sub-assemblies and assemblies susceptible to foreign object debris / damage, the supplier shall ensure articles are free from foreign objects and foreign object damage resulting from supplier processing. The supplier shall establish and maintain an effective Foreign Object Damage / Debris prevention program to reduce FOD using National Aerospace Standard 412 (NAS 412) as a guideline.

15. Internal Audit

The supplier shall conduct internal audits at planned intervals to determine whether the quality management system conforms to the planned arrangements, the requirements of this manual, and to the quality management system requirements established by the supplier.

Internal audit findings shall be documented. The management responsible for the area being audited shall ensure that actions are taken in a timely manner to eliminate detected nonconformities and their causes. Follow-up activities shall include the verification of the actions taken and the reporting of the verification results.

16. Counterfeit parts

16.1. Application

This section is intended for use on Aerospace and High Performance / Reliability of electronic equipment applications. This standard is recommended for use by all contracting organizations that procure electronic parts, whether such parts are procured directly or integrated into electronic assemblies or equipment. SAE AS-5553 is generic and intended to be applied and flowed down to suppliers that procure electronic parts, regardless of type, size, and product provided. SAE AS-5553 is not intended to be a stand-alone document but to supplement a higher document such as AS9100, ISO9100 and other Quality management systems documents. If there is conflict between purchase order and other documents, SAE AS-5553 takes precedence.

16.2. Avoidance using SAE AS-5553

16.3. Counterfeit Parts Program

The supplier shall maintain a counterfeit parts program to accomplish the following policy. Supplier shall utilize SAE AS-5553 as the baseline. The following shall be accomplished as control:

a. Establish an Electronic Parts Control Program
b. Process Control Plan
c. Verification of purchased product
d. Material control
e. Reporting (i.e., internal, customers, government, organization)
f. Obsolescence management

16.4. Counterfeit detection using SAE AS-5553 as a guideline

a. Perform sample inspections
b. Perform sample functional testing

16.5. Counterfeit Parts Mitigation

a. Prevention plan
b. Adequate control

c. Register of approved suppliers to minimize risk
d. Traceability to suppliers
e. Training
f. Audits
g. Rejection control program

17. Training

The supplier shall ensure that its personnel are aware of the relevance and importance of their activities, and how they contribute to the achievement of the quality objectives. The supplier shall:

a. Determine the necessary competence for personnel performing work affecting product quality.
b. Provide training or take other actions to satisfy requirements.
c. Evaluate the effectiveness of the actions taken
d. Maintain appropriate records of education, training, skills and experience.

18. Definitions

CSCI - Computer Software Configuration Item; Computer software revisions and versions as specified by contract or design engineering.

CSI – Customer/Kaman Source Inspection

ECN – Engineering Change Notice

ECO – Engineering Change Order

ECP – Engineering Change Proposal

ECR – Engineering Change Request

ESD – Electrostatic Sensitive Device

FAI – First Article Inspection

FOD - Foreign Object Damage / Foreign Object Debris

Mission Assurance (MA) - A disciplined application of proven scientific, engineering, quality and program principles toward the goal of achieving mission success. It follows a general systems framework and uses risk management and independent assessment as cornerstones through its lifecycle.

Privacy Assurance - The identification of privacy critical to those CSCI's or portions thereof whose failure could lead to a breach of systems privacy.

QRP – Quality Requirements Procedure

Quality Score - Scores are derived from quantity rejected, late corrective actions, and total received quantity on a 6-month average.

RFQ - Request for Quotation

Safety Assurance - The identification of safety critical components or portions thereof whose failure could lead to a catastrophic failure (could result in death, injury, loss of property or environmental harm).

Security Assurance - Identification of security that is critical to those CSCI's or portions thereof whose failure could lead to breach of systems security.

SOO – Safety of Objectives

SOW - Statement of Work

SQE - Supplier Quality Engineer / Engineering

SRV – Supplier Request for Variation – A document (QAF 05-12) used by a supplier to submit discrepancies disclosed by their inspection and cannot be reworked by the supplier. Submit ECN request for change, process change, or other issues needing KPP review and disposition. The reported discrepancies shall be evaluated and dispositioned by Kaman Precision Products Material Review Board (MRB). Included with this SRV process is the Kaman internal TipQA VR# (Vendor Request Number) that will be attached on the SRV form (QAF 05-12) for traceability in the Kaman TipQA system. The SRV document is a supplier's mechanism into Kaman for disclosure and the VR number is Kaman's mechanism for retention of the supplier disclosure.

SSE - Supplier “Source” Substantiation of Engineering

VR – A Type VR NC or Non-conformance write-up in Kaman’s system. Vendor Request (TipQA System generated non-conformance location). Aligned with SRV.

