

1. Purpose

Northwest UAV (NWUAV) is committed to building strong supplier partnerships. This document provides instructions and guidance for suppliers to be able to deliver product and services compliant to NWUAV and customer drawings or specifications. The document was created to ensure that suppliers have a documented quality management system (QMS) in place, composed of quality management plans and processes that assure drawing/specification compliant products or services are delivered to NWUAV requirements.

These requirements may be in addition to the standard NWUAV Purchase Order Terms & Conditions.

2. Scope

This document applies to NWUAV, NWUAV suppliers, and subcontractors that are subcontract manufacturers or fabricators and/or laborers (all definitions hereinafter referred to as “suppliers”) that provide non-commodity product or services to NWUAV that is intended for sale or lease to a NWUAV customer.

3. References

- www.nwuav.com
 - NWQA-08-003 Supplier Quality Requirements (current & archive)
 - F-740-006 PO Terms and Conditions (current & archive)
 - F-740-007 NWUAV Terms & Flow Down Clauses
 - Additional Customer Flowdown Requirements
- Site Quality Acceptance Rate
 - On-time Delivery Reporting
 - Quality of Delivered Material Reporting
- AS5553 Counterfeit Electronic Parts Avoidance Detection Mitigation Disposition
- ARP6328 Development of Counterfeit EP Systems

4. NWUAV Systems Requirements to support Supplier Quality

- NWUAV will provide input on supplier qualification and on-going performance monitoring and issue Supplier Corrective Actions Requests when required.
- Provide suppliers with updated purchase orders reflecting approved Change in Designs.
- Maintain records of supplier quality performance.
- Review supplier quality performance.
- Review all First Article Inspections and issue a nonconformance report for any specifications or dimensions that are not met on the First Article submission.
- Identify the Purchasing sole point of contact for all commitment & communications with suppliers.

5. General Supplier Requirements

- All products custom produced to NWUAV supplied or approved drawings must comply with all drawings and purchase order requirements. These include materials, subcontracted processes and drawing tolerances, and any flowdown requirements indicated via NWUAV’s internet site.

- Purchasing requirements take precedence in the order of item quality and on-time delivery. The criteria for quality acceptance are as follows:
 - On time delivery is based on those achieving 90% on time performance (tolerance of 30 days early / 0 days late).
 - A Quality Rating achieving a 95% or better defined as the minimum of either:
The number of lots received with defective parts, divided by the total number of lots received, in 3 consecutive calendar months.
Example:
10 Lots received with defective parts
100 Lots received
10% Rejection Rate
- Certificate of Conformance (C of C) is required with every shipment, excluding Commercial Off the Shelf (COTS) items.
- When required, additional certification, inspection and testing requirements are specified on the purchase order or referenced documents.
- Additional C of C's may be included for material, processing (i.e. Aluminum, Anodize, Paint, etc.), inspection and testing results to maintain traceability and conformance.
- Contract Manufacturers, Fabricators and Suppliers are responsible for establishing and maintaining a documented quality system that includes the elements listed below: (NWUAV reserves the right to audit these systems upon request.)
 - Organization, personnel job descriptions, and training
 - Purchase order / contract review
 - Document and data control
 - Product identification and traceability
 - Process control
 - FOD awareness training (minimum requirement) – understanding what it is and prevention
 - Inspection and testing
 - Maintaining internal quality metrics supporting quality improvements (available for review as requested).
 - Control of qualification and inspection of measuring and test equipment.
 - Control of nonconforming product.
 - Corrective and preventive action.
 - Storage, handling and packaging, including control of customer property that might be required as a unique provision handed down by the Purchase Order.
- Suppliers are responsible for notifying NWUAV purchasing of any change to their quality system, their Quality Management Representative, and the effective date of any change requiring a First Article Inspection. When specifically requested, the supplier will make specified quality data and or approved design data available in the English Language.
- Supplier providing components, electronic devices, and other similar items must have a counterfeit mitigation program in place to ensure counterfeit materials are not being used on products built for NWUAV and their customers.
 - Supplier may reference SAE International Standard ARP6328 / AS5553 for assistance with their counterfeit mitigation program.

