



APPENDIX Q
QUALITY CLAUSES
January 2020



Tim Brugger,
Mgr. Supplier Quality

A copy of these QA codes can be accessed on the EFW Supplier Portal Site under General information –
<http://www.elbitsystems-us.com/suppliers>

REVISION HISTORY:

January 2020:

- 1) Modified and/or updated QA Codes 11 adding Note, 20 adding ref to AS9146, 23 changing PCB packaging, 27 reinstating T&R requirements, 38 changing testing of leads, and 58 allowing tailoring

May 2019:

- 1) Modified and/or updated QA Codes 4, 11, 14, 15, 16, 18, 20, 22, 23, 31, 32, 37, 38, 42, 43, 45
- 2) Updated Appendix Q

February 2016:

- 1) Modified and/or updated QA Codes 4, 6, 8, 11, 23, LMMFC-818 and LMMFC-1899.
- 2) Added QA Code 57 for RFID.
- 3) Added QA Code 58 for AS 9145 APQP/PPAP
- 4) General formatting.



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4. CERTIFICATE OF CONFORMANCE (COC)

All items must be accompanied by a COC issued by the manufacturer, supplier or distributor certifying that all materials, processes and finished items supplied under the P.O. were inspected and found to comply with the requirements of the P.O. and applicable specification(s). Test and inspection data shall be kept on file by the Seller and be available for review, on request, for a period of seven years after final delivery, unless specified in SOW or other binding contract. Seller/O.E.M./Authorized Distributor's COC shall state/certify that materials, items or services provided under this purchase order meet all applicable contractual, technical, traceable and solderability requirements called out in the applicable item specification. Materially applicable certifications required to be delivered with the shipment per specification(s) or other quality requirement(s) shall also be provided.

As a minimum, the COC shall contain the following information:

1. **Name of Company and Date**
2. **ESA-FWO Contract number or ESA-FWO purchase order number**
3. **ESA-FWO part number identified on the purchase order, revision number, and/or national stock number (as applicable) and Manufacturer part number**
4. **Complete nomenclature of supplies together with lot number or other identification**
5. **Lot number, batch number, serial number, or date code**
6. **Quantity in shipment**
7. **Printed name and Title of certifying official with signature**

Computer-generated or Facsimile-reproduced signatures will be considered to have the same force as an original signature.

5. Dimensional Test Data

A copy of the Seller's test report containing quantitative results of all dimensional measurements is required to be included with each lot.

6. Functional Test Data

A copy of the Seller's final test report containing quantitative results of all electrical and/or functional tests is required to be included with each lot.

7. Chemical & Physical Analysis

A copy of the Seller's test report containing quantitative results of chemical and/or physical analysis is required with each lot. Raw material used in the fabrication of parts under this P.O. shall be traceable to a mechanical and chemical analysis. The test results shall conform to the current material specification and/or acceptance tests. A copy of the actual analysis shall accompany each delivery. The Seller is also required to provide a COC which includes a statement that the parts delivered have been fabricated from certified material.

For MIL-spec paints - if test reports are not obtainable, manufacturer's certs will be acceptable.

8. Safety Data Sheet (SDS)

Suppliers must submit SDS's in accordance with Title 29 Code of Federal Regulations 1900.1200 and the new Global Harmonized System (GHS) per December 1, 2015 deadline to meet the requirements in ANSI Z400.1/Z129.1-2010 Hazardous Workplace Chemicals – Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation.

Adjustment to the updated SDS format shall be performed on or before the indicated timing per sub- paragraphs (j) (2), (i), (ii) and (j) (3).

All Precautionary Labeling must be the correct GHS labeling (pictograms inside of diamonds).

11. First Article Inspection (FAI) according to AS9102 Requirement

Seller is responsible, prior to delivery of the first production lot, to complete an FAI in accordance with Aerospace Standard AS9102. SAE AS9102 current revision documentation can be obtained at www.sae.org/ a completed copy of the AS9102 Appendix A-current revision forms, as well as other applicable supporting



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First Article Inspection (FAI) according to AS9102 Requirement, continued

Documentation, shall be presented to ESA-FWO with the FAI lot. A copy of the annotated drawing and any supplier generated drawings/sketches used to identify dimension locations referenced on the dimensional report must be included in the FAI package. Manufacturing of the remaining lot without ESA-FWO approval of the FAI is at the Seller's risk.

ESA-FWO Supplier Quality Engineering (SQE) reserves the right to witness the FAI performance at the Seller's facility. ESA-FWO SQE shall be notified via e-mail at <mailto:SQE@elbitsystems-us.com> at least 10 working days prior to the scheduled FAI task. ESA-FWO SQE will return written notification if we wish to witness the FAI. Exception to the AS9102 requirements will require ESA-FWO Supplier Quality and/or Customer concurrence prior to product acceptance.

See Attachment 1 of Appendix Q for FAI detail instructions.

Note: Seller shall perform an FAI for any of the following reasons when QA CODE 11 is imposed on Purchase Orders for follow on builds which the supplier has a prior AS9102 FAI on file:

1. A gap of 2 years or more since the supplier's last production for ESA-FWO.
2. A Delta FAI to the original FAI is required for any revision change on the product.
3. AS9102 requires an FAI for any change in facility location, design or process that may affect form, fit or function of the part. ESA-FWO Procurement and Supplier Quality shall be notified of any of these changes.

A complete copy of the FAI documentation shall be included with the first production lot delivered to ESA-FWO.

Note: If applicable Seller shall comply with Lockheed Martin Quality Clause Q2A First Article Inspection.

12. Foreign Government Source Inspection

Foreign Government inspector may perform product verification prior to shipment from Seller's plant. Unless specified otherwise on the P.O. the Seller shall notify the Elbit Systems buyer on your P.O., at least 7 working days prior to the scheduled ship date but after performance of final testing and acceptance by the Seller. Notification shall consist of the P.O. number, P.O. Line item, part name, part revision, quantity being presented (preferably full line item quantity) and whether it is an FAI or not.

13. Customer/Customer's Third party Inspection

Customer and/or Customer's third party representative's inspection is required prior to shipment from Seller's plant. Upon receipt of this P.O. the Seller shall promptly notify the customer/third party representative who normally services its plant, so that appropriate planning can be accomplished. If such representative does not serve the Seller's plant, the Seller shall immediately notify ESA-FWO's purchasing agent.

14. Source Inspection

All work performed under this P.O. is subject to ESA-FWO's inspection or test at the Seller's plant prior to shipment. Unless specified or Seller has Delegated Source Inspection Authority granted by ESA-FWO, the Seller shall notify ESA-FWO Supplier Quality by email to SQE@elbitsystems-us.com with the ship to street name (Marine Creek or Quorum) referenced in the subject line. The notice shall be provided a minimum of 7 working days prior to the scheduled ship date but after performance of final testing and acceptance by the Seller. Notification shall consist of the completed source inspection request form, which shall include P.O. #, P.O. Line item, Part number, part name, part revision, quantity being presented (preferably full line item quantity) and whether it is an FAI or not. ESA-FWO's representative may perform inspection or test on a random basis or up to 100% inspection, including verification of certificates of conformance for materials and special processes. For deliveries subsequent to the initial delivery, the supplier shall present a copy of the AS9102 FAI report to the source inspector with each source inspection.

A copy of the completed Source Inspection Report (or Delegated Checklist) shall accompany each shipment.



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15. US Government Source Inspection

US Government inspection, typically DCMA, is required prior to shipment from Seller's plant. Upon receipt of this P.O. the Seller shall promptly notify the government representative who normally services its plant so that appropriate planning can be accomplished. If such representative does not serve the Seller's plant, the Seller shall contact the closest Air Force, Army, or Navy Inspection office. **NOTE: the End Customer does not and cannot satisfy this Quality Code when flowed.** If such office cannot be located, the Seller shall immediately notify ESA-FWO's purchasing agent. Seller shall provide access to any and all facilities where work is being performed or is scheduled to be performed, including those facilities of Seller's agents and subcontractors, in order to perform item inspections, surveys, or system/process surveillance as part of verification of conformance to the requirements of this PO. Seller's denial of any such access may result in inactivation of Seller's approval. Seller shall include the provisions of this facility access requirement in its POs with its agents and subcontractors, for this PO.

Seller shall provide the following, at no increase in price, cost or fee to Buyer, Buyer's customers or regulatory agencies:

- A. Suitable facilities at Seller and Seller's subcontractors' manufacturing locations for Buyer, Buyer's Supplier Quality Engineer, Buyer's customer and regulatory agency representatives to perform Item inspections, surveys or system/process surveillance, and
- B. High speed internet access for Buyer's Supplier Quality Engineer.

Evidence of GSI acceptance shall be included in document package to ESA-FWO.