19. Concurring Areas / Approvals

19.1. Concurring Area(s)

19.2. Approvals

Peter Madsen, Vice President, Quality Assurance; Approved 06/22/2018

Jeff Peach, Vice President, Procurement; Approved 06/12/2018

David Landis, Manager, Metrology and Supplier Engineering; Approved 05/14/2018

Ray Grimes, Manager, Quality Assurance, KPPI Orlando, FL; Approved 06/11/2018

Don Simmonds, Manager, Quality Assurance, KPP Middletown, CT; Approved 06/13/2018

All approved via email

APPENDIX A (Formerly QRP 0541.07 APP A)

A.0 (5.0) PROCEDURE / REQUIREMENT PARAGRAPHS: (older alpha-numeric in brackets)

A.1 (5.1) INSPECTION AND DOCUMENTATION:

Articles defined in this purchase order are subject to inspection when received and will not be accepted if the supplier fails to provide the documentation and items specified in the purchase order

Suppliers must have written authorization from Kaman to ship deviated items using form QAF05-12, "Supplier Request for Variation" (SRV). Deviated parts shall be segregated and identified by the supplier. The SRV and VR (Vendor Request: Kaman version from TipQA data base with electronic signatures) must be dispositioned and signed by Kaman Engineering/Quality prior to shipping parts. A copy of the signed and dispositioned SRV and VR must accompany the shipment and referenced on supplier's C of C (Certification). Deviated parts shall be tagged with the SRV and VR number. The SRV form is available on the Kaman website, http://www.kaman.com/fuzing-precision-products/supplier

A.2 (5.2) GOVERNMENT SOURCE INSPECTION:

Government Source Inspection is required prior to shipment from your plant. Upon receipt of this order, promptly (not later than forty-eight (48) hours) notify and furnish a copy to the Government representative who normally services your plant so that appropriate planning for Government inspection can be accomplished. Verification by the Government and or Kaman customer will not be used by Kaman as evidence of effective control of quality by the supplier, and does not constitute product acceptance by Kaman. If a Government representative does not service your plant, contact the nearest Army, Navy, Air Force, or Defense Supply Agency inspection office. In the event the representative or office cannot be located, Kaman purchasing agent shall be notified immediately.

A.3 (5.3) KAMAN SOURCE INSPECTION:

Items covered by this purchase order are subject to surveillance and inspection at points of manufacture specified by Kaman Quality Assurance Department. Hardware shall not be delivered without a Source Inspection & Test Surveillance Record (QAF 06-01) signed by a Kaman Supplier Quality Engineer, Kaman authorized quality representative or a copy of a waiver (QAF 05-31) signed by Kaman Quality Engineering or Supplier Quality Engineering. Suppliers located within the States of Connecticut or Florida shall provide a minimum of three (3) working days advanced notice for source inspection. Suppliers located outside the States of Connecticut or Florida shall provide a minimum of ten (10) working days advance notice for source inspection.

A.4 (5.6) CERTIFICATION OF COMPLIANCE FURNISHED: for Tier 1 or Original Equipment Manufacturer (OEM) Supplier

A.4.1 (5.6.1) The supplier shall furnish a "Certificate of Compliance" (CoC) with each shipment that assures full conformity with the PO requirements. The C of C shall list the PO #, applicable drawings, dwg Rev, Lot #, Batch, Date Code and specifications, as applicable. The certificate shall be validated and signed by an authorized supplier representative, including their title. NOTE: Electronic signature with original on file is acceptable.

A.4.2 (5.6.2) CERTIFICATE OF COMPLIANCE for verification of ferrous and non-ferrous metal and/or validation of Special Processes: for Raw Mat'l or Special Process supplier.

A.4.2.1 (5.6.2.1) Supplier shall furnish a C of C that demonstrates the verification for all ferrous and non-ferrous metals and/or a validation plan for all outside special processes is in place and being adhered to.

A.4.3 (5.6.3) CERTIFICATON OF COMPLIANCE FURNISHED FROM DISTRIBUTORS:

A.4.3.1 (5.6.3.1) Electronic Components:

The distributor shall furnish a Certificate of Compliance from the OEM with each shipment that assures full conformity with the PO requirements. The C of C shall be traceable to the Kaman PO#, list applicable drawings, dwg Rev, Lot Number, Batch, Date Code and specifications as applicable. The certificate shall be validated and signed by an authorized OEM representative. NOTE: Electronic signature with original on file is acceptable.

When sub-tier or OEM, C of C validation is not feasible from the original manufacturer, the seller must notify the Kaman buyer at the time of quotation or prior the acceptance of the order and the shipment of the material, for the additional requirements which the Seller must perform, in order to certify the validity of the component and to allow for the acceptance and use by Kaman

A.4.4 (5.6.3.34) Supplier shall enforce controls to assure all design construction, components, fabrication, material, processing methods changes, facility relocation, management changes, change in sub-tier suppliers, or changes that may impact form-fit-function-performance-durability have not changed since the last successful Qualification, First Article Inspection, on-site survey, SSE, and Customer notification, Any such changes must be communicated, in advance of being implemented, to the appropriate Kaman Buyer, in order for Kaman and/or our Customers to review and communicate requirements which may be placed on the supplier/sub-tier supplier, for qualification and approvals of said change (before it can be introduced into the product).

