



A Phoenix Mecano Company

Supplier Quality Assurance Requirements

110-1000-001 Rev. E
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REVISION HISTORY

REV.	REV. BY	EFFECTIVE DATE	REF. ECO #	BRIEF DESCRIPTION OF CHANGE
A	O. Olaniyan	8/18/2016		Initial Release
B	O. Olaniyan	6/15/2017	CN1145	1. Revised sections: 2.0, 3.3, 5.0, 5.1.3, 5.9, 6.0, 6.4.4, 9.0, 16.2, 27.1 2. Added sections: 3.2.1, 14.1, 15.2 & 35 3. Revised the cover page, revision history block & footer
C	O. Olaniyan	10/03/2017	CN1367	1. Added section 5.1.1.1.1 2. Revised section 5.2.2
D	O. Olaniyan	3/7/2018	CN1501	Revised clauses 25 & 28 to reference the correct applicable clause. This was done to fix a copy & paste error.
E	O. Olaniyan	11/12/2018	CN1644	Modified the following clauses: 30, 20.1, 16.2, 18.0, 14.1, 5.9, 4.0, 3.0, 1.0 Added the following clauses: 36, 37, 38, 38.1 & 38.2 Removed the following clauses: 18.1c & 18.1d

The following clauses, when specifically referenced in the Purchase Order by number, form a part of the Purchase Order in addition to all other clauses, terms, and conditions, drawings and specification, which are made a part of the Purchase Order. Unless otherwise specified, specifications referenced herein shall be of the issue in effect on the date of the request for quotation.

- 1.0 On Site Visit – Supplier agrees to On Site visit by Orion Technologies and Orion Technologies’ customer when required during the period of performance of this purchase order. Orion will notify the supplier in advance prior to the onsite visit.
- 2.0 Orion Technologies Source Inspection – Please note that clause 2.0 shall be accompanied by one of the sub requirements listed below and shall apply to all materials and services supplied under the Purchase Order. Supplier shall notify Orion Technologies Purchasing Department (or Field Representative specified in the Purchase Order) that product is ready for source four (4) days prior. Evidence of inspection must accompany shipment. If the supplier elects to utilize automated testing programs for final acceptance, proof must be supplied to Orion Technologies that the program is capable of fully testing material to the drawing requirements. A single verification prior to testing of the first lot of material may normally suffice, unless significant modifications are made to the program that in the opinion of Orion Technologies requires re-verification.

Readiness for Source Inspection – supplier is responsible for assuring products are ready for Orion Technologies’ inspection at the scheduled time. Should an Orion Technologies representative be required to cancel source inspection after their departure, the supplier is subject to time and travel charges incurred by such Orion Technologies representative. Supplier’s readiness shall include making available all test and inspection documentation including P.O. and drawings, inspection/test equipment, and necessary personnel required to complete the Source Inspection.

- 2.1 Source Verification of Qualification Test, Reliability Demo, Burn-in, and Production Sampling is required. (Note: QC Clause 2.0 is also invoked in conjunction with this clause.)
- 2.2 Inspection of work-in-process at points selected by Orion Technologies QA is required. The points shall be detailed in a Statement of Work (SOW), Purchase Order (PO), or supplemental documentation. (Note: QC Clause 2.0 is also invoked in conjunction with this clause.)
- 2.3 Pre-Cap Visual Inspection is required prior to closure as detailed in Statement of Work (SOW), Purchase Order (PO) or supplemental documentation. (Note: QC Clause 2.0 is also invoked in conjunction with this clause.)
- 2.4 Final Inspection/Test prior to shipment is required. Orion Technologies shall validate the Final Insp/Test to ensure that all items/services are compliant to the required specifications. (Note: QC Clause 2.0 is also invoked in conjunction with this clause.)
- 2.5 Physical Configuration Audit (PCA) is required prior to delivery from your facility. The PCA prerequisites shall be defined by Orion Technologies in a Statement of Work as defined under Clause 8 (SOW required). (Note: QC Clause 2.0 is also invoked in conjunction with this clause.)
- 2.6 Repair units – Units under an Orion Technologies Repair Purchase Order shall be source inspected to the extent of the repair performed in order to verify repair complies with Orion Technologies approved requirements. (Note: QC Clause 2.0 is also invoked in conjunction with this clause.)
- 3.0 Quality Assurance Management – the supplier shall maintain an effective quality program in accordance with the applicable clause indicated below for all material and services supplied under the Purchase Order. The supplier’s calibration system shall conform to ISO 10012-1, ANSI/NCSS Z540-2 or equivalent. MRB authority is not granted for this Purchase Order. The supplier shall develop and maintain a product recall system (traceable to the serial number/date code, location, and date of manufacture) which is capable of notifying Orion Technologies of any circumstances that might affect the integrity of products previously delivered. Orion Technologies reserves the right to perform surveys and audits necessary to assure conformance to the Quality Assurance requirements of the latest P.O. issue in effect unless otherwise noted. Orion Technologies also reserves the right to request Corrective Action for Quality System or material noncompliance. The use of “Part

Brokers” for the acquisition of any parts or materials on this Purchase Order is permissible only if the independent distributor/broker is approved by Orion Technologies. A “Part Broker” is a non-approved Orion

Technologies supplier that is not a manufacturer or an authorized distributor of the product. The proposed use of a non-Certified Parts Broker must be approved by Orion Technologies via Orion Technologies written deviation prior to acquiring the item. The supplier is responsible for the successful completion of all additional testing that may be required to obtain approval. The approval process must be documented on Orion Technologies deviation form or supplier’s format and submitted to the buyer for approval.

