M02 - Subcontractor Product Assurance Requirements – Reduced

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1. **SCOPE:**

The contents of this subcontractor product assurance requirement document are applicable to a single heritage Rocketdyne supplier only. It shall not be used for other suppliers.

2. **APPLICATION:**

This document is applicable for the design and production of qualification and production SM3 IB and IIA hardware. Requirements specified herein shall not supersede any design specifications, drawing, or applicable laws.

3. **GENERAL REQUIREMENTS**

a. **Sub-Tier Flow-Down**: Supplier shall flow down to sub-tier suppliers the applicable requirements of this Subcontractor Product Assurance Requirements document.

b. **Quality Management System**: Supplier shall maintain a quality system in compliance with SAE AS9100 (Quality Systems-Aerospace-Model for Quality Assurance in Design, Development, Production, Installation and Servicing). Compliance to SAE AS9100 shall be evidenced by a current third party certification and listing in the IAQG OASIS database. Any loss of certification shall be immediately reported to Rocketdyne. Copies of certification shall be furnished whenever renewed or changed.

c. **Right of Entry**: Rocketdyne reserves the right to assign representatives, including Rocketdyne's customer or government representatives, on an itinerant or resident basis, at supplier's facility or those of lower-tier suppliers for any purpose including verifying all tests and/or inspections performed as a part of the terms and conditions of the purchase order(s). Supplier is required to provide Rocketdyne representatives with reasonable facilities and equipment and access to all areas essential to complete this task throughout all periods of performance under the purchase order(s).

d. **Source Inspection:** Source inspection is required at final inspection unless otherwise waived, in writing, by Rocketdyne Quality.

e. **Calibration System Requirements:** Supplier shall maintain a calibration system that complies with ANSI Z540.1, Calibration System Requirements. All test equipment and gages used for calibration must be traceable to the National Institute of Standards & Technology (NIST) standards.

f. **Sample Inspection:** Supplier may perform sample inspection on piece parts per ANSI/Z1.4.

   i. General Inspection Level II (ANSI Z1.4)
   ii. All Characteristics AQL=1.5, except Accept = 0 and Reject = 1
   iii. Parts selected for sampling must have all (100%) of the features inspected.

Supplier must inspect source control drawing "C" or "M" features on all hardware manufactured.

g. **Material Review Board (MRB):** Supplier does not have MRB authority and shall take no action that results in accepting hardware that does not meet the drawing and specification requirements (i.e., use-as-is, repair, conditional use dispositions). Supplier may disposition hardware that returns the item to the approved configuration with rework instructions. Supplier shall seek Rocketdyne approval on all dispositions other than rework, return to vendor, or scrap.

h. **Nonconformances Acceptance:** Any acceptance of a nonconforming item shall *not* be considered a precedent for future actions. Copies of all Rocketdyne nonconformance forms shall accompany documentation of shipment for nonconforming items.

i. **Corrective Action:** Supplier shall respond to Rocketdyne's requests for corrective action. Responses shall be timely and *must* include the root cause of the problem, the action taken to preclude a recurrence, and the effectivity of the action.

j. **Test Failure Report Control:** Supplier shall report to Rocketdyne the failure of any Rocketdyne required test, including acceptance test (e.g., functional test, leak test, vibration test, burst test, etc.). Hardware experiencing a test failure shall be maintained in its same condition pending authorization from Rocketdyne for any investigation activity (i.e., do not disassemble, do not retest). The following notification schedule applies:

   i. *Within 24 hours:* Report by telephone
   ii. *Within 5 days:* A preliminary written report.
   iii. *Within 30 days (goal):* A final written failure analysis report identifying failure cause and action(s) taken to prevent recurrence.

   Rocketdyne shall approve the failure analysis investigation plan and may elect to participate in investigation.