A.4.5 (5.6.5) When parts are reworked or replaced as a result of a Kaman Non Conformance Report, supplier shall state the Non-Conformance Report number on the Certification of Compliance. Applies to all C of C's and suppliers.

A.5 (5.7) PHYSICAL AND CHEMICAL ANALYSES:

a. The items or services addressed on this order require copies of actual chemical and physical test results showing actual readings taken, and conformance to applicable specifications. These documents shall be included with each shipment.
b. For non-ferrous parts and non-ferrous raw material, the material identification and applicable specification are required on the certificate of conformance in lieu of actual physical and chemical analysis data.

NOTE: When requirement paragraph A.5 (5.7) is specified on the purchase order without suffix a or b, paragraph A.5. (5.7) a applies, unless an item is non-ferrous material, then "b" will apply.

A.6 (5.8) INSPECTION/TEST DATA REQUIRED:

A copy of inspection and/or test data (including time/temperature charts and SPC charts, if required) shall be supplied with each shipment identifiable to the serial numbers and/or date code of items supplied. The reports shall be validated and signed by an authorized supplier representative. Subcontract documentation shall be retained at the Tier 1 for the specified program duration and be included with each lot, if required on the PO.

NOTE: For Heat Treat hardness testing, Kaman authorizes statistical sampling in accordance with SAE AMS2759, unless otherwise specified in this purchase order.

Supplier shall perform inspection and/or acceptance tests and supply data for the appropriate requirements. Inspection and/or acceptance test reports shall reference a purchase order number, supplier's name and address and/or independent laboratory name and address, part number, serial number, if applicable, date and run time. These reports shall accompany each shipment to be delivered and shall be validated by an authorized supplier representative.

A.6.1 (5.8.1) (a) **Attribute Results:** List each inspection and test attribute with the corresponding specification limit(s). Record the number of items inspected, the number accepted, and the number rejected, if sampling plan is used. Indicate the plan used and the related accept/reject criteria.

A.6.2 (5.8.2) (b) **Variables Results:** Record inspection and test measurements for each item inspected or tested. Variables inspection data is applicable to the extent specified on the applicable drawing or in the purchase order.

A.7 (5.9) TEST SAMPLES-FABRICATED PARTS, ASSEMBLIES, FLEXIBLE CIRCUITS AND PRINTED WIRING BOARDS:

Concurrent with the shipment, the supplier shall furnish test samples, slugs, or coupons appropriately identified and traceable to the batch or lot number. When flexible circuits or printed wiring boards are purchased in accordance with an applicable specification, the supplier furnished coupons and data shall satisfy the requirements of the applicable revision of the Specifications and its amendments.

A.8 (5.11) AGE CONTROLS, PERISHABLE ITEMS:

Articles delivered under this order shall contain: (1) date of manufacture (2) shelf life expiration date (3) batch or lot number. The remaining life shall not be less than 80% of the total shelf life at time of delivery. In addition, materials purchased under this requirement shall include a copy of the manufacturer's technical bulletin describing use and precautions, if applicable.

A.9 (5.12) PRODUCTS, METHODS AND MANUFACTURING PROCESSES:

Supplier shall enforce controls to assure all design construction, components, fabrication, material, processing methods changes, facility relocation, management changes, change in sub-tier suppliers, test software changes or changes that may impact form-fit-function-performance-durability have not changed since the last successful Qualification, First Article Inspection, on-site survey, SSE, and Customer notification, have *NOT* been changed since previous or during purchases without written approval from Kaman. Supplier shall notify the Kaman buyer of any such changes. Kaman quality will make a determination if any action, such as first article inspection or on-site survey is appropriate.

A.10 (5.13) SUPPLIER QUALITY SYSTEM:

The contractor's quality system shall be compliant to ISO 9001 or AS 9100, ISO/TS-16949 or meet the requirements of the Kaman Aerospace Corporation, Kaman Fuzing SUPPLIER QUALITY REQUIREMENTS MANUAL. The manual is located on the Kaman web site http://www.kaman.com/fuzing-precision-products/supplier During the performance of this purchase order, the suppliers quality system, inspection system and manufacturing processes are subject to review, verification and analysis by Kaman, Kaman customer representatives and Government representatives as applicable

A.11 (5.15) FIRST ARTICLE INSPECTION Per Flow Down requirements:

First article inspection per AS9102 is required on this order.