- 3.1 Supplier’s Compliance to AS9100 or ANSI/ASQC/ISO 9001. Supplier shall have a quality program that complies with the Aerospace Standard 9100 or American National Standards Institute/American Society for Quality Control (ANSI/ASQC) document ANSI/ASQC/ISO 9001, “Model for Quality Assurance in Design/Development Production, Installation, and Servicing.” At Orion Technologies’ Request, the supplier is subject to periodic audit/assessment of their quality program to ensure compliance to AS9100 or ANSI/ASQC/ISO 9001 requirements.
- 3.2 If Orion Technologies accepts AS9100/ANSI/ASQC/ISO 9001 registration and in the event the seller changes registrars, loses registration status, or is put on notice of losing 3rd party registration status, the seller shall notify Orion Technologies within three (3) days of receiving such notice from their registrar. (Note: QC Clause 3.0 is also invoked in conjunction with this clause.)
 - 3.2.1 Supplier shall maintain a control system ensuring all sub-tier suppliers are capable of meeting the requirements of the Purchase Order. The supplier shall notify Orion of any intentions to subcontract work required to complete the Purchase Order Requirements. Orion retains the right to approve or disapprove any sub-tier suppliers considered for use on deliverable items. (Note: QC Clause 3.0 is also invoked in conjunction with this clause.)
- 3.3 Counterfeit Parts Control Program for OCMs/OEMs The Supplier shall have a counterfeit electronic part detection and avoidance system that complies, at a minimum, with each of the twelve (12) system criteria outlined in paragraph (c) of DFARS clause 252.246-7007. The supplier’s system must be fully documented and is subject to review and approval by Orion Technologies.

For non-DOD contracts, the supplier shall have a counterfeit electronic part detection and avoidance system that complies, at a minimum, with AS5553. The supplier’s system must be fully documented and is subject to review and approval by Orion.

Suppliers shall be required to procure parts, whenever possible, from Original Component Manufacturers (OCMs), Original Equipment Manufacturers (OEMs), or Authorized/Franchised Distributors that comply with the requirements of AS6496 and/or AS5553. Parts procured from OCMs/OEMs, or AS6496/AS5553 compliant Authorized/Franchised Distributors are required to have documented Certificates of Conformance that are traceable by lot to the OCM.

Parts procured from Independent Distributors (IDs)/Brokers are permitted only if the ID/Broker has been pre-qualified by the Defense Logistics Agency (DLA) and listed on the DLA’s Qualified Suppliers List of Distributors (QSLD) or Qualified Testing Suppliers List (QTSL). Procurement from IDs/Brokers who are not pre-qualified and listed by the DLA is not permitted without the express written approval of Orion Technologies’ Quality Assurance Department. Orion Technologies approval will require testing to be performed by an Orion Technologies-approved test facility for part authentication/verification prior to inclusion in any product to be supplied to Orion Technologies.

3.4 Counterfeit Parts Control for Distributors

The distributor’s counterfeit electronic part detection and avoidance system must be fully documented and is subject to review and approval by Orion Technologies.

- 3.4.1 Franchised/Authorized Distributors shall have a documented system that defines processes used to prevent the purchase and distribution of counterfeit electronics products. The system shall meet the requirements of SAE AS6496 and/or AS5553.

- Documented Certificates of Conformance that are traceable by lot to the Original Component Manufacturer (OCM) shall be provided with each lot delivered.
- 3.4.2 Independent Distributors/Brokers must be pre-qualified by the Defense Logistics Agency (DLA) and listed on the DLA's Qualified Suppliers List of Distributors (QSLD) or Qualified Testing Suppliers List (QTSL).
- 4.0 Change Control (Ref: Mil-Std-480/973) – is applicable to all material supplied under the Purchase Order. Any changes in design, manufacture, materials, performance, processes, Quality Assurance procedures, manufacturing location, test, equipment, sub-tier supplier or service incorporated after initial Orion Technologies approval must be submitted to Orion Technologies Purchasing/Subcontracts for notification at a minimum with subsequent approval required based on commodity type. Class I changes requires Orion approval, class II changes require notification. Build-to-print will always require notification and subsequent Orion approval. Supplier format for submittal is acceptable.
- 5.0 Objective Evidence of Quality – must accompany all material and service delivered under the Purchase Order. The certificates and data must be fully traceable and indicate the Orion Technologies Purchase Order number and must be approved by the seller's Quality Assurance Department. This data must be maintained for a ten-year period after completion of the order or as specified on the Orion Technologies Purchase Order.
- 5.1 Certificate of Compliance stating that all materials, parts processes, and services used in the manufacture meet Purchase Order requirements and that substantiating certificates are on file. (Note: QC Clause 5.0. is also invoked in conjunction with this clause.)
- 5.1.1 Supplier shall maintain a method of item traceability that ensures tracking of the supply chain back to the manufacturer of all Electrical, Electronic and Electromechanical (EEE) parts included in assemblies and subassemblies delivered per this order. This traceability method shall clearly identify the name and location of all supply chain intermediaries from the manufacturer to the direct source of the product for the Supplier and shall include the manufacturer's batch identification for the item(s) such as date codes, lot codes, serializations or other batch identification.
- 5.1.1.1 Manufacturer's Certificate of Compliance traceable to product supplied. (Note: Quality Clause 5.0 and 5.1 are invoked in conjunction with this clause.)
- 5.1.1.1.1 Authorized distributor Certificate of Compliance for all Electrical, Electronic and Electromechanical (EEE) parts traceable to a lot code, date code or serial number is required.
- 5.1.2 Certificate of Calibration is required for each item delivered indicating that the equipment is in calibration and is traceable to NIST. (Note: QC Clause 5.0. is also invoked in conjunction with this clause.)
- 5.1.3 Special Process Certifications must accompany all material delivered under this Purchase Order. Supplier shall furnish a certification for all special processes used to fabricate/ manufacture the item including those performed by any sub-tier supplier. When special processes are subcontracted, the seller must use NADCAP approved suppliers. Special Processes must be performed by only those processors with valid NADCAP (National Aerospace and Defense Contractors Accreditation Program) approvals for all material delivered under this Purchase Order. Supplier shall furnish a certification for all special processes used to fabricate/manufacture the product supplied including those performed by any sub-tier supplier. All certificates and data must indicate Orion Technologies' Purchase Order number, Orion Technologies' Part Number, serial number (if applicable) or date codes (if applicable), the special process used, and applicable specifications. The seller/subcontractor's Quality Assurance Department must sign and/or stamp the Certificate of Special Processes. Special Processes are defined as: anodizing, plating, chemical film, welding – fusion or spot, brazing – dip or vacuum, chemical milling, heat-treating, non-destructive testing (NDT), etc. (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)
- 5.1.4 A Certificate must accompany all Dip Brazed assemblies delivered under this Purchase Order. The Certificate must indicate Orion Technologies P.O. number, Orion Technologies Part Number, Serial Number (if applicable) or date codes (if applicable), and that the part or assemblies meet the following cleanliness requirement:

