

L-3 Communications Electrodynamics, Inc.
SUPPLIER QUALITY ASSURANCE REQUIREMENTS (SQARs)

Printed versions may not be the latest. Suppliers shall utilize the latest version which can be found on our website at www.L-3com.com/EDI following the Supplier Information link.

- I. Application:** When any of the following Electrodynamics, Inc. (a wholly-owned subsidiary of L-3 Communications Corporation) SQAR Clauses in [Section IV](#) of this document are cited on the face of our Purchase Order (PO), they shall be expressly made a part of that PO based on the “Effective” date in this document’s footer. Seller may elect to comply with the latest revision of Form 1002 in advance of its “Effective” date.
- II. Terms and Definitions:** Electrodynamics, Inc. is hereinafter referred to as the “Buyer” and the supplier is hereinafter referred to as the “Seller”. The words “shall” and “must” express mandatory requirements. The word “should” expresses a recommendation or advice on implementing such a requirement. Buyer encourages such recommendations or best practices to be followed. The word “may” expresses a permissible practice or action. The word “will” expresses a provision or intention in connection with a requirement.
- III. Clause Interpretation:** For example, if SQAR Clause 1A is specified on the PO, Seller shall comply with parent Clause 1 and subordinate Clause 1A.

IV. SQAR Clauses:

1. Seller Quality System.

When SQAR Clause 1A, 1B, or 1C is specified on the PO, the Seller’s Quality System shall ensure products supplied conform to the specified SQAR Clause 1A, 1B, or 1C, and the following [General Requirements](#):

General Requirements.

- **Suspect Counterfeit/Counterfeit/Substandard/Unapproved Parts/Items.** Only new and authentic materials shall be used in products delivered to Buyer. No Suspect Counterfeit/Counterfeit/Substandard/Unapproved Parts/Items (hereinafter Suspect Counterfeit/Counterfeit Parts/Items collectively referred to as Counterfeit Parts, Substandard Parts/Items as Substandard Parts, and the terms parts and items shall be interpreted as being interchangeable) shall be contained within the delivered item.

All items shall be guaranteed to meet the original manufacturer’s or government/industry/regulatory/statutory full specifications, inclusive of being authorized or qualified (e.g., listed on the Qualified Product List (QPL), Qualified Manufacturer List (QML), Buyer drawing/specification, or possessing Federal Aviation Authority (FAA) Parts Manufacturer Approval (PMA) or Technical Standard Order Authorization (TSOA), etc.) to manufacture or provide such item(s), when required. Fasteners shall be compliant to the Fastener Quality Act (FQA), Public Law 101-592 and successor amendments

If Counterfeit Parts are furnished under this PO and are found in any of the goods delivered hereunder, such items will be impounded by Buyer. The Seller shall promptly replace such Counterfeit Parts with parts acceptable to the Buyer, and the Seller shall be liable for all costs relating to the removal and replacement of said parts as specified in the purchase order requirements or Seller’s insurance policies.

Buyer reserves all contractual rights and remedies to address grievances and detrimental impacts caused by Counterfeit/Substandard parts, and may, at the Buyer’s sole discretion, report such to law enforcement agencies, and/or third-party monitoring or reporting entities.

Independent Distributor's procedures shall meet the requirements of IDEA-STD-1010 and SAE AS5553, and have a Quality Management System certified to AS/EN/JISQ 9120. Certification and traceability requirements shall be as specified in [SQAR Clause 3A \(Certificate of Conformance \(C of C\)\)](#).

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1. Seller Quality System – CONTINUED.

Sellers buying items and manufacturing subassemblies, assemblies, units, subsystems, systems, etc. for delivery under a PO from Buyer (a.k.a. subcontractors and contract manufacturers who have not been consigned material by Buyer) shall have risk mitigation methodologies established and documented that are acceptable to Buyer. Sellers should model their control plan based upon SAE AS5553 available from the Society of Automotive Engineers (SAE) at www.sae.org. Parts shall be purchased directly from the OCM/OEM, or through the OCM's/OEM's Franchised Distributor. Documentation shall be available that authenticates traceability to the applicable OCM/OEM. Independent Distributors (i.e., Brokers or Non-Franchised Distributors) shall not be used without written consent from Buyer.

All occurrences of Suspect Counterfeit and/or Counterfeit parts shall be immediately reported to the Buyer.

Definitions:

Counterfeit Part: A suspect part/item that is a copy or substitute without the legal right or authority to do so, or one whose material, performance, or characteristics are misrepresented.

Examples of counterfeit parts include, but are not limited to:

- a. Items which do not contain the proper internal construction (die, manufacturer, wire bonding, etc.) consistent with the ordered part.
- b. Items which have been used, refurbished or reclaimed, but represented as new product.
- c. Items which have different package style or surface plating/finish than the ordered parts.
- d. Items which have not successfully completed the original manufacturer's full production and test flow, but are represented as completed product.
- e. Items sold as up-screened parts, which have not successfully completed up-screening.
- f. Items sold with modified labeling or markings intended to misrepresent the part's form, fit, function, or grade.
- g. Items which are required to be manufactured by a qualified manufacturer (e.g., listed on the Qualified Product List (QPL), Qualified Manufacturer List (QML), Buyer drawing/specification, etc.), but who is not listed as being qualified at the time of manufacture.
- h. In the context related to the FAA, parts made or altered to imitate or resemble an "Approved Part" (ref. FAA [AC 21-29](#)) without the authority or right, and with the intent to mislead or defraud by passing as original or genuine. For example: items which are required to be manufactured by an FAA approved/authorized manufacturer (e.g., FAA PMA or TSOA), but who are provided by suppliers, who are not approved/authorized to do so at the time of manufacture or sale.
- i. Fasteners not compliant to the Fastener Quality Act (FQA), Public Law 101-592 and successor amendments.

Parts which are not generally considered counterfeit are those whose characteristics or specifications have been authorized to be modified, and which have not been misrepresented, such as lead refinishing, up-screened, or up-rated parts.

Franchise Distributor: A distributor with whom the OCM or OEM has a contractual agreement to buy, stock, re-package, sell, and/or distribute its product lines.

Independent Distributor (i.e., Broker or Non-Franchised Distributor): A distributor that purchases parts with the intention to sell or redistribute them.

Item: A part, subassembly, assembly, unit, group, set, subsystem, system, etc. (ref. [MIL-HDBK-505](#)).

Original Component Manufacturer (OCM): An organization that designs, engineers, and/or manufactures a part, and is pursuing, or has obtained the intellectual property rights to that part.

Original Equipment Manufacturer (OEM): Same as OCM.

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1. Seller Quality System – CONTINUED.

General Requirements – CONTINUED.