16. Government Source Surveillance

The Government representative may perform process oversight of manufacturing and product management processes. Surveillance activities may be taken at such times and places, including any stage in the manufacturing process at any Subcontractor or Subcontractor's supplier's plant as may be necessary, to determine conformance to the Subcontract requirements. Such surveillance does not relieve the Subcontractor of any responsibilities under this Subcontract. Seller shall provide access to any and all facilities where work is being performed or is scheduled to be performed, including those facilities of Seller's agents and subcontractors, in order to perform item inspections, surveys, or system/process surveillance as part of verification of conformance to the requirements of this PO. Seller's denial of any such access may result in inactivation of Seller's approval. Seller shall include the provisions of this facility access requirement in its POs with its agents and subcontractors, for this PO.

Seller shall provide the following, at no increase in price, cost or fee to Buyer, Buyer's customers or regulatory agencies:

- A. Suitable facilities at Seller and Seller's subcontractors' manufacturing locations for Buyer, Buyer's Supplier Quality Engineer, Buyer's customer and regulatory agency representatives to perform Item inspections, surveys or system/process surveillance, and
- B. High speed internet access for Buyer's Supplier Quality Engineer.

18. Raw Material Identification

All raw material supplied under this P.O. must be clearly identified by the application, type, condition and manufacturer of the material via the Certificate of Conformance.

20. Foreign Object Debris/Damage (FOD) Prevention

- A. Seller shall maintain a FOD prevention program IAW AS9146 Foreign Object Damage (FOD) Prevention Program - Requirements for Aviation, Space, and Defense Organizations. Seller's FOD prevention program shall include the review of design and manufacturing processes to identify and eliminate foreign object entrapment areas and paths through which foreign objects can migrate. Seller shall ensure work is accomplished in a manner preventing foreign objects or material in deliverable Items. Seller shall maintain work areas and control tools, parts and materials in a manner sufficient to preclude the risk of FOD incidents. Seller shall document and investigate each FOD incident and ensure elimination of the root cause of each such incident.
- B. Buyer shall have the right to perform inspections, verification and FOD Prevention Program audits at Seller's facility to ensure program documentation and effectiveness. Seller shall identify a FOD control person responsible for implementing FOD prevention, awareness and training.
- C. Seller's FOD prevention program shall include Seller's periodic self-assessment of its internal FOD prevention practices, including subcontractors FOD Prevention Program at every tier, to measure effectiveness of program compliance to requirements.
- D. Seller's FOD prevention program shall provide annual FOD training to Seller's employees. At Buyer's request, Seller shall provide records of such self-assessment and training to Buyer.

- E. Seller's FOD prevention program shall, at a minimum, contain the following elements:
- | | |
|---|---|
| 1. Design & Manufacturing Process Review | 2. Tool Accountability |
| 3. Performance Measurement | 4. Hardware Accountability |
| 5. Training | 6. Lost Items |
| 7. Material Handling and Parts Protection | 8. Physical Entry Control into FOD Critical Areas |
| 9. Housekeeping | 10. FOD Focal Point(s) |

F. Seller shall ensure that the requirements of this Quality Clause are flowed down to Seller's subcontractors at every tier.

G. Prior to closing inaccessible or obscured areas and compartments during assembly, Seller shall inspect for foreign objects/materials. Seller shall ensure that 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.

22. Manufacturing Date Code

Rubber Items:

Only items manufactured with at least one year of material shelf life remaining prior to the date of shipment may be supplied under this purchase order.

23. Marking / Packaging

External Marking

External containers must be marked with the following shipment information unless specifically exempted or otherwise specified in the contract, purchase order, statement of work, drawing or regulatory requirement:

1. Name and address of supplier facility
2. ESA-FWO Part Number (or Reference Number only if there is not an ESA-FWO part number on the purchase order)
3. ESA-FWO Purchase Order Number
4. Quantity
5. Serial Number, Date Code, or Lot/Batch Number (as applicable)
6. Hazardous Material (HAZMAT) marking (if applicable)

Internal Marking

Every container; reel(s), tray(s), tube(s), bag(s), etc. must be labeled with the ESA-FWO part number, Serial Number, Date Code, or Lot/Batch Number (as applicable), and Quantity (if more than one).

Packaging

Finished parts shall be adequately protected to prevent damage during handling and shipment. Parts shall be wrapped, bagged, or otherwise protected to prevent damage when packaged within a larger pack. The Seller shall be responsible for determining the method of packaging, unless otherwise directed, to assure protection during transit in accordance with ASTM-3951 (Standard Practice for Commercial Packaging) while taking into consideration the following specific instructions:

1. **Plated or Painted** parts must be individually packaged to prevent tarnish, abrasions, and corrosion.
2. **SMT Components** - surface mount plastic chip carriers shall be classified, baked, packed and labeled per J-STD-033A or its equivalent. Taped & reeled components shall be packaged in accordance with ANSI/EIA-481 or equivalent.
3. **Rubber** items shall be packed in bags per MIL-B-131H, Type 1, Class 2. Each bag shall be heat-sealed and marked by a label which includes the following information:

1. Item description
2. Material specification number
3. ESA-FWO part number
4. Quantity
5. Expiration date
6. Manufacturing date

7. Serial Number, Date Code, or Lot/Batch Number (as applicable)

NOTE #1: Rubber items greater than 100 square inches shall be packaged no more than 5 pieces per bag, with each individual item separated from the next by a thin cardboard separator.

4. **PCB'S**

- a. Separate up to 10 individual PCB with slip sheets.
- b. Place up to 10 PCB's in a low out gassing, ESD Moisture Barrier bag with a "NEW DRY" desiccant pack and moisture indicator card.
- c. Vacuum seal each individual moisture barrier bag.
- d. Label individual bags with part number, rev, serial number, PCB supplier/cage code, PCB date code and date sealed.
- e. If panelized, note useable quantity and x-out quantity per bag.
 - X-outs in panelized boards (PWB Array's) shall:
 - Not exceed 1 per panel with panels of 4 or less boards.
 - Not exceed 20% on panels with more than 4 boards.
 - Not exceed 5% of the total number of boards in the lot.
 - **Be clearly marked on the component side of the board (with an "X" using a permanent marker) and packaged separately.**
 - In addition to the "X marking requirement" drawings may also identify fiducial drill locations as well.

24. **Electrostatic Discharge (ESD)**

ESD sensitive devices shall be handled, packaged and marked in accordance with the requirements of MIL-STD-1686. Tubes and rails used for packaging Micro-electronic devices shall be made from conductive materials per MIL-HDBK-263. Connectors shall be supplied with protective caps made from conductive material per MIL-HDBK-263. ESD Labels are required to be on the outside of the box for shipment per MIL-STD-129 paragraph 5.2.20.1 and 5.2.20.2.

26. **Limited Shelf Life Items**

For chemicals, adhesives, silicone, and other age sensitive items the Seller shall provide a Certificate Of Compliance (COC) that includes:

1. The Safety Data Sheet (SDS),
2. Expiration date and / or date of manufacture,
3. Permissible shelf life,
4. Lot and batch number as appropriate,
5. Storage temperature range, and
6. Any other pertinent information relating to the shelf life of the items supplied.

In addition the Supplier shall put the following on each product container label:

1. Product name or nomenclature,
2. Date of manufacture,
3. Expiration date or permissible shelf life,
4. Lot or batch number, and
5. Storage temperature range.
6. The material on shipment date shall not have exceeded 25% of the total shelf life from the date of manufacture.

27. **Tape & Reel SMT Devices**

If the package definition on the Purchase Order is T&R, then conform to EIA taping standards EIA-481 and EIA-971. If the package definition encoded into the Manufacturer's part number is stick or tray on the PO, then parts are to be packaged in stick or tray as called out on the PO.

For components 25mm or larger, tray is the preferred packaging but tape and reel may be requested.

28. **SPC Data Requirement**

A copy of the Seller's statistical process control data (control charts, histograms, process capability studies), relevant to the manufacturing of this lot is required with this shipment.

EFW Inc., 4700 Marine Creek Parkway Fort Worth, TX 76179
Tel: 817-234-6600 Website: www.elbitsystems-us.com



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31. Supplementary Q.A. Provisions (SQAP)

The Seller shall meet all the supplementary quality requirements specified on the SQAP.

32. Statement of Work (SOW)/Corporate Work Transfer (CWT)

The Seller shall meet all the supplementary quality requirements specified in the Statement of Work (SOW) or Corporate Work Transfer (CWT).

33. See requirements for Fastener Quality Assurance in Appendix QG para L.

34. As Planned/As Built Report

An As Planned/As Built (AP/AB) report shall be submitted for each part supplied under this P.O.

35. Independent Test Lab Testing

Each lot ready for delivery under this P.O., shall be shipped to the ITL stated in the P.O. Lots approved by the ITL shall be forwarded to ESA-FWO, Inc. together with the ITL test reports

36. ISO 9001 Quality System

The Seller shall have a quality system meeting the requirements of ISO-9001.

37. Obsolete/Diminished Material, Broker/Independent Distributor purchases.

This code is enacted to mitigate risk associated with obsolete or diminished material and certain product purchased from jobbers/brokers or independent distributors who are **not** the manufacturer **nor** their franchised distributor.