   The requirements of this section are not applicable for leak checking the CDI body weld and ISD.

k. **Training:** Supplier shall establish, implement, and maintain a training and certification program to ensure sufficient program knowledge and personnel skills are developed and sustained. Supplier's personnel shall have necessary skills and knowledge to perform their assigned activities.

l. **Government-Industry Data Exchange Program (GIDEP):** Supplier shall utilize the GIDEP process to alert industry of encountered counterfeit parts. Supplier is prohibited from shipping material for which a GIDEP Alert has been issued without written authorization from Rocketdyne. Supplier agrees to support Rocketdyne in GIDEP compliance efforts. Also supplier shall not ship any suspected counterfeit parts as reported by ERAI or as notified by Rocketdyne of any alerts or other suspect counterfeit conditions.

m. **Foreign Object Elimination**: Supplier shall establish and maintain an effective foreign object elimination program (FOE) / foreign object debris (FOD) program to reduce/eliminate FOD using NAS 412 as a guideline. The program shall be proportional to the sensitivity of the design of the product to the FOD as well as the FOD-generating potential of the manufacturing methods. Supplier shall take steps to mitigate contamination by foreign objects/debris. Supplier will document, investigate, determine root cause, and eliminate repetitive nonconformances related to Foreign Object Debris (FOD) incidents. In addition, supplier shall consider packaging materials that mitigates the generation of particles, fibers, or other debris.

n. **Supplier Manufacturing Readiness Review (SMRR)**: Supplier shall support a supplier manufacturing readiness review before the start of production if hardware has not been manufactured within the last 12 months or as otherwise stated in the contract. The purpose of the SMRR is to define the baseline technical documentation for production in the absence of a Manufacturing Baseline Review (MBR). While intended to have a scope that is a subset of an MBR, the SMRR shall include the minimum as follows:

   i. Verification of Drawings

ii. Configuration Management
iii. Quality Control
iv. Manufacturing Planning
v. Materials
vi. Tools and Fixtures
vii. Inspection and Test Equipment
viii. Test Procedures.

Supplier shall ensure subject matter experts are available to guide and answer questions pertaining to the purchase order, drawings, specifications, testing, schedule, quality requirements, and sub-tier flow-down requirements.

o. **Configuration Changes:** Supplier and supplier's sub-tier suppliers shall make no changes to design, materials, parts, processes, tooling, software/firmware, test equipment, or manufacturing location without written approval from Rocketdyne. Procured commercial off-the-shelf (COTS), EEE and MIL-SPEC items are exempt from this requirement. However, supplier must take precautions to ensure these items meet the fit, form, and requirements as demonstrated in the end item qualification program or other verification test.

p. **Special Processes**: Special processes including, but not limited to, heat treating, welding, soldering, plating, cleaning, and non-destructive testing shall be performed only by Rocketdyne or NADCAP approved sources for all processes identified on the applicable end item source control drawing including applicable specifications. Supplier shall control their special process suppliers and sub-tiers by either ensuring NADCAP certification or by approving the special process supplier in accordance with supplier's quality assurance system.
The approval process shall ensure that special processes are performed in accordance with the applicable specification requirements. Use of an Rocketdyne or NADCAP approved supplier does not relieve the supplier of the responsibility to meet all purchase order requirements.

Supplier shall provide with each shipment a certification identifying the following:

i. Process
ii. Part number and revision
iii. Purchase order number
iv. Serial numbers
v. Process specification and revision
vi. Identification of the process method used as the acceptance criteria document
vii. Evidence of acceptance including applicable reports.

q. **J-STD-001 Soldering:** Supplier shall meet the requirements of IPC-J-STD-001 Class 3 – Requirements for Soldered Electrical and Electronic Assemblies. Operators are not required to be certified to J-STD-001 but trained to the applicable sections that are appropriate for the work being performed. However, all solder instructors must be certified to J-STD-001 before providing training to personal. Training records must be on file and available for review upon request.

Supplier shall not hand solder leadless ceramic components.

4. DOCUMENTATION REQUIREMENTS

a. **Electronic pre-approval prior to shipment:** Prior to shipment of product, Seller shall provide all contract required quality related documentation through Rocketdyne Supplier Portal for Buyer's review and acceptance seven days prior (7) to promise date. If Seller is not registered on the Supplier Portal, Seller shall contact Buyer to activate registration process.

b. **Certificates of Conformance (C of C):** Supplier shall provide a legible Certificate of Conformance which states that the items were produced, processed, and/or tested in accordance with stated applicable purchase order or subcontract requirements, including revision level(s) as stated on the PO. Certifications shall be signed by a company quality assurance representative or responsible company official. The following minimum information is required on the C of C:
   - **i.** Seller's name
   - **ii.** Purchase order number
   - **iii.** Line item
   - **iv.** Rocketdyne part number with revision number
   - **v.** Serial number(s).

