



SUPPLIER QUALITY REQUIREMENTS

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Revision Log

Revision	Affected Section(s)	Description of Changes	Change Date
A		Initial document	9/28/2021
B		Updated Q-16	12/3/2021
C		Added OCM to Terms, Revised Q-2, removed verbiage from Q-8 and add Special Processes	2/1/2022
D		Q10 revised to eliminate confusing text. Added Q17 to address prohibited materials.	3/2/2022
E		Update Q10. Added drawing example of what is to be inspected by supplier.	5/2/2022
F		Section 3: Add AS9100-4 for record retention and disposition. Section 4: Add Q-Notes 18 and 19	6/14/2022
G	4.0	Update Q2 and Q16	10/11/2022

1.0 Purpose

This document lists the Quality Notes and expected deliverables. Standard Quality Requirements apply to all Purchase Orders without exception. BCT Purchase Order Specific Quality Notes are listed on the Purchase Order and are contractually binding and by accepting the purchase order, it is assumed the supplier is agreeing to the requirements of this document. Order of precedence is the Purchase order w/Qnotes, Engineering Drawing, process standards (IPC, NASA, etc.), and finally, the manufacturer's data sheets.

Suppliers SHALL notify Blue Canyon Technologies immediately if they are unable to comply with the Standard AND BCT PO Specified Quality Note(s).

This document is expected to be provided to suppliers in its entirety.

2.0 Definitions/Terms

- BCT – Blue Canyon Technologies
- PO – Purchase Order
- Quality Note – Additional requirements levied by BCT in addition to any drawing, SOW, or other requirements derived from or indicated on the PO, RFQ, or RFI.
- RFI – Request for Information
- RFQ – Request for Quote
- OCM – Original Component Manufacturer

3.0 AS9100 Standard Quality Requirements

The following notes apply to **ALL** Purchase Orders from Blue Canyon Technologies and are part of the AS9100 flow down requirements. These may not be removed without explicit approval from BCT Quality Assurance.

AS9100-1: Supplier SHALL ensure the right of access by the organization, their customer, and regulatory authorities to the applicable areas of facilities and to applicable documented information, at any level of the supply chain.

AS9100-2: Supplier SHALL notify the BCT Buyer, within 5 business days of discovery of ANY non-conformance of BCT product discovered during manufacturing or after delivery to BCT.

AS9100-3: Supplier SHALL notify the BCT Buyer, within 5 business days of notification of ANY change of certification (e.g., Nadcap, AS9100, ISO9001, ISO17025, etc.) status (suspended, protest, appeal, revoked, etc.)

AS9100-4: Retained records shall be destroyed at the expiration of the retention period.

4.0 BCT PO Specified Quality Notes

These Quality Notes are called out on the Purchase Order line and apply to the part number referenced on that line. ONLY the Q#(s) called out on that line apply to that line.

Title: **Q1: Full Traceability requirement for EEE Parts**

Requirements: The seller SHALL provide all traceability back to and including the manufacturer's (OCM) certifications for parts with this Quality Note. Seller SHALL ensure that the manufacturer's lot information and/or date code information is provided for each lot of parts delivered to BCT.

Deliverables: Manufacturer (OCM) certification including documentation from all intermediaries proving chain of custody. MFG lot and/or date code for each lot of delivered parts to be clearly indicated on the paperwork and part packaging sent to BCT.

****ESD sensitive parts shall be packaged appropriately (Sealed ESD protective bags, etc.)**

Title: **Q2: Raw Material Certifications Required**

Requirements: Certifications for all raw materials used in the product SHALL be delivered to BCT with the purchased product. In the case of composites, fiberglass, resins, sheet metal, plate metal, and Machined Goods (e.g., housings, brackets, structures, etc.), the mill certs with physical and/or metallurgical analysis and heat treat (if applicable) are required. For all metallic materials, use ODOC5161 *Metals Procurement Standards* to ensure the material meets one of the procurement standard options for each alloy and temper.

Deliverables: Manufacturer certification with MFG heat/lot number for all raw materials used in the manufacture of delivered parts to be provided with each shipment sent to BCT.

Title: **Q3: Certificate of Conformance/Certificate of Analysis Required**

Requirements: Supplier SHALL deliver a certificate of conformance attesting to the compliance of the deliverable including BCT part number, revision, name of supplier's authorized signer, and BCT PO number. The certification statement may be printed on the packing slip or separate provided the certification is traceable to the purchase order. The signature is strongly desired, but BCT will accept supplier's format (usually pre-printed or no signature.)

Note: This may also be referred to as a Certificate of Analysis in certain industries.

Any deviations must be approved, and documentation sent to BCT with shipment.

Deliverables: A certification statement SHALL be included on the deliverable documentation in addition to the BCT part number, lot number/date code, revision, name of supplier's authorized signer, and BCT PO number.