If you have received a P.O. with this code and your organization is not the manufacture or your organization is not an approved franchised distributor for the manufacturer you must follow these steps prior to shipment;

1. Complete an authenticity test/inspection report containing all minimum required test and inspection items per SAE AS6081 STD to include visual evidence of each test/inspection result.
2. Email a copy of the authenticity test/inspection report to ESA-FWO Component Engineering and Supplier Quality for review and written email approval of the report.
3. After email approval of the report has been issued by ESA-FWO Component Engineering then the product shipment, per the purchase order requirements, may be sent to ESA-FWO.

38. Manufacturing Dates for Solderable Components

ESA-FWO prefers components manufactured within the past 36 months. If components have date codes greater than 36 months, parts must be solderability tested prior to delivery to ESA-FWO. The manufacturer's date code must appear on Seller's packing slip, Certificate of Conformance and test data must accompany shipment to ESA-FWO.

Solderability tested parts should be bagged and tagged separate from remainder of lot in appropriate packaging to prevent lead damage. Solderability tested parts should accompany remainder of lot to ESA-FWO.

Solderability testing for component leads is as follows:

Standards J-STD-002 and JES022-B102 - preferred Preconditioning Condition Category C, Durability (exposure 8 hr. Steam aging). However, upon email request from Supplier and ESA SQE approval, ESA may allow and accept Preconditioning Condition Category E Durability (exposure 4 hr. minimum, 150°C Dry Bake).

Sample size per MIL-STD-1916 Attributes:

| Lot Size: | Level | Sample Quantity |
|---------------|-------|-----------------|
| 0-170 | A | 5 |
| 171-288 | B | 6 |
| 289-545 | C | 8 |
| 545-960 | D | 10 |
| 961 AND ABOVE | E | 12 |

PWB's –



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Seller shall supply items within three months of manufacturing date or acceptable solderability test. If the supplied items or packaging is not identified with the manufacturing/lot date, then the Seller will indicate the manufacturing/lot date on the Seller's packing slip. Solderability tests for Circuit Boards in compliance to:
J-STD-003 Test C solder float test (Test A--Edge Dip Test is acceptable if board has surface lands only) Category 3, Class 3, Sample size of 1 coupon or board/lot.

39. Boeing Company D1-4426 Approved Processors

Seller shall comply with the process source control requirements and limitations of Boeing Company Specification D1-4426. The most current revision of D1-4426 shall be utilized and is available at <http://active.boeing.com/doingbiz/d14426/index.cfm>

40. Lockheed Martin Fort Worth Aeronautics/Missiles and Fire Control

Seller shall comply with the process source control requirements and limitations of LM Aero QCS-001. The most current revision of QCS-001 shall be utilized.

A list of Lockheed approved processors can be accessed via the Lockheed Website;

<https://www.lockheedmartin.com/en-us/suppliers/business-area-procurement/aeronautics/quality-requirements/control-specs.html> if unable to access this site it is the Seller's responsibility to contact the ESA-FWO buyer for a list of approved special processors.

Lockheed Martin Aeronautics approved Special Processors; *In accordance with Lockheed Martin Aeronautics Appendix QJ you are required to complete the 90 day usage report on behalf of ESA-FWO. ESA-FWO's Lockheed Martin Aeronautics supplier codes = 800765331*

Seller shall comply with the requirements of Lockheed Martin Aeronautics Company Quality Clause's Appendix QX and QJ. The latest revision in effect as of the date of this P.O. is applicable. *Seller shall ensure all applicable quality requirements are imposed on sub-tier suppliers and manufacturing facilities.*

Lockheed Martin Aero Quality Clauses can be accessed at the following website:

<https://www.lockheedmartin.com/en-us/suppliers/business-area-procurement/aeronautics/quality-requirements/clauses.html>

41. Failure Analysis

Seller shall provide a failure report indicating the failure mode, the root cause of the failure, the action performed to correct the failure (including replaced or reworked part number(s)) and evidence of verification.

42. Solder per J-STD-001

All electronic and electrical assemblies will be soldered per J-STD-001 current revision. The Seller shall flow this requirement to all sub-tier Contractors that perform solder processes.

43. METREGRIP 303 (P/N 12345009I ONLY)

Product must meet requirements of BMS5-72 Type IV.

44. Specialty Metals

See requirements in Appendix QG, Section II

45. UID Label

Deliveries will require Unique Identification per DFARS 252.211-7003 and MIL STD 130 current revision. Specific customer requirements may vary.

46. Civil Aviation Records Retention

The Seller, including all of its subcontractors at all tiers, shall retain and safeguard all records related to the production of the parts for unlimited time in order to maintain airworthiness of the products. Seller shall not destroy any of the records unless Buyer written approval is provided. In the event that Seller will go out of business all records shall be provided to Buyer. Data that should be retained include but not limited to routecards, audit records, raw material COC, test data, etc. Computerized records shall be backed up and kept at a safe place, protected against fire, fluids and burglary.

47. Safety Product

The material must be marked with serial and consecutive numbers including manufacturing date. The word “**SAFETY**” in **red** (minimal font 28) will be marked on the external container either by stamp or by label.

48. Lead Free Components

All components under this purchase order will be marked and identified according to IPC-1066 or J-STD-609 – “Lead or Lead free MARKING AND LABELING” standard. The COC document shall state whether the material is Lead or Lead free according to the purchase order.

49. Lithium Battery

The material will be accompanied by an **MSDS/SDS** record containing at least:

(1) Weight of Lithium in the battery; (2) UN Number; (3) Proper Shipping Name; (4) Hazard Class

50. Packaging for LCD Bare Glass

Each item shall be individually packed. Each box shall include a maximum quantity of the individually packed items. The marking of the box shall include: ESL P/N and Rev. (at least on the COC); Supplier's P/N; Date Code; LOT Number and S/N.

The packaging must be adequate to protect the entire unit (this includes LCD glass, TABs and electronics) from any damage, distortion or any defects during transportation, handling and storage.

51. Subcontractor Parts Management Control Plan

Supplier shall comply with requirements of document ESA-PP-0003. Contact ESA buyer for a copy of the document if not included with P.O. package. Copies are also available on the ESA Supplier Portal -<http://www.elbitsystems-us.com/suppliers-portal>.

52. Counterfeit Materiel, Assuring Acquisition of Authentic and Conforming Materiel

Supplier shall comply with requirements of SAE, AS6174.

53. Counterfeit Electronics parts; Avoidance, Detection, Mitigation and Disposition

Suppliers shall have in place a Counterfeit Electronic Part Detection and Avoidance System in compliance with the current revision of applicable industry standards SAE AS5553 and/or SAE AS6081. In accordance with DFAR 252.246-7007, Supplier shall be compliant to paragraphs (a) through (e) of DFAR 252.246-7007 regardless of the Cost Accounting Standard as mentioned in DFAR 252.246-7007. Supplier shall flow down these counterfeit detection and avoidance requirements to subcontractors at all levels in the supply chain that are responsible for buying or selling electronic parts or assemblies containing electronic parts, or for performing authentication testing. A copy of AS5553 may be obtained from <http://standards.sae.org>. DFAR 252.246-7007 is available at <https://www.federaregister.gov>.

54. This QA Code applies to **Software developed in accordance with specifications provided by Elbit Systems of America. Unless otherwise specified, the supplier must deliver the following documentation:**

1. Software Requirement Specification (SRS) with content and format in accordance with DI-IPSC-81433A
2. Version Description Document (VDD) with content and format in accordance with DI-MMCR-80013A
3. Software Test Description (STD) with content and format in accordance with DI-IPSC-81439A
4. Software Test Report (STR) with content and format in accordance with DI-IPSC-81440A

55. This QA Code applies to **Software developed in accordance with specifications provided by Elbit Systems of America. Unless otherwise specified, the supplier must deliver the following documentation:**

1. Interface Requirement Specification (IRS) with content and format in accordance with DI-IPSC-81434A
2. Software Product Specification (SPS) with content and format in accordance with DI-IPSC-81441A
3. Software Design Document (SDD) with content and format in accordance with DI-IPSC-81435A