First Article Inspection by definition is 100% inspection of all engineering characteristics including drawing notes on a random sample of parts from the production lot that is 100% complete to the engineering drawing and / or purchase order requirements. The supplier shall complete the First Article Inspection using AS9102 First Article Inspection Report Forms 1, 2 and 3. The forms are available on the Kaman Fuzing website: http://www.kaman.com/fuzing-precision-products/supplier Forms other than those contained on the Kaman website may be used, however they must contain all “Required” and “Conditionally Required” information and have the same field reference numbers.

If this is the first time the supplier is manufacturing this part for Kaman then a FAI is required to ship the parts or assemblies.

If the supplier has not manufactured or processed this product for a period of two (2) years, defined as more than 2 years since the end of the last production/process run of the part, then a full FAI is required.

When assemblies and sub-assemblies are subject to FAI, each non COTS (commercial off the shelf) part within the assembly or sub-assembly shall have a separate FAI. Additionally, an FAI shall be performed on the completed assembly or sub-assembly.

If the supplier revises the tooling, implements new tooling, implements a change in process flow or otherwise changes the process or venue, then an approved SRV (see note A.1) will provide direction on extent of FAI required.

If the supplier has not shipped product in to Kaman Precision Products for a period of time that would call for a FAI but the material is residual from a previous manufacturing run that had an approved FAI, a statement shall appear on the Certificate of Conformance stating “Residual material completed manufacture on MM/DD/YYYY, previous FAI included for reference.”

If the supplier does not know how to perform an AS9102 First Article inspection and report, Kaman will provide training. Please contact the Kaman Buyer to arrange for the training.

Supplier shall provide the FAI report to Kaman in the following manner:

1. Send a copy of the FAI Report to: KPP.Quality@Kaman.com
   a. The FAI Report must also include:
      i. All certifications for parts, material and special processes.

ii. Supplier's Certificate of Conformance.
iii. If FAI source witness is required then refer to SQRM-1, Appendix A, Para A.11.B.

2. Once FAI Report is received via the above email address, Kaman QE will review the data. If acceptable, the QE will sign the FAI customer approval field on page one of the FAI and will email the signed cover sheet back to supplier as acceptance.
   a. The supplier is then directed upon receipt of the signed cover sheet to ship the Production Hardware to Kaman along with the signed FAI cover sheet
   b. The Supplier should also identify and segregate the FAI Unit from the rest of the shipment lot.

A.11.A (5.15 A) FIRST ARTICLE INSPECTION 1 YEAR:

Same requirements as A.11 except the 2 year redo of the FAI requirement is now 1 year.

If the supplier has not manufactured or processed this product for a period of 12 months, defined as more than 12 months since the end of the last production/process run of the part, then a full FAI is required.

A.11.B WITNESSED FIRST ARTICLE INSPECTION

The FAI is required to be performed and witnessed at the suppliers' facility. Please contact your Kaman purchasing agent to arrange for Kaman witnessing of the FAI Inspection. Parts shall not be delivered without a Source Inspection & Test Surveillance Record (QAF 06-01) signed by a Supplier Quality Engineer or authorized Kaman quality representative or a copy of a waiver (QAF 05-31) signed by Kaman Quality Engineering or Supplier Quality Engineering. If there is a signed waiver, it shall accompany FAI submittal. The waiver is issued to forgo the witnessing of the FAI inspection, but the completed FAI must be sent in with the parts shipment along with a copy of the waiver.

Suppliers located within the States of Connecticut or Florida shall provide a minimum of five (5) working days advanced notice for First Article Inspection. Suppliers located outside the States of Connecticut or Florida shall provide a minimum of ten (10) working days advance notice for First Article Inspection.

Upon notification to the supplier, the Kaman customer(s) shall be allowed access to the supplier's facility to jointly witness the FAI with the Kaman representative.

Supplier shall provide the FAI report to Kaman in the following manner:
Send a copy of the FAI Report to: KPP.Quality@Kaman.com
   a. The FAI Report must also include:
      i. All certifications for parts, material and special processes.
      ii. Supplier's Certificate of Conformance.
      iii. If FAI source witness is required then refer to SQRM-1, Appendix A, Para A.11.B.

A.12 (5.16) STATIC SENSITIVE MATERIAL:

Parts on this order are static sensitive devices. All work shall be performed at ESD protected workstations. ESD protected workstations shall meet the requirements of ANSI/ESD S-20.20. Exceptions taken by the supplier require written approval from Kaman Supplier Quality Engineering. Static sensitive parts shall be packaged in protective containers. Packing and marking shall comply with MIL-STD-1686 or EIA JESD625.