Each assembly shall exhibit cleanliness to the extent that flux residue (chloride, fluoride, etc.) will not exceed five (5) PPM when measured over the entire brazed assembly, or in any specific area. The seller's Quality Assurance Department must sign and/or stamp this document.

- 5.2 Variable Data (Measured Values) must accompany all items delivered, showing conformance to all inspection/tests specified in the Orion Technologies purchase Order, or applicable specifications (SCD/SOCD) or Orion Technologies approved ATP. (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)
 - 5.2.1 Mechanical Data – Mechanical data (measured values) is required with each shipment and shall be traceable to serial number, lot number, or date code as required. (Note: QC Clause 5.2 is also invoked in conjunction with this clause.)
 - 5.2.2 Electrical Data – Electrical data (measured values) shall be maintained with each shipment and shall be traceable to serial number, lot number, or date code as required. (Note: QC Clause 5.2 is also invoked in conjunction with this clause.)
- 5.3 Attribute Data (Go, No Go) for each lot delivered showing conformance to all inspections/tests specified in applicable specifications (SCD/SOCD) or Orion Technologies ATP. (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)
 - 5.3.1 Attributes Data – supplier shall supply attribute data with each lot delivered as follows:
 - a) Microcircuit and semiconductors (non-Mil-Spec) shall consist of number tested, number rejected for environmental screens, as called out in the procurement control drawings, PDA attributes data and P.O. number.
 - b) Resistors, capacitors and other electrical parts (non-Mil-Spec) shall consist of number tested, number rejected for screening tests as called out in the procurement control drawing, and P.O. number.
- 5.4 Screening Results per Mil-Std-883, Method 5004, indicating the name and location of the facility at which the screening was performed shall accompany each shipment. (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)
 - 5.4.1 Microcircuits
 - a) Microcircuits shall be quality level “B” or better of Mil-PRF-38535.
 - b) Screening of microcircuits shall be in accordance with Mil-Std-883, Method 5004, Class “B” with a PDA<10%. Qualification Testing shall be in accordance with Method 5005.
 - c) Supplier shall be on the Current Qualified Manufacturer’s Listing (QML) suppliers for QPL-38535. (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)
- 5.5 PROMS – Programmable Read-Only Memories must meet the following requirements:
 - a) Burn-in shall be in accordance with Mil-Std-883, Method 1015, and Condition D after programming.
 - b) Electrical Tests shall include marginal “O”s testing for programming re-verification.
 - c) Programming equipment shall be calibrated daily for proper pulsing conditions.
 - d) PROM part marking shall be unique and traceable to vendor lot numbers.
- 5.6 Particle Impact Noise Detection (PIND) – all microcircuits, hybrids, and semiconductors with an internal cavity shall be capable of passing PIND testing in accordance with Mil-Std-883, Method 2020, and Mil-Std-750, Method 2052 respectively. (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)
- 5.7 Data supplied in accordance with 5.2, 5.2.1, 5.2.2, 5.3, 5.3.1, 5.4, 5.4.1, 5.5, and 5.6 must show dates of inspection (or processing), limits and conditions, and yield (quantities submitted and Accept/Reject data) (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)

5.8 Key Characteristic Data - Measurement Data is required for each Key Characteristic specified by the PO, Drawing or SCD for each item delivered and shall be traceable to a serial number, lot number, order number or date code as required. A supplier format is acceptable, Supplier shall complete and forward to Orion Technologies with shipment, the required Key Characteristics data. (Note: QC Clause 5.0 is also invoked in conjunction with this clause.)

5.9 AS9102 First Article Inspection with Orion's Source Inspection and Report (FAIR)
First Article Inspection (FAI) shall be performed by the Supplier in accordance with the requirements of AS9102. When documenting the FAI, the Supplier may use the forms contained within AS9102 or their equivalent, so long as the forms contain all the information required by AS9102. Supplier shall notify the Buyer to coordinate and plan for the Orion First Article Inspection to be conducted, as determined appropriate, by the Buyer. Supplier shall include a copy of the FAI report with the initial shipment of the FAI item. Additionally, when a partial or re-accomplished FAI is performed as required by AS9102, the Supplier shall include copy of the FAI report with the initial shipment of the FAI item.

Prior to shipment of the FAI item, AS9102 FAI reports shall be provided in electronic format with all documentation provided in English. During shipment, the FAI item shall at a minimum be tagged with a First Article identifier traceable to the FAI report. A copy of the Orion approved FAI report shall accompany the FAI item with the shipment.

The Supplier shall perform a First Article Inspection (FAI) and provide the Report (FAIR) per SAE AS9012 requirements for any of the following:

- a new part representative of the first production run.
- a change in the design affecting the fit, form or function of the part.
- a change of the location point of manufacture or other changes that can potentially affect the fit, form and function of the part including but not limited to, changes of the manufacturing source(s), process(s), tooling or materials.
- a natural or man-made event, which may adversely affect the manufacturing process.
- a lapse in production for two years or as specified by Orion Technologies.

