Applies to: Aerojet Rocketdyne East, Aerojet Rocketdyne West

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QUALITY REQUIREMENTS FOR STANDARD INDUSTRY HARDWARE

1. SCOPE

The contents of this subcontractor product assurance requirement document are applicable to industry standard metallic fasteners, nuts, helicoils, rivets, washers, tube fittings, etc.

2. APPLICATION

Standard hardware manufactured to meet Government (MIL), Industry (AN/NAS/SAE/ASTM) or Company (RD/RE) drawing/specification requirements only.

3. GENERAL REQUIREMENTS

a. Quality Management System: The distributor furnishing materials to Aerojet shall maintain a quality system that shall be in compliance with SAE AS9120 (Quality Managements Systems – Aerospace Requirements for Stocklist Distributors) latest revision, at a minimum. Compliance to SAE AS9120 shall be evidenced by a current third party certification or as determined by an Aerojet survey/audit of the suppliers AS9120 quality management system. Certifications required by this Purchase Order shall be signed by a company Quality Assurance Representative or Responsible Company Official. Distributors must be Original Equipment/Component Manufacturer (OEM/OCM) authorized. Materials supplied by distributors must retain the OEM/OCM's material traceability and comply with all OEM/OCM environmental/shelf-life requirements.

b. LOT CONTROL: The Supplier shall maintain a system that assures full traceability to the material/manufacturing lot and/or any applicable requirements imposed by listed drawing or specification standards. The Supplier shall maintain records that provide lot/batch traceability/batch control number for each shipment. 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. The Supplier shall make all possible efforts to minimize the number of lot/date codes included in each shipment. If multiple lots must be used, each lot shall be segregated for packaging and shipment to Aerojet.

c. SAMPLE INSPECTION: The Supplier may perform sample inspection as defined per ANSI/Z1.4 or C=0 Sampling Plan.

- **i.** General Inspection Level I (ANSI Z1.4)
- **ii.** Features shall be selected for and an associated inspection 1.0 AQL minimum.
- **iii.** Accept = 0 and Reject = 1
- **iv.** Parts selected for sampling must have all (100%) of the feature inspected.

4. DOCUMENTATION REQUIREMENTS

a. CERTIFICATE OF CONFORMANCE (C of C): The Supplier shall provide with each shipment 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. Supplier's name, address and contact information and manufacturer's name (if different from Supplier) if applicable or be traceable to other supplied documents
ii. Part number and quantity
iii. Purchase order number
iv. Specification Number (including revision and amendments)
v. The title of the official that signed the document.

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

b. ACCEPTANCE DATA PACKAGE REQUIREMENTS: The Supplier shall assemble, organize, and provide an acceptance data package (ADP) containing the following data with each hardware shipment (as applicable).

ADP will contain the following:

i. Certificate of Conformance
ii. Inspection Data
iii. Raw Material Certifications including chemical and physical tests results and mill certifications
iv. Acceptance Test Data or Laboratory acceptance report number
v. Special Process Certifications: The Supplier shall provide a certification to each of the special process performed on the delivered hardware. Special processes include but not limited to soldering, conformal coating, welding, brazing, penetrant inspection, plating, passivation, heat treat, etc. For processes performed in-house, the Supplier may provide certification on the Certificate of Conformance.

c. SUPPLIER DOCUMENTAION – AEROJET PRIOR APPROVAL: The Supplier shall submit all quality documentation and certifications relevant to the purchase order requirements to Aerojet for approval prior to shipment. The documentation/certification package submittal should be coordinated with the responsible Aerojet buyer. Aerojet reserves the right to perform in-process/final quality surveillance at the seller's facility when non-conformances occur with the product or the documentation/certification packages.

5. MATERIAL REQUIREMENTS

a. **RAW MATERIAL TRACEABILITY:** The Supplier shall maintain a material traceability process that ensures full traceability to the raw material lot/heat lot and any applicable requirements imposed by the drawing or specification. The 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.

b. **CHEMICAL TEST ACTUALS:** Reported results must be identifiable with test parameters, test methods, specifications, and material(s) to product(s) delivered. Reports must bear the date and

signature of a responsible representative of the agency performing the test(s) along with traceability to the Aerojet Purchase Order Number. The specifications must be listed, including the revision letter(s) or revision number(s) and amendments. Test specimens used for material verification tests shall be selected from, and traceable to, each delivered heat/lot of material.

c. **PHYSICAL TEST:** Reported results must be identifiable with test parameters, test methods, specifications, and material(s) to product(s) delivered. Reports must bear the date and signature of a responsible representative of the agency performing the test(s) along with traceability to the Aerojet Purchase Order Number. The specifications must be listed, including the revision letter(s) or revision number(s) and amendments. When parts are serialized, serial numbers must appear on the report(s).