   This Certificate of Conformance shall provide a link to all documentation for this product.

c. **Record Retention:** Supplier shall keep on file records reflecting that all materials and finished items were controlled, tested, and complied with the imposed specifications detailed on the purchase order. Such records shall be available for Rocketdyne examination. Records shall be retained 10 years after final payment. Records shall be maintained for the retention period in a manner that prevents damage from fire, moisture, pests, or other deteriorating effects. Supplier shall notify Rocketdyne buyer if conformance to this requirement cannot be met. In such instances copies of records shall be provided to Rocketdyne. Rocketdyne shall be notified thirty days prior to destruction of documentation related to Rocketdyne orders.

d. **Acceptance Test Plan Approval:** Supplier shall submit to Rocketdyne an acceptance test plan (ATP) for approval. Supplier shall not perform any acceptance test before written approval received. Supplier shall make no changes to the approved ATP without first obtaining written approval from Rocketdyne.

e. **As-Built Configuration:** Supplier shall furnish with each end item delivery a legible and reproducible copy of the As-built configuration identifying all part numbers, part revisions, serial numbers, and lot/batch/date code numbers as applicable.

f. **Rocketdyne Serial Numbers:** Supplier end items shall be identified with Rocketdyne-provided serial numbers as defined in applicable drawings, specifications, and the purchase order. Serial numbers shall not be duplicated. Serial numbers shall provide full traceability to all material, fabrication, assembly, inspection, and test documentation.

g. **First Article Inspection Report (FAIR):** Supplier shall perform a First Article Inspection per AS9102 for each end item. Supplier shall submit the report with the first shipment of hardware and with subsequent deliveries if product has not been manufactured within a 12 month period (note this deviates from AS9102) or any of the FAIR trigger events listed in AS9102 Section 5.3. Supplier shall ensure the First Article unit serial number is annotated on the FAIR.

h. **Inspection/Test Data Report:** Supplier shall furnish a completed, legible, reproducible copy of the Inspection/Test Data Report for each serialized end item. The report shall include actual data for all dimensions as identified, and an indication of acceptance for the other dimensions. The report shall be identified as follows:
   - **i.** I. Part number and revision
   - **ii.** II. Part name
   - **iii.** III. Serial number.

i. **Ammunition/Explosive Lot Data:** Supplier shall provide ammunition/explosive data that complies with MIL-STD-1168 for each lot of pyrotechnic devices shipped. Supplier shall use form

DD1650 or a supplier generated form containing all applicable data (ref. Data Item Description DI-MISC-80043A).

Supplier shall supply an EFDI Material Safety Data Sheet with each shipment.

j. ESD Program: Supplier shall establish and maintain an electrostatic discharge (ESD) control program in accordance with ANSI/ESD-S20.20 or MIL STD 1686. As a minimum, the ESD control program shall address training, protective work area, procedures and verification schedules, packaging, facility maintenance, storage, and shipping. The Plan shall control and ensure all hardware is handled stored, manufactured, package, and shipped to prevent ESD damage.

k. Acceptance Data Package Requirements: Supplier shall assemble, organize, and provide an acceptance data package (ADP) containing the following data with each hardware shipment (as applicable).

I. *Title Page* – The Title page shall contain the following

1) Supplier's name and address
2) Part Name
3) Rocketdyne's End Item Part Number
4) Supplier's End Item Part Number
5) Serial Number(s)
6) Contract Number

II. *Index Page* – The Index page shall contain the following items and provide a check box indicating applicability of contents

1) Certificate of Conformance
2) As-Built Configuration
3) Acceptance Test Data
4) First Article Inspection Report
5) Inspection Data
6) Ammunition/Explosive Lot Data
7) Raw Material Certifications
8) Special Process Certifications
9) Open Work
10) Material Review Board Actions

III. *Certificate of Conformance*

This section shall contain the supplier Certificate of Conformance (C of C) for the end item supplied as described in this document. This section shall also contain sub-tier supplier's certifications for cable assemblies (IB only), CDI back shell, connectors (IIA only), EFDI, and CDI Radiflo leak check, as applicable.

IV. *As-Built Configuration*

This section shall contain the as-built configuration log of the end item. Further, this section shall contain a copy of the applicable Controlled Document Notice (CDN) as noted on the applicable end item drawing. The configuration log must justify all differences between the As-built and the CDN.