The AS9102 reporting format shall be utilized (Forms 1 through 3) and provided in legible, electronic format (i.e. scanned documents), with all documentation provided in English.

Additionally, Orion Technologies (OT) reserves the right to require an AS9102 FAIR from the Supplier when any of the following occurs:

- OT Customer contract requirement
- when a partial FAI is triggered per AS9102 requirements, or
- as deemed necessary by Orion Technologies based on poor historical performance or

risk. An AS9102 FAI is not required for the following:

- Standard Catalog Hardware (as defined in AS9102). Examples include: Commercial Off the Shelf (COTS) items, O-rings, gaskets, nuts, bolts, attachment hardware (rivets), epoxy, carrying cases and containers.
- COTS equipment, even when assigned an Orion Technologies SCD partnumber.
- Software.

Suppliers may request Orion's Supplier First Article Inspection Requirements as a guide.

6.0 Standards of Workmanship – the supplier must maintain written standards of workmanship directly applicable to the nature and level of work to be performed under the Purchase Order. In addition, the supplier shall develop, implement, and maintain training programs as deemed necessary by the supplier's management to maintain acceptable areas of performance in quality control, purchasing, and manufacturing. Upon request, a copy of the

workmanship standard and applicable training or competency records shall be supplied to Orion Technologies Purchasing/Subcontracts.

- 6.1 The material and workmanship shall conform to the latest revision at the time of the RFQ, of Mil- Hdbk-454, requirements 5 and 9, and applicable “Pass down” requirements written within the standards (requirement 17, printed wiring, etc.). (Note: QC Clause 6.0 is also invoked in conjunction with this clause.)
- 6.2 Commercial Workmanship shall be in accordance with the latest revision at the time of the RFQ, of IPC-A-610, Class 2, at the time of the RFQ. (Note: QC Clause 6.0 is also invoked in conjunction with this clause.)
- 6.3 Workmanship shall be in accordance with latest revision at the time of the RFQ, of IPC 610-Class 3 (Note: QC Clause 6.0 is also invoked in conjunction with this clause.)
- 6.4 Workmanship and Process Control shall be in accordance with the latest revision at the time of the RFQ of J-Std-001. (Class 3 compliance required) (Note: QC Clause 6.0 is also invoked in conjunction with this clause.)
 - 6.4.1 Workmanship and Process Control shall be in accordance with the latest revision at the time of the RFQ of J-Std-001. (Class 2 compliance required). (Note: QC Clause 6.0 is also invoked in conjunction with this clause.)
 - 6.4.2 Workmanship and Process Control shall be in accordance with the latest revision at the time of the RFQ, of IPC-A-620, Class 3. (Note: QC Clause 6.0 is also invoked in conjunction with this clause.)”
 - 6.4.3 Workmanship and Process Control shall be in accordance with the latest revision at the time of the RFQ, of IPC-A-600, Class 3. (Note: QC Clause 6.0 is also invoked in conjunction with this clause.)
 - 6.4.4 Foreign Object Damage (FOD) Awareness. The supplier shall develop and maintain a FOD policy and program consistent with NAS 412. The policy shall as a minimum provide for effective housekeeping management of material, inspection of in process and final assemblies. Upon request, the supplier shall provide a copy of the policy to Orion Technologies for review.
- 7.0 Statement of Work (SOW) – When a SOW applies to this order; the supplier is responsible to comply with all SOW requirements. All questions or concerns regarding the SOW must be forwarded, in writing prior to performance of the subject order to Orion Technologies Purchasing/Subcontracts department. Proposed changes to the SOW require approval from Orion Technologies Quality Engineering.
- 8.0 Casting Requirements – Castings shall meet all applicable drawing requirements. An inspection report listing actual measurements of all dimensions must be supplied with the first article of the initial order. A chemical, physical, and X-ray analysis representing each melt, and heat shall be supplied with each shipment. All castings supplied shall not exceed applicable limitations of porosity, distortions, shifts, and corrosion and shall meet dimensional requirements. Repairs shall not be made to defective items without prior approval from Orion Technologies Quality Engineering Department.
- 9.0 Welding Qualification – fusion welding shall be performed by welders certified to AWS D17.1 Resistance welding and machines shall be certified to AMS-W-6858.
- 10.0 Radiographic Inspection – shall be performed in accordance with AMS-STD-2175 and ASTM E 1742. The seller shall furnish X-rayed film and TWO copies of the laboratory report, identifiable to the items X-rayed, with each shipment.
- 11.0 Magnetic Particle / Penetration Inspection – as applicable, shall be performed in accordance with ASTM E 1444 or ASTM E 1417; certified test reports shall be submitted with each shipment. Personnel performing inspections shall be certified in accordance with NAS 410.
- 12.0 Chemical/Physical Certification – shall be furnished with each shipment. The heat, batch, melt numbers, etc., shall be included in the certificate.
- 13.0 Certified Light Test Data – the seller shall take light measurements in accordance with the applicable specification and furnish data, which includes high and/or low readings, identifiable by Serial Number and/or date codes to the delivered items. Method of measurement and data correlation is subject to Orion Technologies approval.

- 14.0 Limited Life Material – seller shall identify each item, package, or container with the manufacturing date and shelf life expiration date. Rubber products shall be identified as to cure and mold date. In no case shall material be supplied with more than 20% of its useful life expired.
- 14.1 Suppliers shall apply a permanent label that contains the manufacturing/cured date and the expiration date to all age sensitive materials. Supplier shall provide a C of C certifying the age sensitive material meets or exceeds 80% of its shelf life.
- 15.0 Failure Reporting, Analysis And Corrective Action System (FRACAS) – the Supplier shall have a documented system for failure (reject) reporting, analysis and corrective action that meets the following minimum requirements (based on ANSI/AIAA S-102.1.4-2009):
- Electronic Database – a record of all failures to the lowest level possible; maintained for historical analysis and reporting.
 - Trend Analysis – perform periodic analysis and summarization of failure data to identify trends and recurring failures using statistical techniques for analyzing, summarizing and presenting the trend data with defined performance thresholds for corrective action.
 - FRACAS Report – timely reporting of each failure occurrence capturing detailed information, providing for item and data traceability and including factors that may have affected performance and any other information that accurately characterizes the failure.
 - Closed-loop Corrective Actions System – a documented process for containment, prompt root cause analysis, and corrective and preventive action with feedback loop for continuous improvement; including provisions for verifying the effectiveness of corrective actions taken.