• **Suspect/Counterfeit/Substandard Parts/Items – CONTINUED.**

Definitions – CONTINUED:

Substandard Part: Unless otherwise authorized in writing by Buyer Substandard Parts/Items are defined as parts/items which may actually be the part ordered; however, they (i) have been sold to an entity other than the original manufacturer authorized/franchised distributor (i.e. independent distributor or broker), since leaving the original manufacturer, (ii) have been previously installed in an application/equipment, (iii) have been previously programmed (for programmable items), (iv) have been reclaimed, refurbished, renovated, or re-processed in any manner, including, but not limited to, being re-marked/identified, up-screened, re-tinned, re-finished, solder-dipped, re-polished/brightened, leads re-aligned, etc. (v) have been previously scrapped or otherwise discarded, or (vi) is beyond 7 years from the date of manufacture. Note, the issuance of a PO by Buyer does not constitute Buyer authorization unless accompanied with specific text authorizing such cited in the body of the PO or cited in the item's governing drawings/specifications.

Suspect Part (a.k.a. Suspect Counterfeit Part or Suspect Unapproved Part): A part/item in which there is an indication that it may have been misrepresented by the supplier or manufacturer and may meet the definition of a counterfeit part.

- **Export / Import Control.** Buyer requires that the Seller maintains full compliance with the U.S. Government export/import laws and regulations including the U.S. Department of State, Directorate of Defense Trade Controls (DDTC), International Traffic in Arms Regulations (ITAR) and the U.S. Department of Commerce, Bureau of Industry and Security (BIS), Export Administration Regulations (EAR) throughout the entire fulfillment period of this PO, as may be applicable.

The Seller shall be solely responsible, and shall release, indemnify, and hold harmless (which for purposes of this requirement shall include, without limitation, Buyer's officers, employees, and agents) from and against any and all claims, demands, losses, damages, defense costs, or liability of any kind, which may arise out of, or are in any manner connected with the protection of any controlled technical data or defense articles provided to Seller by Buyer to assist in the manufacture of a defense article or provision of a defense service.

The release of this data by the Seller to a Foreign Person employee or its transfer to another Foreign Person for the purpose of Off-Shore Procurement is defined as an export (ITAR 22 CFR Parts 120.17 and 124.13 and EAR 15 CFR Part 734.2(b) (2) (ii) and Supplements 1 and 2 or Part 774) and shall be subject to the licensing requirements of the ITAR and EAR, as applicable.

- **Referenced Document Revisions.** Unless otherwise specified, all specifications and standards referenced as part of the PO shall be the latest issue in effect at the time of PO placement. In the event a military/industry standard or specification is canceled or superseded, the superseding document should be used. If no superseding document is cited or known, the latest revision prior to cancellation should be used. Direct any questions to Buyer's purchasing agent specified on the PO.
- **Document and Record Language.** All documents and records produced in conjunction with this PO shall be in the English language.
- **Workmanship.** Items supplied shall be in accordance with the applicable requirements specified in Buyer's Workmanship Manual, [6310034](#), which can be found on Buyer's website at www.L-3com.com/EDI following the Supplier Information link, or can be obtained via Buyer's purchasing agent specified on the PO.
- **Zero Based Sampling.** Seller's sampling plans employed shall be in accordance with established military or industry consensus standards. Seller should employ zero acceptance number (c=0) or often referred to as accept-on-zero (AOZ) sampling techniques. The use of statistically valid sampling plans does not relieve Seller of Seller's sole obligation to provide 100% defect-free items at no increase in price, cost, or fee to Buyer.

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1. Seller Quality System – CONTINUED.

General Requirements – CONTINUED.

- **Tin Prohibition.** Unless specifically approved in writing by the Buyer, the tin content of any constituent element (e.g., plating or finish), part, assembly, solder, etc., regardless whether internally or externally, shall not exceed 97 percent tin and shall be alloyed with a minimum of 3 percent lead, by mass. Note, the issuance of a PO by Buyer does not constitute Buyer authorization unless accompanied with specific text authorizing such cited in the body of the PO or cited in the item's governing drawings/specifications.
- **Individual SQAR Clauses Invoked.** The following SQAR Clauses are in full affect for this order as if they were explicitly stated on the PO:
 - [Clause 13A - First Article Inspection](#)
 - [Clause 22 - Special Tooling and Special Test Equipment](#)
- **General Quality System Objectives and Requirements.** Sellers should be third-party registered and receive periodic quality management system audits (QMS), or be potentially subjected to increased periodic audits by Buyer. Third-party registrations to an ISO/AS standard will likely be accepted by Buyer if third-party registrar (a.k.a certification body) is (i) properly accredited by ANAB or international equivalent, and (ii) the scope of Seller's certificate of registration adequately covers the product(s) or service(s) being provided by Seller. ANAB accredited Certification Bodies (CBs) are listed at the following web site: <http://www.anab.org>.

Buyer's objective is to have predominantly only third-party registered suppliers on Buyer's Approved Suppliers List (ASL). Buyer's required (*) and preferred QMS levels are as follows:

- **Manufacturing With Design Authority:** Third-party registered to AS/EN/JISQ 9100 with design being included in scope of registration. Supplier may not exclude any design portions of the standard.
- **Manufacturing Without Design Authority / Special Processes:** Third-party registered to AS/EN/JISQ 9100 or ISO 9001.
- **Maintenance, Repair and Overhaul:** Appropriate Civil Aviation Authority (CAA) Certification (i.e., domestic (e.g., 14 CFR Part 145) and/or international regulatory agency certifications/approvals), and either AS/EN/JISQ 9110 (preferred) or AS/EN/JISQ 9100. Note: CAA may be sometimes be referred to as National Aviation Authority (NAA).
- **Special Processors (Non-Manufacturing):** Third-party registered to AS9003 or satisfactory audit to NADCAP AC7004.
- **Materials Laboratories and Non-Destructive Test (NDT) Laboratories:** Third-party registered to ISO 17025, or AS 9003, or satisfactory audited to NADCAP AC7004.
- **Franchised Distributors:** Third-party registered to AS/EN/JISQ 9120.
- **Independent Electrical/Electronic Distributors (i.e., Brokers or Non-Franchised Distributors):** Quality Management System third-party registered to AS/EN/JISQ 9120, and IDEA-STD-1010 and SAE AS5553 compliant.*
- **Calibration Laboratories:** Third-party registered to ISO 17025 for the scope of the calibration service.
- **Software Service Providers:** Third-party registered to AS/EN/JISQ 9100 and either, AS 9115 (replacing AS 9006), RTCA/DO-254, or EUROCAE ED-80 compliant.

NOTE: * indicates "Required". Unless otherwise specified by governing regulatory or statutory policies, rules, or regulations, all others QMS levels are considered "Preferred", for continued inclusion on Buyer's ASL, at this time.

For the duration of Buyer's approval of Seller's QMS, Seller shall notify Buyer of any changes as specified in [SQAR Clause 10 Changes](#).

