



WHEN PERFORMANCE
REALLY MATTERS

SUPPLIER QUALITY AND MANAGEMENT SYSTEM REQUIREMENTS FOR AIRCRAFT GROUP AND INDUSTRIAL GROUP

SQR-1 REVISION 1.2
AUGUST 2021

MOOG

Table of Contents

1.0	PURPOSE.....	4
2.0	CONTENTS, SCOPE & RESPONSIBILITY	4
3.0	DEFINITIONS	4
4.0	ORDER OF PRECEDENCE.....	5
5.0	REFERENCES.....	6

SECTION A – GENERAL REQUIREMENTS

A1	QUALITY MANAGEMENT SYSTEM REQUIREMENTS	7
A1.1	Quality Management System Certification and Approval	7
A1.2	Control of Moog Documents.....	8
A1.3	Control of Moog Records	8
A1.4	Communication with Moog	9
A2	MANAGEMENT RESPONSIBILITY	10
A2.1	Management Commitment	10
A2.2	Responsibility, Authority and Communication.....	10
A3	RESOURCE MANAGEMENT.....	11
A3.1	Training and Competence.....	11
A3.2	Cleanliness of Workplace.....	11
A3.3	Vision Standards	11
A3.4	Business Continuity and Risk Management	12
A4	OPERATIONAL MANAGEMENT	13
A4.1	Critical Items, Assurance of Product Safety and Integrity	13
A4.2	Counterfeit Parts Prevention.....	14
A4.3	Contract Review.....	14
A4.4	Purchasing / Sub-Contracting	15
A4.5	Receipt Inspection / Verification of Purchased Product	16
A4.6	Subcontractor / Sub-tier Supplier Monitoring	16
A4.7	Manufacturing Process Control.....	17
A4.8	Control of Reworked Product.....	18
A4.9	Foreign Object Debris	18
A4.10	Storage, Identification and Traceability.....	18
A4.11	Preventive and Predictive Maintenance.....	19
A4.12	Part Preservation, Packaging and Delivery	19
A4.13	Control of Work Transfers & Process Changes.....	20

A4.14	Release of Products and Services.....	21
A4.15	Control of Non-Conforming Product.....	22
A4.16	Deviations and Concessions	23
A5	MEASUREMENT, ANALYSIS & IMPROVEMENT	24
A5.1	Quality and Delivery Performance.....	24
A5.2	Audit Process.....	24
A5.3	Corrective Action.....	25

SECTION B – REQUIREMENTS FOR ADVANCED PART QUALITY PLANNING & PRODUCTION PART APPROVAL PROCESS

0.1	Introduction & Scope.....	26
B1	ADVANCED PART QUALITY PLANNING (APQP) REQUIREMENTS.....	27
B1.1	General Requirements	27
B1.2	Advanced Part Quality Planning Project Management	27
B1.3	Phase 1 Requirements –Planning	27
B1.4	Phase 2 Requirements –Product Design and Development.....	27
B1.5	Phase 3 Requirements –Process Design and Development	28
B1.6	Phase 4 Requirements –Product and Process Validation.....	28
B1.7	Phase 5 Requirements – On-going Production, Use and Post Delivery Services	28
B2	PRODUCTION PART APPROVAL PROCESS (PPAP) REQUIREMENTS	29
B1.1	Process Requirements for Production Part Approval Process.....	29
B1.2	Production Part Approval Process File and Submission.....	29
B1.3	Production Part Approval Process Disposition.....	29

1.0 PURPOSE

The purpose of this document is to consolidate and communicate Moog's quality and management system expectations and requirements to suppliers of parts and services used in a wide variety of application markets. The document is available to view and download from the Moog supplier portal on www.moog.com/suppliers.

2.0 CONTENTS, SCOPE & RESPONSIBILITY

This document defines quality and management system requirements applicable when goods and services are procured to **Moog Aircraft and Industrial Group** design authority Build-to-Print and Build-to-Specification part numbers. Moog Space and Defense Group requirements are defined separately.

Unless otherwise explicitly stated in this document, these requirements also apply to Standard Catalog Hardware (COTS), Modified COTS, and Supplier IP¹.

These requirements do not apply to Moog indirect procurement of general supplies.

This document comprises two sections and is applicable to all suppliers or partners who supply product related to Moog contracts / purchase orders as follows:

Section A – General Requirements

This section represents general or basic requirements for Moog purchase orders and are modelled upon the structure of ISO9001 and AS9100.

Section B – Advanced Product Quality Planning and Production Part Approval Process

This section outlines the requirements for Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP). The requirements are based on AS9145 and embody the concepts of error prevention and continual improvement that will be used to “build in quality” into production processes for Moog products. This section is applicable to suppliers when supplementary quality clause S580 is applied on the Moog PO.

NOTE 1: Definitions of key terms are provided in Section 3.0 below.

3.0 DEFINITIONS

The following terms used throughout this document are consistent with ISO9000:2015 and AS9100:2016 definitions.

3.1 Counterfeit Part – An unauthorized copy, imitation, substitute, or modified part which is knowingly misrepresented as a specified genuine part of an original or authorized manufacturer.

3.2 Critical Items – Those items having significant effect on the provision and use of the products and services; including safety, performance, form, fit, function, producibility, service life, etc.; that require specific actions to ensure they are adequately managed.