A.13 (5.18) CONTROL OF SPECIAL PROCESSES:

Suppliers who perform a process such as welding, heat treating, brazing, plating, soldering, anodizing, painting, non-destructive testing, etc. shall be Kaman approved or listed on the Kaman "Qualified Process Supplier List" prior to the manufacture and/or processing of the articles defined in the purchase order. Special Process suppliers maintaining a current NADCAP certification may be exceptions to the Kaman approved list but may require additional screening at the discretion of the Kaman supplier quality department. Second tier special process suppliers shall be controlled by the first tier supplier. The first tier supplier shall have established and maintained a positive method to verify the special process characteristics. Approved sources are Program specific per requirements for performance of the special process shall be noted on the purchase order or Vendor Instruction (V.I.). Qualified suppliers are listed on the Kaman web-site. http://www.kaman.com/fuzing-precision-products/supplier

A.14 (5.20) SOLDERING AND WORKMANSHIP REQUIREMENTS:

The requirements of the current revision of J-STD-001, "Procedures and Requirements for Preparation and Soldering of Electrical Connections" are applicable. The supplier's quality system shall contain documented evidence of compliance to J-STD-001, CLASS 3. The supplier shall furnish a Certification of Solderability with the electronic components specified on this PO. All personnel performing soldering per this paragraph shall be trained and certified according to IPC-J-STD-001 Class 3.

A.15 (5.22) SAFETY DATA SHEET OR MATERIAL SAFETY DATA SHEET:

The supplier shall furnish a Safety Data Sheet (SDS) or a Material Safety Data Sheet (MSDS) for the material specified on this Purchase Order Ref: Globally Harmonized System of Classification & Labeling of Chemicals (GHS).

A.16 (5.25) EXPLOSIVE DEVICES:

Hazardous Material Identification and Material Safety Data Sheet are required on this Purchase Order. DFARS 252.223.7002 "Safety precautions for Ammunition and Explosives" and 252.223.7003 "Change in Place of Performance-Ammunition and Explosives", DOD 4145.26M "Contractor's Safety Manual for Ammunition and Explosives", FAR 52.223-3 and Notification to Suppliers of Hazardous Material - No. P124 apply to this order.

A.17 (5.26) SOFTWARE CONTROL:

Software Controls per the Supplier Quality Requirements Manual Appendix **D** apply to this purchase order.

A.18 (5.27) CALIBRATION SERVICES:

Calibration services required by this order shall comply with the requirements of ANSI/NCSL-Z540-1 or ISO/IEC 17025:2005.

A.19 (5.28) CERTIFICATION OF COMPLIANCE ON FILE:

Documented evidence of conformance shall be on file for a minimum of (10) ten years from the delivery date or as specified on the Purchase Order and available for review upon request. Exception to this paragraph is the JPF program. Suppliers shall retain all documentation for minimum of (20) twenty years.

A.20 (5.29) FIRST PIECE INSPECTION TWELVE (12) MONTHS

First Piece Inspection and acceptance may be required on this order. First Piece Inspection, by definition is the inspection of a given operation or process. The purpose of First Piece Inspection is to verify that process or operation will conform to engineering drawing requirements. If the supplier has not manufactured or processed this product for a period of twelve (12) months from the last date of manufacture, revises the tooling, implements new tooling, implements a change in processes or is a new supplier for this product, First Piece Inspection is required to be performed at the suppliers facility, prior to producing the balance of the lot, unless otherwise authorized in writing. Contact your Kaman purchasing agent to arrange Kaman witness of the First Piece Inspection. Hardware shall not be delivered without objective evidence of First Piece Inspection (Source Inspection & Test Surveillance Record QAF 06-01 signed by a Kaman Supplier Quality Engineer, authorized Kaman quality representative or a copy of a waiver (QAF 05-31) signed by Kaman Quality Engineering or Supplier Quality Engineering.

Suppliers located within the States of Connecticut a minimum of ten or Florida shall provide a minimum of three (3) working days advanced notice for First Piece Inspection. Suppliers located outside the States of Connecticut or Florida shall provide (10) working days advance notice for First Piece Inspection. Upon notification to the supplier, the Kaman Customer(s) shall be allowed access to the supplier’s facility to jointly witness the FAI with the Kaman representative.

A.21 (5.34 A) FIRST PIECE INSPECTION SIX (6) MONTHS

First Piece Inspection and acceptance may be required on this order. First Piece Inspection, by definition is the inspection of a given operation or process. The purpose of First Piece Inspection is to verify that process or operation will conform to engineering drawing requirements. If the supplier has not manufactured or processed this product for a period of six (6) months from the last date of manufacture, revises the tooling, implements new tooling, implements a change in processes or is a new supplier for this product, First Piece Inspection is required to be performed at the suppliers facility, prior to producing the balance of the lot, unless otherwise authorized in writing. Contact your Kaman purchasing agent to arrange Kaman witness of the First Piece Inspection. Hardware shall not be delivered without objective evidence of First Piece Inspection (Source Inspection & Test Surveillance Record QAF 06-01 signed by a Kaman Supplier Quality Engineer, authorized Kaman quality representative or a copy of a waiver (QAF 05-31) signed by Kaman Quality Engineering or Supplier Quality Engineering.

