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Change Log				
Revision	Prepared by:	Approved by:	Pages Effected	Issue Date
A	Brett Lindenfeld	Chris Thayer	All	1/6/2015
B	Brett Lindenfeld	Chris Thayer	Cover,6,5,10,11,12,13	4/11/2017
C	Scott VanderZyl	Chris Thayer	1,5,8,13, 16-26	11/10/2019
D	Scott VanderZyl	Chris Thayer	7,15,17,20	5/8/2020
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Change Description	
Revision	Change
A	--Initial Revision--
B	Incorporation of QT9;Added additional references; Changes to Q2,Q17,Q21,Q25,Q29
C	Incorporating AS9100 Rev D Requirements
D	Updated clauses to better represent EEE activities and requirements. Q1,Q7,Q10,Q35
E	Updates to provide better clarity to Suppliers and Motiv Staff for specific Q Clauses and remove unnecessary requirements/deliverables

Introduction

1.1. Purpose

The purpose of the Quality Clauses contained within this instruction is prepared as a means to flow down various quality **requirements** to Motiv Space Systems', Inc. (Motiv) sub-tier suppliers. These requirements may include regulatory and statutory **requirements**.

1.2. Scope

This instruction contains the Quality Clauses to be placed on purchase orders for the procurement of materials, goods, and services.

1.3. References

AS9100D Section 8.4 - Quality Management Systems - Requirements for Aviation, Space and Defense Organizations: Control of Externally Provided Processes, Products and Services

AS9100D Section 8.4.1 - Quality Management Systems - Requirements for Aviation, Space and Defense Organizations: Control of Externally Provided Processes, Products and Services - General

AS9100D Section 8.4.2 - Quality Management Systems - Requirements for Aviation, Space and Defense Organizations: Type and Extent of Control

AS9100D Section 8.4.3 - Quality Management Systems - Requirements for Aviation, Space and Defense Organizations: Information for External Providers

AS9102 Aerospace First Article Inspection Requirement (AS/EN/JISQ 9102)

NIST Calibration - National Institute of Standards and Technology Calibration

ANSI/ESD S20.20 - ESD Control Program

GIDEP S0300-BT-PRO-010 and S0300-BU-GYD-010 - Government-Industry Data Exchange Program (GIDEP) Requirements

1.4. Applicability

These clauses apply to Motiv suppliers and sub-tier suppliers.

This instruction and/or its associated process(s), complies with the AS9100 Quality Management Systems requirements of the standards document section 7.4.2 Purchasing Information.

1.5. Referenced Motiv Documents

None

2. Quality Clauses

2.1. Q1- - Certificate of Conformance Required

Q1A - Certificate of Conformance Required

Supplier shall provide a certification with each shipment to attest that the parts conform to the Contract/Purchase Order requirements.

Certificate shall contain the following:

1. Motiv Contract/Purchase Order number
2. Line item number from the Contract/Purchase Order
3. Part number as identified in the Contract/Purchase order
4. Name and address of manufacturing or processing location
5. Manufacturer's lot number, heat lot number, batch number, date code, and/or serial number(s), if applicable
6. A certification statement stating that all requirements of the drawing, Contract/Purchase Order (which include all applicable "Q clauses") and all associated specifications have been met
7. A signature and date of a supplier representative
8. List of any Motiv approved exceptions

Certifications shall be hard copy unless electronic format is approved by Motiv Quality

Q1B - Certificate of Conformance Required with Applicable Date/Lot Code

- Supplier shall provide a certification with each shipment to attest that the parts conform to the Contract/Purchase Order requirements.
- This certification shall include the applicable Date and/or Lot Code/Number which traces back to the required screening and/or testing for that item.
- Certificates shall contain the following:
 1. Motiv Contract/Purchase Order number
 2. Line item number from the Contract/Purchase Order
 3. Part number as identified in the Contract/Purchase order
 4. Name and address of manufacturing, processing or distributing location
 5. Manufacturer's lot number, batch number and/or date code. (Serial number(s), if applicable shall also be documented)
 6. A certification statement stating that all requirements of the drawing, Contract/Purchase Order (which include all applicable "Q clauses"), and all associated specifications have been met

7. A signature and date of a supplier representative
 8. List of any exceptions which must be Motiv approved
- Certifications shall be hard copy unless electronic format is approved by Motiv Quality.

Q1C - Certificate of Conformance Required with Full Chain of Custody

Supplier shall provide a certification with each shipment to attest that the parts conform to the Contract/Purchase Order requirements.

This certification shall include the applicable Date and/or Lot Code/Number which traces back to the required screening and/or testing for that item.

This certification shall include a record of the full chain of custody for the manufacturer through all distributors and to Motiv Space Systems

Certificates shall contain the following:

1. Motiv Contract/Purchase Order number
2. Line item number from the Contract/Purchase Order
3. Part number as identified in the Contract/Purchase order
4. Name and address of manufacturing or processing location
5. Manufacturer's lot number, batch number and/or date code. (Serial number(s), if applicable shall also be documented)
6. A certification statement stating that all requirements of the drawing, Contract/Purchase Order (which include all applicable "Q clauses"), and all associated specifications have been met
7. A signature and date of a supplier representative
8. List of any Motiv approved exceptions

Certifications shall be hard copy unless electronic format is approved by Motiv Quality.