6. Additional Verification Testing – <u>For Deliveries to AR Canoga Park (Los Angeles) Only</u>

Verification test reports shall contain verification test results for each lot/heat of material. The test results shall be reported in accordance with the applicable drawing and/or material specification. The test report shall indicate pass/fail (or accept/reject) for each test.

Additionally, test reports shall provide the following - as applicable to the drawing and/or material specification:

a. Part Number
b. Serial Number or Forge/Foundry Record (FR) Number
c. Heat/Lot Number
d. Material Specification No. & Rev
e. Laboratory Name & Address
f. Test Date
g. Test Report Approver Name & Signature (or stamp)

NOTE: Test Reports can only be amended by the issuing/testing laboratory.

Fasteners shall be sampled in accordance with Table I. Fasteners shall be tested in accordance with Table II. Fasteners Include tube fittings, bolts, collars, eyebolts, inserts, locknuts, nuts, pins, rivets, screws, studs, and T-bolts. Tube Fittings include couplings, elbows, nipples, reducers, plugs, tees and unions, etc.

Acceptance Tests Performed by Approved Laboratories

Verification tests are not required if acceptance tests as identified in Table I and/or Table II were performed by an Aerojet Rocketdyne approved laboratory.

Standard Parts

Except for Fasteners and Tube Fittings described in this document, metallic Standard parts (Company, Government, and Industry) do not require verification testing. This includes but is not limited to: retaining rings, clamps, washers, spacers, springs, safety cables, bearings, and safety wire.

Definitions

Acceptance Tests: Tests required by the applicable drawing and/or material specification to assure that material requirements are satisfied. These tests usually consist of physical (weight, density, coefficient of thermal expansion, etc.), chemical (composition, etc.) and mechanical property (tensile, creep rupture, stress rupture, microstructure, hardness, etc.) testing.

Verification Tests: Tests performed in addition to the acceptance tests. Verification tests are performed to verify the accuracy of the acceptance test results. Verification testing does not, in most cases, require a re-test of all acceptance tests; however, a re-test of a subset of acceptance tests is required. This subset of acceptance tests, which require re-testing, is identified in Table II unless acceptance test was performed by an Aerojet Rocketdyne approved laboratory.

TABLE I

SAMPLE PLAN FOR VERIFICATION TESTING FOR FASTENERS, TUBE FITTINGS

LOT SIZE	SAMPLE SIZE	SAMPLE SIZE FOR COATED FASTENERS
UP TO 150	3	4
151 to 1200	5	6
1201 to 35000	8	9
>35000	13	14

NOTE: If any sample does not pass a test requirement, its respective lot will be rejected.

TABLE II

VERIFICATION TEST REQUIREMENTS FOR FASTENERS

	SAMPLE ALLOCATION (See notes)		
SAMPLE SIZE	**TENSILE TEST**	**MICROSTRUCTURE AND HARDNESS**	**CHEMISTRY**
3 or 4	2	1	1
5 or 6	3	2	1
8 or 9	5	3	1
13 or 14	8	5	1

1. Only those verification tests that are a subset of the acceptance tests must be performed. Excess samples shall be reallocated. For example, if the part is “too short” (as defined by material specification) for tensile or has no tensile requirement, these samples would be added to the quantity required for microstructure and hardness (or vice versa). When no other requirements exist, the samples are all used for chemistry testing. Total sample size remains the same.

2. Chemistry is done using one of the pieces from the tensile test for uncoated fasteners and a separate part for coated or plated fasteners since the tensile test can interfere with the plating identification. Base metal and all coatings are required to be identified.

3. Microstructure is required whenever there is a requirement for grain size or structure, evaluation of flow lines or a limit on location or depth of laps or other discontinuities.