- C of C's from the Original Equipment Manufacturer (OEM) must be available for review on all parts.
- Supplier may not purchase non-OEM parts from anyone other than the OEM or authorized OEM distributor without written approval from NWUAV.
- All suspect parts must be quarantined, removed from use, and notification given to NWUAV with a list of potentially suspect product (should any exist).
- All parts found to be counterfeit shall continue to be quarantined & reported to the authorities to prevent reintroduction back into the supply chain (in accordance with ARP6328, Section 3.7 Table 1- Reporting contact sources).
- Authorities will provide information on how to proceed.

6. Records and Documents

All documentation generated as a result of this specification must, at a minimum, be retained and kept available for review at the supplier's facility 3 years from the date of manufacturing.

- NWUAV Purchase Order or Contract.
- Referenced drawing(s) with revision number.
- Referenced NWUAV or customer specifications
- Industry specifications not listed.
- If the supplier ceases to deliver product or services to NWUAV within the 3-year period, all records become property of NWUAV.

Records should include:

- Who completed the documentation
- When the record was made
- Who made additions or corrections and when they were made
 - If the rationale for a change is not evident, additional documentation is highly recommended for explanation. A note to the side or memo to the file may serve this purpose.
 - Handwritten entries must be recorded legibly in ink. Any correction should be crossed out with a single line, initialed and dated with current date. This is so the original entry is not obscured.

Not acceptable:

- Additions to source documents that are not initialed or signed and dated.
- Write-overs of the original entry.
- Double strikethrough lines on an edited entry.
- Correction fluid (white-out).
- Pencil.
- Scribbles.

7. Production Control

Suppliers must develop and maintain effective methods of production control. A control plan is required when SPC/CTQ dimensions are present.

- ***All SPC/CTQ dimensions must be monitored and recorded at 100% AQL (unless otherwise specified by NWUAV Quality).***

- Where the supplier uses material with limited shelf-life control, a method for ensuring that the material has not exceeded the recommended shelf life prior to use is required.
- When NWUAV requires specific methods of production control, handling or storage due to the critical nature of the process or product, these requirements will be stated on purchasing documents and must be addressed in the written work instructions and the supplier control plan.

8. Incoming Inspection

Suppliers must perform an inspection prior to performing release of components/material for further processing or assembly.

- This inspection is to include verification that quantities/part descriptions match and that there is no damage or non-conformances.
- Suppliers must verify that any required certifications or test reports are included.
- Suppliers are fully responsible for controlling quality of their suppliers of subcontracted materials and processes.
 - *In the case of NWUAV supplied items:* if there is evidence of damage, non-conformances or paperwork discrepancies, the supplier must notify NWUAV Quality within 3 working days of discovery. The NWUAV Material Review Board will determine what action is required.
- If the supplier fails to achieve and maintain 95% site quality acceptance rate, which is a prerequisite for delegated inspection authority awarded at NWUAV's discretion, the supplier shall be responsible for one or more of the following as directed:
 - Obtaining source inspection from a NWUAV qualified contractor at the supplier's expense
 - Reimbursing NWUAV for reasonable costs incurred at the point of manufacturer (i.e. supplier site) to verify product conformance
 - Reimburse NWUAV for reasonable costs incurred at the point of receipt to verify product conformance.
 - Responding to a Supplier Corrective Action Report to determine root cause of the issue.

9. First Article Inspection

The supplier must perform a first article inspection prior to release of production product to verify that all CPC/SPC dimensions, features, and product attributes meet specified requirements. Documentation of first article inspection must be submitted for review and approval by NWUAV Quality prior to the first production shipment.

First Article Inspection Report (FAIR) documents may be submitted via NWUAV secure site and / or provide a copy with shipped FAI item. **DO NOT SEND VIA EMAIL.**

First article inspection must be performed from the first production run of a new part or following any subsequent change that invalidates the previous first article inspection result:

- The part is being introduced into production for the first time as a result of a new product development.
- The part is being sourced from a new supplier.
- The part manufacturing location has changed.

