

KAMAN

KAMAN AEROSPACE CORPORATION

KAMAN PRECISION PRODUCTS

MIDDLETOWN, CT

KAMAN PRECISION PRODUCTS, Inc.

ORLANDO, FL

SUPPLIER QUALITY REQUIREMENTS

MANUAL

Title Supplier Quality Requirements Manual	Book Identification ---		Number Control SQRМ-1
Originator Joe Klish	Approval Director, Supply Chain Management		Appendix A, B, C, D, E
Date Issued November 2004	Rev Level E	Date Revised November 14, 2008	Date Reviewed November 19, 2008
Flowdown From Quality Systems Manual			

*This document is for online use.
Printed copies are for reference only and considered uncontrolled.
Blue text indicates the changes for this revision
All hyperlinks will be in blue and underlined.*

- 1.0 INTRODUCTION**
 - 1.1 Scope
 - 1.2 Application
 - 1.3 Application: Kaman Precision Products Inc., Orlando, FL Issued Purchase Orders Only
- 2.0 SUPPLIER APPROVAL PROCESS**
 - 2.1 Supplier Approval
 - 2.1.1 Self Survey
 - 2.1.2 On-Site Assessment
 - 2.2 Supplier Performance Monitoring/Rating
 - 2.3 Part Qualification: Suppliers Substantiation of Engineering (SSE)
 - 2.4 Certified Supplier Program
- 3.0 REQUEST FOR QUOTATION (RFQ)**
- 4.0 CONTRACT/PURCHASE ORDER REVIEW**
- 5.0 MANUFACTURING CONTROL AND WORK INSTRUCTIONS**
- 6.0 MANUFACTURING TRACEABILITY AND INSPECTION STATUS**
- 7.0 INSPECTION AND TEST**
 - 7.1 Environment Control
 - 7.2 Inspection Instructions

- 7.3 First Piece Inspection
- 7.4 First Article Inspection
- 7.5 Sample Plan Inspection
- 7.6 Correlation of Inspection Measurements
- 7.7 Kaman Source Inspection
- 7.8 Government Source Inspection
- 7.9 Visual Inspection
- 7.9.1 [Packaging](#)
- 8.0 ELECTRO-STATIC SENSITIVE DEVICE (ESD) CONTROL**
- 9.0 CONTROL OF NON-CONFORMING PRODUCT**
- 10.0 USE OF SUB-TIER SUPPLIERS**
- 11.0 CONTROL OF KAMAN OR GOVERNMENT PROPERTY**
- 12.0 AVAILABILITY AND APPLICABILITY OF SPECIFICATIONS**
- 13.0 CONTROL OF DRAWINGS AND SPECIFICATIONS**
- 14.0 CONTROL OF MEASURING AND TEST EQUIPMENT**
- 15.0 RECORD RETENTION**
- 16.0 FOD CONTROL**
- 17.0 INTERNAL AUDIT**
- 18.0 TRAINING**
- 19.0 DEFINITIONS**

- Appendix A Source Substantiation of Engineering (SSE)**
- Appendix B Certified Supplier Program**
- Appendix C Statistical Process Control (SPC)**
- Appendix D Six Sigma and LEAN**
- Appendix E Software Controls**

CONCURRING AREAS/APPROVALS

CONCURRING AREAS

Kaman Aerospace Corporation. Kaman Precision Products. Middletown, CT -
Quality & Purchasing

Kaman Precision Products Inc. Orlando, FL - Quality & Purchasing

APPROVAL

This procedure has been approved via e-mail dated [November 19, 2008](#) by Jack Bergquist, Director, Supply Chain Management.

1.0 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.

1.3 Application: Kaman Precision Products, Inc. Orlando, FL Issued Purchase Orders Only

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 (c) impose a quality system that is mutually acceptable to Kaman and Kaman customers.

2.0 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 – Suppliers Substantiation of Engineering (SSE)

- Certified Supplier Program

2.1 Supplier Approval

2.1.1 Self Survey

- The supplier evaluates their quality system by completing the **SUPPLIER QUALITY SYSTEM QUESTIONNAIRE**.
- The form is returned to the attention of the applicable Kaman Quality Assurance Manager.
- The questionnaire is reviewed and evaluated by Kaman Supplier Quality Engineering.
- If the supplier is listed as approved, Kaman Supplier Quality Engineering evaluates the quality and delivery 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.
- The supplier must maintain a minimum 95% quality and on-time delivery rating. Kaman reserves the right to intervention actions when quality or on-time delivery 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 suppliers and supplier's subcontractors and to temporarily assign Kaman Supplier Quality Engineering personnel at a supplier's plant 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 and on-time delivery to remain an approved supplier.