- A. Quality Management System.** The items and/or services provided by the Seller under this PO shall be controlled by a documented "Quality System Program" that complies with AS/EN/JISQ 9100, AS/EN/JISQ 9120, ISO 9001, ISO 17025, 14 CFR Part 21, MIL-Q-9858A, or Buyer accepted equivalent, and be compliant with the above [General Requirements](#).

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1. Seller Quality System – CONTINUED.

- B. Inspection Quality System.** The items and/or services provided by the Seller under this PO shall be controlled by a documented “Inspection Quality System” that complies with AS 9003, AC7004, MIL-I- 45208, or Buyer accepted equivalent, and be compliant with the above [General Requirements](#).
- C. Other Quality System.** Deleted without replacement at Revision H.
- D. Maintenance, Repair, and Overhaul (MRO) Quality System.** The items and/or services provided by the Seller under this PO shall be controlled by a documented “MRO Quality System” that complies with the applicable Civil Aviation Authority (CAA) Certification (i.e., domestic (e.g., 14 CFR Part 145) and/or international regulatory agency), and either AS/EN/JISQ 9110 (preferred) or AS/EN/JISQ 9100, or Buyer accepted equivalent, and be compliant to the above the [General Requirements](#).

2. Right of Access, Surveillance, and Source Inspection. Regardless of Buyer’s or Buyer's Customer Point of Acceptance on this order or whether Buyer's Customer has issued a delegation for this PO, Seller shall provide or obtain for Buyer, Buyer’s customers, and regulatory agency personnel, access to any and all facilities where work is being performed or is scheduled to be performed, including those facilities of Seller’s sub-tier suppliers, in order to perform item inspections, surveys or system/process surveillance as part of verification of conformance to the requirements of this order. Seller’s denial of any such access may result in inactivation of Seller’s approval.

Seller should include the provisions of this right of access requirement in its POs with its sub-tiers. Seller shall provide, at no increase in price, cost or fee to Buyer, Buyer’s customers or regulatory agencies, suitable facilities, equipment, records, and personnel which are readily available at Seller and Seller’s sub-tiers for Buyer, Buyer’s customer and regulatory agency representatives to perform item inspections, surveys, or system surveillance.

Upon Buyer’s sole discretion of Seller’s performance in fulfilling the order, Source or Surveillance Inspection may be invoked by Buyer during execution of the order at no increase in price, cost, or fee to Buyer. Source or Surveillance Buyer-authorization documentation shall accompany each applicable shipment. Unauthorized shipments shall be cause for Seller’s rejection. Source or Surveillance Inspection shall not relieve Seller of Seller’s responsibility to provide acceptable conforming items on-time.

- A. Surveillance.** Seller shall notify Buyer in writing at least 7-working days in advance of a Buyer’s established need for surveillance audit/inspection. Failure to provide written notification within 7-working days may result in a charge to Seller and payable by Seller, for additional Buyer costs incurred. Notification shall include (i) Buyer’s PO number and line item, (ii) quantity for surveillance inspection, and (iii) need date.
- B. Buyer Source Inspection.** Source inspection and acceptance by Buyer is required prior to shipment from Seller’s plant. Seller shall notify Buyer in writing at least 7-working days in advance of need for source inspection. Failure to provide written notification within 7-working days may result in a charge to Seller, and payable by Seller, for additional Buyer costs incurred. Notification shall include (i) Buyer’s PO number and line item, (ii) quantity for inspection/acceptance, and (iii) need date.
- C. Government Source Inspection.** Inspection by the U.S. Government is required prior to shipment from Seller’s plant pursuant to the applicable Federal Acquisition Regulations. Seller shall furnish necessary information to the Government representative whom normally services Seller’s facility. If no Government representative normally services Seller’s facility, Seller shall contact and coordinate inspection services with their local DCMA or other appropriate government agency. Buyers Source Inspection acceptance per [SQAR Clause 2B](#) shall be required prior Government Source Inspection.

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3. Certification.

A. Certificate of Conformance (C of C).

Certifications shall accompany all shipments as specified below dependent upon whether the Seller is an Original Manufacturer or their Distributor classification type. Buyer [Form 1006](#) is available for Seller use.

- Original Manufacturer and Distributors: The certificate shall cite the (i) Buyer's PO number, (ii) Buyer's part number and revision, (iii) Buyer approved nonconformance (if applicable), (iv) Seller's name, (v) Seller's address, (vi) Seller's part number and/or revision (if applicable), (vii) Seller's traceability data such as date codes, lot codes, serializations, and / or any other batch identifications, (viii) quantity in shipment, (ix) an attestation statement stating compliance to Buyers PO, (x) the name of Seller's authorized representative, and (xi) the date.

Additional C of C requirements for Active and Passive Electronic Components (APECs) Distributors shall be as specified below.

- Active and Passive Electronic Components (APECs) Distributor (includes all types of resellers - Franchised and Independent Distributors, Brokers, etc.): Pursuant to [SQAR Clause 1 General Requirements, Suspect Counterfeit/Counterfeit/Substandard Parts/Items](#), in addition to the above C of C requirements, for Distributor providing APEC the OCM's/OEM's C of C and all traceability documentation shall be included with each shipment of components. Seller shall contact Buyer in the event that the original OCM's/OEM's C of C and traceability documentation are not available. The issuance of a PO by Buyer does not constitute Buyer's authorization for Seller to ship APECs without the OCM's/OEM's C of C, unless Buyer specific authorization is cited in the body of the PO.

Inspections and tests required shall be as noted on Buyer's Purchase Order. All inspection and testing shall be performed to the original manufacturer's specifications and parameters. Should the inspection and testing be subcontracted, [SQAR Clause 17A \(Sub-tier Supplier Approval\)](#) shall apply. Recorded evidence of all testing performed shall be included with each shipment.

The original manufacturer's certificate shall cite the (i) manufacturer's name, (ii) manufacturer's address/location (preferred), (iii) manufacturer's part number, (iv) manufacturer's traceability data such as date codes, lot codes, serializations, and / or any other batch identifications, (v) a compliance attestation statement, (vi) the name of the manufacturer's authorized representative (preferred), and (vii) the date.

The Buyer has available for Seller's usage a Certificate of Conformance ([Form 1006](#)), which provides a template and check sheet to facilitate the certification process. [Form 1006](#) can be found on Buyer's website at www.L-3com.com/EDI following the Supplier Information link, or can be obtained via Buyer's purchasing agent specified on the PO.

- B. Physical and Chemical Test Report.** Physical and chemical analysis test data of the material supplied on this PO and a certified statement that the test results are within specified limits are required and shall be furnished by Seller. The test data shall provide objective evidence that the material supplied meets the chemical and physical requirements of the drawing(s) and / or specification(s) cited on the PO.

- C. Physical and Chemical Properties.** Seller shall list and certify to physical and chemical properties of material supplied on this PO. The properties listed shall include those specified on the drawing (s) and/or specification (s) cited on the PO.