Should a failure(s) occur during Orion Technologies (OT) Qualification testing, Acceptance test or during Field operations, the following actions shall be taken by the supplier upon receipt of the failed unit(s):

- a) Determine the direct cause of failure(s) within 2 business days (i.e. to lowest level possible) and submit preliminary report with containment actions to OT Procurement Representative.
- b) Determine the root cause of the failure and submit the corrective actions/plan, for approval by Orion Technologies, within 15 business days to OT Procurement Representative. Final report due within 30 days.

Reporting – responses to Orion Technologies requests for failure analysis shall be forwarded to the Orion Technologies Procurement Representative within the dates specified. As a minimum, the response should include containment action(s) to be taken, direct and root cause analysis and corrective and preventive actions planned/taken.

Orion Technologies reserves the right to have the supplier repeat any tests necessary to verify the corrective action, and to direct the scheduling of retests, the data to be taken, and the extent of reconditioning needed for the purpose of these tests. A failure is defined as any condition which causes any of the item(s) performance characteristics to be outside of the contract specification requirements at any specified environmental condition, or as further specified by the requirements of the applicable test.

15.1 Failure Analysis – Component Level

The supplier shall perform a failure analysis to the component level, on all items that fail Orion Technologies Qualification, Reliability Testing, Acceptance Testing, and/or as a result of internal failure trend analysis. The results of such failure analyses shall be included as part of the response required by Clause 16. The supplier shall notify the Orion Technologies Procurement Representative when, due to the complexity of the failure, the 30-day turnaround time for root cause corrective action cannot be achieved. (Note: QC Clause 16 is also invoked in conjunction with this clause).

15.2 Supplier Corrective Action Request

When requested, the Supplier shall conduct, and document a thorough root cause analysis of the defects/failures found and implement and document effective corrective actions (and preventive actions where necessary). An Eight Disciplines (8D) method is usually required per the Supplier Corrective Action Request (SCAR), the Supplier shall comply with the requirements of standard AS13000 “Problem Solving Requirements for Suppliers” and utilize the **110-1000-001 Rev. E**

template/checklist contained within to ensure an acceptable RCCA was conducted and documented.

- 16.0 Traceability - all items delivered under this Purchase Order shall be fully traceable by lot number or serial number.
- 16.1 Traceability Identification by Serial Number for Off-Load Vendors shall be furnished for each item contained within each top-level deliverable assembly. As Built Lists (ABLs) shall be provided containing serial number and revision of said items. For Circuit Card Assemblies the date code for the bare printed circuit board shall also be listed on the ABL's.
- 16.2 Traceability Identification for Circuit Card Assemblies (CCA's)- All CCA's delivered on this purchase order require the serial numbers of the CCA and the date code of the bare printed circuit board be listed on the suppliers Certificate of Conformance. Serialization to be done per the drawing.
Supplier shall be responsible for maintaining internal traceability on bare PWB date/lot code and serial number usage on CCA level serial numbers delivered.
- 17.0 Printed Circuit Bds/Flex Prints Special Marking – Mark permanently and legibly with Orion Technologies Vendor Code Number followed by the 4 (four) digit Date Code (Week and Year) in an area free of circuitry.
- 18.0 Packaging/Handling –The supplier shall handle and package material in a manner that will assure protection against corrosion, oxidation, deterioration, ESD damage and physical damage during shipment to Orion Technologies. Bulk packaging may only be used if and when the component lead integrity is maintained, and material is protected against damage. ESD protective packaging shall be used for all ESD sensitive electronic components. All unmated connectors shall be protected at all times, non-conductive caps maybe used for connector protection on non-ESD sensitive assemblies. ESD sensitive components shall have connector protection that is ESD compliant.
- 18.1 Static Sensitive Devices: ESD protective Packaging requirements of unit packs of Class I and Class II items as defined in the latest revision of Mil-Std-1686 and ANSI/ESD S20.20 shall conform to the following:
- Protection shall be provided to prevent physical damage and to maintain leads and terminals in the manufactured condition under handling and transportation environments. Materials used for the protection shall be non-corrosive and provide protection against triboelectric generation of static electricity. Conductive shunting foam, bars, or clips shall be applied on electrical connectors to short all connector pins and the connector together.
 - To provide protection from electrostatic voltage sources of at least 4,000 volts in the form of field or direct discharge, unit packs shall be enclosed in ESD protective material that is qualified to MIL-PRF-81705 Type 1 and procured from a source that is listed on QPL-81705.
 - Outer surface of the package shall be marked with the following caution note or other marking approved by Orion Technologies.

Caution Note: Observe Precautions for Handling Electrostatic Discharge Sensitive Items



Figure 1: Protection

- Equipment and/or materials purchased for ESD control shall have Certificates of Compliance to latest version of ANSI/ESD S20.20.