2.2 Supplier Performance Monitoring/Rating

Suppliers are rated based upon a twelve calendar month average for quality and on-time delivery. 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. The on-time delivery rating is calculated by the number of line items (lots) received late/early to the Purchase Order contract date divided by the total number of line items received each month. A score is calculated for each month and the supplier is evaluated on the twelve-month average. Allowances are made for months with no activity.

2.3 Part Qualification: Suppliers Substantiation of Engineering (SSE)

Selected critical parts must be qualified by part number. These parts include but not limited to; detonators, gas generators, explosive leads, gears, bearings, printed wiring boards, flex circuits and critical machined parts. When 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 A for SSE requirements.

2.4 Certified Supplier Program

Suppliers who have maintained consistent high levels of quality, on-time delivery, responsiveness, process improvement and have implemented a superior quality system may be awarded the status of "Certified Supplier". This status assures that "best value" can be factored to justify, as the need requires, an increased volume of business from Kaman. See Appendix B for Certified Supplier requirements.

3.0 REQUEST FOR QUOTATION (RFQ)

3.1 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.

4.0 CONTRACT/PURCHASE ORDER REVIEW

4.1 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 (QRP 0541.07 Appendix A) and, if applicable, Supplier Instructions (SI) shall be reason for rejection of the product and 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: (copies of Kaman QRP requirements can be found on the Kaman web site as specified on the purchase order or from the cognizant Kaman Purchasing Representative).

- Supplier Instruction (S.I) This document is part of the P.O. and contains specific instructions regarding the manufacture, inspection and test of the specified part number.
- QRP 0541.07 Appendix A. This document applies to product that is deliverable to Kaman, Middletown, Connecticut or Kaman – Dayron, Orlando, FL.

- Engineering Change Order (ECO) or Engineering Change Notice (ECN) Documents a change to the engineering drawing and must be incorporated into the product.

5.0 MANUFACTURING CONTROL AND WORK INSTRUCTIONS

- 5.1 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 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 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.

6.0 MANUFACTURING TRACEABILITY AND INSPECTION STATUS

- 6.1 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 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.

7.0 INSPECTION AND TEST

- 7.1 Environment Control
- The supplier shall ensure the environment for performance of inspections and test is adequate in respect to temperature, humidity, vibration, lighting 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
- First piece inspection is the verification of a given operation or process. When specified on the purchase order as a quality requirement, 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

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. FAI is performed on a randomly selected part(s) from a 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.

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 Source Inspection (CSI)

When Kaman source inspection is required, it shall be noted in the quality assurance clauses of the Purchase Order or Supplier Instruction. Suppliers shall contact the Kaman Purchasing Representative named on the Purchase Order to arrange for source inspection. Suppliers located within the State of Connecticut shall provide a minimum of three (3) working days advanced notice for source inspection. Suppliers located outside the State of Connecticut 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 stamped and signed by a Kaman Supplier Quality Engineer. A copy of the source inspection record shall accompany the shipment. Source inspection maybe 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 or Supplier Instruction. 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.

8.0 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.

9.0 CONTROL OF NON-CONFORMING PRODUCT

9.1 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. 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.**

9.1.1 Suppliers Request for Variation: The supplier may submit a Suppliers Request for Variation (SRV form QAF 05-12) when a non-conformance is discovered prior to the product shipment to Kaman. 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 Kaman buyer named on the purchase order. 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 SRV number must also appear on the packing slip, which will accompany the shipment. The SRV form QAF 05-12 is available on the Kaman web site listed on the purchase order or from Kaman Purchasing Department.

9.1.2 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.

9.2 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:

- Internal non-conforming reports
- Customer complaints
- Customer quality and delivery rating reports
- Internal audits
- Customer audits
- Third party audits

10.0 USE OF SUB-TIER SUPPLIERS

- 10.1 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.
- 10.2 When the use of special process sub-tier suppliers is restricted to those specifically approved by Kaman, it shall be noted in the quality requirements section of the purchase order. The list of Kaman approved special process suppliers is available on <http://www.kamanaero.com/Fuzing> & Kaman Aerospace International/suppliers support/supplier quality page, or from the Kaman Purchasing Department.
- 10.3 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.

11.0 CONTROL OF KAMAN OR GOVERNMENT PROPERTY

- 11.1 The supplier shall exercise care with Kaman or Government supplied property while it is under the suppliers control or being used by the supplier.
- 11.2 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.
- 11.3 The supplier shall immediately report damaged, malfunctioning or otherwise unacceptable items to Kaman Purchasing.
- 11.4 After the acceptability determination, the supplier shall provide for identification and protection, periodic inspections, and controls necessary to ensure against damage or deterioration during handling or storage.
- 11.5 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.