- D. Special Processes Certification (Heat Treat, Chemical Film Conversion, Plating, Painting, Non-Destructive Testing, etc.).** The special processor shall be approved by NADCAP or a major defense contractor for the special process on the date of which the special process was actually performed. The special process certification shall include, as a minimum (i) the Buyer's part number, including revision, (ii) name and address of special processor, (iii) applicable special processor's NADCAP certification or major defense contractor's special process approval document including approval period/expiration date, (iv) special process specification, including revision, and complete designation (e.g., associated grade, class, type, etc.), (v) quantity processed, (vi) the date(s) of which the special process was performed, and, (vii) for heat-treated material the actual hardness reading(s).

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3. Certification – CONTINUED.

- E. Buyer’s Customer Approved Special Process Supplier.** Not to be used for new part number assignment. For existing legacy PO assignments, [SQAR Clause 16](#) shall apply for this order as if it was explicitly stated on the PO.
- F. Actual Test/Inspection Data.** Actual test/inspection measurements of items on this PO shall be recorded and included with each shipment.
- G. Attribute Test/Inspection Data.** Attribute test/inspection measurements of the items on this PO shall be recorded and included with each shipment.
- H. Calibration Services Certificate.** A certificate, report, or data sheet shall be supplied for each item calibrated under this PO that identifies: (i) the identifier (e.g. Buyer’s Cal ID and/or manufacturer, manufacturer’s model number, and serial number (when available)) of the item calibrated, (ii) the name of the individual who performed the calibration, (iii) the date calibrated, (iv) the environmental condition under which the calibration results furnished were obtained, (v) the specification(s) to which the item was calibrated, (v) the calibration standards used which are traceable to the National Institute of Standards and Technology (NIST), or which have been derived from accepted values of natural physical constants or by the ratio-type of self-calibration techniques, as applicable, (vi) a “calibration attestation statement”, and (vii) “before” and “after” calibration data, as required. The “calibration attestation statement” (ref. vi) shall attest to the fact that the accuracy of the standards used in obtaining the results have been compared at planned intervals with the National Institute of Standards and Technology (NIST), or which have been derived from accepted values of natural physical constants or by the ratio-type of self-calibration techniques. If any adjustments (ref. vii) were made to the item being calibrated, “before” and “after” data for the adjusted characteristic(s) shall be provided. If any out-of-tolerance (OOT) conditions were observed and/or repairs (ref. vii) were made, “before” and “after” data for all the calibrated characteristics of the item under calibration shall be provided, regardless whether the calibrated characteristics were adjusted, OOT, or affected by the given repair, or not.
- I. TSO/PMA Certificate and Airworthiness Approval Tag.** If the Seller holds Civil Aviation Authority (CAA) (a.k.a. National Aviation Authority (NAA)) certification/approval/authorization (e.g., Federal Aviation Authority (FAA) Technical Standard Order Authorization (TSOA)/Parts Manufacturer Approval (PMA)/Type Certification (TC)), the Seller is responsible for assigning and maintaining serial number control. If Buyer holds the CAA certification/approval/authorization, the Seller shall assign serialization as specified in Buyer’s order.

For product with Seller-held TSOA/PMA, the Seller shall provide an Authorized Release Certificate, FAA Form 8130-3 (Airworthiness Approval Tag) or other CAA equivalent Airworthiness Approval Tag with each product. Where it may be impractical to supply an Airworthiness Approval Tag with each discrete item, a single Airworthiness Approval Tag covering the range of serial numbers/batch numbers/date codes shipped shall be provided. If the Buyer’s part number differs from the TSOA/PMA/TC part number, the Buyer’s part number shall be referenced on the 8130-3 (Remarks, Section 13) or other CAA equivalent Airworthiness Approval Tag location. The (i) Certificate of Conformance (C of C) provided with each shipment shall be in accordance with [SQAR Clause 3A](#), and the (ii) Airworthiness Approval Tag shall be in accordance with the applicable CAA governing regulations and as specified herein.

If the C of C and/or the Airworthiness Approval Tag is provided inside the “exterior container” (see MIL-STD-129 for definition), a stamp or label should be on the “exterior container” indicating the enclosure.

- 4. Nonconforming Material (NCM) and Material Review Authority (MRA).** Seller shall maintain an effective and positive system for controlling NCM, including procedures for the identification, documentation, evaluation, segregation, and disposition of NCM. If at any time, the Seller suspects or determines nonconforming material or may have been shipped to the Buyer, the Seller agrees to notify the Buyer within 48-hours of identification.

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4. Nonconforming Material (NCM) and Material Review Authority (MRA) - CONTINUED.

Seller's Material Review Authority shall not extend to "Repair" or "Use-As-Is" dispositions for supplier published characteristics or Buyer specified requirements. Rework of nonconforming supplier published characteristics or Buyer-specified requirements shall be in accordance documented procedures and shall require re-inspection prior to shipment.

"Repair" is defined as the reprocessing of a nonconforming Buyer-specified characteristic to reduce, but not completely eliminate, the nonconformance. The purpose of a repair is to bring the nonconforming characteristic(s) into an acceptable usable condition. "Rework" is defined as the reprocessing to make a nonconforming characteristic completely conform to the drawing, specification, or PO requirements. "Repair" is distinguished from "Rework" in that the item after repair still does not completely conform to the applicable drawing, specification, or PO requirements.

"Scrap" shall be adequately controlled and positively identified to prevent inadvertent re-entry into the Seller's process or supply chain.

The Seller shall not ship, nor will the Buyer accept, nonconforming or repaired items, unless authorized in writing, in advance, by the Buyer. Buyer approved nonconforming or repaired items shall be identified on the applicable Certification provided with the shipment. Note, the issuance of a PO by Buyer does not constitute Buyer authorization unless accompanied with specific text authorizing such cited in the body of the PO.

When requested by Buyer, Seller agrees to provide to the Buyer corrective action using Buyer's Form 1402 (Supplier Corrective Action Request) within 30 days from issuance. Seller further agrees to (i) conduct a thorough failure/root cause analysis identifying the cause(s) for the discrepancy(ies) noted, (ii) determine and take the necessary corrective action(s) to prevent recurrence, (iii) to identify whether any previous shipments for the subject or similar parts contain the noted discrepancy, and (iv) to identify the effectivity of the corrective action(s). The failure/root cause analysis should be conducted using proven techniques such as 5-Why's, Cause and Effect/Fishbone diagrams, Fault Tree diagrams, etc. Upon request, assistance/training is available from the Buyer.