- 18.2 Components Packaged in Trays – All components shall all be placed in the same orientation in relation to a reference point or part marking on the body of the component
- 18.3 Packaging – Each lot of printed circuit boards by part number shall be vacuum packed with moisture indicator.
- 18.4 Part Packaging/Preservation – Parts shall be packaged and preserved IAWMIL-STD-2073-1D
- 18.5 UID Package Marking- UID package marking shall be in accordance with Mil-Std 130 or requirements as stated on drawing, purchase order, or SOW.
- 18.6 RFID Package Identification -RFID package identification shall be in accordance with requirements as stated on drawing, purchase order, or SOW.
- 18.7 Circuit Card Assembly Packaging-Unless otherwise specified in the Purchase Order or Statement of work the supplier shall package Circuit Card Assemblies to be shipped to Orion Technologies in a manner that will assure protection against corrosion, electrostatic discharge damage (ESD), oxidation, deterioration and/or damage during shipment. Each Circuit Card Assembly (CCA) shall be individually packaged in an ESD bag. Each bag must be packaged in an individual ESD container (container must have protection ESD symbol on the exterior) that contains sufficient ESD cushioning material to preclude damage to the CCA if dropped from six feet.
- 18.8 Harness, and Cable Assemblies (Rigid, Semi rigid, Flex, Flat, and Ribbon) Packaging - Unless otherwise specified in the Purchase Order or Statement of work the supplier shall package Harnesses, and Cable Assemblies to be shipped to Orion Technologies in a manner that will assure protection against corrosion, electrostatic discharge damage (ESD), oxidation, deterioration and/or damage during shipment. Each Harness and Cable Assembly shall be individually packaged in an ESD bag. All connectors must be covered with ESD dust caps. Each bag must be packaged in an individual ESD container (container must have protection ESD symbol on the exterior) that contains sufficient ESD cushioning material to preclude damage to the Harness, or Cable Assembly if dropped from six feet.
- 19.0 Mil-S-19500F Semiconductor Devices
- a) Purchase Orders to Device Manufacturers – the following statement applies:
- During performance of this order, your quality control or inspection system and manufacturing processes are subject to review, verification, and analysis by authorized Government representatives. Government stamping of lot Traceability documentation is required. Government release of shipment is not required unless notified.
- b) Purchase Orders to Other Suppliers – the following statement applies:
- During performance of this Order, your control of devices lot Traceability documentation and your inventory control for MILS-19500F JAN branded devices are subject to review, validation, and verification by an authorized Government representative. Government release of shipment is not required unless you are otherwise notified.
- 20.0 Software Quality Program – the supplier’s software quality program shall conform to the requirements of the applicable standards and Orion Technologies specifications. Orion Technologies retains the right of review and disapproval of the program.
- 20.1 The Software Development & Documentation Program shall be in accordance with RTCA DO-178C and the latest revision of RTCA DO-248 at the time of the Purchase Order. (Note: QC Clause 20.0. is also invoked in conjunction with this clause.)
- 20.2 The Aerospace System & Software Development Program shall be in accordance with SAE AS9100 and the latest revision of AS9115 at the time of the Purchase Order. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 20.3 The Firmware Quality Program shall be in accordance with the latest revision of RTCA DO-254 at the time of the Purchase Order. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 20.4 The Software Process Maturity shall be in accordance with the latest revision of SEI CMM V1.1 at the time

- of the Purchase Order. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 20.5 The System & Process Maturity shall be in accordance with the latest revision of SEI CMMI at the time of the Purchase Order. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 20.6 The Software Quality Program shall be in accordance with ISO 9001:2008 and the latest revision of ISO 90003 at the time of the Purchase Order. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 20.7 A Software Quality Program acceptable to Orion Technologies is required. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 20.8 Programming Record supplier shall provide a record of all programmed items and required test programs. Each item shall be listed with its version and checksum or other verification criteria. Examples are altered items, programmed microcircuits, flashed memory, and downloaded software, custom BIOS and ATE/STE programs. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 20.9 Program Data All Orion Technologies provided media files or other programming information shall be returned to Orion Technologies upon completion of programming effort. All media used must contain indication of both Orion Technologies Configuration and Software Quality Engineering approvals. (Note: QC Clause 20.0 is also invoked in conjunction with this clause.)
- 21.0 Printed Circuit Boards shall be IAW IPC-6011 and IPC-6012 unless otherwise specified on Orion Technologies drawing. The supplier shall complete the required inspections/tests and maintain the data on file for three years. This data shall be made available to Orion Technologies upon request: Micro-sections of each panel of the delivered lot will be provided to Orion Technologies for review and approval. The Vendor may request the micro-sections back or a retention agreement with Orion Technologies for the 3year maintenance period. Any panels that have a CCA fail for voids must have a failure analysis performed and submitted with the lot to Orion Technologies to justify shipment of the remaining pieces on each panel with any voids. A C of C is also required for electrical testing performed by the supplier. Orion Technologies may request electrical Data in the event internal trace open issues are identified during processing at Orion Technologies.
- 21.1 Printed Circuit Boards – a solder sample representative of the lot processes shall be submitted with each date code and/or part number supplied under this order. This sample shall only be used for Solderability testing and can be a piece of a board rejected for other issues.
- 21.2 Solder Mask Height Requirement – For printed circuit boards the solder mask height of bumps surrounding the via holes shall be no higher than .002” above the solder mask coating.
- 21.3 Surface Finish – For printed circuit boards all exposed copper shall be Ni/Au – Immersion Gold over Electroless Nickel (ENIG).
- 21.4 Cleanliness – Each lot of printed circuit boards shall meet the cleanliness requirements of IPC-6012 after final processing. Actual numeric data must accompany each lot.
- 22.0 Non-Standard Parts Approval – the supplier must apply to Orion Technologies Corporation for approval for the use of nonstandard parts and materials in accordance with Mil-Std-965.
- 23.0 QML Requirement – the Mil, AN and MS parts supplied against this Purchase Order shall be manufactured by only QML sources. The inclusion of products from the QML does not relieve the supplier of their responsibility to provide supplies, which meet all specification requirements, or to perform all inspections and tests specified for such material.
- 24.0 Interchangeability – all items purchased under this purchase order are to be completely interchangeable. Any deviation to any of the supplier’s design, processes, or procedures requires prior approval by Orion Technologies.
- 25.0 Industrial/Military Applications: For products and services used in an Industrial /Military environment the following clauses shall apply: 3, 3.1, 5.0, 5.1, 18.0, 23.0, 24.0. For semi-conductors procured to Mil-S- 19500F, the following clauses apply 3, 3.1, 4, 5.0, 5.1, 18.0, 19.0, 23.0, 24.0. All supplied material must be NEW and UNUSED with Certificates of Conformance traceable to the original manufacture. Component Lead material or

finish containing Alloy 42, and Solder process utilizing the following; Sn-3.4Ag-4.8Bi, Sn-3.4Ag-1Cu3.3Bi, & Sn-58Bi as identified in GEIA-HB-0005-2 are strictly prohibited.