Title: **Q4: Electrical Test Required (PWB Only)**

Requirements: The supplier shall electrically test the Printed Wiring Board to verify the schematic and electrical connections. This may be accomplished using capacitance testing,

continuity testing, clamshell testing, flying probe, bed of nails, etc. Supplier may select an appropriate method but lack or insufficiency of testing does NOT alleviate the supplier of compliance to the requirements.

Deliverables: Supplier SHALL provide test results to BCT that indicates the test(s) performed, results, and the part number with serial number/batch number of the PWB(s).

Title: Q5: Process in accordance with OPR0187

Requirements: This document defines processing requirements for electronics Printed Wiring Assembly (PWA) soldering, assembly, and general manufacturing provisions, required by BCT Purchase Orders.

Deliverables:

- a. **A detailed inspection report**, including identification of non-conformances and dispositions, shall be included with the delivered assembly, or provided electronic format (email or CD-ROM). Supplier format acceptable). Automated Optical Assembly reports may be supplied if available.
- b. **Tantalum Preconditioning process documentation** if Tantalum capacitors were used.
- c. BGA Specific Requirements:
 - i. **Reballing report** shall include process identification and materials certification if Sn/Pb reballing was required.
 - ii. **X-Ray inspection** shall be performed for all Ball Grid Arrays (BGA) and thermal attachments, with results included in the inspection report.
- d. PWAs shall be inspected to IPC-A-610, Class 3 prior to delivery.
 - i. **X-Ray inspection** shall be performed on ALL EEE parts that cannot be inspected visually.
 - ii. **X-Ray inspection** shall be performed on ALL devices that have a thermal pad or for which solder connections cannot be visual inspected. This includes but is not limited to the following package types: BGA/CGA/LGA, QFN, LCC, SON, Thermally Enhanced TSSOP.
 - iii. Thermal pad solder coverage shall be >50%.
- e. **Photographs of each side of each board** shall be provided in electronic format (email or CD-ROM). Resolution and quality of supplied files shall be sufficient to identify parts, reference designators on silkscreen and part numbers if visible.
- f. **All non-conformances shall be reported to BCT formally (written or email) prior to proceeding**

Title: Q6: PWA Assembly Verification: Automated Optical Inspection and X-Ray Required

Requirements: Supplier shall perform Automated Optical Inspection on the PWA. AOI should confirm polarities, component placement, missing components, solder acceptability, and IC orientation. Supplier shall perform an X-Ray of parts that have connections that are not visually inspectable. Supplier shall provide x-rays and AOI results to BCT.

Deliverables: For each S/N board, the supplier SHALL supply X-Rays of each installed component that cannot be visually confirmed AND the AOI results in an electronic format to BCT. Supplier SHALL identify all deliverables to the assembly part number and serial number.

Title: Q7: DPAS Rated Order. Process in accordance with "15 CFR 700"

Requirements: Rated orders take precedence over all unrated orders as necessary to meet required delivery dates. Among rated orders, DX rated orders take precedence over DO rated orders. Persons receiving rated orders must give them preferential treatment as required by this part. All rated orders must be scheduled to the extent possible to ensure delivery by the required delivery date. See 15 CFR 700 for additional requirements. Check PO for actual rating (e.g., DX, DX-A4, DO, etc.)

Deliverables: None

Title: Q8: Sub-tier Suppliers/Special Processes

Requirements: The supplier must have processes in place to assure full compliance to all quality Purchase Order (PO) notes and requirements applicable to this PO. When products or services applicable to this PO are procured by the supplier from sub-tier suppliers, the supplier must flow the Q-note requirements on the PO and all other requirements, as necessary, to ensure full compliance is achieved.

Deliverables: a certificate of conformance attesting to the special process specification (MIL-STD, ASTM etc.) the process was performed to and is in compliance with.

Title: Q9: As-Built Report and Certifications Required.

Requirements: The seller SHALL provide a report, in Excel or similar spreadsheet electronic format, that lists the Find Number from the BCT BOM, the BCT BOM part number, the ACTUAL part number that was used by the supplier, the ACTUAL lot number and/or date code, and ACTUAL quantity installed on the deliverable. The As-Built report SHALL clearly identify any parts that were NOT installed. Supplier SHALL deliver all part certifications and traceability to BCT with the parts. Electronic data may also be sent to the BCT buyer.

Deliverables: An electronic report that shows all the ACTUAL parts used in the manufacturing of the PO line-item deliverable.

Title: Q10: Inspection Report Required

Requirements: The seller shall provide an inspection report, preferably in Excel or similar electronic spreadsheet format, that details the results for an inspection as follows

- a) A complete inspection of one piece from each manufacturing lot delivered, to include all features dimensioned with a specified tolerance (not a block tolerance*) and all non-global GDT callouts (not the block GDT callout), and
- b) An inspection of every piece in the lot that details the results of all part dimensions annotated on the drawing with an oval (i.e., critical dimension), if applicable.
- c) See example drawing below for reference

*Block tolerances still apply; they are not required to be inspected.

