NORTHROP GRUMMAN

Supplier Quality Assurance Requirements

For

Developmental Programs

(Excludes Legacy Space Technology)

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Signature on File

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REVISION RECORD

The latest issue to this manual may be confirmed by viewing the OASIS web site: **https://oasis.northgrum.com**

Revision	Revision Date	Revision	Date
Original Issue	12 January 2006		
	22 May 2006		
	30 July 2009		
	21 September 2011		
	19 march 2012		

Note – All revisions are in Blue font

Primary Change Summary

Added Section S – Counterfeit Prevention

Overview

This document provides the Supplier Quality Assurance Requirements for Northrop Grumman Aerospace System's Developmental Programs. It is a guide to understanding program quality requirements and expectations for Research and Development programs authorized to use this document. This document forms a part of Northrop Grumman purchase order, unless otherwise specified herein. It contains helpful general information and specific quality requirements.

The requirements in the engineering specifications, purchase order and/or other contractual documents shall take precedence over the requirements below.

This document is applicable to all purchase orders, when invoked by Standard Note I004. These quality requirements shall be used by the supplier as part of their quality planning function to ensure compliance with the Northrop Grumman requirements.

Programs General Requirements

a) Northrop Grumman Access

Northrop Grumman reserves the right to visit the supplier's facilities to determine purchase order compliance. The type, necessity and degree of demonstration of conformance will be based on the confidence in the supplier's quality system and other factors such as product complexity, the environment where the product is used, the ability to determine product quality after receipt, and past supplier performance. Northrop Grumman reserves the right to reject non-conforming products.

b) Quality System Requirements

Supplier shall implement and maintain a quality management system in accordance with a recognized industry standard, such as; ISO 9001, AS/EN9100, AS 9003, etc. or a Program specific plan approved by the applicable Program Quality Manager.

c) Product Release

Northrop Grumman reserves the right to perform First Article Inspection, In Process Inspection, and Final Inspection.

d) NC Part Inspection Requirements - Machined Parts

Machined Parts inspections are to be performed utilizing a model to program motion validation system, i.e. Vericut. A sampling of actual part features is to be verified and recorded utilizing CMM's or other types of physical measuring devices to validate drawing/model compliance.

e) Critical Part Inspection Requirements - Machined Parts

Note: Section e, in its entirety, applies to Critical parts only

Supplier shall ensure with objective evidence that all engineering, design and specification requirements for Critical Parts are verified and recorded.

Inspection requirements for each critical part (or critical zone) will be defined by engineering in the drawings and specifications. Where solid model fabrication definitions are utilized, Responsible Design Engineering and the respective Quality shall approve the inspection requirements prior to the manufacturing of the part. Design characteristics (Critical Features) shall be verified and results recorded. Results from the verification of the design characteristics shall be expressed in quantitative data (Actual Values not Pass/Fail) when a design characteristic is expressed by numerical limits.

The following is the minimum, but not limited to, data required, and should be delivered to NGC for the quality record:

- Part Number, Name, and Serial Number
- Drawing/Model and Specification Number and Revision
- Supplier Code and P.O. Number
- Special Processes Used and Respective Supplier Code
- Features (should be identified)
- Instrument Used for Measure
- Design Dimension and Tolerance
- Actual Measurement
- Acceptance Stamp
- Certificate of Conformance Number (Use NGC Form P0-F165)
- Applicable Nonconformance Numbers

Northrop Grumman source inspection is required on all critical parts.

f) Manufacturing Plan Submittals for Critical Parts

Parts designated or described as fracture critical, fracture critical traceable, fatigue critical, durability critical, maintenance critical, or candidate material requiring traceability by engineering drawing/models, specifications or purchase order configuration, require submittal of the manufacturing plan to Northrop Grumman at least thirty (30) days prior to start of manufacturing. The submittal shall be on the Request for Change/Information form (Form P0-F030) located on Oasis, Contract Data – Forms. The manufacturing plan shall contain sequential fabrication, processing, processor name and inspections steps, in the order required by the applicable process specification(s) and/or engineering drawing(s).

Upon approval of Supplier's manufacturing plan, the Supplier shall control all manufacturing, processing, testing and inspections as stated in the approved plan. No deviations, including the selection of supplier's sub-tier suppliers/processors, is permitted without Northrop Grumman prior knowledge and written authorization. Manufacturing of these products are not permitted until Supplier has received Northrop Grumman approval.