26.0 Items not subject to Quality Assurance – No quality clauses are applicable to the parts/services on this P.O.

27.0 Advanced Quality Planning and Control Plan – A Control Plan (CP) shall be developed detailing the quality control/assurance methods and techniques used in the Seller's processes for delivery of compliant hardware under this Purchase Order/Contract. It shall include the critical product/process characteristics, process controls, measurements, inspections and tests and the associated actions to be taken to ensure process control and capability. The Plan shall be used during production to ensure stability and capability of associated processes utilizing proven methods such as FMEA, SPC and mistake-proofing.

The CP shall be submitted to the "Buyer" prior to use on production deliverable hardware and whenever changes are made to reflect the current methods of control, assurance and measurements systems used. Review and approval of the initial CP and any changes shall be through the "Buyer's" Supplier Quality Assurance group. The seller's Quality Assurance Procedure Manual, when specified, shall also be provided with the Plan.

27.1 Process Validation Assessment (PVA) is required during the manufacture of goods for this contract. The PVA will be utilized to identify and evaluate compliance to contract requirements and aid with supplier's continuous improvement process. The PVA prerequisites shall be defined by Orion Technologies in a Statement of Work as defined under Clause 7 (SOW required) or, as applicable, by Buyer's Supplier Quality Assurance representative. This clause does not take precedence over other Buyer requirements.

28.0 Commercial Applications– for products and services used in a commercial environment, the following clauses shall apply: 3, 3.1, 3.3, 3.4, 3.4.1, 3.4.2, 5, 5.1, 18, and 24. All supplied material must be NEW and UNUSED with Certificates of conformance traceable to the original manufacture. Component Lead material or finish containing Alloy 42, and Solder process utilizing the following; Sn-3.4Ag-4.8Bi, Sn-3.4Ag-1Cu3.3Bi, & Sn-58Bi as identified in GEIA-HB-0005-2 are strictly prohibited.

29.0 Measurement and Test Equipment – All purchased or rented Measurement and Test equipment received at Orion Technologies must be routed through Orion Technologies Metrology Department. Address labels and invoices must contain the statement "Attn: Metrology Department" to insure proper routing at the Orion Technologies Facilities.

30.0 Rejected Material – the material specified on this Purchase Order has been rejected by Orion Technologies Corporation and is subject to rework or replacement. Reworked or replaced items must meet all of the requirements specified on the original Orion Technologies Purchase Order. MRB authority for repair or use as is decisions is not granted to the supplier for this purchase order.

30.1 Source Inspection, New Material – Source Inspection requirements may be invoked on rejected material, which is returned to the supplier for rework or replacement against this order. Supplier shall notify Orion Technologies Purchasing Department prior to shipment of reworked or Replaced Items to verify source inspection status. Reworked or Replaced items shall meet all of the original Purchase Order requirements. Reworked or Replaced items must appear and function as new equipment.

30.2 Source Inspection, Field Returns – Source Inspection requirements may be invoked on rejected material, which is returned to the supplier for rework or replacement against this order. Supplier shall notify Orion Technologies Purchasing Department prior to shipment of reworked or replaced items to verify Source inspection status. Reworked or Replaced items shall meet all of the original Purchase Order requirements. Reworked or Replaced items must appear and function as new equipment.

30.3 Destination Inspection, New Material – All original Purchase Order requirements are invoked on the material that is being Reworked or Replaced on this Purchase Order. Reworked or Replaced material must satisfy all requirements specified by the drawing and the original Purchase Order. Reworked or Replaced items must appear and function as new Equipment. Material will be inspected at Orion Technologies for compliance to these requirements.

30.4 Destination Field Returns – All original Purchase Order requirements are invoked on material that is being Reworked or Replaced on this Purchase Order. Reworked or Replaced material must satisfy all requirements

specified by the drawing and the original Purchase Order. Material will be inspected at Orion Technologies for compliance to these requirements.