5. Solder/Solderability of Parts.

A. Electronic and Circuit Card Assemblies. Unless otherwise authorized in writing by the Buyer, the following shall apply. Electronic and electronic circuit card assemblies (CCA) shall be soldered to the requirements of IPC J-STD-001, Class 3, or Buyer acceptable equivalent as applicable to this PO. The Seller shall implement and maintain a system that includes adequate process controls to assure conformance to the soldering, cleanliness, acceptance, material handling, storage, and shipping requirements. CCA's containing hidden solder joints (e.g., Ball Grid Arrays (BGA's)) shall be 100% inspected in accordance with [SQAR Clause 27D](#). The tin content of any constituent element (e.g., plating or finish), part, assembly, solder, etc., regardless whether internally or externally, shall not exceed 97 percent tin and shall be alloyed with a minimum of 3 percent lead, by mass. The item shall meet the cleanliness requirements of IPC J-STD-001, cleanliness designator C-22. Rework, if required, shall be per [SQAR Clause 27F](#).

B. Component & PCB Solderability. The Seller (manufacturer or distributor) shall ensure that all parts: leads, lugs, terminal, wires and terminations cited on this PO shall meet the component solder requirements of IPC J-STD-001 and the solderability requirements of IPC J-STD-002 or Buyer acceptable equivalent, and Printed Circuit Boards shall meet the solderability requirements of IPC J-STD-003 or Buyer acceptable equivalent.

C. Pre-Tinning. Component leads or the like shall be tinned with SN63PB37 or SN60PB40 solder per IPC J-STD-006 and properly cleaned to remove flux residue. Leads shall meet the solderability requirements of IPC J-STD-002, Category 3 or Buyer acceptable equivalent.

D. Solderability Test Samples. To assure the solderability of plated parts are acceptable, Seller shall furnish with each shipment a minimum of three samples from the same lot, which have been subjected to the solderability test of MIL- STD-202, Method 208 or Buyer acceptable equivalent.

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5. Solder/Solderability of Parts – CONTINUED.

E. Fluxes, Solder and Solder Paste. Fluxes, solder alloys, and solder pastes shall meet the IPC J-STD requirements: J-STD-004 for Fluxes, J-STD-005 for Solder Pastes, and J-STD-006 for Solder Alloys, or Buyer acceptable equivalent. Unless otherwise authorized in writing by the Buyer, the tin content of any solder used shall not exceed 97 percent, and shall be alloyed with a minimum of 3 percent lead. Note - the issuance of a PO by Buyer does not constitute Buyer authorization unless accompanied with specific text authorizing such cited in the body of the PO or cited in the item's governing drawings/specifications.

F. Under Plating & Solder Coating Test Coupons. Test coupons shall be furnished by the Seller for under plating (qty. 4) and solder coating (qty. 4) with each lot supplied as specified on the drawing(s) and /or specification(s) cited on the PO.

6. Calibration Services. Seller's inspection, measuring, and test equipment (IM&TE) services shall have a calibration system in compliance with the requirements of MIL-STD-45662A, ISO 10012, ANSI/NCSL Z540, or ISO17025. Calibration procedures shall be maintained which provide sufficient information for periodic calibration of IM&TE. Buyer reserves the sole right to return items at no charge that have less than 75% of their calibration interval remaining and/or which were not calibrated within the last 52-weeks from Buyer's receipt. Calibrations shall be per the original equipment manufacturers specifications or of greater accuracy. Software programs, scripts, stored memory data, or the like, shall be left in the "as-received" state, and any additions, deletions, or changes from this "as-received" state requires the prior written authorization of Seller. At Buyer's sole discretion, Seller may be held liable for any such unauthorized changes.

7. Electrostatic Discharge (ESD) Protection. Components and assemblies, which are susceptible to electrostatic discharge damage, shall be handled and packaged to prevent ESD damage utilizing MIL-STD-1686, ANSI/ESD S20.20, or EIA/JEDEC JESD625 as a guideline or Buyer acceptable equivalent. ESD protective containers shall be marked as containing ESD sensitive devices.

8. Seller Quality Assurance Program Requirements. Deleted without replacement at Revision H.

9. Tool Proofing. Dimensional part samples from tooling to be used for production shall be furnished to and approved by the Buyer prior to fabrication of production parts. For multi-cavity molds or dies, samples shall be provided from each cavity and the cavity shall be identified. Production parts fabricated in advance of Buyer approval shall be at the Seller's risk (ref. [SQAR Clause 13A](#) or [SQAR Clause 13B](#)).

10. Changes. Seller shall not make any changes in (i) material(s), (ii) design, (iii) manufacturing source(s), (iv) process(es), (v) tooling, (vi) equipment, (vii) equipment/tooling/product software, etc. which can potentially affect the fit, form, function, reliability, or maintainability of the item or services on this PO without the prior notification (within 48-hours of the event) and approval of the Buyer. Additionally, Buyer shall notify Seller of (i) any changes in its quality management representative or quality leadership, (ii) any adverse changes to Seller's quality system accreditations (e.g., expired, withdrawn, suspended, downgraded) or stature (iii) any changes of senior management, (iv) changes in company ownership, (v) any significant manufacturing / production infrastructure changes, including expansions and relocations, and (vi) the curtailment/discontinuance of manufacturing operations or product/services not being continuously available for purchase. Execution of order in advance of Buyer approval shall be at the Seller's sole risk.

11. Material Traceability.

A. Components (Electrical, Electronic, and Mechanical). All components used on this PO shall be traceable to the original manufacturer's lot or date codes and supporting approval documentation (e.g., PO's & certificates of conformance). This also applies to test data and reports, as specified in the applicable PO, contract or specification. The Seller shall be able to trace these components to all delivered items.

B. General. The Seller shall establish and maintain a system for documenting the history of item from receipt of raw material through all stages of manufacture, inspection, test and shipment by such means as a lot number, date code, or serial number control. The means used shall relate the item to the particular lot of raw material, manufacturing process, specification, drawing, heat number, cure date, etc., to provide a complete history traceable to Seller's records and data. Seller shall furnish the lot, date code, serial number or other traceable identification with each shipment.

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12. Qualification Testing. Qualification testing in accordance with Buyer's drawing or applicable specification(s) is required. Seller shall submit a Qualification Test Procedure (QTP) to Buyer, and Seller receive Buyer's written approval prior to the start of qualification testing. Upon completion of qualification testing, Seller shall submit a Qualification Test Report (QTR) for Buyer's written approval. Any work performed or expenditures made by Seller prior to Buyer's QTR written approval shall be at the Seller's risk.

13. First Article Inspection. (*Note: SQAR Clause 13A is the same as former Rev E SQAR Clause 13*)

A. First Article Inspection with Production Lapse Re-accomplishment FAI Every Two (2) Years.

First Article Inspection (FAI) is required for all items except those that are (a) standard catalog items (ref. AS9102 Standard Catalog Hardware and [FAR 2.101](#) Commercial Item definitions), (b) raw material, or (c) covered by a military/industry standard/specification. FAI is required to be performed on an item from the initial production lot provided by the Seller.