Suppliers shall verify that all tooling used as inspection media is delineated in the supplier's manufacturing plan at the applicable operation/sequence where the inspection occurs. Inspection Media tooling shall be controlled as a part of the supplier's periodic or calibration system prior to use for fabrication.

g) Nondestructive Test (NDT) Procedure / Technique Submittal Requirements

Supplier shall review the purchase order and associated drawings/drawing notes and related documents to determine if NDT procedures and/ or technique submittal is required. Submittal to and approval of NDT general procedures and part-specific techniques by Northrop Grumman is required at least thirty (30) days prior to start of inspection.

Note: Suppliers with Nadcap accreditation shall be processed per Section "h" of this document.

After initial approval, any changes to subject documents must be resubmitted to Northrop Grumman for approval.

Suppliers using outside sources for NDT shall ensure that the selected NDT sub-tier are in compliance with Section 'h" of this document. The approved list for Nondestructive Testing procedures and/or techniques is available on OASIS under Approved Special Processor List. On-site validation of procedures/techniques to verify specification compliance may be performed at the discretion of Northrop Grumman level III.

The detail instruction for NDT general procedures and part-specific technique submittals can be found in the NDT Procedure/ Technique Submittal Guide posted on OASIS.

h) Special Process Requirements

When special processes are required by the drawing, part specification, process specification, or purchase order, the supplier performing the special processes shall be either listed on the Northrop Grumman Approved Special Processor List (ASPL) or be accredited by Nadcap. Nadcap approval shall be to the corresponding process identified on the specification. This requirement is applicable to both Critical and Non Critical Parts.

i) Nonconforming Material Control

Nonconforming material must be identified, documented, evaluated, segregated (when practical), and dispositioned to prevent its unintended release or use. Suppliers do not have MRB authority for Northrop Grumman or any of its customer's designed items unless specifically authorized in writing by the buyer. The supplier's disposition authority of nonconformances is limited to rework to spec, return to supplier, and scrap. These items are defined as follows:

1) **Rework -** Restore material to specification compliance in accordance with required process(s) and addressed by governing process specification(s). Parts subject to subsequent processing not authorized by specification shall be submitted to Northrop Grumman Material Review Board for disposition. Specific rework instructions shall be provided with rework dispositions.

2) **Return To supplier**- Return to subcontractor product found to be discrepant for subsequent rework or replacement.

3) **Scrap -** Permanent removal from production and destruction of product found to be unfit for use. Scrapped product shall be controlled until destroyed.

Suppliers of product that retain design authority to a Source/ Specification Control Drawings (SCD) or NGC Performance Specifications and are ISO 9001/ AS 9100 certified may use dispositions of "use as is" or "repair" as long as the nonconformity does not result in a departure from the requirements of the SCD/ Customer Specification. This includes those suppliers that produce products of proprietary design, and products to military and industry standards.

Note: Northrop Grumman reserves the right to perform a survey of a supplier's MRB process based on the supplier's overall performance and /or product complexity.

j) Notification/ Disclosures

The suppliers system shall provide for timely reporting of nonconformities that may affect already delivered product, including any continuing airworthiness actions. Notification to the buyer shall include a clear description of the discrepancy, identification of all suspect parts (to include mfg. dates, serial numbers, quantities, etc.) and material affected by the deficiency, date'(s) delivered, any information relating to the Root Cause / Corrective Action steps initiated to address the defective condition, and preventive measures taken to preclude recurrence of the process failure. Modifications of a disclosure (additions or deletions of data) requiring subsequent issuances shall be revision controlled to provide definitive sequencing (i.e. Rev 'A', 'B' etc.).

For suppliers with a Level 1 Quality system approval, a technical assessment and recommended disposition shall be provided.

k) Certificate of Conformance

Suppliers shall provide a Certificate of Conformance (C of C) assuring that all work performed in connection with the purchase order and this document conforms to requirements therein. The C of C may be a separate document or included on the packing sheet. Suppliers providing Certificate of Conformance (C of C) for critical parts must document on the latest revision of form P0-F165. The form can be accessed on OASIS. The supplier's Quality management or designee must sign and/or stamp this document and shall be included with every shipment.

l) Qualification Certification

When Northrop Grumman' drawing, procurement specification and/or purchase order requires deliverable items to be "Qualified", suppliers shall certify that materials, parts, assemblies and/or related contract "Data Items" have been approved and all components of a deliverable item have been inspected and/or tested to applicable Acceptance Test Procedures (ATP) and/or specification/control drawings (both Northrop Grumman and supplier originated).

m) Part Marking Requirements

Supplier shall mark all deliverable products as required in the purchase order, engineering drawing and/or manufacturing planning. Supplier shall mark all deliverable products as required in the purchase order, engineering drawing and/or manufacturing planning. In addition, if the part has a repair authorized by a nonconformance tag, the deliverable parts should be identified with the Nonconformance number as part of the identification requirement.

n) Software Control

Supplier shall establish and maintain a Software Quality Assurance (SQA) program in accordance with contractual requirements.