Suppliers located within the States of Connecticut or Florida shall provide a minimum of three (3) working days advanced notice for First Piece Inspection. Suppliers located outside the States of Connecticut or Florida shall provide a minimum of ten (10) working days advance notice for First Piece Inspection. Upon notification to the supplier, the Kaman Customer(s) shall be allowed access to the supplier's facility to jointly witness the FPI with the Kaman representative.

A.22 (5.35) USE OF KAMAN APPROVED SUPPLIERS:

Inclusion of this quality paragraph requires that suppliers and sub-tier suppliers requiring subcontract services shall use subcontractors approved by Kaman for the performance of such services. The approved subcontractors are listed on Kaman the website: http://www.kaman.com/fuzing-precision-products/supplier

A.23 (5.36) X-RAY FLORESCENCE (XRF) REQUIRED:

Supplier shall provide XRF results with nickel or gold plating to show evidence of plating thickness.

A.24 (5.37) SPC REQUIREMENTS:

The supplier shall implement Statistical Process Control (SPC) per the requirements of the SUPPLIER QUALITY REQUIREMENTS MANUAL APPENDIX B.

A.25 (5.38) SOURCE SUBSTANTIATION OF ENGINEERING (SSE):

Source Substantiation of Engineering per the Supplier Quality Requirements Manual Appendix A applies to this purchase order. All corrective actions requests will be processed through the Kaman Auto-Quality system and require formal, written cause and corrective action from the supplier or Sub-tier supplier.

A.26 (5.40) SIX SIGMA and LEAN:

Six Sigma and Lean methodologies per the Supplier Quality Requirements Manual, Appendix **C** apply to this purchase order.

A.27 (5.41) REQUIREMENTS FOR SOLDERED/PLATED ELECTRICAL, ELECTRONIC ASSEMBLIES / HARNESSES / CABLES / COMPONENTS AND MECHANICAL ITEMS

Electronic, electrical, electromechanical, and mechanical piece parts and assemblies, including the internal fabrication of hardware, delivered to Kaman Aerospace Corporation under the provisions of the Purchase Order shall not have pure tin finishes. Any tin-lead plating or solder process/processing shall result in a finish of no less than 3% lead composition. The following surface finishes are exempt from this requirement: gold, nickel-palladium, nickel-palladium-flash-gold, tin-silver, and tin-silver-copper.
Note: This applies to "component leads and terminations (internal and external), carriers, bodies, cages, brackets, housings, mechanical items, hardware (nuts, screws, bolts), etc."

Seller shall provide a Certificate of Conformance (C of C) with each shipment.

The C of C shall mean that the Seller or Seller's agent has verified and validated that delivered product meets the minimum 3 % lead (Pb) composition requirements, or the material meet at least one of the following provisions:
Seller or Seller's agent has contacted the Original Equipment Manufacturer (OEM) and verified that the specific Mfr / Lot Date Code of delivered product meets the specified minimum lead (Pb) requirement if Tin (Sn) is present in the product.

(a) Seller or Seller's Subcontractor has verified by actual sample testing (X-ray Fluorescence testing is preferred) or other industry acceptable method that a minimum of 3% lead (Pb) is present in any process that uses tin (Sn).

(b) If the material ordered under this P.O. is governed by a MIL-SPEC or Kaman Control Drawing or Specification that specifies or allows the use of tin (Sn) that contains less than 3 % lead (Pb), Seller is to contact the Kaman Buyer to have this Quality Attachment removed from the Purchase Order.

Seller shall be responsible for managing compliance with this requirement with subcontractors or sub-tier suppliers, and provide evidence of the appropriate flow-down and management of this requirement to the satisfaction of the Buyer or designate.

A.28 (5.43) FOREIGN OBJECT DAMAGE / DEBRIS (FOD) PREVENTION

(a) The supplier shall establish and maintain an effective Foreign Object Damage / Debris (FOD) prevention program to reduce FOD. The suppliers program shall be proportional to the sensitivity of the design of the products(s) to FOD, as well as, to the FOD generating potential of the manufacturing methods. The written policies and procedures developed by the supplier shall be subject to review and audit by Kaman, and disapproval when the suppliers policies and procedures do not accomplish their objectives.
(b) The supplier shall establish and maintain an effective Foreign Object Damage / Debris prevention program to reduce FOD using National Aerospace Standard 412 (NAS 412) as a guideline.

NOTE 1: When requirement paragraph A.28 (5.43) is specified on the purchase order without suffix a or b, paragraph A.28 (5.43) (a) applies.

A.29 (5.44) RE-TINNING OF ROHS OR LEAD-FREE TERMINATIONS (REF. GEIA-STD-0005-2 LEVEL 2C).