The Seller shall not perform FAI using prototype items or items manufactured using methods different from those intended for the normal production process. The Seller shall record, whenever possible the variable measurements, of all characteristics including applicable drawing notes on the First Article Inspection Report (FAIR). All multi-cavity molds/dies require a FAI for each cavity. A representative of the Seller's Quality Assurance Department shall sign and date the report. The Seller shall forward the FAIR along with applicable material or test data/certifications (e.g., painting, plating, composition, x-ray, Group A/functional testing etc.) with the lot. The FAI item shall be readily identified and distinguishable as such.

A partial (a.k.a. delta) or re-accomplishment FAI shall be performed when any of the following events occur:

1. A change in design, manufacturing source(s), process(es), inspection method(s), location of manufacture, tooling or materials that can potentially affect form, fit or function.
2. A change in numerical control program or translation to another media that can potentially affect form, fit or function.
3. A natural or man-made event, which may adversely affect the manufacturing process.
4. A lapse in production for two years or as specified by the Buyer.

AS9102 Aerospace First Article Inspection Requirement should be used as a guide and contains a Buyer-acceptable FAIR form. Copies of AS9102 may be obtained from the Society of Automotive Engineers (SAE) at www.sae.org. The [AS9102 FAIR Form 1013](#) can be found on Buyer's website at www.L-3com.com/EDI by following the Supplier Information link, or can be obtained via Buyer's purchasing agent specified on the PO.

B. First Article Inspection with Production Lapse Re-accomplishment FAI Every One (1) Year.

Same as [SQAR Clause 13A](#) with the following change to Note 4 above. Remove and replace Note 4 above with:

4. A lapse in production for one year or as specified by the Buyer.

C. Annual Mechanical First Article Inspection FAI.

Same as [SQAR Clause 13A](#) with the following Note 5 being added after Note 4:

5. A "mechanical" First Article Inspection (FAI) is required to be performed once every calendar year on an item from that calendar year's initial production lot provided by the Seller. The FAI shall cover all the mechanical characteristics on the drawing, inclusive of all dimensions, material and/or plating/painting/finish thicknesses, surface finish, marking size and/or location, mechanical tests (e.g., pull-tests, hardness), etc., regardless of whether the characteristic appears on the field of the drawing, in the notes, in the title block, or in a reference specification. FAI of electrical or environmental characteristics shall not be required. In the event of any possible doubt or a question, Seller shall be responsible to contact the Buyer for written clarification in advance of submission. Note: the same FAI partial or re-accomplishment "trigger" events (1 through 4) in [SQAR Clause 13A](#) shall still apply.

14. Shelf Life/Hazardous Material/Explosives. Items with limited life shall be supplied with accompanying effective date of manufacture or date of expiration and at time of receipt at Buyer, shall have at least 75% of their shelf life remaining. Items shall be labeled with correct shipping or HMIS markings, item description, part number, and date of manufacture and/or expiration date, storage temperature, and name of manufacturer. The Seller shall provide Material Safety Data Sheets with all shipments requiring such special handling as required by applicable regulatory agencies and law.

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- 15. Buyer/Customer-Furnished Material (B/CFM).** When furnished by the Buyer or Buyer's customer, the Seller shall (i) verify quantity and inspect upon receipt, (ii) functionally test/verify prior to and/or following unit installation as required by the PO, (iii) identify as Buyer's property and segregate from other material to assure proper use on end product, and (iv) document the receipt, inspection, test, handling, and disposition of the material. Buyer or Buyer's Customer assets (i) shall not be used for other than the originally intended purpose, and (ii) shall not be modified, repaired, or disposed of, without the written authorization from the Buyer. Seller shall be solely responsible for instituting preventive maintenance, performing calibration (when required), and performing minor repairs on B/CFM at no increase in price, cost, or fee to Buyer. Buyer authorization is required prior to Seller performing any repairs.
- 16. Special Processes.** A special process is an operation performed on an item where the operation is not readily inspectable subsequent to its conclusion. Special processes have verifiable controls inherent to the process (i.e. heat treat, plating, nondestructive testing, etc.). Special Processes shall be performed in accordance with specification(s) stated on the drawing and procurement documents.

Buyer or Buyer's customer requires special processes to be performed by approved Buyer/Buyer's customer approved special process suppliers as listed on this PO. If a special process supplier(s) is not listed on the PO, the special process supplier, as a minimum, shall be NADCAP approved or approved by a major defense contractor. The special processor shall be approved by NADCAP or a major defense contractor for the special process on the date of which the special process is actually performed. Unless otherwise specified, certification(s) shall be in accordance with [SQAR Clause 3D](#). If a Seller's sub-tier supplier performs the special process, the Seller is responsible to flow down the requirements on sub-tier POs. Seller's utilization of Buyer's/Buyer's customer-approved sources does not relieve the Seller from the obligations to ensure subcontracted sources are in full compliance with applicable specifications and to deliver conforming items. *(L-3 EDI internal note: when applicable, specify Customer-Approved Special Processor(s) on PO IAW [QOP-06-03](#).)*

A. Lockheed Martin Aeronautics Special Processes. Deleted without replacement at Revision H.

- 17. Sub-tier Supplier Control.** Seller shall flow down the applicable clauses of this document to sub-tier suppliers for this PO.

A. Sub-tier Supplier Approval. Seller shall furnish the Buyer with the name and address of each sub-tier supplier and receive Buyer written approval prior to issuance of any sub-tier PO.

- 18. Software Control.** Seller shall establish and maintain a software quality assurance system suitable for this PO. Buyer may accept Seller's adaptation of industry consensus standards, such as SAE AS9115, RTCA/DO-254 or EUROCAE ED-80 for contracted deliverable software. Buyer approval of Seller's software quality assurance system shall be obtained prior to starting work.

A. Software Plans. Unless otherwise specified, Seller shall submit the following documents for approval within 60 days after date of this PO: (i) Software Quality Assurance Plan, (ii) Software Development Plan, and (iii) Software Configuration Management Plan.

- 19. Packaging Requirements.**

A. Unique Packaging. Unique packaging is in effect as cited on the PO. Contact Buyer if further clarification is required.

B. Moisture/Re-Flow Sensitive Devices. Moisture/Re-Flow Sensitive Devices shall be adequately packaged per ANSI/J-STD-33, or Buyer acceptable equivalent. These devices shall be dry and sealed in moisture barrier bags/containers with desiccant, a humidity indicator card and appropriate caution label applied to the exterior of the moisture barrier bag or container.

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19. Packaging Requirements – CONTINUED.

- C. Hazardous Material/Explosives.** Hazardous Material/Explosives on this PO shall be properly packaged and labeled per appropriate Federal regulation (s). The Seller is responsible to ensure that all Federal regulations are met.
- D. Tape and Reeled Components.** Surface mount or axial lead components shall be tape and reeled in accordance with ANSI/EIA-481.