This section for supplier software quality involves newly developed software, modified commercial-off-the-shelf software, and commercial-off-the-shelf software.

o) Corrective and Preventive Action

The supplier shall respond to all requests for corrective action on or before the requested response due date. The response must be submitted on the supplier's letterhead Supplier shall maintain a documented system for determining root causes of documented defects and obtaining corrective action both internally and from its suppliers. The supplier is accountable for effectiveness of corrective action and preventive action taken.

Buyer requests for corrective action and preventive action will be issued to the supplier's representative in the form of, but not limited to:

- Supplier Corrective Action Request (SCAR)
- Quality Assurance Deficiency Review Report (QADRR)

p) Control and Use of Digital Datasets

When digital data sets are required to manufacture product, the supplier shall comply with "SQAR Supplement for the control and use of Digital Datasets located in the quality requirements section of OASIS.

q) Foreign Object Debris / Damage (FOD)

Supplier shall maintain good housekeeping and where applicable a Foreign Object Debris / Damage (FOD) prevention program to preclude introduction of foreign objects into any deliverable item.

r) Supplier Sub-tier Control

Supplier is responsible for ensuring all items procured from its subcontractors conform to all requirements of the Northrop Grumman purchase order. Supplier shall ensure all applicable provisions of this document are flowed down to its subcontractor.

s) Counterfeit Prevention

1) Electrical Parts

The supplier shall have a counterfeit detection process that meets the intent of SAE standard AS5553, Counterfeit Electronic Parts, Avoidance, Detection, Mitigation, and Disposition.

Companies that procure electrical, electronic, electro-mechanical, and electro-optical (EEE) parts shall have a counterfeit parts program plan to ensure it does not receive counterfeit parts into inventory, use them in manufacturing, or inadvertently sell them to other parties. The plan shall meet the intent of AS5553 paragraph 4.1 and all appendices.

All electrical, electronic, electro-mechanical and electro-optical parts delivered and/or used in the manufacture of deliverable products shall be from the Original Component Manufacturer (OCM)/ Original Equipment Manufacturer (OEM) or their franchised distributor or authorized aftermarket manufacturer (AAM).

In the event a part is not available from the OCM/ OEM/ AAM or franchised distributor, purchase from independent distributors may be made but the verification activities below shall be completed prior to shipment to NGAS if traceability back to the OCM/OEM/AAM or franchised distributor is not provided.

Note: OCM and OEM are considered interchangeable in this document.

Detail part suppliers must have a certification from the OCM/ OEM/ AAM, and that certification shall be delivered with each lot/ shipment. The certificate shall include as a minimum: manufacturer name and address, manufacturer and/or buyer's part number and dash number, batch identification for the item(s) such as date codes, lot codes, heat lot, serializations, or other identifications, Signature or stamp with title of seller's authorized personnel signing the certificate.

NOTE: Distributors shall, in addition to the above, include their name for each part shipped

Independent distributors shall, in addition to the certification requirements for Detail suppliers above, ensure their traceability (chain of custody) method clearly identifies the name and location of all of the supply chain intermediaries from the manufacturer to the direct source of the product on the certification which shall be delivered with each lot/ shipment.

Parts shall not be used or reclaimed and misrepresented as new.

Suppliers that deliver next higher assemblies shall flow this requirement down to all their sub-tier suppliers to prevent the inadvertent use of counterfeit parts and materials. Certifications from the OCM/ OEM/ AAM must be readily retrievable and made available upon request.

If evidence of supply chain traceability (chain of custody) to the OCM/ OEM/ AAM is not available, the supplier shall verify authenticity prior to shipment. The supplier may use an independent inspection/ test service provider to verify authenticity.