These results must include all the information listed on AS9102 Form 3. The supplier may also utilize the form in Appendix A of this document (use as many copies as necessary).

Deliverables: An electronic (preferred) report that shows all the inspection results of one piece of each manufacturing lot

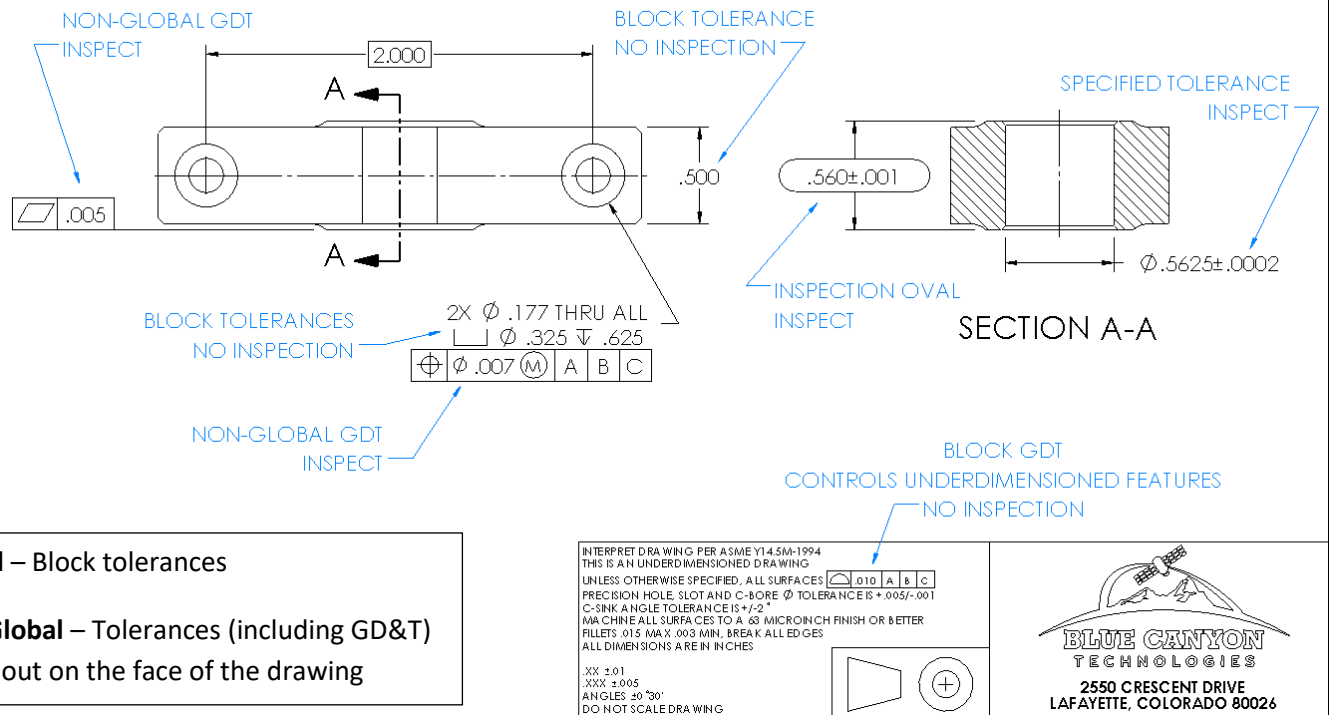


Figure 1: EXAMPLE DRAWING

Title: **Q11: Non-Franchised/Non-Authorized Distribution Procurement**

Requirements: See SOW 88DOC0025.

Deliverables: Appendix A checklist, inspection, and data report per section 3.16, and Approved and BCT Signed Appendix B form per section 3.17 of SOW 88DOC0025.

Title: **Q12: Requirements for Cable and Harness Assemblies**

Requirements: This note details the delivery requirements for Cable and Harness Assemblies inclusive of soldering, wrapping, crimping, assembly, and general manufacturing provisions, required by BCT Purchase Orders.