56. The supplier shall host a **Test Readiness Review (TRR)** prior to a Formal Qualification Test (FQT) of the deliverable software. The TRR presentation material shall include the following information at a minimum:
1. FQT schedule and participants
 2. Changes from previous software release
 3. Document delivery status
 4. Software metrics (defined by ESA software lead), known issues,
 5. Test configuration (including software and hardware)
 6. Test results from previous tests and Quality involvement in the verification process.
- The supplier will notify the ESA-FWO Software Lead of the TRR time and location a minimum of 14 calendar days in advance and provide a draft version of presentation materials a minimum of 3 business days in advance. ESA-FWO has the right to attend both the TRR and FQT at their discretion.
57. **Radio Frequency Identification (RFID) (SEP 2011) DFARS 252.211-7006**
- (b)(1) Except as provided in paragraph (b)(2) of this clause, the Contractor shall affix passive RFID tags, at the case- and palletized-unit-load packaging levels, for shipments of items that—
- (i) Are in any of the following classes of supply, as defined in DoD 4140.1-R, DoD Supply Chain Materiel Management Regulation, AP1.1.11:
- (A) Subclass of Class I – Packaged operational rations.
 - (B) Class II – Clothing, individual equipment, tentage, organizational tool kits, hand tools, and administrative and housekeeping supplies and equipment.
 - (C) Class IIIP – Packaged petroleum, lubricants, oils, preservatives, chemicals, and additives.
 - (D) Class IV – Construction and barrier materials.
 - (E) Class VI – Personal demand items (non-military sales items).
 - (F) Subclass of Class VIII – Medical materials (excluding pharmaceuticals, biologicals, and reagents – suppliers should limit the mixing of excluded and non-excluded materials).
 - (G) Class IX – Repair parts and components including kits, assemblies and subassemblies, reparable and consumable items required for maintenance support of all equipment, excluding medical-peculiar repair parts; and
- (ii) Are being shipped to one of the locations listed at <http://www.acq.osd.mil/log/rfid/> or to—
- (A) A location outside the contiguous United States when the shipment has been assigned Transportation Priority 1, or to—
 - (B) The location(s) deemed necessary by the requiring activity
- (2) The following are excluded from the requirements of paragraph (b)(1) of this clause:
- (i) Shipments of bulk commodities.
 - (ii) Shipments to locations other than Defense Distribution Depots when the contract includes the clause at FAR 52.213-1, Fast Payment Procedures.
- (c) The Contractor shall—
- (1) Ensure that the data encoded on each passive RFID tag are globally unique (i.e., the tag ID is never repeated across two or more RFID tags and conforms to the requirements in paragraph (d) of this clause;
 - (2) Use passive tags that are readable; and
 - (3) Ensure that the passive tag is affixed at the appropriate location on the specific level of packaging, in accordance with MIL-STD-129
- (Section 4.9.2) tag placement specifications.
- (d) Data syntax and standards. The Contractor shall encode an approved RFID tag using the instructions provided in the EPC™ Tag Data Standards in effect at the time of contract award. The EPC™ Tag Data Standards are available at <http://www.epcglobalinc.org/standards/>.
- (1) If the Contractor is an EPCglobal™ subscriber and possesses a unique EPC™ company prefix, the Contractor may use any of the identifiers and encoding instructions described in the most recent EPC™ Tag Data Standards document to encode tags.
 - (2) If the Contractor chooses to employ the DoD identifier, the Contractor shall use its previously assigned Commercial and Government Entity (CAGE) code and shall encode the tags in accordance with the tag identifier details located at http://www.acq.osd.mil/log/rfid/tag_data.htm. If the Contractor uses a third-party packaging house to encode its tags, the CAGE code of the third-party packaging house is acceptable.

(3) Regardless of the selected encoding scheme, the Contractor with which the Department holds the contract is responsible for ensuring that the tag ID encoded on each passive RFID tag is globally unique, per the requirements in paragraph (c)(1).

(e) Advance shipment notice. The Contractor shall use Wide Area Workflow (WAWF), as required by DFARS 252.232-7003, Electronic Submission of Payment Requests, to electronically submit advance shipment notice(s) with the RFID tag ID(s) (specified in paragraph (d) of this clause) in advance of the shipment in accordance with the procedures at <https://wawf.eb.mil/>.

58. AS 9145 APQP / PPAP

As applicable, Seller shall define, implement and maintain the methodologies and processes defined in the Aerospace Standard AS9145. As related to the organization's AS9100 certification, Seller shall provide supporting documentation upon request, to the extent with which they apply, for each delivery item: ADVANCED PRODUCT QUALITY PLANNING REQUIREMENTS

1. Phase 1 Requirements – Planning
2. Phase 2 Requirements – Product Design and Development
3. Phase 3 Requirements – Process Design and Development
4. Phase 4 Requirements – Product and Process Validation
5. Phase 5 Requirements – On-going Production, Use, and Post-delivery Service

PRODUCTION PART APPROVAL PROCESS REQUIREMENTS

1. Process Requirements for Production Part Approval Process
2. Production Part Approval Process File and Submission
3. Production Part Approval Process Disposition
4. Production Part Approval Process Resubmission

<http://www.aiag.org>

Tailoring of QA Code 58 is allowed but must be approved in writing by ESA.

BA1 NOTE: IF PARTS ARE NOT PAINTED THIS CODE DOES NOT APPLY:

The Supplier/Subcontractor shall be responsible for the compliance of their sub-tier painter to all requirements.

Objective Quality Evidence – paint:

A. Data: the following shall be recorded and maintained for all parts painted:

- a. Part number and revision with Purchase Order and batch/lot number.
 - i. Sub-tier painters may use the Suppliers Purchase Order Number however; parts and processes shall be traceable to the part number and Purchase Order.
- b. Cleaning Method.
- c. Pre-treatment method.
- d. Prime coat process:
 - i. Primer batch number.
 - ii. Date Painted.
 - iii. Prime coat start and stop times.
 - iv. Temperature, dew point, RH.
 - v. Accelerated drying if applicable.
 - vi. Operator.
 - vii. Dry film thickness.
- e. Top coat process:
 - i. Top coat batch number.
 - ii. Date painted.
 - iii. Top coat start and stop times.
 - iv. Temperature, dew point, RH.
 - v. Accelerated drying if applicable.
 - vi. Operator.
 - vii. Dry film thickness.

B. Tests:

- a. The specification-defined lot conformance test shall be performed, the results shall be documented and maintained by the Supplier/subcontractor and shall be made available upon request.

- b. The specification required process qualification tests shall be performed as minimum when no otherspecified qualification tests are defined in the applicable technical data package. The results shall be maintained and made available upon request.
- c. All test reports shall include digital photographs of the test panels.

BA3 CARC Paint Traceability Marking (Chemical Agent Resistive Coating (CARC) painted parts only)

NOTE: IF PARTS ARE NOT PAINTED THIS CODE DOES NOT APPLY:

All assemblies requiring CARC paint shall have a date or lot number stamped on the parts traceable to when and where the parts were finished and what materials (batch/lot numbers) were used. If the company applying the finish is different from the company providing the part(s) to USCS, they shall also be identified by the use of an ink stamp or other means of identification. A name, number or symbol can be used as identification. Adhesive labels are not acceptable. This marking shall be in the vicinity of the part identification marking. The Supplier to USCS is responsible to maintain the objective quality evidence to support who painted the sub-assemblies. Sub-assemblies or lower components to an assembly need not meet the painted product marking requirements as referenced above.

BO1 BDS Seller Special Tooling Requirements

If you are in possession of US Government-owned accountable to Boeing or Boeing owned tooling then this code applies. **If you are not sure, please contact your EFW buyer.** Boeing -E223: Seller is required to maintain a special tooling management process that complies with the requirements of D950-11059-1, "BDS Seller Special Tooling Requirements." D950-11059-1 is incorporated herein and made a part hereof by reference. Buyer reserves the right to conduct surveillance at Seller's facility to determine whether Seller's special tooling management process meets the requirements of this clause. A copy of D950-11059-1 can be obtained at the following URL address:

http://www.boeingsuppliers.com/supplier_portal/index_general.html

BO2 Deliverable Software Requirements

Supplier shall maintain a Quality Assurance Program to include Software Quality Assurance, in accordance with BQMS Appendix A-Quality Management System (SAE AS9100) and BQMS Addendum 2-Quality System Requirements for Deliverable Software. Reference address: <http://www.boeingsuppliers.com/supplier/D6-82479.pdf>

BO3 Seller performing **MRB on Buyer's government contracts** (e.g., V-22, CH-47, etc.) shall promptly notify the government representative who normally services Seller's facility to provide the opportunity to be included in Seller's MRB process. If a government representative does not normally service Seller's facility, Seller shall furnish a copy of this contract to the nearest Defense Contract Management Agency (DCMA) office. In the event the government representative or DCMA office cannot be located, Seller shall immediately notify Buyer's Authorized Procurement Representative. DCMA has the right of approval / disapproval on all MRB dispositions on all Buyer procurements.

F1 First Article Inspection / Test (FAI/T) shall be performed for all initial production items. FAI/T shall also be performed on production items that have had TDP changes made and or have been out of production 90 days or more. Written notice of any First Article Inspection, Lot Acceptance Test and/or Audit shall be provided to ESA at least 20 days prior to the event so Government or ESA can attend if desired.

F2 The Contractor shall implement the **IUID** marking for those items that meet the criteria in DFARS 211.274-2. The Contractor shall provide the results of the non-recurring engineering (NRE) to the Government at no additional cost. *All delivered items with unit price >=\$5,000; DoD serially managed; Item is mission essential Class VII major end item; A parent item contains DoD serially managed subassembly, component, or part; Additional items requiring IUID (per AR 750-1, Para 3-7.0.1) include the maintenance of all end items and Class IX repairable items with a Maintenance Repair Code (MRC) of F, H, D, or L will be managed at the serial level of detail. The Contractor shall provide a pre-delivery sample of the IUID mark to be validated prior to the first delivery.*

F3 The Contractor shall be responsible to establish, control, and be responsible for the handling, storage, packaging, and shipping to protect the quality of the materiel and to prevent damage from loss, deterioration, degradation, or substitution of products that meets the requirements specified in MIL-STD-2073 (Standard Practice for Military Packaging) for the materiel listed in this contract.