2.2. Q2 - Dimensional Inspection Report Required

While AS9102 formatted reports are preferred, dimensional inspection reports, of any written format with recorded actual measurements are required for all dimensions and all relevant notes as identified as critical by MOTIV. **This applies to each individual item and each inspected part unless specifically stated on the purchase order.** If no dimensions or notes are identified as critical, then all dimensions and notes are considered critical. Multiple place features are to be reported as a range. All basic dimensions shall be reported with their actual value, but reference

dimensions need not be reported. All inspection reports shall clearly reference the serial number of the part inspected.

2.3. Q3 - Material Certifications Required

Certifications of chemical, physical, mechanical and/or analytical test results are required in accordance with the applicable material specification for each item delivered.

Certifications shall include:

- Reference to the specification(s) and revisions as noted.
- Shelf life and temperature sensitive material certifications shall include the storage conditions, maximum shelf life, and out time requirements.
- **ALL MACHINE SHOPS:** Full chain of custody certifications from the mill or manufacturer, through ALL distributors and/or processors to the supplier's facility. Certification packages shall include the following at a minimum (where such activities have occurred):
 - 1) Certificate of Conformance to **YOUR** shop from processor (paint, prime, clean, anodize, etc)
 - 2) Certificate of Conformance from metals distributor to **YOUR** shop.
 - 3) Certificate of Test/Conformance from the mill/manufacturer to **YOUR** distributor
 - 4) Certificate of Conformance from heat treat facility to **YOUR** distributor
 - 5) Certificate of Test/Conformance from third party chemical analysis test facility to **YOUR** distributor
 - 6) Certificate of Test/Conformance from ultrasonic inspection facility to **YOUR** distributor
 - 7) Certificate of Conformance from anneal process facility to **YOUR** distributor

•
Plastics and/or synthetic polymer materials are only required to supply certificate of conformance consistent with Motive Q1B, but any additional information available regarding the delivered materials should be provided

Supplier shall not provide metallic material that has been machined down, sawed or by any other means to achieve the requested thickness or diameter. Supplier shall not substitute cut plate for bar stock. Certificate must include signature and date by a company official. There shall be no lapse in dates of transfer and receipt in chain of custody.

2.4. Q4 - Special Process Certifications Required

Certifications are required for each shipment of items from special processing (i.e. priming, painting, plating, anodize, heat treating, passivation, etc.). Those services requiring certified operators shall have current certifications or valid training records from a certified instructor.

Certifications shall include:

- Supplier's name and address
- MOTIV purchase order number
- Part number(s)
- Serial number if applicable
- Reference to the process specification and revision
- Lot and/or batch number of the raw materials used as applicable (e.g., primer, paint, etc.)
- Records of the technician who performed the work
- Objective evidence, shall be available upon request, showing compliance with the applicable specification as required

2.5. Q5 - Right-Of-Entry

MOTIV, its customers and regulatory agencies reserve the right to examine the supplier's facility as necessary to ensure that quality of work, records, and material are being processed in accordance with contract requirements.

2.6. Q6 - Source Inspection Required

Source inspection is required and shall be requested no less than 2 working days in advance of the need date. Request shall be sent to quality@motivss.com with a copy to the MOTIV buyer issuing the PO. Item(s) may be released only after the MOTIV representative approves by stamping or initialing the supplier's shipper or packing slip.

The Subcontractor shall provide the following during Motiv source inspection:

- Subcontract/PO, drawings, specifications, procedures, statements of work, and any other related inspection documentation that may be required.

- Personnel and resources that may be required.
- Suitable workspace and environment to conduct the source inspection.
- Calibrated test equipment/instruments to conduct the source inspection.

2.7. Q7 - First Article Inspection Report Required

The Subcontractor shall provide the following:

- A first article inspection report (AS9102 format) of all dimensions and notes shall be furnished to MOTIV with recorded actual measurements for each part number listed on this purchase order.
 - Multiple place features are to be reported individually each as a separate item on the first article inspection report.
 - No ranges are acceptable.
 - For example, a hole called out (5x) must have all five places recorded for size and position with the actuals for all basic dimensions. The exceptions to this multiple place requirement are chamfers, fillet radii and corner radii, in which case ranges will be accepted.
 - All basic dimensions shall be reported with their actual value
 - Reference dimensions need not be reported.
- This report is to accompany each shipment of each part number.

2.8. Q8 - Nondestructive Test Certifications Required

Certifications are required in accordance with the applicable specifications. Certifications shall be included with each shipment. Certifications shall include:

- Reference to the MOTIV purchase order number
- Quantity of parts inspected
- Name and address of the company performing NDI/NDT
- Date of inspection
- Reference to the specification and revision
- Inspector/name/stamp and NDI/NDT certification level
- Specification or other requirement defining the NDI/NDT accept/reject criteria
- Material or item identification
- Material or item traceability
- Inspection results

2.9. Q9 - Certificate of Calibration

Calibration shall be performed using equipment and standards fully traceable to NIST. A certificate of calibration is required which includes actual measured values, a statement of NIST traceability and a signature attesting to the correctness of the results.