Deliverables:

- a. **A detailed inspection report**, including dimensions, weight(s), labeling, and identification of non-conformances and dispositions, shall be included with the delivered assembly, or provided electronic format (email or CD-ROM). Supplier format acceptable.
- b. **Photographs of the harness and each connector showing the conditions of the pins/sockets**. Pictures shall be provided in electronic format (email or CD-ROM). Resolution and quality of supplied files shall be sufficient to identify parts, reference designators and part numbers if visible.
- c. **A test report for each cable indicating continuity and isolation of the entire harness corresponding to the schematic on the engineering drawing**. This is typically accomplished using a Cirris™ or similar tester and produces a report that indicates point to point connection resistance or isolation.
- d. **All non-conformances shall be reported to BCT formally (written or email) prior to proceeding.**

Title: **Q13: Requirements Limited Life and Temperature Sensitive Materials**

Requirements: Items with a limited shelf life shall arrive at Blue Canyon Technologies with a minimum of 50% shelf life remaining. Material with special storage requirements per manufacturer's specifications (e.g., frozen, refrigeration, etc.) shall arrive at Blue Canyon Technologies properly packaged and maintaining those storage conditions (e.g., insulated containers, packed with dry ice, etc.) Blue Canyon Technologies reserves the right to return any shipment that arrives exceeding the temperature parameters. Materials that may be stored at room temperature does not need special packaging.

Deliverables: Material properly packaged, maintaining manufacturer's required storage temperature, and expiration date(s) clearly indicating 50% shelf life remaining upon arrival.

Title: Q14: Electrical Test Required (PWA Only)

Requirements: The supplier shall electrically test the Printed Wiring Assembly to verify the schematic and electrical connections. This may be accomplished using clamshell testing, flying probe, ICT bed of nails, etc. Electrical probing of the boards SHALL NOT cause a solder joint acceptability failure per applicable IPC/J-STD standards. Keep Out areas SHALL be established to avoid component damage. Testing should be strategized for highest coverage without the need for powering the board and/or load programmable logic devices. Supplier may select an appropriate method but lack or insufficiency of testing does NOT alleviate the supplier of compliance to the requirements. Supplier should use the SOFTEST touch (or ball probes) to minimize witness marks.

Deliverables: Supplier SHALL provide test results to BCT that indicates the test(s) performed, results with net list, and the part number with serial number/batch number of the PWA(s). All non-conformances shall be reported to BCT formally (written or email) prior to proceeding.

Title: Q15: AS9102 First Article Inspection Report Required

Requirements: The seller SHALL provide a report, preferably in Excel or similar spreadsheet electronic format, that details the results for a complete AS9102 First Article inspection of one piece of the manufacturing lot delivered. This report SHALL utilize the latest AS9102 forms. The supplier MUST also provide material certifications and traceability for all subassemblies, materials, processes, and items contained in the deliverable (e.g., metal, Helicoils, pins, inserts, adhesives, plating, etc.)

Deliverables: An electronic AS9102 FAI of one piece of the manufacturing lot and applicable material and process certifications.

Title: Q16: Lead Re-Tinning / Dipping

Requirements: For electrical, electronic, and electromechanical (EEE) hardware, all interconnect finishes containing tin must be alloyed with a minimum of 3% lead (Pb). Pre-tinning is not required when components are installed using 63%Sn37%Pb solder paste with flux meeting the J-STD-001 Space Addendum requirements (for BGA's, see Q5c. above). All gold-plated leads MUST be tinned prior to installation. Guidance documents such as GEIA-STD-005-2 Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High-Performance Electronic Systems may be referenced for pure tin mitigation strategies.

Deliverables: Supplier shall submit a certificate with each shipment stating compliance with this clause.

Title: Q17: Prohibited Materials

Requirements: Supplier shall provide material that does not contain any of the following:

- Cadmium (>1% composition when alloyed with copper; all other Cadmium alloys and cadmium plating is prohibited)
- Mercury
- Pure Zinc (>97% by composition)
- Pure Tin (>97% by composition)
- Brominated Polyimide

Deliverables: Statement or a certificate stating no prohibited materials were used. The certificate must be signed and dated.

Title: Q18: Calibration

Requirements: The supplier must have a calibration system in place that meets ISO 17025 or the ability to show uncertainty summary in accordance with Z540.3 standards. If a minimum test accuracy ratio of 4:1 cannot be achieved, Blue Canyon must be notified prior to work starting. Perform all inspections and tests using calibrated equipment.

Deliverables: A statement on the CofC showing compliance to ISO 17025 OR a statement that in-house calibration is used and, if requested, a report can be provided to BCT showing internal calibration completed per Z540.3 standards for equipment used on BCT product.

Title: Q19: Electrostatic Discharge (ESD) Control Program

For all ESD sensitive Electrical, Electronic, and Electromechanical (EEE) devices, the Subcontractor shall properly handle, package, and identify in accordance with ANSI/ESD S20.20 [current rev] including all requirements of Section 8.1-8.5. All personnel handling BCT ESD Sensitive Hardware shall be trained in ESD safe handling practices and receive refresher ESD training at least once every 2 years. All BCT ESD sensitive equipment is assumed to have a sensitivity of greater than or equal to 100 volts.

Deliverables: A statement on the CofC showing compliance with the current revision of ANSI/ESD S20.20.