(a) Components with RoHS High Tin finish terminations (less than 10% Lead) and components with Lead-free (Pure Tin) termination shall be re-tinned with SnPb (tin-lead) solder, Sn63Pb37. Other termination finishes i.e. Gold, Nickel-palladium, etc., do not apply.
(b) A RoHS & Lead-free components list shall be controlled and maintained; with approval and change notification to Kaman.
(c) A sampling plan of receipt material is required for materials / termination verification and shall be approved by Kaman.
(d) Pb-free tin finish is prohibited unless an exception is made (reviewed and approved by Kaman). Specific instruction on use of Pb-free tin finish and required control measures to be provided and reviewed on a case-by-case basis.

APPENDIX B Supplier "Source" Substantiation of Engineering (SSE)

B1.0 SUPPLIER SOURCE SUBSTANTIATION OF ENGINEERING

B1.1 Supplier Substantiation of Engineering (SSE) is the method used for the control of critical components.

B1.2.1 The requirements of this document shall be enforced whenever a component is identified as critical on the engineering drawing, Purchase Order, Vendor Instruction (VI), Detailed Specification (DS), Statement of Work or Engineering Information Memorandum.

B1.2.2 Following initial qualification approval of a critical component by Kaman, the supplier shall not change manufacturing method, manufacturing sequence or site location without prior written notification to Kaman. Kaman Supplier Quality Engineering shall determine if a follow-up SSE is required.

B1.3 The supplier shall define a system for controlling processes and process changes and it shall address:

a. Responsibility and methods for identifying controlled processes

b. Coordinating internal approval of process change (controlled and non-controlled).

c. Methods to assure changes are not introduced in the manufacturing process without formal approval by Kaman.

d. Tool Control; System and its identification of tools, life, marking, tracking and maintaining. Reference the SSE Tool Control section and the listing on purchase order.

B1.4 The supplier shall maintain on file the original copy of each of the following documents. Hard or electronic copies are acceptable.

1. Kaman Purchase Order
    a. SQRM-1 Appendix A Clauses (Formerly, QRP 0541.07 Clauses)
    b. Supplier Instructions
    c. Statement of Work
    d. Engineering Information Memorandum (EIM)
2. Manufacturing and Assembly Routing Sheets.
3. Manufacturing and Assembly Work Instructions
4. Inspection and Test Instructions
5. Inspection and Test Results; including receiving inspection of purchased goods and services.
6. Material Certifications
7. Process Certifications
8. Sub-Tier Certifications
9. Tool Control System including identification, marking and maintenance.
10. Line Qualification Data (Energetic Components)
11. Internal non-conformance reports with disposition
12. Any associated SRV's and/or Waivers/Deviations
13. Approved Source Inspection & Test Surveillance Records, as applicable
14. Kaman SSE Assessment Form.

B2.0 SSE REVIEW

B2.1 Kaman reserves the right to perform on-site review of the suppliers' processes in relation to the SSE documentation at any phase in the production cycle.

APPENDIX C Statistical Process Control (SPC)

C1.0 Statistical Process Control (SPC) is required when specified in the purchase order quality requirements, engineering drawing, statement of work, supplier instruction, or engineering information memorandum. When not required by purchase order, suppliers are strongly encouraged to use SPC as a tool for continuous improvement and to monitor and control their processes.

C1.1 When required, the supplier shall provide variable data control charts and a histogram / process capability study for the characteristics or products identified for control.

C1.2 A process is considered in-control when a Cpk of 1.33 or greater is achieved and variation is within statistical control limits.

APPENDIX D Six Sigma (6σ) and Lean

Six sigma (6σ) and lean manufacturing are toolkits to reduce waste in business processes.

D1.0 SIX SIGMA (6σ)

Six Sigma (6σ) is a philosophy of doing business with a focus on eliminating defects through fundamental process knowledge. The goal of Six Sigma is to eliminate variability, defects and waste. Six Sigma can be understood or perceived at three levels:

a. **Metric:** 3.4 Defects Per Million Opportunities (DPMO). DPMO allows for the complexity of the product/process to be taken into consideration.

b. **Methodology:** Define, Measure, Analyze Improve and Control (DMAIC) is a process for continued improvement. It is systematic, scientific and fact-based. This closed-loop process eliminates unproductive steps, and applies technology for improvement. Design for Six Sigma (DFSS) is a systematic methodology utilizing tools, training and measurements to enable the supplier to design products and processes that meet Kaman expectations and can be produced at Six Sigma quality levels.

c. **Philosophy:** Reduce variation in the processes and make customer-focused, data driven decisions.