2.10. Q10 - End Item Data Package Required (EIDP)**Q10A- (EIDP) Mechanical Products**

EIDP is to be furnished with hardware shipment. The data package shall include, signed and dated by the applicable representative, copies of the following (when applicable) as a minimum,

1. Certificate of conformance
2. Build documentation (i.e. travelers and or assembly documentation (redacted as necessary and agreed to by Motiv purchasing officer))
3. Material/parts usage and traceability records,
4. Inspection data,
5. Test data,
6. Cure charts,
7. Assembled/included materials certification(s) and/or certificates of conformance(s)
8. Any other process documentation as specified on the purchase order.

Q10B- (EIDP) EEE Components and Connectors

EIDP is to be furnished with hardware shipment. The data package shall include signed and dated by the applicable representative, copies of the following (when applicable) as a minimum,

1. Certificate of conformance, reference to associated specifications

2. Part data sheet(s) conforming QML/QPL information (include applicable sub-sections) and/or
3. Manufacturers test screening and acceptance data
4. Lot acceptance test data
5. Part age data (if Q35 has been invoked)
6. Applicable GIDEP or other industry alerts
7. Any other applicable specifications and/or process documentation stated in the purchase order.

For connectors the supplier to provide Q3 - Material Certifications for connector components, e.g. pins, sockets, fasteners, shells, screws, washers, seals, polymeric materials and associated special processes, i.e. plating.

For custom parts such as hybrid and electromagnetic components, the supplier shall provide all test performance data and passing results, part radiographic (X-Ray) inspection images in three different axis (x, y, z) i.e., the quality of images shall have significant visual evidence i.e., to determine that the part mechanical assembly met purchased specification and/or part SCD.

2.11. Q11 - Test Documentation

Subcontractor shall develop and submit a detailed Qualification Test Procedure that encompasses all qualification requirements of the Product Requirements Specification for the Subcontract/Purchase Order. This Qualification Test Procedure and all subsequent changes shall be submitted to Motiv for review and approval prior to use. Test results are to be furnished upon completion of the required tests.

2.12. Q12 - Quality Management System Requirements

While no specific documentation or records of this requirement is required to be submitted to Motiv, by acceptance of this Purchase Order (PO), the supplier agrees to maintain a Quality Management System (QMS) that complies with the requirements as set forth by MOTIV at their time of approval.

Any deliverables to this PO shall be developed within the requirements of that QMS.

The supplier is required to notify MOTIV Quality Assurance of any change to the status of their registration, if so registered at the time of approval.

The QMS shall conform to the latest revision of one of the following standards:

- ISO9001
- AS9100
- AS9120
- AS9003
- ISO/TS 16949
- AC7004
- ISO17025

2.13. Q13 - NADCAP Accreditation of Special Process Sources

By accepting this Purchase Order (PO), suppliers performing special processes, as identified below, shall affirm that they are accredited by the National Aerospace and Defense Contractors Accreditation Program (NADCAP). Special processes requiring NADCAP accreditation:

- Heat treatment
- Non-destructive testing
- Chemical processes (e.g., chemical milling, chemical conversion coat, anodize, prime, paint)
- Composites
- Surface enhancements
- Welding
- Brazing
- Shot peening
- Material testing by independent test laboratories

2.14. Q14 - Limited Life and Age Controlled Items

Based on the specified method of shelf life determination this order requires submittal of date of manufacture when shelf life is based on such, or date of shipment from the manufacture when shelf life is based on date of shipment. Upon shipment, shelf life remaining shall meet the minimum shelf life specified on the purchase order. Verification that the "Shelf Life" materials were indeed used within their shelf life limits shall be provided. For

“Raw” or “uncured” materials or materials delivered in their “not yet applied” state, 75% of the shelf life shall be remaining on the product at the time of delivery to Motiv.

2.15. Q15 - Supplier (sub-tier) Process Controls

While no specific documentation or records of this requirement is required to be submitted to Motiv, by accepting this Purchase order (PO), the supplier is agreeing to maintain a system to control processes per this purchase order, not only at their facilities, but for the processes performed at lower-tier suppliers' facilities. This clause mandates that all requirements, which are invoked or applied per this purchase order, including this clause, shall be flowed down to sub-tier suppliers.

2.16. Q16 - Electrostatic Discharge (ESD) Protection Program & Packaging

While no specific documentation or records of this requirement is required to be submitted to Motiv, by Acceptance of this purchase order (PO), the supplier is affirming that they have documented and implemented an ESD protection program in accordance with ANSI/ESD S20.20, ESD Association Standard for the Development of an Electrostatic Discharge Control Program for protection of Electrical, Electronic, and Electromechanical (EEE) parts, assemblies and equipment. EEE Parts shall be properly packaged and identified as required in ANSI/ESD S20.20. All EEE parts shall be placed in conductive or static-dissipative packages, tubes, carriers, conductive bags, etc., for shipment. The packaging shall be clearly labeled to indicate that it contains electrostatic sensitive parts and the level of sensitivity (if applicable). Electrical parts that may be used or shipped in conjunction with ESD sensitive parts shall be treated as ESD sensitive.