L1 LMMFC-816-Specification Revision Level

For Lockheed Martin Part Numbers that reference military, industrial, and commercial standard processes, Sellers shall use the latest revision at time of the purchase order unless otherwise stated in the purchase order.

L2 LMMFC-818

Batch traceability data is required for this hardware by date code, Heat Lot and Lot Number.

L3 LMMFC-1839

The Seller shall identify the special processes referenced by specification within the Lockheed Martin Engineering Design required to produce the item/s under contract.

Special processes referenced by specification within the Lockheed Martin Engineering Design shall be documented and controlled by the special process supplier.

The Seller is responsible to assure all special process providers are capable and qualified to perform the special process in accordance with specification requirements. Objective evidence of Seller special process approvals shall be retained by the Seller in accordance with P.O. quality note 831 and is subject to buyer periodic audit. When using Lockheed Martin approved special process providers, a copy of the special process provider's certificate of compliance that certifies the process was accomplished in accordance with the applicable specification is acceptable objective evidence. Use of special process providers approved by Lockheed Martin is recommended.

L4 LMMFC-1800 - Supplier Process Change Control (Fit, Form, Function)

This requirement does not apply to Commercial Off The Shelf (COTS) parts. Seller agrees that the Work produced internally and/or the work procured from sub-tier suppliers under this Contract shall comply with the following requirements unless a documented request for change is approved by the Lockheed Martin Procurement Representative.

1. Work shall not be moved from the original location of manufacture to another location of manufacture within a production facility or to any other production facility.
2. Where First Article Inspection is required, work shall not be moved from the original location where the Work was produced at the time of First Article Inspection acceptance.
3. No changes shall be made to the design, manufacturing processes, materials or activities that affect fit, form or function.
4. A fit, form or function analysis shall be performed documented, and included with any request for change.
5. A documented process shall be in place to review, identify and submit a request for changes to the Lockheed Martin Procurement Representative.
6. A documented request for change shall be submitted to the Lockheed Martin Procurement Representative 30 days prior to planned implementation. The change will not be implemented unless approved by the Lockheed Martin Procurement Representative.

L5 LMMFC 1818 – First Article Inspection (FAI) REQUIREMENT:

A First Article Inspection (FAI) is required in addition to inspection requirements elsewhere in this purchase order. FAI'S shall be performed in accordance with Aerospace Standard AS9102. A FAI shall be conducted by Seller and accepted by a LMMFC supplier quality representative at Seller's facility, prior to any material shipment.

The FAI shall consist of: A complete, independent, and documented physical and functional inspection process to verify that prescribed production methods have produced an acceptable item as specified by engineering drawings, planning, purchase order, engineering specifications, and/or other applicable design documents.

Witnessing of the Acceptance Test (ATP) will also become a part of the FAIR when applicable.

Any changes, as defined in AS9102, paragraph 5.3 or a break in production of one (1) year or more shall require a new FAI.

DOCUMENTATION:

Inspection results shall be documented by recording data whenever possible. Attribute data will be recorded only when variable data is not available.

AS9102 or equivalent forms shall be used. In addition, a Product/Process Verification (PPV) checklist shall be used as a guide for process verification and shall become part of the FAIR.

The LMMFC supplier quality representative shall stamp AS9102 Form 1, Part No. Accountability or equivalent as evidence of LMMFC FAI acceptance.

Original FAI reports and supporting documentation shall be included with delivery of the initial FAI article.

A copy of FAI reports and supporting documentation shall be retained at the Seller's facility in accordance with records retention requirements as defined elsewhere in this purchase order.

For deliveries subsequent to the initial delivery, the Seller shall include a copy of the first page (AS9102 Form 1, Part No. Accountability

Or equivalent) of FAI report with each shipment.

APPLICABILITY:

FAI is required for the part/assembly number(s) included on the purchase order with no exceptions.

FAI is required for subassemblies and detail parts that make up the configuration item(s) included on this purchase order, with the following exceptions:

A) SELLER DESIGN AUTHORITY

For subassemblies and/or detail parts where the Seller has design authority, FAI requirements shall be as defined in the Statement of Requirements.

B) CATALOG AND COMMERCIAL OFF-THE-SHELF

If the part number, as listed on this P.O., is for a buyer or Seller designed product that has standard catalog or commercial off-the-shelf hardware included at subassembly levels, then FAI is not required for the standard catalog or commercial off-the-shelf parts/assemblies.

C) PREVIOUS INSPECTIONS

The FAI requirements defined in this P.O. quality note are not applicable for FAI's completed and approved under the previous P.O. note 834 requirements. All new or delta FAI's are to be conducted in accordance with the requirements as defined in this P.O. note.

L6 LMMFC 861-Source Inspection

Buyer Source Inspection is required on this product in addition to inspection requirements elsewhere in this order.

Inspection by a representative(s) of the Buyer is required at your facility prior to the shipment of the material. The Buyer's customer shall have the right to inspect all work included in this order at the supplier's facility. All Source Inspections must be coordinated with the Buyer. Unless otherwise superseded by a Letter

of Delegation issued by the Lockheed Martin Quality representative, a request for Supplier Quality Engineering to conduct source inspection must be received at least (5) working days in advance of the planned inspection to allow for participation if required. If this order indicates that it is not placed under a government contract or subcontract, all reference to government inspection is deleted. This source request is in addition to any other buyer notification that may be required. A copy of the completed Source Inspection checklist or a Letter of Delegation is to be included in the data package with each shipment of hardware.

L7 LMMFC 850 - Government Source Inspection

Government Inspection is required prior to shipment from your plant. On receipt of this order promptly furnish a copy to the government representative who normally services your plant, or defense logistics agency inspection office. In the event the representative or office cannot be located, our purchasing agent should be notified immediately. Evidence of government source inspection must be included with each shipment.

L8 LMMFC 1816 - Unique Identification (UID)

Material delivered for this purchase order shall meet the Unique Identification of tangible assets requirements per the specification requirements as designated on the Lockheed Martin engineering drawing. The contractor shall submit to Lockheed Martin prior to shipment, an electronic file containing this UID information. The electronic file shall also include all embedded UID information.

The contractor shall ensure that the materials furnished to Lockheed Martin are in conformance with applicable requirements for UID identification as specified on the engineering drawings and that supporting documentation is on file and made available to Lockheed Martin or the government representatives upon request. The contractor shall ensure the UID label includes the following information as defined on the engineering drawing:

1. Name of contractor
2. Quantity shipped
3. Purchase order number
4. Concatenated unique item identifier or DOD recognized unique identification equivalent per DFARS 252.211-7003.
5. Unique item identifier type
6. Issuing agency code (if concatenated unique item identifier is used)
7. Enterprise identifier (if concatenated unique item identifier is used)
8. Original part number
9. Lot or batch number
10. Current part number (if not the same as the original part number)
11. Current part number effective date
12. Serial number

13. UID verification marking complies with minimum print quality per Mil-Std-130.
14. UID validation Material defined in this purchase order is subject to Lockheed Martin inspection at destination.

L9 LMMFC 852

Government Contract Quality Assurance is a contract requirement under our prime contract therefore government monitoring of your processes is a requirement. Contact your local government representative for specific instruction and coordination.

L10 LMMFC 405 - Counterfeit Parts

- (a) Definition. "Counterfeit Work" means Work that is or contains items deliberately misrepresented as having been designed and/or produced under an approved system or other acceptable method. The term also includes approved Work that has reached a design life limit or have been damaged beyond possible repair, but are altered and deliberately misrepresented as acceptable.
- b) Prohibition. SELLER agrees and shall ensure that Counterfeit Work is not delivered to LOCKHEED MARTIN.
- c) Prevention. SELLER shall only purchase products to be delivered or incorporated as work to LOCKHEED MARTIN directly from the Original Component Manufacturer (OCM)/Original Equipment Manufacturer (OEM), or through an OCM/OEM authorized distributor chain. Work shall not be acquired from independent distributors or brokers unless approved in advance in writing by LOCKHEED MARTIN.
- d) Notification. SELLER shall immediately notify LOCKHEED MARTIN with the pertinent facts if Seller becomes aware or suspects that it has furnished Counterfeit Work. When requested by LOCKHEED MARTIN, SELLER shall provide OCM/OEM documentation that authenticates traceability of the affected items to the applicable OCM/OEM.
- e) Remedies. In the event that work delivered under this contract constitutes or includes counterfeit work, Seller shall, at its expense, promptly replace such counterfeit work with genuine parts conforming to the requirements of this contract. Notwithstanding any other provision in this contract, Seller shall be liable for all costs relating to the removal and replacement of counterfeit work, including without limitation LOCKHEED MARTIN's costs of removing counterfeit works of reinserting replacement work and of any testing necessitated by the reinstallation of work after counterfeit parts have been exchanged. The remedies contained in this paragraph are in addition to any remedies LOCKHEED MARTIN may at law, equity or under other provisions of this contract.
- f) Relationship to other provisions of this contract. This clause applies in addition to any quality provision, specification, statement of work or other provision included in this contract addressing the authenticity of work. To the extent such provisions conflict with this clause, this clause prevails.