- In the judgment of NWUAV Engineering or Quality, that significant change has been made to the manufacturing process/work instructions that could affect product conformance (i.e. moving a machine, changing).
- Changes have been made to features or characteristics identified on the engineering drawings as “Critical to Quality”.
- There has been a material change as a result of a cost reduction, warranty reduction or producibility improvement effort.
- The part has been released at a new revision level.
- If a production period of over 2 years has passed a new First Article Inspection report may be requested for validation materials and all dimensional requirements are still being met.
- In the case of changes to an existing part, a partial first article may be acceptable if stated on the purchase order.
- A partial first article report (PFAIR) will consist of a cover sheet referencing the part number and revision and the reason for PFAIR, a characteristic sheet referencing the actual change (i.e. the dimension(s), revision roll from pre-production to production - no drawing change, etc.), a drawing with the referenced data bubbled, and a C of C with any additional material C of C that may be required.
- The supplier may use their own documents.
First article inspection documentation must include:
 - Part number and revision level.
 - Part name as shown on the drawing.
 - Part serial number, if applicable.
 - Drawing or Specification used for the inspection.
 - Characteristic number – a unique number for each design characteristic.
 - Reference location – drawing zone, page number and section, specification, etc.
 - Requirement of the design characteristic including nominal and tolerances if applicable.
 - Measured Results for all non-referenced drawing requirements and specifications.
 - Identification of acceptance or nonconformance.
 - Type, identification and qualification of measurement equipment used for critical/significant characteristic measurements.
 - Who performed the FAI
 - Date of the performed FAI
 - Certificate of Conformance for process.
 - Material Analysis Report (MAR) for materials.
 - The Control Plan that documents the supplier’s plan which assures, at a minimum, that all defined CPC/SPCs are met.
 - The results of the measurement studies/Gage R&R that validates the measured results on all the critical and significant characteristics.

10. In-Process Inspection

- Once approved for production, the supplier must monitor and record, at a minimum, all features identified as Critical and Significant Product Characteristics on the drawing and functional product specifications.
 - The SPC/CTQ data must be included with the parts delivered to NWUAV **“ATTN: QUALITY.” The SPC/CTQ data is to be monitored at 100% inspection until Gage R&R can be achieved or unless specified by NWUAV.**
 - Validation that products conform to requirements must be recorded.
- When sampling inspection is used by the supplier, the sampling inspection plans must be statistically valid and preclude the acceptance of lots whose samples have known nonconformities.
 - Sampling AQL must be a minimum of 2.5.
 - An approved sampling plan is provided in Appendix-A on page 9 of this document (C=0).
 - If the supplier uses a different sampling plan, it will require NWUAV approval.

11. Inspection Records

- Inspection documentation must include:
 - Purchase order number with revision number from the drawing or specification identified on the purchase order
 - Part or piece number inspected
 - Dimension or attribute being inspected
 - Criteria for acceptance and/or rejection
 - A record of the measurement/inspection result
 - Type of measurement instruments used (tool ID & calibration date)
 - Name of person performing the inspection and date of the inspection

12. Manufacturer's/Supplier's Certificate of Conformance (C of C)

- C of C's provided shall contain the following information:
 - Name and address of manufacturer
 - NWUAV Purchase Order (PO) and/or contract number
 - Statement attesting that goods and services conform to all PO/Contract, and associated product requirements and specifications.
 - Part number(s) and revision(s), as applicable
 - Product definition identification with revision level to which goods were manufactured (e.g. Drawing number and revision level; FPS number and revision level).
 - Chemical analysis and mechanical properties, for required material C of Cs.
 - Quantity and serial number(s) if required.
 - Quantity, type of process and what specification/revision used, for required process C of C's.
 - Quantity, serial numbers, type of test, results, specification used, for required test C of C's.
 - Authorized signature & date

13. Supplier Non-conformances and Deviations on Production Product

- When, prior to shipping a product, a supplier's product does not meet the criteria established on the PO (waiver) or anticipates deviating from the requirements of a PO (deviation), it is the responsibility of the supplier to contact NWUAV prior to delivery of the product.
 - The supplier must receive approval, in writing, authorizing the shipment of non-conforming product.
 - The supplier shall contact the buyer noted on the PO and the buyer shall enlist the appropriate personnel who might grant the authority for either a deviation or a waiver.
 - The supplier must submit a deviation request for any known nonconformance to a Critical or Significant Product Characteristic that will not be scrapped or reworked by the supplier.
 - Nonconforming material must be clearly identified and segregated where practical to prevent unintended use.
 - The supplier must have written approval from NWUAV Purchasing or designee (i.e.: a PO amendment, CID, ECN, fax, e-mail) for the deviation by NWUAV prior to shipment.
- After receipt of a product, when NWUAV notifies supplier of a detected nonconformance, the supplier shall immediately take action to eliminate the nonconformance on all products in the supplier's control. Parts returned will be placed on priority for replacement and shipped back to NWUAV.
- The supplier shall also maintain on file verification that root cause corrective action has occurred and has resolved the subject condition. NWUAV reserves the right to review the verification data.