2.17. Q17 - Nonconformance Reporting

The supplier shall upon discovery of a nonconformance to a product or process or within 24 hours of discovering the shipment of nonconforming product, supplier shall notify Motiv via email correspondence at quality@motivss.com at which point a non-conforming product (NCP) report will be generated. Upon disposition the supplier should receive a copy of the dispositioned MOTIV NCP

and Supplier Corrective Action Report (SCAR) either through the supplier portal of Motiv's quality management software system, QT9, or via email of which a copy shall be sent with each shipment and referenced on the supplier's Certificate of Conformance. For "use as is" dispositions the discrepancy shall be shown as nonconforming on the supplier AS9102 First Article Inspection report or on their inspection report with the NCP and/or CAR number(s) listed in the appropriate area. For rework dispositions, the supplier is required to rework the part to conform to the drawing requirements.

2.18. Q18 - Third Party Material Test Report Required

Supplier shall send a sample of the material to an independent third party laboratory for analysis. Certifications of chemical, physical, mechanical and/or analytical test results are required in accordance with the applicable material specification for each item delivered. Certifications shall include:

- Testing laboratories name and address
- Reference to the MOTIV purchase order number
- Date of testing
- Reference to the specification(s) and revisions as noted.
- Reference to lot number, heat lot number and/or batch number of the raw materials

2.19. Q19 - Prohibited Materials

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

- Cadmium (defined as greater than 1% composition when alloyed with copper; all other Cadmium alloys and Cadmium plating prohibited)
- Mercury
- Pure Zinc (defined as greater than 97% composition)
- Pure Tin (defined as greater than 97% composition)
- Brominated Polyimide

Subcontractor shall submit material information for the part(s) under this Subcontract/Purchase Order (PO) to determine compliance with this clause. Information shall be either a Material Identification Usage List (MIUL) or a certificate stating no prohibited materials were used. The certificate must be signed and dated.

2.20. Q20 - Export Control

The information contained in this document may be controlled by U.S. Export Laws and Regulations. An export license or other legal authorization is required to transfer or re-transfer items or information to foreign persons. An export includes the following: physically transferring items or information, or providing technical assistance or export controlled information to any foreign person, whether the foreign person is located inside or outside the United States.

2.21. Q21 - Quality Records Retention

Supplier and sub-tier suppliers shall maintain verifiable objective evidence of all inspections and tests performed, results obtained, and dispositions of nonconforming articles. These records shall be clearly associated with the procured products and/or supplies, including lot number of materials/unit or lot serialization which shall be made available to MOTIV, its customer and/or government Representatives upon request. Records shall be retained in a safe, accessible location for a period of ten (10) years after date of delivery to Motiv. Consistent with the terms of the subcontract/Purchase Order, the supplier's records associated with the manufacture of serialized or lot controlled articles will provide for continued traceability of serial number(s) or lot number identification through all phases of manufacture, commencing with raw material and continuing through final acceptance of the end item. Records held within the required retention period (10 years) shall not be destroyed without MOTIV's written concurrence.

2.22. Q22 - Reserved:**2.23. Q23 - GIDEP Alert and Problem Advisories**

While no specific documentation or records of this requirement is required to be submitted to Motiv, the supplier affirms that they participate in the Government-Industry Data Exchange Program (GIDEP) per requirements of the GIDEP S0300-BT-PRO-010 and S0300-BU-GYD-010, available from the GIDEP Operations Center, PO Box 8000, Corona, CA 91718-8000. The supplier shall review GIDEP Alerts, GIDEP Safe-Alerts, GIDEP Problem Advisories, GIDEP Agency

Action Notices, and NASA Advisories to determine if they affect the supplier's products/services provided to MOTIV. For those that affect the program, the supplier shall take action to eliminate or mitigate any negative effect to an acceptable level. The supplier shall generate the appropriate failure experience data report(s) (GIDEP Alert, GIDEP Safe-Alert, GIDEP Problem Advisory) whenever failed or nonconforming items, available to other buyers, are discovered during the course of the purchase order.

2.24. Q24 - In-Process Mandatory Inspection Points (MIPS)

Motiv Mandatory Inspection Points (MIPs) shall be required where visual inspection access to hardware may be obscured by the next assembly task or where critical features need to be measured/examined prior to proceeding.

These MIPS shall be inserted into Contractor's shop planning or routing documents and agreed upon after review by Motiv Quality representatives.

This planning shall have no subsequent alteration by Contractor without first obtaining approval from Motiv Quality Assurance or their designee

It is the responsibility of the vendor to coordinate and schedule MIPS with Motiv Quality Assurance or their designee. *Items/Products not strictly adhering to these requirements will be considered Non-Conforming and will constitute cause for rejection.*

2.25. Q25 - Changes in Approved Processes or Product

The supplier shall not change any process or product approved /agreed to from the time of the submission of the quote to throughout the Purchase Order terms, without notification and approval by MOTIV.