20. Contractor Safety Program. Contractors are obligated to comply with all applicable provisions of the Contractor Safety Manual as a term and condition of their respective PO and purchase agreements. It is the policy of Buyer to ensure that outside contractors performing work at our facility comply with all applicable environmental, health, and safety (EHS) regulations and perform their work in a manner which ensures their own safety, and that of our employees.

21. Preference for Domestic Specialty Metals. This clause requires compliance to DFARS 252.225-7014 (Alternate I) and applies to all POs in which specified, regardless of its acquisition threshold (DFARS 225.7002-2). In the case of conflict between this SQAR clause and L-3 Communications Terms and Conditions, the former shall apply. Unless otherwise stated, all references to “Contracting Officer” will mean the L-3 EDI procurement agent.

The Seller shall reference DFARS 252.225-7014 (Alternate I) on all applicable sub-tier orders.

DoD’s interpretation of this specialty metals clause, DFARS Subpart 225.7002-2, is that it prohibits the contractor (including its suppliers at every tier) from incorporating into military parts, components, and/or end item deliverables “specialty metals” (including specific titanium and stainless steel alloys as specified therein) which have been melted outside the United States, its possessions, or Puerto Rico, unless certain limited exceptions set forth in the clause or DFARS Subpart 225.7002-2 (exclusive of acquisition threshold) apply. One such exception is for specialty metals melted in a qualifying country or incorporated into an article manufactured in a qualifying country. Those countries are listed at DFARS 225.872-1 (a) or (b).

Since the United States is not listed as a qualifying country, DoD does not consider it to be qualifying country. You must comply with this clause unless you apply for and are granted in writing through the Buyer one or more of the limited exemptions authorized under the specialty metals clause.

The following is strongly encouraged of the Seller to ensure compliance with this clause:

- i. Contact your procurement and quality assurance personnel including receiving inspection, (i.e. where incoming material and certifications are verified), to make them aware of this specialty metals clause’s requirements, and to ensure that no foreign melted specialty metals are utilized to fabricate any components for use on a product to be supplied to the Buyer unless they are melted in a qualifying country.
- ii. If a distributor or other sub-tier supplier is the source of your material, ensure that the specialty metals clause requirements have been flowed down. Also take the necessary steps to ensure that your supplier provides only specialty metals (such as titanium or stainless steel) that have been melted within the United States or a qualifying country.

The Seller provided Certificate of Conformance (ref. [SOAR Clauses 3A](#)) accompanying the shipment shall serve as demonstrating compliance with DFARS 252.225-7014 (Alternate I) and [SOAR Clause 21](#).

If the Seller needs further information and/or assistance, please contact the procurement agent identified in the PO. Note, the aforementioned DFARS can be found at www.acq.osd.mil/dpap.

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- 22. Special Tooling and Special Test Equipment.** For any Special Tooling (ST) or Special Test Equipment (STE) as defined in FAR 52.245-17 and 52.245-18, respectively, that has been developed using monies from this PO, the following shall apply: (i) Seller hereby grants to Buyer all design rights to ST or STE developed under this PO, (ii) Seller is responsible to flowdown to Seller's suppliers the appropriate provisions providing the comparable rights to the Buyer, (iii) Buyer shall have the option to approve the design and the Seller shall submit sketches and/or drawings for such approval when the price is \$2500 or greater, or when otherwise directed by the Buyer, (iv) ST or STE shall be functionally tested/verified prior to usage, except that ST or STE used for acceptance purposes shall be calibrated before use as specified in [SQAR Clause 6](#), (v) ST or STE shall be permanently marked as Buyer's property, unless directed otherwise by the Buyer, (vi) Seller shall have a system to account for ST or STE and to enable ST or STE to be provided to Buyer within 48-hours of request, (vii) ST or STE shall be adequately stored to preclude degradation or damage, (viii) ST or STE shall be permanently marked with the Buyer's part number on the PO, or, when provided by the Buyer with a unique identifier. If space constraints prohibit physical marking, ST or STE shall be tagged or the item's unit container shall be marked.

Buyer or Buyer's customer's ST or STE shall not be used for other than the originally intended purpose, and shall not be modified or disposed of, without the written authorization from the Buyer. In the event of conflict with FARs 52.245-17 or 52.245-18, or [SQAR Clause 22](#), the aforementioned FAR clauses shall govern.

If the Seller needs further information and/or assistance, please contact the procurement agent identified in the PO. Note, the aforementioned DFARS can be found at <http://www.arnet.gov/far>.

- 23. Acceptance Testing.** Seller shall prepare an Acceptance Test Procedure (ATP) and submit to Buyer. ATP document shall be under Seller's established document control system, which is acceptable to Buyer, uniquely identified, and containing a revision/version identifier. Seller shall receive written approval from the Buyer prior to the processing of items for the first shipment through final inspection. All subsequent shipments shall be processed in accordance with the Buyer approved ATP. Any revisions to the Buyer approved ATP, requires Buyer approval prior to incorporation and usage. The ATP shall identify the inspections and tests that are to be performed, including sampling plan, as part of Seller's final inspection operation. Unless otherwise approved by the Buyer, the final inspection operation is defined as the very last operation performed prior to packaging and shipping.

24. Variation Management.

- A. Process Control Plan.** Seller shall manage variation and prepare a Process Control Plan (PCP) in accordance with (IAW) AS9103 and submit to Buyer. Seller shall receive written approval from the Buyer prior to the processing of items IAW the PCP for the first shipment. All subsequent shipments shall be processed in accordance with the Buyer approved PCP. Any revisions to the Buyer approved PCP, requires Buyer approval prior to incorporation and usage. Copies of AS9103 can be obtained from the Society of Automotive Engineers at www.sae.org.

- B. Process Capability.** Unless otherwise specified by the Buyer, Seller shall maintain a minimum Cpk of 1.33 for the characteristic(s) specified. Statistical data for the entire lot produced (not just the items shipped) of the items included in the shipment shall be supplied. If the items supplied in the shipment are from two or more different lots, then the entire data set associated with each lot shall be supplied. Seller shall demonstrate the process capability calculation is valid, that is the process is in a state of statistical control with respect to both the mean and standard deviation via a variables control chart to make sure that all points in the \bar{x} , s or R charts are in control. Until the required Cpk is achieved, the Seller shall perform 100% inspection for the characteristic(s) specified, unless otherwise authorized in writing by the Buyer.

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25. Foreign Object Debris/Damage (FOD) Prevention.

(ref.: Lockheed Martin Aeronautics' Quality Clause Q4R, Revision 4, Dated 01 April 2010)

Seller shall maintain a FOD prevention program in accordance with National Aerospace Standard NAS-412, Foreign Object Damage/Foreign Object Debris (FOD) Prevention.

Whenever and/or wherever FOD entrapment or foreign objects can migrate, Seller shall ensure that applicable SQAR Clause 25 FOD requirements are flowed down to Seller's sub-tier suppliers.