Flow down. SELLER shall include paragraphs (a) through (d) this clause or equivalent provisions in lower tier subcontracts for delivery of items that will be included in or furnished as work to LOCKHEED MARTIN.

L11 LMMFC 800 - Requirements flow down

The Seller shall have systems and methods to assure full compliance to all quality purchase order (P.O.) notes applicable to this P.O. When products or services applicable to this P.O. are procured by the Seller from sub-tier suppliers, the Seller shall flow the quality P.O. note requirements as necessary to assure full compliance is achieved.

L12 LMMFC 823 – SOR/PROC Spec

Statement of Requirements and/or Procurement Specification-Statement of Requirements (SOR) and/or Procurement Specification document and compliance thereto are applicable to this purchase order and are subject to review and approval by the buyer. Quality requirements contained within the Statement of Requirements and/or Procurement Specification are in addition to the quality requirements contained elsewhere in the purchasing document.

L13 LMMFC 831 - Quality and Inspection Records

Quality and inspection records shall be established and maintained by the Seller to provide evidence of conformity to requirements and the effective operation of the Quality management system. Records retention requirements differ based on the Lockheed Martin Missiles and Fire Control contract/product associated with the procurement. As a minimum, records must be maintained for a period of seven (7) years after completion of this Purchase Order (P.O.) or as otherwise stated elsewhere in this P.O. Records may be archived to an offsite location, but shall remain legible and readily retrievable. Buyer reserves the right to periodically audit the Seller's historical records, retention policies and practices.

L14 LMMFC 1837 – Special Process – Seller Approved

The Seller, when designing or using a Lockheed Martin engineering design to produce the item/s under contract, shall identify, document and have sole control over any and all special processes/special processors referenced by specification in the design. The Seller is solely responsible to assure all special process providers are capable and qualified to perform the special process in accordance with specification requirements. Objective evidence of surveys shall be retained by the

Seller in accordance with P.O. qualitynote 831 and is subject to buyer periodic audit. A copy of the special process provider's certificate of compliance that certifies each process was accomplished in accordance with the applicable specification shall be available for review by buyer as objective evidence the special process was performed to the specification requirements. Special process definition: special process -a method controlled by a contractually required specification where: When a product undergoes a physical, chemical or metallurgical transformation or inspection, conformance to the specification cannot be readily verified by normal inspection methods, and the product depends on use of specific equipment operated in a specific manner, under controlled conditions, by trained personnel with instructions, procedures and standards.

L15 LMMFC 1899 – Supplier Corrective Action Request

When required, the Seller agrees to provide a formal response to any Supplier Corrective Action Request (SCAR) within the timeframe indicated on the SCAR. Seller is also requested to contact the buyer of record when the material associated with a SCAR investigation has not been returned by buyer to Seller or more time is required to adequately perform an investigation. Failure to provide a formal acceptable SCAR response within the established time frame may adversely affect your supplier approval status for future procurements.

L16 LMMFC 885 - Drawing Revision Level

Seller shall submit Documentation (IE: shipping list, certificate of conformance, etc.) with each shipment, indicating the Lockheed Martin drawing number and revision level to which the part is manufactured.

N1 This QA Code only applies to manufacturers of Circuit card assemblies. ESA-FWO's Tin Whisker Mitigation Plan (EFW-PP-0003, Rev. B-dated 14 June 2007) and lead Free Control Plan (EFW-PP-0002, Rev B, and dated 26 March 2007) shall be applicable to this purchase order.

N2 Requires 12 year record retention. Applicable records are any and all documents and artifacts that prove compliance to the drawing. Records are to be delivered with the parts and should be a "stand alone" package.

N3 All constructions and finishes containing pure cadmium or pure zinc shall be prohibited. Constructions and finishes containing pure tin shall be prohibited unless they contain a minimum of 3 weight percent alloying elements(s), i.e., lead, silver, etc.

R1 Electronic, electrical, electromechanical, and mechanical piece parts and assemblies included the internal fabrication of hardware, delivered shall not have pure tin finishes. Additionally, any tin-lead (SnPb) plating or solder processes/processing shall result in a finish of no less than 3% lead composition. This applies to component leads and terminations, carriers, bodies, cages, brackets, housing, mechanical items, hardware (nuts, screws and bolts) etc. This does not apply to MIL-Spec parts or Customer drawings that allow the use of Tin (Sn) with less than 3% lead (Pb). CoC shall be provided verifying the delivered product meets the above listed composition requirements.

1. Seller shall have contacted the original equipment mfg. to verify that the specific mfg. lot date of delivered product meets the specified minimum lead (Pb) requirement if Tin (Sn) is present in the product.
2. Seller has verified by actual sample testing (x-ray fluorescence testing is preferred) or other industry acceptable method that a minimum of 3% lead (Pb) is present in any process that uses tin (Sn).
3. Seller shall be responsible for managing the compliance with this requirement with subcontractors or sub-tier suppliers, and provide evidence of the appropriate flow-down and management of this requirement to the satisfaction of the buyer or designate. Exceptions must be authorized in writing by the buyer.

R2 Program requires 5 year record retention. Applicable records are any and all documents and artifacts that prove compliance to the drawing.

R3 100% X-ray inspection of all BGA locations is required for 100% of the CCA's produced under this purchase order. X-rays are to be taken preferably using a 3D X-ray. X-ray must be taken at an appropriate angle to clearly show the existence of solder balls or acceptable solder coverage under the BGA.

These X-rays must be captured on a CD and included with the product shipment. Each X-ray must be labeled with the PN, SN and BGA reference designator. These records must be retained by the supplier for a period of 7 years past the contract date.



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Jan 2020



Tim Brugger,
Mgr. Supplier Quality

Appendix Q: ESA-FWO SUPPLIER FIRST ARTICLE INSPECTION (FAI)

When performing First Article Inspection (FAI) the instructions in Attachment 1 of Appendix Q details the specific methods and expectations of the supplier for verification of the supplier's assembly and set up processes and to verify that product conforms to the drawing, Bill Of Material (BOM) or part list requirements.

Acronyms / Definitions:

| | |
|---------|---|
| AOI | Automated Optical Inspection |
| BGA | Ball Grid Array |
| BOM | Bill of Material |
| CCA | Circuit Card Assembly |
| CK/SUM | Check Sum |
| DEV | Deviation |
| ECO | Engineering Change Order |
| ECP | Engineering Change Proposal |
| ESA-FWO | Elbit Systems of America - Ft. Worth Operations |
| ESS | Environmental Stress Screening |
| FAI/FAT | First Article Inspection/Test |
| FQT | Formal Qualification Test |
| ICT | In Circuit Test |
| PL | Parts List |
| PWA | Printed Wiring Assembly |
| PWB | Printed Wiring Board |
| REV | Revision |
| SCAR | Supplier Corrective Action Request/Report |
| S/W VER | Software Version |
| SMT | Surface Mount Technology |
| SOW | Statement of Work |
| TH | Through-Hole Technology |
| TRR | Test Readiness Review |

1.1 PWA GENERAL FAI REQUIREMENTS:

ESA-FWO requires evidence that the supplier has configuration control for non-deliverable software and has verified that the files such as SMT pick and place, Contact systems, (AOI) – Automated Optical Inspection systems or similar equipment electronic media files are to the current Revision of the Bill Of Material (BOM) and Reference Designator Listing (RDL) if applicable. A printed copy shall be provided as objective evidence with the FAI documentation and shall have the signature of the supplier's Quality or Engineering representative that the data is correct. A work printout check sheet should be used or provided such as a Word or Excel spread sheet for ease in verification and identification of the correct quantity of components, part numbers and reference designators to aid inspection verification of the BOM and suppliers AS9102 documentation.

ESA-FWO Supplier Quality engineering shall be notified a minimum of 10 days in advance of the First Article productions run so that arrangements can be made for the ESA-FWO representative to participate in the initial FAI set up processes, verification of soldering (manual and automated), Programming, In Circuit Testing (ICT) processes prior to coating and Final Acceptance Testing.

First Article Inspections (FAI) may be performed on a minimum of 3 PWA from the first lot produced by Product part number or as per the ESA-FWO Program SOW issued to the supplier on the Purchase Order or per the drawing and BOM requirements.

Unless otherwise directed in writing, the Subcontractor shall be at their risk to produce additional products until ESA-FWO has accepted the FAI.