The supplier shall:

- Notify MOTIV in writing (email acceptable) of nonconforming product,
 - Obtain MOTIV approval in writing (email acceptable) for nonconforming product disposition,

- Notify MOTIV of changes to product and/or process, changes of suppliers (including sub-tier), changes of manufacturing facility location and obtain MOTIV approval in writing (email acceptable) prior to implementation
- Flow down to the supply chain the applicable requirements including customer requirements
 - Note: All of the above shall occur within 24 hours or a mutually agreeable timeframe.

2.26. Q26 - Right of Inquiry

The supplier shall notify all sub-tier suppliers that they must accommodate any and all reasonable inquiries or requests pertaining to the materials and processes supplied in support of the completion of this MOTIV purchase order. Including the right to review and request documentation up through the end of the record retention period prescribed on this purchase order.

2.27. Q27 - Product Serialization

Product must have serialization maintained throughout the manufacturing process. All documentation required must be clearly segregated and identified by serial number.

2.28. Q28 - Material Batches and Lots

For each part number, all material used shall be from the same lot or batch. When this is not achievable MOTIV Procurement approval must be obtained in writing.

2.29. Q29 - Suspect Counterfeit Parts

“Suspect/Counterfeit Parts” are parts that may be of new manufacture but labeled to represent a different class of parts or used and/or refurbished parts with false labeling representing them as new parts or a manufacturer other than the actual manufacturer.

Supplies furnished to MOTIV under this contract shall not include suspect/counterfeit parts nor shall such parts be used in performing any work under this contract whether on or off the facility site.

If suspect/counterfeit parts are furnished under this purchase order and are found in any of the goods delivered hereunder, such

items will be impounded by appropriate MOTIV personnel. The Seller shall promptly replace such suspect/counterfeit parts with parts acceptable to the Buyer and the Seller shall be liable for any and all costs relating to the removal and replacement of said parts, including without limitation Buyer's external and internal costs of removing such counterfeit parts, of reinserting replacement parts and of any testing necessitated by the reinstallation of Seller's goods after counterfeit parts have been exchanged. Seller shall be fully liable for all such costs, even if such cost might be considered indirect, special or consequential damages. Seller's liability for suspect/counterfeit parts shall not expire. At Buyer's request, Seller shall return any removed counterfeit parts to Buyer in order that Buyer may turn such parts over to its customer for further investigation. Seller agrees that any Government or quasi-Government directive, such as a GIDEP alert, DOE, or a directive from MOTIV indicating that such parts are counterfeit, shall be deemed definitive evidence that Seller's parts contain counterfeit parts and such reports may be referred to the Department of Justice.

The rights of MOTIV in this clause are in addition to any other rights provided by law or under this contract.

2.30. Q30 - Design, Manufacturing and Development Control

As a part of the design, manufacturing and development activities, the supplier shall maintain configuration management of all models, documents, reviews, and records as deemed necessary by Motiv or the vendor. This includes serialized build paperwork, CNC and /or CMM programs and inspection documentation which is stamped/signed and dated. These records shall be maintained and available for review at Motiv's request.

2.31. Q31 - Reserved

2.32. Q32 - Special Requirements for Verification, Testing & Inspection

For the predominance of testing Motiv requires, Motiv only flows the test/inspection or verification requirements to the vendor using commercial, military standards, etc... Other than test reports, no further documentation is required. For testing, verification

and Inspection activities that are out of the norm, Motiv will supply a documented test procedure with explicit reporting instructions. These tests will be identified in the Purchase Order Document. Questions or clarifications shall be brought to the attention of the Motiv Purchasing Rep.

2.33. Q33 - Use of Statistical Techniques

In General, the use of Statistical Techniques” is not an acceptable practice due to the limited run sizes and complexity of the hardware. There are some occasions where this practice may be acceptable. For authority and acceptance of Statistical Techniques and data, A request in writing (email is acceptable) to request an exception must be proposed to the procurement Rep at Motiv. If granted the vendor will receive a formal notice approving such techniques.

2.34. Q34 - Requirements for the Use of Customer Delegated or Approved External Sources

The use of mandatory external vendors (either customer or Motiv selected) typically resides in the drawing notes or in the supplied documents. In some cases where that is ambiguous it may be placed in the text of the Purchase Order Document. In either case, the use of the specified delegated provider is mandatory. Any questions arising from this topic shall be resolved by contacting the Motiv Procurement Authority.

2.35. Q35 - Age Life Controls for EEE Devices

All Electrical, Electronic or Electromechanical (EEE) parts procured from the organization or its suppliers shall have been manufactured within three (3) years from the delivery date to Motiv for Plastic Encapsulated Microcircuits (PEMs) and five (5) years for all others.

This shall include all sub-assemblies of the article being procured.

Any deviation from this requirement shall be in the form of a written authorization from the Motiv Contracts, and the authorization shall be included with each shipment.