Prior to closing inaccessible or obscured areas and compartments during assembly, Seller shall inspect for foreign objects/materials and ensure no FOD barriers remain embedded or attached, e.g. protective plugs.

Seller shall ensure tooling, jigs, fixtures, and test or handling equipment are maintained in a state of cleanliness and repair sufficient to prevent FOD.

By delivering items to Buyer, Seller shall be deemed to have certified to Buyer that such items are free from any foreign materials that could result in FOD.

26. Advanced Product Quality Plan (APQP). The APQP is the primary document used to verify Seller's compliance with the contractual hardware and software Quality Assurance requirements, and secondly, to assess the level of associated risk in fulfilling those requirements. By the date specified in the PO, the Seller shall submit an APQP for Buyer written approval. If no submittal date is specified, then the APQP shall be submitted 4 weeks minimum prior to the PO product delivery date. The shipment of product shall not occur until Seller receives Buyer's APQP written approval. The APQP shall be in Seller's format using AS9100 and ISO10005 as a guide.

The Seller is expected to identify the best technical approach that is based on individual circumstances, methods, and contractual requirements. AS9100 and ISO10005 should be used as a guide with special consideration given to Preventive Actions, Lean Concepts, and Continual Improvement activities to be employed:

- Quality Planning Process – Methodology to be employed to ensure successful achievement of the requirements including the bullet points below.
- Project Management – Project management process to be employed (ref. ISO10006).
- Risk Management – The identification, analysis, evaluation, mitigation, and monitoring of risk throughout the design, product realization, and post-delivery life-cycle, including Special Requirements (ref. AS9100, ARP9134, ISO31000, IEC/ISO31010, or AS/NZS 4360).
- Software Control – The control of deliverable and non-deliverable software (ref. ARP9005, AS9006, AS9115, RTCA/DO-254, or EUROCAE ED-80).
- Critical Safety Items (CSI's) – The control of Critical Safety Items in accordance with AS9017, when applicable.
- Variability Reduction Process - Ensure that variations in critical processes are identified, documented, and controlled. Key Characteristics are defined and managed using AS9103 (ref. [SQAR Clause 24](#)).
- Key Characteristics - Identify those design features for which variation significantly affects product performance, quality, cost, or safety. Describe how Key Characteristics will be documented and controlled.
- Lean Concepts – The elimination of process waste and providing the Seller with a best-value process-based approach.
- Foreign Object Damage Prevention – The control of foreign objects from entering the product realization process (ref. [SQAR Clause 25](#)).
- Continual Improvement: - Top Management and their organization's role in driving the continual improvement and performance-based success of the organization (ref. ISO9004).
- Statistical Techniques – Usage of statistical techniques (ref. ISO/TR 10017).
- Verification Process - Ensure product is built to Engineering requirements (As Built = As Designed).
- Validation Process - Ensure product meets performance requirements (Form, Fit, Function, and Service Life), including First Article Inspections (ref. [SQAR Clause 13A](#) or [SQAR Clause 13B](#)).

Note, the APQP shall specify the Buyer's value-added technical approach and not be a reiteration of the Seller's Quality Manual or an overview of the Seller's Quality Management System.

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27. **Circuit Card Assemblies (CCA's)**. Software, numerical control (NC) software, command language, etc. for the specified inspections and tests below shall be adequately controlled. Records of inspections and tests shall be retained by the Seller by part number and unique control number and made available upon request by the Buyer.
- A. **Functional Testing of CCA's**. CCA's shall be functional tested to a Buyer-approved Acceptance Test Procedure as specified in [SQAR Clause 23](#).
 - B. **Boundary Scan Testing of CCA's**. CCA's shall be [IEEE](#) 1149 Joint Test Action Group (JTAG) boundary scanned in accordance with a Buyer-approved Acceptance Test Procedure as specified in [SQAR Clause 23](#).
 - C. **Automatic Optical Inspection (AOI) of CCA's**. CCA's shall be AOI inspected in accordance with a Buyer-approved Acceptance Test Procedure as specified in [SQAR Clause 23](#) for: wrong, missing, or extra parts; and, polarity and solder joint criteria. Solder joint criteria may be inspected using X-Ray instead of AOI (ref. [SQAR Clause 27D](#)).
 - D. **X-Ray Inspection of CCA's**. CCA's shall inspected in accordance with a Buyer-approved Acceptance Test Procedure as specified in [SQAR Clause 23](#) by automated x-ray (AXI) or x-ray, or via an alternate mutually agreed method. CCA's hidden solder joints, including BGA and any other inaccessible solder joints, shall be x-rayed to ensure good solder joints have been achieved. X-ray can be used for other solder joints not inspected during AOI (ref. [SQAR Clause 27C](#)).
 - E. **In-Circuit or Flying Probe Testing of CCA's**. CCA's shall be In-Circuit Tested (ICT) or Flying Probe (FP) tested in accordance with a Buyer-approved Acceptance Test Procedure as specified in [SQAR Clause 23](#).
 - F. **Rework and Repair of CCA's**. The rework and repair of CCA's (a.k.a. Printed Wiring Assemblies (PWA's)) shall be in accordance with [IPC 7711/7721](#). The repair of CCA's is strictly prohibited unless specific Buyer authorization is cited in the body of the PO or cited in the item's governing drawings/specifications.
28. **Ball Grid Array (BGA) Reballing**. The reballing of BGA's shall be in accordance with [IPC 7711/7721](#).
29. **Unique Quality Record Retention Duration Requirements**. In the event of conflict between the quality record retention durations specified below and those in other applicable documents (notwithstanding those which may be found in [Form 0605](#) (Addendum to L-3 Communications Corporation General Terms and Conditions) and/or (L-3 Communications Corporation General Terms and Conditions), the greater retention duration requirement shall apply.
- A. **10 Years Record Retention**. The minimum quality record retention period shall be 10 years, beginning with the date the order was completed.
 - B. **15 Years Record Retention**. The minimum quality record retention period shall be 15 years, beginning with the date the order was completed.
 - C. **20 Years Record Retention**. The minimum quality record retention period shall be 20 years, beginning with the date the order was completed.
 - D. **25 Years Record Retention**. The minimum quality record retention period shall be 25 years, beginning with the date the order was completed.
 - E. **30 Years Record Retention**. The minimum quality record retention period shall be 30 years, beginning with the date the order was completed.
30. **Nondestructive Testing, Inspection, or Evaluation (NDT, NDI, or NDE)**. Unless otherwise specified, personnel performing NDT, NDI, or NDE (including but not limited to: radiographic, magnetic particle, ultrasonic, liquid/dye penetrant, eddy current) shall be qualified to perform the specified test, inspection, or evaluation in accordance with (i) one or more of the consensus specifications listed in FAA [AC 65-31](#) (Standards for Qualification, Certification, and Training of NDI Personnel), or (ii) either as specified by or authorized by the Buyer to another suitable consensus standard.

(End)

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