1.2 PWA PROCESS VALIDATION / VERIFICATION:

First Article Process documentation requirements apply to the supplier's manual Through Hole (TH) component insertion by hand assembly or Semi-automated processes such as Contact Systems and automated Surface Mount Technology (SMT) assembly for verification of component placement by part number and reference designator. The supplier should provide documentation showing Objective Evidence that the process is repeatable and that the supplier has performed verification of the process. Production files or Work Instructions should give instructions for manual processes for



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Tim Brugger,
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component installations and hand soldering. Computer software or supplier non-deliverable files used in the set up & assembly process shall be configuration controlled. A copy or print out of the component set up or Pick and Place file used in the automated SMT assembly process shall be provided for used by the ESA-FWO Source Representative for verification of component placement Reference Designators part numbers with the current revision BOM / PL. This documentation shall become part of the First Article Documentation as objective evidence.

1.3 PWA (TH) THROUGH HOLE & HAND COMPONENT INSERTION PROCESSES

For assemblies with TH components using automated process such as a contact system the supplier shall provide a copy of the machine set up for SI verification of the component Reference Designators and part numbers with the current Revision of the Bill of Material (BOM). This form is used to document the verification of the supplier documentation requirements for either in-process activities or final acceptance of the PWA assembly set up process. For manual hand or add-on components and soldering process should be identified in Production Files or Work Instructions showing documented process for repeatability.

1.4 PWA SMT – SURFACE MOUNT TECHNOLOGY / AOI – AUTOMATED OPTICAL INSPECTION

The Supplier is responsible for and shall verify that the Ref Designators listed and component part numbers in the SMT Pick and Place file or AOI matches the current BOM Revision. Objective evidence is required as part of the FAI documentation package. This shall consist of a print out of the supplier pick and place file or AOI program that has been checked against the ESA-FWO BOM for component part number correctness. This shall have the signature of the Process engineer or Quality representative stating all components have been verified to the current BOM revision including writing the revision number that was verified. The Reference Designator Listing (RL) shall also be used when the BOM does not list all the reference designators. This shall be verified and checked for agreement to the BOM part numbers and quantities. Note: The BOM takes precedence over the RL if there is a conflict of part numbers and ESA-FWO shall be notified immediately for clarification and corrections as needed.

During First Article Set up of the SMT feeders reel locations the Part number shall be verified to be in agreement with the current BOM and documentation shall be provided listing the feeder locations for each of the part numbers. Note: Suppliers using automated SMT equipment such as a "My Data" utilizing "Smart Reels" the SMT reel placement may vary during other production runs.

The copies of objective evidence shall become part of the FAI documentation. A copy of the FAI documentation shall be included with first product produced and shipped to ESA-FWO. If desired the FAI documentation package can be shipped to ESA-FWO Supplier Quality Engineering attention for retention and FAI program FAI completion. ESA-FWO Supplier Quality should be contacted so they are aware that the documentation is being shipped separately.

2.1 FAI MECHANICAL – CASTINGS, MACHINED CHASSIS & MACHINED PARTS:

All dimensions of the drawing must be reported including the dimensions derived from any attached media, i.e., SAT files **that have been verified** by the supplier.

A copy of the annotated drawing and any supplier generated drawings/sketches used to identify dimension locations referenced on the dimensional report must be included in the FAI package. It is preferred that dimensions derived from attached media, i.e. SAT files be reported on Form 3, and recorded in the same unit of measure denoted on the drawing (inches or mm) and are clearly marked as SAT dimensions.

The following will be required and must be submitted for all FAI's:

1. Form 1: Part Number Accountability
2. Form 2: Product Accountability
3. Form 3: Characteristic Accountability and any dimensional attachment used to record dimensions derived from the SAT file.
4. Objective evidence of material certifications and special process certifications
5. Copy of the annotated (ballooned) drawing, including any supplier generated drawing/sketches
6. Certificate of Conformance
7. Source Inspection Report



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QUALITY CLAUSES
Jan 2020



Tim Brugger,
Mgr. Supplier Quality

REVISION HISTORY:

January 2020:

- 1) Added I.3

May 2019:

- 1) Updated general term

February 2016:

- 1) Updated Para. L. packaging/labeling requirements.
- 2) Added Para. M in GENERAL REQUIREMENTS for SCARs
- 3) Added Para. N in GENERAL REQUIREMENTS for Rubber Items
- 4) General formatting

I. GENERAL REQUIREMENTS

- A.** Seller shall make specified quality data and/or approved design data available in the English language. Seller shall maintain an English language translation of (1) its quality manual, (2) the operating instructions that implement the quality manual requirements, and (3) an index of Seller's procedures that contain quality requirements. Buyer may require additional documentation to be translated, including but not limited to: shop orders, technical specifications, certificates, reports and nonconformance documents.
- B.** Seller shall notify buyer of any adverse changes in quality system status resulting in the loss of 3rd Party registrar's certification within 30 days.
- C.** The Seller shall provide for review of the ESA, Inc. purchase order to assure that all contractual requirements are included in manufacturing planning, inspection, test instructions, as applicable, and all items procured from its suppliers are in compliance with the PO requirements.
- 1.** Seller shall notify Buyer, in writing, when any Key Characteristic (KC) interchangeable- replaceable features, fracture critical features, durability critical features, maintenance critical features, safety critical features, mission abort critical features or changes affecting fit, form, function or spares are to be subcontracted.
 - 2.** Seller shall have procedures for determining the capability of their sub-tier prior to issuing a PO to sub-tier. Seller shall assure PO flow down of applicable quality and technical requirements, and adequate methods of assuring compliance. Seller's suppliers shall be required to flow down and verify requirements of supplies/services they subcontract.
 - 3.** In case of a "drop" shipment (i.e. the delivery point is not to the site issuing the PO) a copy of all documentation required per the PO must be provided to the issuing site with the packing slip and invoice before the product can be accepted or payment made to the supplier. (This includes but is not limited to: Certificate of Conformance, FAI, Source Inspection Reports, As Planned / As Built, test data, etc.)
- D.** Seller shall establish controls to ensure that material subject to age control shelf life, or environmental controls are properly identified, monitored and maintained.
- E.** Seller shall maintain a documented calibration system for the calibration and maintenance of tools, jigs, inspection and test equipment. Seller's calibration system shall be compliant to prevailing industry requirements in accordance with Seller's Quality Management System to include ISO-17025, ISO10012:2003 or ANSI Z540.
- F.** Seller shall provide for the safety and convenience of Buyer and/or Buyer's customer, access and assistance, without additional cost, to any and all areas, where work is being or is scheduled to be performed under this Purchase Order. Buyer and or Buyer's customer may perform in-process inspection, product audits, and system surveillance at Seller's facilities as part of verification of conformance to contract. Access denial could result in inactivation of Seller's approval.

- G.** Work under this PO is subject to Buyer's periodic audit of Seller's compliance with Seller's internal procedures and other documents applicable to this PO.
- H.** Seller shall provide, at no increase in price, cost or fee to Buyer, Government or appropriate regulatory agencies, suitable facilities at Seller and Seller's subcontractors' manufacturing locations for Buyer, Government and regulatory agency representatives to perform compliance verification.
- I.** Seller is responsible, prior to delivery of the first production lot, to complete an FAI in accordance with Aerospace Standard AS9102. A completed copy of the AS9102 forms, as well as other applicable supporting documentation, shall be presented to ESA-FW with the FAI lot. See QA Code 11 for complete details.
- 1.** Seller shall notify ESA Procurement and Supplier Quality of any changes in facility location, or design or process that may affect fit, form or function of the part, at which time a new First Article is required. Seller's First Article Inspection process shall be in compliance with AS9102.
 - 2.** Seller shall notify ESA Procurement in writing of any pending or changes made or its subcontractors make to an item order under an ESA Source Control or Specification drawing. ESA written approval / concurrence of said change is required prior to implementation.
 - 3.** If applicable Seller shall comply with Lockheed Martin Quality Clause Q2A First Article Inspection.
- J.** Seller shall be aware that it is illegal, under United States law, to knowingly market or sell counterfeit goods utilizing the logo, trademark, trade dress or other distinctive features of another's products or services that confuse the public regarding the true nature or origin of the product or service. Buyer will not submit payment for Counterfeit material and such material will be destroyed by Buyer.
- K.** All components and finishes shall be as indicated on the ESA supplied drawing and parts list. ESA may have customer restrictions as to allowable surface finishes. No unapproved substitutions may be made. If conflicts are apparent or the indicated source of supply is not available, seller shall contact ESA for clarification or approval. Lead free soldered designs must be fully qualified prior to production use.
- L.** The following quality term describes the quality provisions requirements for the following:
- Bolts, nuts, screws, any press nuts or studs and washers of all kinds, 5mm or larger, requires hardening, are documented as Military (Government) or industrial standards.
 - Screws, nuts, bolts or studs having internal or external threads, which bear grade identification marking required by a standard or specification.