2.36. Q36 - Requirements for Vendor Integrity

Motiv programs are primarily "Space Based" and therefore cannot tolerate any failures as they cannot be replaced or repaired. Each detail that your staff creates has significant implications at the project and operational levels.

The need for your staff to understand the importance of their contribution is paramount and bring a sense of pride to your company and its associates.

Additionally the need to instill an environment of personnel and hardware safety is of the utmost importance. Your staff can be the minute difference between a successful operation and a catastrophic incident with injuries and mission failure.

Finally the need for ethical behavior ties these ideas together. Having the courage to speak up when you see something wrong, ask the additional question to take uncertainty out of a situation and to put your company's and the mission needs above yourself has always reduced risk, produced better results and has been the fuel to keep the space exploration alive and expanding.

While no specific documentation or records of this requirement is required to be submitted to Motiv, by acceptance of this purchase order (PO), the supplier agrees to remind their associates of these things (at least annually) to ensure the safety and success our missions.

2.37. Q37 - Identification of Beryllium Containing Material

If the Subcontractor ships a part containing Beryllium to Motiv, the Subcontractor shall identify it as such on the container and all the paperwork, and shall indicate that fabricating or modifying this Beryllium is hazardous. Due to the limitations on what can be stamped on a relatively small product or part, the warning note for Beryllium has been devised as stated below.

- i. All AlBeMet and Beryllium-containing parts, drawings, travelers, and containers shall include the following warning note:
 - a. DANGER-BERYLLIUM ALLOY TOXIC WHEN CUT OR GROUND IN ANY WAY
- ii. A drawing containing AlBeMet or Beryllium-Containing Part(s) or Product(s) shall indicate the location of the

AlBeMet or Beryllium part(s) or component(s). The Subcontractor shall include the following marking:

- a. Danger: This part is an AlBeMet/Beryllium Alloy part. Do not fabricate or modify. Fabricating or modifying this material will pose a serious safety and health hazard if dusts or fumes are generated. No fabrication or modification is allowed at Motiv
- iii. Requirements for any Subcontractor Fabricating or Modifying a Beryllium or Beryllium-Containing Part:
 - a. The Subcontractor shall have facilities for the fabrication or modification of Beryllium or Beryllium- containing parts. These facilities shall meet the OSHA requirements for dust and fume containment and cleaning of the parts.

2.38. Q38 - Material/Part Marking Required for Each Item

In addition to any other markings, as required by part drawing and/or applicable specifications, Contractor shall identify all procured items with the Motiv part number or other part marking, as listed in this Contract/Purchase Order, utilizing the same method as required by part drawing and/or applicable specifications, or a procedure approved in writing by the responsible Motiv procurement officer.

2.39. Q39 - Material Identification and Count:

Each article delivered under the Subcontract/Purchase Order (PO) will require positive identification with each ordered part number. All purchased materials and services are subject to inspection for compliance to the Subcontract/PO and all its applicable Quality Clauses. No material or process substitutions, quantity variations, or splits from the Subcontract/PO may be made without prior written authorization from Motiv.

2.40. Q40 - Electrical Wire and Cable Test Report:

Subcontractor shall provide a certificate that each shipment of electrical wire or cable furnished under the Subcontract/Purchase Order (PO) conforms to the applicable specifications. For each lot of wire or cable in each shipment, a certified test report or copy thereof shall be included with the packing list. The test report shall, at a minimum, include a record of the physical, chemical,

or electrical (and in the case of RF cable, electronic) inspections and tests conducted to satisfy the acceptance requirements of applicable specifications and shall include numerical results when applicable. For cable shipments, RF and otherwise, these requirements apply to both basic wire and finished cable(s). When the specification requires other inspection or test data to be reported, it shall be included in the test report. The delivered data shall provide Subcontractor's or Lower-tier subcontractor's name, the specification number and revision date or change letter (and other data required by the specification) and must be identified to or correlated with the lot shipped.

2.41. Q41 - Connector Cleanliness Requirements

Suppliers shall provide Motiv with parts free of any contamination or foreign material. Contamination can potentially interfere with the operation of the connector in a space environment or have an adverse effect on the surrounding hardware.

Cleaning Requirements: Parts shall be free of any contamination or foreign material including the following:

- Excessive adhesive
 - For example, and not limited to, outside the area requiring the adhesive, and the mating and wire termination surfaces.
- Excessive lubricant or grease
 - For example, and not limited to, outside the area requiring the lubricant, gobs or "caking" of lubricant visible on threads, or other areas that has a reasonable likelihood of breaking off under mate/demate, thermal, or mechanical vibration.
- Injection mold flash on the rubber or plastic components
 - For example, and not limited to, flashing that has reasonable likelihood of breaking off under mating, thermal, or mechanical vibration conditions.
- Insert "chip outs"
 - For example, and not limited to, around contact cavity locations that have a reasonable likelihood to have broken off as FOD, and potentially dislodged in a contact cavity.
- Foreign Object Debris (FOD)
 - For example, and not limited to, fluids, material components or remnants not removed from production/manufacturing processes and/or assembly.