14. Supplier Corrective Action Request

An evaluation is made to determine the extent and impact of nonconformances. This is based on the risk to final product quality, delivery schedules and financial impact (this may include Site Quality Ratings). The Quality Manager or Quality Director determines if a formal Supplier Corrective Action is required.

15. Supplier Corrective Action Report (SCAR)

- The supplier shall, when requested, provide NWUAV a corrective action report within fifteen (15) business days of receipt unless otherwise noted on the SCAR.
- If, after submittal of the SCAR, the supplier determines need for revision; the supplier shall immediately notify NWUAV of such revision.
- In the event the supplier is unable to respond within the allotted fifteen (15) day time frame, the supplier shall submit a request for an extension which shall include the reason for the extension request and the time needed to complete the corrective action report. This extension must be approved by the NWUAV Quality Manager in writing.

The Supplier Corrective Action Report will identify:

- The Root Cause of the non-compliance
- The identification of the affected lot/serial numbers/etc. of non-compliant parts
- The change/addition to the supplier Control Plan that will eliminate the non-compliance in the future (if required).

- The date the corrective action has been incorporated, and the first date the corrected material will be received at NWUAV (documented in section 7 of the SCAR).
- NWUAV reserves the right to reject any root cause and/or corrective action determination provided by the supplier and may request subsequent investigation and/or corrective action.
- If the supplier is late in responding to corrective action requests, or subsequent corrective action is required, NWUAV reserves the right to withhold acceptance of shipments either at their source, or destination until the approved supplier corrective action is submitted and approved.

16. Quality Metrics and Reporting

- When requested, the supplier agrees to collaborate with NWUAV to develop and implement processes designed at improving the supplier's quality performance. The process will include sufficient detail to evaluate the supplier's progress.
- Supplier Recommendations: Suppliers are encouraged to make recommendations to material, design or processing changes that could benefit NWUAV in the form of cost, time savings or product improvement.

17. ESD

- NWUAV suppliers are required to provide ESD protection to ESD sensitive product, while it is being produced, in custody of the supplier, and during shipment.
- When ESD is a factor, a supplier shall, at minimum, train employees on ESP procedures, proper handling, packaging, and storage of ESD sensitive parts.
- All ESD sensitive parts must be clearly labeled to prevent improper handling.

18. Packaging & Labeling Requirements

Components, materials and assemblies shipped to NWUAV or other NWUAV suppliers for final assembly and packaging must be:

- Free of FOD.
- Free of evidence of delamination or dry weave in composite material.
- Free of visible voids that cannot be cosmetically repaired by subsequent operations.
- Packaged in a manner to prevent any sliding, distortion, bending, or other damage during transit/handling.
- Easily identified by part or assembly number clearly labeled on the packaging and additionally on the parts as identified on the part specification.
 - IUID marking requirements as specified in F-740-007 (NWUAV Terms and Flow downs).
- Open-cell foam shapes, closed-cell foam shapes, cardboard spacers and bubble wrap should be used to best suit the particular configuration and critical nature of the item to be shipped. Use shrink-wrap, pallets and other containers suitable to the product being shipped.

- All electrostatic discharge (ESD) sensitive products must be wrapped in ESD protective bubble wrap or ESD protective bags prior to boxing. Apply identification label to the outside of the package clearly marking ESD Sensitive.
- Unless specified, recycled boxes or other suitable shipping containers may be used. The supplier must ensure that no prior identification labels remain on the container that may conflict with the actual contents.
- Shipping documents and product labeling should provide for clear identification of contents, including purchase order number, part numbers, revisions and serial numbers.
- The use of unique identifiers on product labeling, such as bar coding, is encouraged for all shipments to NWUAV.
- Documents (packing list, MSDS, inspection sheets, etc.) attached to the outside of the container must allow damage-free removal.
- Preservation of product techniques shall be used when required to prevent damage to shelved items.

