

Quality Clause Q2A First Article Inspection

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The terms “Item”, “PO”, and “Buyer” used herein have the same meaning as “work”, “contract”, and “Lockheed Martin”, respectively, as may be defined in another provision of the Purchase Order (PO) of which this Quality Clause Q2A is a part.

FOREWORD:

This revision of Quality Clause Q2A is a complete re-write and differs significantly from past revisions. Buyer has intentionally avoided duplication of content adequately covered within the AS9102 standard or interpreted in supporting AS9102 FAQs available online through IAQG. Full understanding of Buyer’s requirements requires the concurrent use of AS9102, AS9102 FAQs and Q2A.

As the aerospace industry moves toward broad adoption of the AS9145 standard for Advanced Product Quality Planning (APQP) / Production Part Approval Process (PPAP), it is important to understand not only how First Article Inspection (FAI) fits into that standard, but why FAI is a critical step in the introduction of new products into production and how it positions organizations for success at rate. Rigorous performance of the FAI on the first production run validates product realization planning, drives timely corrective action (*as-needed*), and accelerates the retirement of program risk. FAI should not be viewed as an isolated activity, but rather as a part of a system that neither begins nor ends with the FAI. Seller’s ability to produce with the lowest possible Cost of Poor Quality results from full application of AS9145 principles.

1. SCOPE:

- A. Unless otherwise stated, Seller shall comply with AS9102 and this Quality Clause at the highest revision levels in effect at the time of PO acceptance. Seller may choose to work to a higher revision level of each at no additional cost to Buyer.
- B. The requirements of this Quality Clause are applicable in full to the PO, including all products sub-indentured within the PO deliverable. This includes products manufactured, processed, assembled, tested or inspected at sub-tier suppliers.
- C. Buyer is the sole authority for interpretation of FAI requirements on the PO.

1. Questions about the interpretation of requirements contained within this document shall be sent to Buyer's FAI Steering Committee via Seller's assigned LM Aero Procurement Representative (buyer).
 2. For questions/interpretation of AS9102, Seller should first consult the AS9102 FAQs published by IAQG and available online as public information at www.sae.org/iaqg.
 3. Additional interpretation not included in the FAQ document is provided below in section 3.
- D. AS9102, including FAI forms, is available from the IAQG at:
<https://www.sae.org/iaqg/forms/index.htm>
- E. In addition to the AS9102 FAI application exclusions, the following categories of deliverables are excluded unless otherwise specified in the PO:
1. Metallic raw material (*e.g., plate, bar, rod*) and non-metallic raw material (*e.g., paints, sealants, adhesives, composite ply prepreg material*)
 2. Products returned to Seller for repair or rework (*whether a production or sustainment repair*)
 3. Special Tooling and/or Perishable Tooling

2. DEFINITIONS:

- A. Critical Item – Products identified as Critical Safety Items, Fatigue Fracture Critical, Fracture Critical, Durability Critical, Maintenance Critical, Mission Abort Critical, Safety Critical and Flight Science Critical.
- B. FAI Planning – FAI-related activities performed prior to the first production run of parts.
- C. Non-Stockable Product: Product is engineered, planned, and manufactured to a specific production aircraft Bill of Material (BoM) that is subject to significant configuration differences from one production aircraft to another. Examples include, but are not limited to, major aircraft components such as a wing, fuselage section, and vertical/horizontal tail.
- D. Sub-Tier Supplier – All entities performing manufacturing, assembly, testing and inspection work on Seller's behalf, including, but not limited to, sub-tier suppliers at all levels, subcontractors, special processors, feeder plants, other Seller manufacturing sites, partners, etc.
- E. Stockable Product: Product is engineered, planned, and manufactured to a configuration that is common to multiple production aircraft BoMs. (Most LM-procured products will conform to this definition.)
- F. Technical Data Package (TDP) – The complete set of technical requirements necessary to communicate design intent. A TDP may include, but is not limited to: drawings, performance-based specifications, Digital Production Definition (DPD) media, process specifications, approved/unincorporated engineering changes.

3. **SUPPLEMENTAL INTERPRETATIONS:** This section provides additional guidance on AS9102 intent beyond the questions addressed by the AS9102 FAQs. Seller shall adopt these guidelines at no additional cost to Buyer.
- A. The AS9102 definition of “Design Characteristics” is comprehensive and includes all elements of the TDP at all levels of indenture. The completeness and accuracy with which Seller identifies all Design Characteristics is foundational to achieving the FAI’s stated purpose.
 - B. The purpose of the FAI includes validation of the adequacy of measurement/inspection steps in the planned manufacturing process. Seller must be able to demonstrate through the FAI that the inspection steps and methods that are planned for recurring production will support the continued verification of product conformity.
 - C. AS9102 repeatedly mentions capable processes and provides a definition of “capability” that differs from the statistical measure called “process capability” (*e.g.*, C_p , C_{pk}). “Process capability” in the statistical sense is not an exit-criteria for the FAI, and completion of the FAI does not preclude process yield impacts resulting from common cause process variation.
 - D. FAI requirements are derived from AS9100 “Production Process Verification” (PPV) which neither prescribes the method for performance and documentation nor discriminates between commodities or levels of complexity. AS9102 limits FAI scope to “parts and assemblies” but does not define either. Buyer recognizes a fundamental difference in a product defined by a BoM that is unique to an aircraft tail number versus a product defined by a lower-level configuration with broader effectivity. Buyer has established the following differentiating criteria and requirements:
 - 1. Stockable Product (reference “Definitions” section): Seller shall meet the intent of PPV through compliance with all requirements contained within AS9102 and this Quality Clause.
 - 2. Non-Stockable Product (reference “Definitions” section): Seller shall meet the intent of PPV through compliance with the requirements of AS9102 and this Quality Clause with the following exceptions:
 - a. Seller is exempt from AS9102 forms requirements to document accomplishment of PPV at the Non-Stockable Product level. Seller shall produce and retain records satisfying all other AS9102 documentation requirements.
 - b. Seller shall perform a PPV on the first production run. In lieu of performing partial or full PPVs for each subsequent production unit with unique BoM changes, Seller may meet the intent of PPV by demonstrating the adequacy of configuration management and control processes. Seller shall re-perform a full PPV at a frequency not to exceed every 3 years or 200 aircraft ship-sets, whichever occurs first, to validate the integrity of configuration management and control processes.