2.42. Q42 - Reserved**2.43. Q43 - Pre Cap Inspection on Electronic Parts (MIP):**

Motiv Mandatory Inspection Points (MIPs) shall be required where visual inspection access to hardware may be obscured by the next assembly task. These inspection points shall be inserted into Contractor's shop planning or routing documents upon review by Motiv project and quality representatives. This planning shall have no subsequent alteration by Contractor without first obtaining approval from Motiv, and subsequent approval of planning changes post-revision. Pre-cap visual inspection shall be performed by the Motiv Quality Assurance representative on all packaged flight Application Specific Integrated Circuits (ASICs), hybrid microcircuits, Multi-Chip Modules (MCMs), crystal oscillators, and non-standard relays. Hybrid flight lots shall be subjected to 100% source inspection. The source inspection team shall include Motiv representatives. Contractor shall promptly notify Motiv so the appropriate inspection can be coordinated. *Items/Products not strictly adhering to these requirements will be considered Non-Conforming and will constitute cause for rejection.*

2.44. Q44 - Test Data Reporting Requirements

The supplier shall provide test data for the components, parts and/or activities as required by the subject purchase order.

2.45. Q45- Packaging, Handling and Labeling

The Subcontractor shall:

- Utilize packaging, handling, and shipping methods that maintain the quality and dimensional integrity of the item and prevent damage, deterioration, substitution, contamination, corrosion or loss in transit.
- Ensure that any special handling information needed to preserve the integrity of the product being shipped (e.g. ESD, moisture sensitive, cleanliness) is clearly labeled on the exterior of the package and stated in the appropriate shipping documentation.

- Ensure that all supporting documentation required to accompany the shipment is inside the container or one of the containers and that container clearly marked indicating that this information is inside.
- Not use pink poly material for packaging due to Motiv Contamination Requirements.

In addition to the General Requirements, if the product is an EEE device, the Subcontractor shall comply with the following requirements:

- For non-ESD Sensitive EEE devices, Subcontractor shall place them in conductive or static-dissipative packages, tubes, carriers, etc. for shipment. ESD-warning label shall not be applied.
- For ESD Sensitive EEE devices, Subcontractor shall place them in conductive or static-dissipative packages, tubes, carriers, etc. for shipment in accordance to ANSI/ESD S20.20. ESD-warning label is mandatory. (If the device has an ESD sensitivity of 200 volts or less, the Subcontractor shall additionally identify the level of sensitivity on the packaging.)

Note: ESD Sensitivity is defined using the Human Body Model (HBM) of MIL-STD-883, Method 3015.

ANSI/ESD S20.20 is for the “Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (excluding electrically initiated Explosive Devices)”.

2.46. Q46 - End Item Data Package - Deliverables to Accompany Printed Wiring Board (PWB):

In addition to the PWBs, the following shall be included in the delivery:

- Final micro-sections (both A and B or A/B coupons) shall be submitted to Motiv. This shall include both:
 - B (X-direction) As-Received
 - A (X-Direction) Thermal Stress
 - B (Y-Direction) Thermal Stress.
- Unless otherwise specified, one additional A and B or A/B coupon strip per panel shall be provided to Motiv. These coupons will not be sectioned prior to sending to Motiv and may be used for independent coupon evaluation. Coupons shall

- reflect coupon design in IPC-2221 and the specified finished PWB characteristics.
- If plated through holes larger than 100 mils are used in the PWB and are within 50 mils of non-common conductors, one representative non-sectioned coupon of the hole shall be sent to Motiv and may be used for independent coupon evaluation.
 - Certificate of Compliance shall contain the following:
 - Motiv's Subcontract/Purchase Order number
 - Line item number from the Motiv Subcontract/Purchase Order
 - Part number and revision letter as identified in the Subcontract/Purchase Order
 - Part description (title) of each item
 - Quantity of each item
 - Serial number, or if there is no serial number, screening lot number of each item
 - Name and address of manufacturing or processing location
 - Manufacturer's date code, lot number and/or serial number(s).
 - Manufacturers logo may also be included.
 - Signature(s) and date(s) by Subcontractor representative and/or Quality Representative.
 - All material certificates: the material used shall be traceable to the manufacturer's lot number through date code and serial number (this information should be submitted in an AS9102 format). If Hot Air Solder Leveling (HASL) is used as final finish, proof of analysis of solder pot in compliance with IPC-6012 shall be provided.
 - The Data Package shall comprise the following document:
 - AS9102 Report(s)
 - Completed Hardware Build Book (with all steps properly signed and dated as required)
 - As-Built Configuration List (Parts lists including traceability for specific items/parts used)
 - Assembly Documents
 - Deviations from Drawing and parts lists and objective evidence for the approval
 - Copies of all redlined drawings and parts lists
 - Copies of all Non-Conformance reports
 - Rework documentation
 - All manufacturer reports/results. The PWB manufacturer shall include the items listed below:
 - Results of all electrical verification testing performed at 250 Vdc (unless otherwise specified)
 - Results of all TDR testing on controlled impedance coupons (if specified in drawing).
 - Results of copper tensile strength and elongation tests (from an independent testing laboratory) for the month in which the Motiv PWBs were manufactured