Verification shall include but is not limited to the following:

- For all packaged active electronic components, verify that component marking and packaging labeling are consistent and that component marking meets permanency and black topping tests. Capture high magnification digital photographs of top, bottom and side view of one component for each date code provided in the delivery and a photograph of the packaging. Component marking and packaging labeling must be clearly legible in the photographs.
- For all packaged components, inspect for manufacturer and Mil-Spec required markings and dimensions (e.g., external visual per Mil-Std-883, Method 2009), and for external counterfeit criteria per IDEA-STD-1010.
- For all packaged components, 100% of the components shall be tested to all specified limits of all Group A static DC parameters at ambient temperature specified per the applicable drawing or in accordance with the applicable industry/military requirements or manufacturer's data sheet. The supplier shall not ship components to NGAS if there are any Group A test failures, unless authorized in writing by the Buyer.
- For packaged components with internal die cavities, unless the supplier requests and obtains from the Northrop Grumman approval of an exception via the RC/I process, both De-Cap and X-Ray are required as follows:
    - De-cap internal visual on at least one component for each date code performed in accordance with Mil-Std-883, Method 2014 and IDEA-STD-1010, with digital photograph(s). The supplier shall verify die topology and markings are authentic with the OCM/ OEM/ AAM or by comparison to other authentic components or images.

- 100% Particle Impact Noise Detection (PIND) test & Seal test for the cavity devices only. PIND - 100% of the part lot shall be inspected per MIL-STD-883, Method 2020, Condition B. Hermeticity (Seal) - 100% of the part lot shall be inspected per MIL-STD-883, Method 1014, Condition A, Fine and Gross leak.
- 100% X-Ray inspection per Mil-Std-883 Method 2012 (digital format preferred).

  Note: Supplier shall verify any mixed construction and/or construction anomalies within a single date code identified in the De-cap or X-Ray inspection to be authentic with the OCM/ OEM/ AAM or validated against a known authentic component prior to shipment.
- For bare die products, inspect for consistent markings on the die and the wafer packaging and verify die size and geometry (visual inspection per Mil-Std-883, Method 2010). The supplier shall verify die topology and markings are authentic with the OCM/ OEM/ AAM or by comparison to other authentic components or images. Mixed construction shall be cause for rejection.

- For other electronic devices – 100% testing to the applicable drawing in accordance with MIL-STD-883, Method 5005, Group A Subgroup 1 (static tests at 25°C), MIL-STD-750 Group A Subgroup 1 (static tests at 25°C), or in accordance with the applicable industry/military requirements or manufacturer's data sheet (static/DC parameters).
- The verification records and results, including a copy of X-ray and digital photographs, for the components that pass the inspections and tests above shall be maintained by the supplier. These records shall be readily retrievable and made available to Northrop Grumman upon request. The supplier shall not ship components which fail these tests/ inspections.
- Marking permanency test is required for all ink marked parts. 5% each lot code date shall be tested per MIL-STD 202 Method 215K or similar. The supplier shall ensure the marking is not masked with clear coat.
- Any part or lot found to be inconsistent with the OEM/ OCM/ AAM specifications or that is suspected as counterfeit, shall be processed as non-conforming material until determination of authenticity is made. When parts are deemed counterfeit, and not approved for use, they shall be destroyed or physically rendered unusable (cut off a lead, etc.) to ensure that the parts will not be reintroduced into the supply chain. Reporting requirements for counterfeit parts shall be per the supplier's control plan.
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2) Non-Electrical Parts

The supplier shall have a counterfeit detection process that is similar to, and meets the intent of, SAE standard AS5553, Counterfeit Electronic Parts, Avoidance, Detection, Mitigation, and Disposition.

Companies that procure non-electrical standard parts shall have a counterfeit parts program plan to ensure it does not receive counterfeit parts into inventory, use them in manufacturing, or inadvertently sell them to other parties. The plan shall meet the intent of AS5553 paragraph 4.1, including all appendices.

Distributors or brokers that supply non-electrical standard parts, like fasteners, nuts, washers, springs, o-rings, inserts, and pins, must have a certification from the Original Component Manufacturer (OCM)/ Original Equipment Manufacturer (OEM) or authorized aftermarket manufacturer (AAM)., and that certification shall be delivered with each lot/ shipment.

Parts shall not be used or reclaimed and misrepresented as new.

Suppliers of next higher assemblies shall flow this requirement to all their sub-tier suppliers to prevent the inadvertent use of counterfeit parts and materials. Certifications from the OCM/ OEM/ AAM must be readily retrievable and made available upon request.

If evidence of supply chain traceability (chain of custody) to the OCM/ OEM/ AAM is not available, the supplier shall submit all material for verification of authenticity in accordance with their counterfeit parts program plan prior to shipment. The supplier may use an independent inspection/ test service provider to verify authenticity.