12.0 AVAILABILITY AND APPLICABILITY OF SPECIFICATIONS

12.1 The supplier shall be responsible for obtaining applicable Government and Industry specifications (e.g. Military Specifications, Aerospace Material Specifications, American National Standards) including necessary documents for use by sub-tiers, 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.

13.0 CONTROL OF DRAWINGS AND SPECIFICATIONS

13.1 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.

13.2 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.

14.0 CONTROL OF MEASURING AND TEST EQUIPMENT

14.1 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.

14.2 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.

15.0 RECORD RETENTION

15.1 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.

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

16.0 FOD CONTROL

16.1 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. 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.

16.2 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. Specific attention should be given to:

- Food and beverage control
- Proper cleaning of internal cavities
- Tool and small part accountability control
- Loose objects

17.0 INTERNAL AUDIT

17.1 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.

17.2 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.

18.0 TRAINING

18.1 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 these needs
- c. Evaluate the effectiveness of the actions taken
- d. Maintain appropriate records of education, training, skills and experience.

19.0 DEFINITIONS

CSCI	Computer Software Configuration Item. Computer software revisions and versions as specified by contract or design engineering.
CSI	Customer Source Inspection
ECN	Engineering Change Notice.
ECO	Engineering Change Order
ESD	Electrostatic Sensitive Device
FAI	First Article Inspection
FOD	Foreign Object Damage / Foreign Object Debris
Privacy Assurance	The identification of privacy critical to those CSCI's or portions thereof whose failure could lead to a breach of systems privacy.
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.
SOW	Statement of Work
SQE	Supplier Quality Engineering

SRV	Suppliers Request for Variation
SSE	Suppliers Substantiation of Engineering

APPENDIX A SUPPLIERS SUBSTANTIATION OF ENGINEERING (SSE)

A1.0 SUPPLIERS SUBSTANTIATION OF ENGINEERING

A1.1 Suppliers Substantiation of Engineering (SSE) is the method used for the control of critical components.

A1.2 Critical components require qualification approval by Kaman.

A1.2.1 The requirements of this document shall be enforced whenever a component is identified as critical on the engineering drawing, Purchase Order, Supplier Instruction, Statement of Work or Engineering Information Memorandum.

A1.22 **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 approval from Kaman.**

A1.3 Table I lists examples of typical critical components, which may require control. Final decisions relative to the assignment as a critical component or controlled process rests with Kaman. Supplier questions concerning critical components and controlled process shall be referred to Kaman Purchasing Department.

A1.4 The supplier shall define a system for controlling processes and process changes and it shall address:

- a. Responsibility and methods for obtaining qualification by Kaman.
- b. Responsibility and methods for identifying controlled processes
- c. Coordinating internal approval of process change (controlled and non-controlled).
- d. Methods to assure changes are not introduced in the manufacturing process without formal approval by Kaman.

TABLE I CRITICAL COMPONENTS LIST	
Detonators	Bellows
Gas Generators	Explosive Squibs
Explosive Leads	Altered Item Components
Hybrids	
Flexible Circuits	
Printed Wire Boards	
Gears	
Rotors	
Capacitors	

A1.5 The supplier shall maintain records of the original Kaman approval of process data and approval of changes to controlled processes. Process changes not identified as controlled must be documented for the supplier’s record, but do not require Kaman approval.

A1.5.1 The supplier shall identify any processes deemed proprietary and obtain agreement from Kaman prior to manufacture.

- A1.6 The supplier shall prepare, maintain and submit to Kaman purchasing prior to the start of production, routing sheets and work instructions for the step-by-step sequence of all processes used in producing the component. Hard or electronic copies are acceptable.
- A1.7 The supplier shall prepare, maintain and submit to Kaman purchasing prior to the start of production, inspection and test instructions for all inspections and tests performed during the components manufacture and final acceptance. Hard or electronic copies are acceptable.
- A1.8 The supplier shall maintain on file the original copy of each of the following documents. These documents shall be maintained in a single file, labeled as the SSE qualification data. Hard or electronic copies are acceptable.
- Kaman Purchase Order
 - QRP 0541.07 Clauses
 - Supplier Instructions
 - Statement of Work
 - Engineering Information Memorandum (EIM)
1. Manufacturing and Assembly routing sheets.
 2. Manufacturing and Assembly work instructions
 3. Inspection and test instructions
 4. Inspection and test results including receiving inspection of purchased goods and services.
 5. Material certifications
 6. Process certifications
 7. Sub tier certifications
 8. Line qualification data (energetic components)
 9. Internal non-conformance reports with disposition
 10. Any associated SRV's and or waivers
 11. Approved Source Inspection & Test Surveillance Record (as applicable)
 12. Kaman approval of SSE package
- A1.9 **ALTERED ITEM COMPONENTS**
- A1.9.1 Kaman shall assure the supplier is supplied the applicable engineering drawings, SOW's and specifications required to control the altered item manufacturing processes.
- A1.9.2 The supplier shall control the applicable revision of engineering drawings and specifications necessary for the altered item component.
- A2.0 SSE REVIEW**
- A2.1 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. SSE folders are also subject to postproduction on-site audit by Kaman.