These provisions are required according to the United States Fastener Quality Act Public Law 101-592 as amended by Pub. L. 105-234 and Pub. L. 106-34. The supplier shall comply with all requirements of the act, and shall identify and hold ESA-FW, Inc. harmless for any damages due to non-compliance with the act.

a) The approved manufacturers shall include with each shipment:

1. Test reports from a U.S. Government accredited laboratory that substantiates qualification and/or acceptance.
2. Certification of Compliance signed by an officer of the supplier, declaring that the items conform to all requirements specified in applicable standards and/or specification documents, manufacturer's identity and lot number and that an original copy of the accredited laboratory report, if applicable, is on file for inspection and review by ESA- FW
3. Items that are individually or intermediately packaged within a container shall be marked on the EXTERIOR with the manufacturer's identity, lot number and ESA-FW's PO. Each intermediate package shall be marked with the manufacturer's identity, lot number and ESA-FW's PO and Part Number.

b) The distributor shall include with each shipment:

1. The approved manufacturer's certification statement, as noted in 1 and 2 above
2. Certification of Compliance signed by an officer of the supplier, declaring: That a manufacturer, listed as approved for the item, manufactured the items.

M. When specified, Seller agrees to provide a formal response to ESA-FW issued Supplier Corrective Action Requests (SCAR) within the timeframe indicated on the SCAR and in the format specified. Seller is also requested to contact the buyer of record when the material associated with a SCAR investigation has not been returned or if more time is required to adequately perform an investigation. Failure to provide a formal SCAR response by the established due date will result in a delinquent SCAR status which will adversely affect your supplier rating and potentially result in loss of future business with ESA-FW.

N. When specified by Contract, PO, SOR/SOW or specification, the Seller shall certify that all items containing Rubber have been testing in accordance with Mil-Std-810 (current revision) and shall provide a copy of the original manufacturer's certifying documentation upon delivery for each lot.

II SPECIALTY METALS CLAUSE

The purpose of this clause is to advise ESA-FW suppliers of metal parts that it is necessary to comply with specialty metals requirements associated with DoD Contracts. The DFARS 252.225 clauses 7008 and 7009, regarding Acquisition of Specialty Metals, implement a portion of the Berry Amendment, a federal law (10 USC 2533a). It requires certain specialty metals (such as Steel, Titanium, Stainless Steel, or Zirconium) incorporated in articles delivered under DoD contracts be smelted in the United States or a qualifying country (or incorporated in an article from a qualifying country). Qualifying countries are listed in DFARS 225.872-1. The DFARS can be found on the following website:
<http://www.acq.osd.mil/dpap/dars/dfars/html/current/252225.htm>.



APPENDIX QG
QUALITY CLAUSES
Jan 2020



Tim Brugger,
Mgr. Supplier Quality



III BUYER FURNISHED MATERIAL

- A. With each delivery containing Buyer furnished material, Seller shall certify as part of the statement of quality as follows:
"The material used on this order includes material furnished by Buyer and no unauthorized substitutions have been made."
- B. When repairing property furnished by the Buyer, the seller will use only new materials unless written permission is provided by the Buyer.
- C. If the seller receives part specific written permission from the Buyer to use used or reconditioned materials, then the Seller will maintain configuration management records in accordance with AS9100 and guidance from ISO10007.
- D. If the seller receives direction from the buyer to scrap Buyer property, then the Seller will prepare a Scrap Certificate of assemblies scrapped including:
 - 1. Part number(s),
 - 2. Serial number(s), and
 - 3. Part numbers, nomenclature and serial numbers of any subassemblies or parts missing from scrapped assemblies. Seller shall not "salvage" any parts from items to be scrapped without part specific written permission from the Buyer.
 - 4. The Seller's designated representative's printed name and signature
 - 5. Scrap Certificate Date

IV BUYER AT SOURCE REQUIREMENTS



When Buyer Source Inspection is specified in this Purchase Order, Seller shall comply with the following:

- A. All work performed under this PO is subject to ESA's inspection and test at the supplier's facility prior to shipment. ESA's representative may elect either to perform inspection or test per a sampling plan or up to 100% inspection. Seller shall present with each shipment, for review by the Buyer representative, the final inspection/test results, as applicable, and the required certifications.
- B. When modifications, repairs or replacements occur after Seller's final inspection or testing, Seller's Quality Assurance shall perform re-inspection and retest of affected characteristics prior to presentation for Buyer inspection.
- C. Seller shall obtain evidence of Buyer's Field Representative's acceptance, prior to shipment (signature OR stamp) on ESA's Source Inspection Report.
- D. Seller shall include a copy of the Source Inspection Report with each shipment of accepted materials.
- E. Seller shall provide a Certification of Conformance (COC), or Statement of Quality (SOQ) to attest that all supplies presented meet the applicable purchase order terms and conditions. This certification shall bear the signature of an authorized agent of the Seller.
 - 1. For purposes of this general statement of quality, computer-generated or facsimile-reproduced signatures will be considered to have the same force as an original signature
 - 2. This general statement of quality shall be in addition to any specific certifications required to be delivered with the shipment by specifications or other quality documents. All statements of quality shall accompany the shipment.

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VI. MATERIAL REVIEW AUTHORITY

- A. For Seller-designed Items, Seller has Material Review Authority, except for one or more Non-conformances that affect a parameter controlled by Buyer drawing or specification, where form, fit or function, interchangeability, Critical Safety Characteristic ("CSC") related to Critical Safety Item ("CSI") service life or reliability is affected. Seller shall submit dispositions of non-conformances, if any, affecting any such parameter(s) to Buyer's MRB.
- B. For Buyer-designed Items, Seller disposition authority is limited to scrapping of Items, eliminating the nonconformance by rework to specification, or returning to supplier. On Items of Buyer design, Seller shall document non-conformances for submittal to Buyer's MRB for dispositions as required by this PO. Seller shall not continue processing Item(s) or incorporating any non-conformances into any Item, process, procedure or data that affects a parameter controlled by Buyer drawing or specification or affects form, fit or function, interchangeability, service life or reliability unless and until Seller has received prior written approval from Buyer. Upon prior written approval from Buyer, Seller's continued processing shall be limited to subsequent operations that do not hide, alter or limit the ability to inspect, disposition or repair Item.
- C. Regardless of design control (Buyer or Seller) all departures from the Buyer's specified requirements, or any nonconformity that may adversely affect the fit, form, function, reliability, or safety for the deliverable item must be submitted to Buyer for MRB disposition.
- D. When a nonconforming item is reworked or repaired it shall be subject to re-verification/re-inspection by the Seller to demonstrate conformance to the requirements and to assure no other nonconformity was incurred during the rework or repair process.
- E. Items with disposition of "Scrap" shall be conspicuously and permanently marked (painted red) until physically rendered unusable. Scrap items shall not be shipped from Seller.
- F. Seller's nonconforming material reports shall be maintained by the Seller and made available for review by Buyer and Buyer's Customers. Buyer and Buyer's Customers reserves the right to dispute Seller's MRB actions and/or audit the Seller's MRB procedures, processes and documentation at any time during the performance of this contract.

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VI BUYER-FURNISHED, SELLER-MANUFACTURED OR SELLER-OWNED TOOLING

Seller's documented quality system shall include written procedures for the control, maintenance and calibration of special tooling, jigs, inspection and test equipment, and other devices used in manufacturing processes.

VII CHANGES TO SELLER'S OPERATIONS

- A. Seller shall promptly notify Buyer's authorized Procurement Representative and Supplier Quality Representative of intended or actual changes in the Management Representative with assigned responsibility and authority for its quality management systems. Seller shall also promptly notify Buyer's authorized Procurement Representative and Supplier Quality Representative in writing of intended or actual major change to its quality management system that may affect the conformity of its goods or services. Each change to Seller's quality management systems is subject to review by Buyer.
- B. Seller shall maintain complete records of all manufacturing, inspection and testing in connection with the Items. At Buyer's election, and at no additional price, cost or fee, Seller shall provide such records to the Buyer, Buyer's Customers and/or appropriate regulatory agencies during the performance of this PO and for at least seven (7) years after completion of this PO or for such longer periods, if any, as may be specified elsewhere in this PO. Upon Buyer's request therefore, Seller shall forward such record to Buyer at no price, cost or fee to Buyer.
- C. Records of manufacturing, inspection, and test (Objective Quality Evidence) shall be maintained and stored by Seller for a period of **seven (7)** years after completion or termination of this Purchase Order. The COC's, SOQ's final inspection/test results, and all objective evidence which substantiates Seller's certifications, including certification for buyer furnished material, shall be retained on file at Seller's facility. When additional quality requirements so specify, appropriate data shall be provided with each shipment. This data shall be readily available for subsequent on-site review by Buyer. When requested by Buyer, Seller shall provide at no cost, legible photocopies of inspection/test results or substantiating objective evidence for any certification or statements of quality.
- D. Seller shall maintain documented records of tool control whether the tooling is furnished by Buyer, or manufactured by Seller and/or Sellers' sub-tier, or is Seller-owned.
- E. Natural Disaster Occurrence-Seller shall promptly notify Buyer's Authorized Procurement Representative of any occurrence of natural disaster that diminishes Seller's ability to deliver conforming goods or services.

The requirements imposed by this Quality Appendix are denoted as "**QG**" on the Purchase Order and may be supplemented by one or more additional appendices denoted as "**QUALITY CLAUSES**". For example, the entry "**QG, 8, 11**" appearing in the Purchase Order shall mean that Quality Clause **8** and Quality Clause **11** are also imposed on the Purchase Order.