D2.0 LEAN MANUFACTURING

Lean Manufacturing is a proven approach to reduce waste and streamline operations. Lean manufacturing embraces a philosophy of continually increasing the proportion of value added activity through ongoing waste elimination. A lean manufacturing approach provides suppliers with tools to survive in a market that demands higher quality, faster delivery**,** lower cost, and controlled processes. Specifically, lean manufacturing**:**

- Dramatically reduces the waste chain.
- Reduces inventory and floor space requirements.
- Creates more robust production systems.
- Develops appropriate material delivery systems.
- Improves layouts for increased flexibility

Kaman suppliers are strongly encouraged to first, eliminate the non-value added processes (Lean). Second, make the enduring processes robust using Six Sigma methods.

APPENDIX E Software Controls

E1.0 PURPOSE

This procedure provides requirements to the Supplier for Software Quality Assurance Control when required.

E2.0 SCOPE

E2.1 This procedure applies to Kaman deliverable software.

E2.2 This procedure does not apply to administrative (e.g. word processors, spread sheets etc.) software.

E2.3 Software development and/or control procedures shall be documented by the Supplier per IEEE 12207 or Equivalent activities excepted by Kaman Middletown SQA.

E3.0 RESPONSIBILITY

Supplier is responsible for the implementation and maintenance of the Software Development Program.

Supplier shall perform the following activities:

a. Reviews the contract for Quality requirements**,** attached S.I. or S.O.W. for contractual requirements.

b. Review the contract and specifications to identify required software products (e.g. software, Development/Deliverable Documents, test Procedures, etc.) and their evaluations, testing, and corrective action requirements per contract requirement.

c. Review the contract and SDP for software Development activities and their requirements (e.g. Software Development Process, Design Review, Technical Review, Program Review, SCCB Meetings, Testing, etc.).

d. Prepare a program-specific Software Quality Program Plan (SQPP) documenting SQA on-going support of the software development process and application software development process per the SQPP.

e. Prepare a program-specific evaluation manufacturing process plan, utilizing a checklist, and evaluate the software development activities and applicable software products.

f. If a system or component is developed in multiple builds, the activities and software (SW) products of each build are evaluated in the context of the objectives established for that build. An activity or SW product that meets those objectives is considered satisfactory even though it is missing aspects designed for later build.

g. Document evaluation results on the appropriate checklist, issue corrective action request, if necessary, and verify implementation of corrective action.

h. Prepare and maintain records of each SQA activity per SQPP.

i. Assure that the person responsible for conducting SQA activities are not the person who developed the software product, performed the activity, or are responsible for both.

j. Is responsible for ensuring compliance with the contract and has the resource, training, responsibility, authority, and organizational freedom to permit objective SQA evaluations and to initiate and verify corrective actions.

k. Is responsible for delivering Software and required documentation per contract requirement

E4.0 PRIVACY, SAFETY AND SECURITY ASSURANCE

E4.1 Supplier is responsible during Software Development to maintain Safety by identifying safety-critical components or portions thereof whose failure could lead to hazardous systems state (could result in death, injury, loss of property or environmental harm).

Supplier is responsible to identify Security components that are critical to those components or portions thereof whose failure could lead to breach of systems security.

Supplier is responsible to Identify Privacy critical to those components or portions thereof whose failure could lead to a breach of systems privacy.

E5.0 AUDITS, ASSESSMENTS AND SURVEYS

E5.1 Kaman reserves the right to assess, audit, and attend supplier software or inspection reviews. The supplier shall be notified of this requirement via purchase order quality requirements.

Document Revision History

Rev	Description of Change	Date Released	Training Required (KPP/KPPI) only
22	Removed section 5.42 as it had no comment other than the word, “removed”	01/16/2016	N
22	Removed, “QRP 0541.07 Appendix A” “wording” and any “wording” associated with this application. It is now within this SQRM-1 document.	03/30/2016	N
22	Updated SQRM-1 with all BLUE updates	05/03/2016	N
22	Updated; all Appendices to correct formatting.	05/03/2016	N
23	Updated the website link for supplier information at various paragraphs, and updated some text in blue Appendix A. Moved A4.5 below A4.4 and modified text to reflect, “A4.5 = Renumbered as A4.5 from “Renumbered as 5.6.5 from 5.6.2.2.5” …” Under Section A4.4 removed, “(side note: Renumbered as 5.6.4 …) Under Section A.11 removed, “Review section 5.5 of this document (QRP0540.01) for additional information pertaining to inspections. Revised Section A.11 and A.11A and add Section A.11B Under A.28 changed, “NOTE 1: When requirement paragraph A.28 5.43 is specified on the purchase order without suffix a or b, paragraph A.28 (a) 5.43(a) applies. Under A.19 removed, “Para 5.33 does not relieve the supplier from furnishing certifications and data requirements by PO test or other Quality Codes.” Added under section 7.4 FAI report activity and function .providing instructions to suppliers on how to send in the FAI Updated 19.2 approvals section.	07/09/2018	N