**APPENDIX
B CERTIFIED SUPPLIER PROGRAM**

The intent of the Certified Supplier Program is to provide Kaman selected suppliers with "partnership" advantages.

The essence of the "Certified Supplier" status on the supplier rating means that future purchase orders can be factored to justify "Best Value" for a supplier with a "Certified" status. When procuring material or services, Purchasing shall give first priority to certified suppliers.

Acceptance into the Kaman Certified Supplier Program is based upon consistency and adequacy of the Supplier's Quality System and performance rating.

B1.0 SUPPLIER REQUIREMENTS

- a. The supplier shall comply with applicable Purchase Order terms and conditions including specifications, Statements of work and Quality Requirements stated therein.
- b. The supplier shall demonstrate control of manufacturing processes. Process capability shall be reviewed prior to certification, during quality surveys and upon Kaman request.
- c. The supplier shall assure that material meets the requirements of applicable specifications. Material and process certifications shall be maintained on file and provided to Kaman upon request.
- d. The Supplier Representative or delegate shall review each shipment for accuracy and completeness then apply the Certified Supplier Stamp to the Certification of Compliance and the shipper to signify acceptance.
- e. Product shipped from a supplier on suspended certification shall be subjected to Kaman lot inspection for a specified period of time or lots.
- f. If a suspended supplier's quality rating meets/exceeds 99% and all other delinquencies are completed, the supplier shall be considered for full certification status.
- g. If the supplier cannot maintain a 99% quality rating or correct delinquencies during the suspended certification period, the supplier shall be decertified.
- h. The responsibilities of the Certified Supplier shall include but not be limited to the following:
 1. Processes for operations producing Kaman parts/assemblies shall be controlled in accordance with the suppliers system.

Note: Changes in processes must be reviewed and approved by applicable Kaman Engineers and First Article Inspection witnessed, as required.

2. If applicable, generate and review statistical process control (SPC) data to assure continued process capability controls.
3. Verify applicable drawings, Statements of Work and specifications are of the correct revision as required on the Purchase Order and requirements are met.
4. Assure that purchase order requirements are incorporated in documents used to produce each certified item.
5. Assure that appropriate documents accompany each shipment as required by the purchase order.

6. Assure timely Cause/Corrective Action responses when required.
- i. Occurrence of any of the following will result in a review to determine the relation to a supplier's certified status.
 1. Failure to comply with requirements of Kaman Certified Supplier Plan.
 2. Unauthorized submittal of non-conforming hardware.
 3. Discrepancies discovered during hardware/process audits at Kaman, which show out-of-control conditions.
 4. Rejections during Kaman assembly process or field use, if directly attributed to supplier's product non-conformance.
 5. Change in Quality Management or facility move to a different location.

Note: Test data, inspection results and non-destructive testing results must be retained on file for a period of not less than 4 years, unless otherwise directed by purchase order. This data must be available for Kaman review upon request.

B2.0 SUPPLIER DECERTIFICATION

A SUPPLIER SHALL BE DECERTIFIED IF ANY OF THE FOLLOWING CONDITIONS EXISTS:

- a. A non-conformance resulting in serious cost/quality impact to Kaman customers.
- b. Lack of timely corrective action or general lack of responsiveness to Kaman requests.
- c. Quality System survey findings warranting disapproval as a Kaman supplier.
- d. Inability to demonstrate process control or process improvement plans (if imposed).
- e. Inability to maintain a 99% quality performance rating.
- f. Inability to maintain a 97% on-time delivery rating.

A supplier may request consideration for re-certification by notifying Kaman Purchasing. The request must include corrective action implemented and extensive evidence of process controls, if required.

Upon successful completion of a comprehensive on-site survey of the supplier's facility, quality system and process capabilities, the supplier will be considered for certified status.

**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 AND LEAN**

Six sigma and lean manufacturing are toolkits to reduce waste in business processes.

D1.0 SIX SIGMA

Six Sigma 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 products of each build are evaluated in the context of the objectives established for that build. An activity or SW product that meet those objectives are 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.