- 31.0 COTS/Modified COTS Supplier Reliability Requirements - The supplier shall comply with the SOCD/SCD to assure the item's reliability requirements are met, unless tailored by the Orion Technologies Purchase Order or Statement of Work.
- 31.1 Materials, Parts, And Processes - The materials, parts, and processes used in the design of the item shall be selected on the basis of reliability, maintainability, producibility, safety, logistics considerations, and service history. All materials shall be non-toxic, self-extinguishing, or nonflammable. The use of components shall be limited to those available from multiple sources to the maximum possible. Evidence of compliance shall be via Certificate of Compliance provided by the Supplier.
- 31.2 Reliability - A Reliability prediction based on Mil-Hdbk-217 Notice 2 or equivalent shall be supplied to Orion Technologies, using the following guidelines:
- Quality factor of 1.2 for plastic encapsulated microcircuits (PEMs)
 - Quality factor of 'R' for industrial grade passive components
 - Quality factor of 'JAN' for industrial grade semiconductors
 - Use vendor supplied reliability life test data for major ICs (processors, memories, ASICS, etc.)
- 31.3 In lieu of the above, the vendor shall supply sufficient part data information to allow Orion Technologies to perform the prediction.
- 31.4 Reliability - Environmental stress screening (ESS)
- 31.5 The vendor shall perform ESS on all delivered items as specified in the P.O. and/or SOW. ESS profiles shall include temperature, vibration, and functional tests, and shall be made available for Orion Technologies' Reliability for approval prior to the start of ESS Testing.
- 32.0 Marking - Items shall be marked legibly and permanently. Marking requirements shall include the following:
- a) Supplier's identification or Cage code.
 - b) Electrostatic sensitivity identification marking, if applicable.
 - c) Identification of reference designation and polarity as required.
- 32.1 For Source Control Drawings (SOCDs), Orion Technologies Part Number, Serial Number, and SOCD Revision shall be marked on the item.
- 32.2 For Specification Control Drawings (SCDs), Suppliers' Part Number, Serial Number, and Suppliers' Revision will be marked on the item.
- 32.3 Serialization - Serial numbers shall consist of 4 to 10 alphanumeric characters. The last four characters shall be numeric. The serial numbers must be consecutively numbered even if the dash number changes. Once assigned a serial number must not be changed or duplicated even if the end item is lost or scrapped
- 32.4 UID Marking UID marking shall be in accordance with Mil-Std 130 or requirements as stated on drawing. Samples of UID marking shall be provided to Orion Technologies for approval prior to delivery of product.
- 33.0 Lead Free Soldering Requirements (Parts/Components)

The Supplier shall provide as part of the Certificate of Compliance a statement specifying that the material provided under the Orion Technologies Purchase Order(s) is NOT lead free and complies with the following criteria:

All components and parts shall be free of solder, plating, coatings, and claddings that exhibit either of the following:

- *Material composition greater than 97% tin.*
- *Tin alloy with composition of less than 3% lead.*

Supplier is required to notify buyer when any change in product or part number is made or planned which would
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incorporate Lead Free (Pb) finish or solders by means of Orion Technologies Supplier Variation Request form.

33.1 Lead Free Soldering Requirements (Sub-Contractors/Turn Key; Orion Technologies design)

The Supplier shall provide as part of the Certificate of Compliance a statement specifying that the material provided under the Orion Technologies Purchase Order(s) is NOT lead free and complies with the following criteria:

- All products supplied shall be free of solder, plating, coatings, and claddings that exhibit either of the following: Material composition greater than 97% tin.
- Tin alloy with composition of less than 3% lead.

The supplier shall supply a "Lead Free" Control plan or procedure that shall include as a minimum:

- Requirement to flow Lead free (Pb) requirement to sub tier suppliers.
- Receiving inspection criteria for measuring/validating part lead finish.
- Tracking of leadfree parts procured by the supplier.
- Tracking of Lead free (Pb) parts through the manufacturing process.

Supplier is required to notify buyer when any change in product or part number is made or planned which would incorporate Lead Free finish or solders by means of Orion Technologies Supplier Variation request form.

34.0 Rework Data

Seller is required to provide to Orion Technologies, in Seller's format, consumption and failed component data for each reworked item. The data shall include, but not be limited to:

Identify reworked item by part number, nomenclature, and serial number. Make note if the failure was confirmed or could not be duplicated.

- List rework actions taken: For example: Replaced R1 on A2 board.
- Identify any subassembly that was removed and replaced by part number, nomenclature, and serial number.
- Identify any consumable parts that were replaced by part number, nomenclature, and quantity.
- If parts were inter-changed from other items, Seller shall provide part number and serial number (if applicable) of the parts interchanged and identifies the originating item by part number and serial number.

35.0 Conflict Minerals

Seller shall develop and maintain a conflict mineral program consistent with industry standard. Orion requires the seller to:

- Perform sufficient due diligence into their respective supply chains to determine whether products sold to on this purchase order contain tin, tantalum, tungsten or gold, and, if so, whether and to what extent those metals are sourced from conflict-free smelters;
- Report to Orion on a Conflict Minerals Reporting Template the results of such due diligence; and
- Commit to being or becoming "conflict-free," so that any such metals are sourced only from conflict-free smelters.

36 Control of Nonconforming Material/Material Review Authority

Supplier shall have a documented process that includes provision to identify, segregate and control nonconforming materials to ensure the supplier does not ship nonconforming materials to Orion. Supplier is not authorized to make use as is or repair disposition. Use as is or repair disposition requests shall be forwarded to Orion Quality Assurance for review. Supplier shall flow down this requirement to applicable lower-tier suppliers.

37 Obsolescence Management

The Supplier shall notify Orion within five working days upon receipt of information that a part/material has or will become obsolete, including its sub-tier suppliers' parts and materials. The Supplier may identify and propose alternate sources, replacement parts, or optional part numbers for parts and materials that become obsolete. Such proposal shall be forwarded to Orion's Quality Assurance.

38 Lead/Tin Finish

38.1 Prohibition of Pure Tin – Electronic, electrical, electromechanical, and mechanical parts and assemblies, including the internal fabrication of hardware delivered to Orion Technologies under this purchase order shall not have pure tin finishes. Additionally, any tin-lead plating or solder process/processing shall result in a finish of no less than 3% lead composition.

Supplier shall provide a CoC with each shipment to verify that delivered product meets the above listed composition requirements, or the material meets at least one of the following:

- A. Supplier or supplier's lower tier supplier has contacted the OEM and verified that the specific Mfr./ Lot Date Code of delivered product meets the specified minimum lead requirement if tin is present in the product.
- B. Supplier or supplier's lower tier supplier has verified by actual sample testing (X-ray Fluorescence testing is preferred) or other industry acceptable method that a minimum of 3% lead is present in any process that uses tin.

38.2 When any change in product or part number is made or planned which would incorporate lead free finish or lead-free solder, supplier is required to inform Orion. Supplier shall include the substance of this clause in every applicable purchase order. Change notifications received from supplier's sub tier supplier in response to this clause shall be forwarded to Orion for disposition.