NOTE: Seller shall apply Stockable/Non-Stockable Product criteria described above to internal production and sub-tier supplier sourcing to determine applicability of FAI and/or PPV requirements. Sub-indentured Stockable Products are subject to full FAI requirements.

- E. Equipment and software associated with Acceptance Test Procedures (ATP) meet the AS9102 definition of Designed Tooling.

NOTICE: A hard copy of this document may not be current – the latest version is maintained on the Lockheed Martin Aeronautics Intranet and is controlled by LM Aero Supplier Quality Management.

- F. Part marking verification requirements apply to both human and machine-readable formats.
- G. Buyer's Supplier Quality Engineer's (SQE) signature in block 23 (*Customer Approval*) of Form 1 does not transfer or limit Seller's liability for FAI compliance.

4. GENERAL REQUIREMENTS:

- A. Seller shall notify Buyer's assigned SQE, in writing, no less than five business days prior to each of the following event occurrences:
 - 1. Seller procuring items or beginning any FAI Planning activity for the PO
 - 2. Seller's planned start date for inspection of the first production run parts for the PO (*Seller must plan adequate time for Buyer's SQE to participate without impact to PO delivery schedule.*)
 - 3. Implementing any changes as defined in AS9102 criteria for Partial or Re-accomplishment of First Article Inspection that affect products to be delivered under the PO
- B. When Seller has manufactured and delivered products to a customer other than Buyer and can provide objective evidence of an FAI compliant to AS9102 and this Quality Clause within the prior two years from the date of the PO or more than two years prior with evidence of continual production to the same configuration as defined by the PO, Buyer will accept the previous FAI documentation as evidence of compliance to the requirements of this PO.
- C. Buyer's assigned SQE may elect to review or participate in Seller's FAI process at any time and may require in-process and/or final FAI validation hold points.
- D. Seller shall perform initial FAI on first production part to be delivered. Deferrals can only be granted by written authorization from Buyer's FAI Steering Committee via LM Aero Procurement Representative (buyer).
- E. Approval to satisfy FAI requirements by similarity can only be granted by written authorization from Buyer's FAI Steering Committee via the LM Aero Procurement Representative (buyer). FAI by similarity is not allowable for any products designated Interchangeable-Replaceable (I-R) or Critical, regardless of criticality category.
- F. Seller shall notify Buyer's SQE in writing of any proposal to use "similarity" to satisfy qualification requirements for a design change and shall provide supporting objective evidence of concurrence from Buyer's cognizant Engineering authority. (*Typically, applicable when Seller holds design authority*)
- G. Upon Buyer request, Seller shall provide a complete copy of FAI report(s) at all levels of indenture, including those of sub-tier suppliers.
- H. Buyer reserves the right to require Seller to perform a partial or full FAI for causes defined in AS9102 or for any reason causing Buyer to believe that the current production process lacks traceability to the TDP. Reasons why Buyer may invoke this requirement include, but are not limited to the following examples:
 - 1. Lost or destroyed FAI records
 - 2. Non-conformance revealing a failure to account for Design Characteristic(s)
 - 3. Non-conformance revealing a failure to plan appropriate product verification steps

NOTE: *Non-conformances resulting from documented Special Cause Variation (e.g., power outage, weather event, shipping damage) or Common Cause Variation with supporting statistical data would typically be considered out of scope for re-performance of an FAI.*

- I. If Seller elects to produce multiple pieces in first production run and fails to complete FAI, Buyer may refuse acceptance of any pieces from that run or subsequent production runs until Seller completes FAI.
- J. When applicable for Critical Items, Seller must provide objective evidence of manufacturing plan approval from Buyer's cognizant engineering authority prior to start of first production run.
- K. When Buyer has approval authority for the ATP, including associated equipment and/or software when applicable, Seller shall not complete the FAI or deliver hardware without providing objective evidence of approval from Buyer's cognizant engineering authority and Buyer's SQE.
- L. Seller must be able to demonstrate to Buyer's SQE that all Design Characteristics are identified and documented. While AS9102 does not specify a method to identify Design Characteristics, Buyer requires Seller to use the "ballooning" technique except for TDP elements applicable to multiple part numbers (e.g., *material & process specifications*) where Buyer will also accept a compliance matrix approach.
NOTE: Accomplishment logistics for verification are at Seller's discretion. (i.e., which personnel perform the activities or whether previously performed verifications occurred for other purposes and are still valid for the current application)
- M. When Buyer has imposed condition-of-supply definitions (i.e., *Production Operation Instruction Sheet [POIS]*) through the PO that modify/re-order released engineering requirements, the FAI shall reflect the condition-of-supply.
- N. Upon Buyer request, Seller shall provide objective evidence of AS9100 compliant configuration management and control processes that accurately and completely account for production process impacts resulting from configuration change activity common to Non-Stockable Products.
- O. Buyer's FAI Steering Committee retains the final authority to determine if Seller's deliverable meets the definition of "Non-Stockable Product".