- Results of ionic contamination testing
- All deviation and waiver reports including all MRB action taken on the PWBs or constituent material.
- All existing raw material reports and vendor certifications. Raw material manufacturer's test report (i.e., mill test report) that states that the lot of material furnished has been tested, inspected, and found to be in compliance with the applicable material specifications. Refer to Motiv Q3 Material Certifications Required.
- Final copy of any Technical Queries or drawing redlines that were required for fabrication and approved by Motiv.
- Results of the solderability coupon
- A completed AOI Certificate of Conformance (C of C) verifying the following:
 - All inner layers have been inspected by AOI to IPC-6011/6012 Class 3/A requirements for rigid inner layers.
 - All inner layers have been inspected by AOI to IPC-6011/6013 Class 3/A requirements for flex inner layer (if there are flex layers).
- Finished Printed Wiring Boards
 - All PWBs finished by the supplier shall be part of the PWB Deliverables Package.
- High resolution photo documentation of both sides of the each PWB delivered.
- Coupons and Pre-Selected Microsections
 - Coupons and pre-selected microsections supplied by the PWB manufacturer shall be part of the PWB Deliverables Package.
- Solderability Coupon
 - The PWB manufacturer shall ensure that a solderability coupon accompanies the end-item deliverables package.
- Results of the Solderability Coupon
 - The PWB manufacturer shall ensure that the results of the solderability coupon are recorded.
- Peel Test
 - If foil construction is used for a multilayer PWB, the PWB manufacturer shall report the results of an independent peel test from a sample PWB from the lot.
 - Note: This will require sacrificing a PWB from the lot. It will also require the PWB manufacturer to send the PWB to an independent testing lab if the PWB shop is not equipped with a tensile strength tester. (In either case the tensile testing equipment shall be calibrated and evidence of calibration shall be included)

- Deviations Noted
 - All deviations from the deliverables package shall be noted by Motiv QA.
- Prohibition
 - Tin-plating or tin-coating shall not be allowed on any electronic product.
 - Note: This includes, but is not limited to, items such as bare PWBs, component leads, and screws. However, a PWB manufacturer may use tin plate as an etch resist provided that it is removed entirely prior to shipping the PWBs to Motiv.
- Tin Purity
 - Tin shall be considered pure if it contains less than 3% alloy material.
- Serialization When Printed Wiring Board Rebuilt
 - The S/N(s) shall not be duplicated if the PWB manufacturer rebuilds or produced additional the boards.

2.47. Q47 - End Item Data Package - Deliverables to Accompany Printed Wiring Assemblies

In addition to the PWAs, the following shall be included in the delivery:

- Certificate of Compliance shall contain the following:
 - Motiv's Subcontract/Purchase Order number
 - Line item number from the Motiv Subcontract/Purchase Order
 - Part number and revision letter as identified in the Subcontract/Purchase Order
 - Part description (title) of each item
 - Quantity of each item
 - Serial number, or if there is no serial number, screening lot number of each item
 - Name and address of manufacturing or processing location
 - Manufacturer's date code, lot number and/or serial number(s).
 - Manufacturers logo may also be included.
 - Be signed and dated by Subcontractor representative
- All manufacturer reports/results. The PWA manufacturer shall include the items listed below:
 - If applicable, a complete list of the test results performed at the bareboard level or on the unpotted and potted harnesses
 - A complete shortage list (parts and/or activities as applicable)

- A list of all problem/failure reports generated against any piece of equipment, including open and closed status
- Results of ionic contamination testing
- All deviation and waiver reports, including all MRB actions taken on the PWAs or constituent materials
- All raw material reports and vendor certifications, if any
- The End Item Data Package (EIDP) shall comprise the following document:
 - Completed Hardware Build Book (with all steps properly signed and dated as required)
 - All material certificates; all materials used shall be traceable to the manufacturer's lot number through date code and serial number. In lieu of this any Motiv supplied components may be identified/recorded using the supplied IR number. One of these two methods shall be used. (this information should be submitted in an AS9102 format).
 - As-Built Configuration List (Parts lists)
 - Assembly Documents:
 - Table of contents
 - Log sheets to record work travelers and non-conformance reports
 - Work Travelers
 - Deviations from Drawing and parts lists and objective evidence for the approval
 - Copies of all redlined drawings and parts lists
 - Copies of all Non-Conformance reports
 - Rework documentation
 - ESD Logs (soldering irons, grounding and stray voltage)
 - Soldering Iron Temperature Logs
 - List of Indirect Assembly Materials (solder, ink, wire, flux, etc.) including lot and expiration date
 - X-Ray Images of CGA, BGA and BTC components, and finished PWAs as required.
 - Surface Mount Process Paste Height (mean & std dev)
 - Surface Mount Process Reflow Profile(s)
 - High resolution photo documentation of all sides of the completed PWA
- All deviations of the hardware from the documentation shall be noted by vendor