V. *Acceptance Test Data (ATP)*

This section shall contain the acceptance test data as defined in the governing Acceptance Test Procedure for the end item. Further, EFDI, CDI Radiflo leak check,

and cable (IIA only) acceptance data shall also be provided, as applicable. All data shall be traceable by part, serial, and/or lot number to the end item hardware.

VI. *First Article Inspection Report*

This section shall contain the first article inspection report (FAIR) for the end item. If the FAIR was performed on a previous delivery, this section shall contain either a copy of the FAIR or a statement specifying the FAIR was performed previously citing the *part number, revision number, serial number, and date it was performed.*

VII. *Inspection Data*

This section shall contain the physical inspection data for each serialized end item delivered.

VIII. *Ammunition/Explosive Lot Data*

This section shall contain a copy of the following, if applicable (CDI):

1) Ammunition/Explosive Data
2) DOD Competent Authority Approval letter or special permit letter (DOT-SP8451)
3) EFDI Material Safety Data Sheet (MSDS)

IX. *Raw Material Certifications*

This section shall contain the raw material chemical and physical mill certification for the ISD housing and ISD Lid (for IIA program).

X. *Special Process Certifications*

This section shall provide a certification for each special process identified on the Rocketdyne's source control drawing (SCD). Special processes include but not limited to soldering, conformal coating, welding, brazing, x-ray inspection, plating, conversion coating, etc. For processes performed in-house, supplier may provide certification on the Certificate of Conformance and shall include specification number and revision.

XI. *Open/Deferred Work*

This section shall contain a detail description of any open or deferred work on the end item. Items delivered with open or deferred work must have written authorization from Rocketdyne. Supplier must include written authorization with the delivered end item data package.

XII. *Material Review Board Actions*

This section shall provide a copy of all Material Review Board actions that resulted in a use-as-is, repair, conditional use, or unexplained anomaly disposition.

5. MATERIAL/COMPONENT REQUIREMENTS

a. Raw Material Traceability: Supplier shall maintain a material traceability process that ensures full traceability to the material lot/heat lot and any applicable requirements imposed by the drawing or specification. Supplier shall maintain records that provide manufacturing production lot/batch/heat lot traceability/melt number/batch control number for each:

I. Serialized subassembly
II. Non-serialized subassembly
III. Individual part (details)
IV. Consumed materials (solder, adhesives, lubricants, etc.)
V. Castings, forgings, wrought material, etc. shall have complete traceability to the original mill/melt source.

Materials used must be traceable to the manufacturer's records of acceptance and identified by applicable lot number, date code, material type, specification, applicable change letter or number, heat number, etc. Parts fabricated by Supplier shall be identifiable to the lot of material used.

Supplier shall ensure that the certifications provided include the actual material, special process, or testing standards noted on the applicable drawings along with the applicable revision letter or identifier.

Mill certifications are required for metallic raw materials used in the manufacturing of hardware specifically designed, fabricated, or altered for the program. Mill certifications must contain the actual chemical and physical properties demonstrating compliance to the governing specification. For aluminum "typicals" is acceptable for the reporting of chemical properties. COTS, EEE, and MIL-SPEC hardware are exempt from this requirement unless they meet the fabrication criteria stated above.

b. **Component Traceability:** Supplier shall maintain records that demonstrate that all components used in the fabrication of end items are traceable by part number and lot, batch, date code, serial number, or other identification methods to the manufacturer through appropriate certifications.

c. **Qualified Products List (QPL):** Parts and/or material furnished must be manufactured only by those suppliers specified in the purchase order, drawings, specifications, or applicable QPL. Certifications that must provide traceability to the approved source.

d. **Obsolescence Management:** Supplier shall perform an obsolescence/end of life (EOL) analysis of the product Bill of Material (BOM). The purpose of the analysis is to categorize every item in the BOM as follows.

I. Known obsolescence/EOL: Component(s) no longer in production by the manufacturer.
II. Potential obsolescence/EOL concern: Component(s) nearing the end of their life cycle. The manufacturer has plans to discontinue component(s) within the next 12 months as a minimum and/or up to as much as four (4) years.
III. Small or no obsolescence/EOL concern: Verified with the components manufacturer(s) that component(s) will be available for the next 12 months minimum.