19. Appendix A

Appendix A:

**C=0 SAMPLING PLANS
INDEX VALUES
(ASSOCIATED AQLS)**

From: *Zero Acceptance Number Sampling Plans*, 4th edition by Nicholas L. Squeglia

15.1.1.1 Note: The acceptance number in all cases in ZERO nonconforming

AQL⇒	.010	.015	.025	.040	.065	.10	.15	.25	.40	.65	1.0	1.5	2.5	4.0	6.5	10.0
LOT SIZE																
2 to 8	*	*	*	*	*	*	*	*	*	*	*	*	5	3	2	2
9 to 15	*	*	*	*	*	*	*	*	*	*	13	8	5	3	2	2
16 to 25	*	*	*	*	*	*	*	*	*	20	13	8	5	3	2	2
26 to 50	*	*	*	*	*	*	*	*	32	20	13	8	5	5	5	3
51 to 90	*	*	*	*	*	*	80	50	32	20	13	8	7	6	5	4
91 to 150	*	*	*	*	*	125	80	50	32	20	13	12	11	7	6	5
151 to 280	*	*	*	*	200	125	80	50	32	20	20	19	13	10	7	6
281 to 500	*	*	*	315	200	125	80	50	48	47	29	21	16	11	9	7
501 to 1200	*	800	500	315	200	125	80	75	73	47	34	27	19	15	11	8
1201 to 3200	1250	800	500	315	200	125	120	116	73	53	42	35	23	18	13	9
3201 to 10,000	1250	800	500	315	200	192	189	116	86	68	50	38	29	22	15	9
10,001 to 35,000	1250	800	500	315	300	294	189	135	108	77	60	46	35	29	15	9
35,001 to 150,000	1250	800	500	490	476	294	218	170	123	96	74	56	40	29	15	9
150,001 to 500,000	1250	800	750	715	476	345	270	200	156	119	90	64	40	29	15	9
500,001 and over	1250	1200	1112	715	556	435	303	244	189	143	102	64	40	29	15	9

*Indicates entire lot must be inspected

15.1.1.2 SMALL LOT SIZE SUPPLEMENT

(ASSOCIATED AQLS)
(Use for small lots when the associated AQL values are 1.5 and below)

LOT SIZE	.25	.4	.65	1.0	1.5
5-10	*	*	*	8	5
11-15	*	*	11	8	5
16-20	*	16	12	9	6
21-25	22	17	13	10	6
26-30	25	20	16	11	7
31-35	28	23	18	12	8

Document Revision History			
Rev	Date	Description	Author
0	8/17/2009	Initial Release	M. VanSlyke

1	5/18/2011	Section 8, Revised C OF C paragraph. Added chemical analysis requirement and better defined existing requirements. Added FAI email for FAIR submission. Added numbered paragraphs all sections	M. VanSlyke
2	6/10/2011	Added paragraph Numbering. Added approved by lower footer. Updated 1.1 purposes and 1.2 scopes. Up-dated 2 Definitions.	M. VanSlyke
3	12/11/12	Updated Approved By data. Changed "Copyright" to "Proprietary to"	J. Kendall
4	04/01/13	9.2 removed "email to fai@nwuav.com " and replaced with "NW UAV FTP site (need to obtain permissions)" Updated 5.2	J. Kendall
5	07/19/2013	Refinement / expansion of Sec 3. References, add reference to flowdown requirements to 5.1, control of customer property 5.4.11, 7.3 production control, expansion of Sec 13 to address deviations/waivers	J. Pike
6	07/18/2014	Removed "Northwest UAV Propulsion systems from most sections and replace with "NWUAV", Added FOD definition section 2, removed 2.21.1 "ratio" site rate, 5.4.5.1 Added FOD training requirement, updated 9.2 to reflect "NWUAV secure site" & Do not email, removed 9.6.17, Added to section 10.1 SPC/CTQ data to be delivered with parts, updated 10.3 to reflect correct Appendix A page, added "or designee" to section 14.3, changed section 18.1.1 to reflect FOD,	J. Pike
7	6/7/2018	Updated NWUAV logo, removed Definitions, updated formatting, included counterfeit mitigation responsibility, and revised requirements in all sections	J. Kendall / J. Pike