The method for the analysis is at supplier discretion. Supplier shall perform the analysis in the first two months of purchase order execution and every 12 month thereafter. Supplier shall submit the data to Rocketdyne upon conclusion of the analysis. Parts/materials that are determined to be unavailable or have been identified as unavailable for new designs shall be immediately reported to Rocketdyne.

e. **Ridged PWB Manufacture:** Supplier shall comply with the requirements of MIL-PRF- 31032, and/or IPC-2221/IPC-2222 and IPC-6011/IPC-6012 as applicable.

f. **Microcircuit Manufacture:** Supplier shall comply with the requirements of MIL-STD-883 and MIL-PRF-38535 for all QPL-type hardware. Supplier shall determine the testing and acceptance requirements for COTS-type hardware. Test should demonstrate the reliability of the microcircuits.

g. **Tin Content:** Supplier shall certify (via the Certificate of Conformance) there are no unapproved pure tin finishes contained in supplied electronic, electrical, electromechanical, and/or mechanical piece parts and assemblies. All tin-lead plating or solder processes shall not result in coatings which contain less than 3% lead.

h. **Silver Coated Wire:** All silver coated copper wire must be in compliance with Raytheon specification P8658300.

6. **COUNTERFEIT AVOIDANCE:**

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 being 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 Rocketdyne and shall include the manufacturer's batch identification for the item(s) such as date codes, lot codes, serializations, or other batch identifications. This traceability requirement applies to new purchases of material, material in inventory, and material transferred from other business units of the supplier. If this traceability is unavailable or cannot be provided, Rocketdyne shall approve this exception in writing at the time of purchase order.

Source Controlled / Supplier Designed products that contain EEE parts shall have a Counterfeit Parts Prevention Program utilizing SAE International Standard AS5553 (latest revision) as a guide. All EEE components must be obtained from the Original Component Manufacturer (OCM) or Authorized/Franchised Distributor. This requirement shall be flowed to all sub-tier suppliers of components and products thereof as appropriate, including commercial-off-the-shelf (COTS) parts that are not obtained from the OCM.

Deliverables: Supplier shall approve, retain, and provide copies of Electrical, Electronic, and Electromechanical (EEE) Manufacturer Certificates of Conformance (C of C) when available. In no case shall the manufacturer’s certificate be altered or show signs of alteration. As an alternative of receiving and maintaining the manufacturer’s certification, supplier may authorize distributors to retain the manufacturers’ certifications. Supplier shall ensure that distributors are obtaining and retaining manufacturer’s certifications and will make them available upon request. Manufacturer C of Cs shall, at a minimum, include the following:

I. Manufacturer name and address
II. Manufacturer and/or Customer's part number and dash number
III. Batch identification for the item(s) such as date codes, lot codes, serializations, or other batch identifications
IV. Signature or stamp with title of Manufacturer’s authorized personnel signing the certificate

Where manufacturers’ C of Cs are not available (i.e. retained by supplier or their approved supplier), supplier shall provide a signed and dated C of C with the following statement to Rocketdyne:

“Supplier has completed rigorous supplier selection practices, supplier assurance practices, and tests and inspections of the specific parts supplied that are designed to prevent the supply of

fraudulent / counterfeit parts. Based on the authenticity report, parts are not suspected to be counterfeit. Their condition suggests they are new and authentic and have not been salvaged, reclaimed, or otherwise used".

Distributor certificates for individual EEE items shall state that the products have been procured and handled in accordance with the manufacturer's and include as a minimum the following:

- **I.** Distributor's name
- **II.** Part number
- **iii.** Manufacturer's name
- **iv.** Name and address of the Customer
- **v.** Quantity of the parts in the shipment
- **vi.** Lot date code, as applicable
- **vii.** Latest re-inspection date, if applicable
- **viii.** Certification that the shipment is part of the shipment covered by the Manufacturer's documentation
- **ix.** Signature and date of transaction. An authorized signatory assigned by a corporate officer with responsibility for the product quality and reliability or their documented designee.

Supplier shall maintain copies of certificates with lot records until the lot is completely shipped. Supplier shall maintain the product and shipment traceability for a minimum of 10 years after the date of the last shipment from each lot or in accordance with other record retention requirements of the purchase order.

7. PACKAGING REQUIREMENTS

Packaging shall conform to the requirements specified on the applicable drawings, specifications or purchase order. Hardware shall be packaged in a manner that will prevent damage and preclude moisture, foreign matter or contamination damage, and be properly maintained during handling, storage, and transportation. Packaging/containers shall be appropriately identified to show electrostatic protection.