3.3 Key Characteristics – An attribute or feature whose variation has a significant effect on product fit, form, function, performance, service life, or producibility, that requires specific actions for the purposes of controlling variation.

3.4 Product Safety – The state in which a product can perform to its designed or intended purpose without causing unacceptable risk of harm to persons or damage to property.

3.5 Special Requirements – Those requirements identified by the customer, or determined by the organization, which have high risk of not being met, thus requiring their inclusion in the operational risk management process. Factors used in the determination of special requirements include product or process complexity, experience, and product or process maturity.

3.6 Manufacturing Lot – Defined as all parts manufactured at the same time from the same materials, or processed together through all operations, unless otherwise specified in the Moog drawing.

3.7 Frozen Process – An approved and controlled process, commonly associated with critical items, key characteristics, and special requirements, where no changes can be made to the method of manufacture and inspection or control of the process without prior formal approval by Moog.

3.8 Standard Catalog Hardware or COTS – Standard Catalog Hardware is defined as a part or material that conforms to an established industry or national authority published specification, having all characteristics identified by text description, National/Military Standard Drawing, or catalog item.

3.9 Modified COTS – COTS parts that have been altered to meet the design requirements of the assembly. The drawing will typically carry the following note or similar: MAKE FROM PART NUMBER _____. Alterations with this category exclude special processing requirements. Modification of special processing requirements for COTS hardware renders them Build-to-Print or Build-to-Specification parts.

3.10 Supplier IP (Intellectual Property) – Non-Moog design hardware that is neither COTS nor Modified COTS. Moog neither owns nor has access to design data. Functional test data is often delivered with the product as usually Moog does not possess the inspection/test equipment necessary for validation.

3.11 Deviation – A non-conformance or non-compliance with Moog requirements as defined on drawings, specifications, SQR-1, supplementary quality clauses, and any other purchase order flow-downs.

3.12 Escape (or Escapement) – Nonconformities (deviations from requirements) that were produced, not detected and remedied, and subsequently sent to the customer.

3.13. Concession – Written authorization from Moog to the supplier to use or release a product which does not conform to the specified requirements. Waiver/concession and product quality escape differ with respect to the point in time when a non-conformance is detected. The need for a waiver/concession is evident before delivery to the customer, while a product quality escape is identified after delivery to the customer.

Refer to the Moog supplier portal at <https://www.moog.com/suppliers> for other key Moog terms and definitions, included those listed in the Moog Standard Terms and Conditions of Purchase.

If Moog does not provide a definition for a term in any Moog artefacts or flow-downs, then industry standard definitions (<https://www.sae.org/iaqg/dictionary/>) shall apply.

4.0 ORDER OF PRECEDENCE

The order of precedence for Moog purchases is defined in the Moog Standard Terms and Conditions of Purchase^{1,2} available to view and download at: <https://www.moog.com/suppliers>.

In case of any conflict between this document and the standard terms and conditions of purchase, the standard terms and conditions of purchase shall take precedence. Suppliers should read this document in conjunction with the standard terms and conditions of purchase.

NOTE 1: The purchase order cannot change design data, i.e. data on drawings, specifications, standards. If a Moog purchase order flow-down contradicts or appears to invalidate design data, the supplier should raise an SN-type NC (A1.4) requesting clarification.

NOTE 2: Moog Standard Terms and Condition of Purchase may differ between operating groups and between geographic regions. Suppliers should refer to and comply with those that apply to the purchase orders from the Moog ordering site.

5.0 REFERENCES

The following international standards are important references for the structure and content of the requirements stipulated in this document.

- ❖ BS/EN/ISO 9001:2015 (Quality Management System Requirements)
- ❖ AS/EN/JISQ 9100:2016 (QMS Requirements for Aviation, Space and Defense Organizations)
- ❖ AS/EN/SJAC 9110:2016 (QMS Requirements for Aviation Maintenance Organizations)
- ❖ AS/EN/JISQ 9120:2016 (QMS Requirements for Aviation, Space and Defense Distributors)
- ❖ AS/EN/SJAC 9145:2016 (Requirements for APQP and Production Part Approval Process)
- ❖ AS/EN/SJAC 9146:2017 (Foreign Object Damage (FOD) Prevention Program)
- ❖ AS/EN/SJAC 9102 (Aerospace First Article Inspection Requirements)
- ❖ AS/EN/SJAC 9138 (Quality Management Systems Statistical Product Acceptance Requirements)
- ❖ AS13000 (Problem Solving Requirements for Suppliers)
- ❖ AS13002 (Requirements for Developing and Qualifying Alternate Inspection Frequency Plans)
- ❖ AS13003 (Measurement Systems Analysis Requirements for the Aero Engine Supply Chain)
- ❖ AS13004 (Process Failure Mode and Effects Analysis (PFMEA) and Control Plan)
- ❖ AS13006 (Process Control Methods)
- ❖ ARP9136 (Root Cause Analysis and Problem Solving (9S Methodology))
- ❖ ARP5316 (Storage of Elastomer Seals and Seal Assemblies)
- ❖ ANSI /ESD S20.20 (Protection of Electrical and Electronic Parts, Assemblies and Equipment)
- ❖ BS EN 100015-1 (Protection of electrostatic sensitive devices)
- ❖ MIL-STD-1686 (Electrostatic Discharge Control Program for Protection of Electrical ...)

To access these standards:

<https://www.iso.org/standards.html>

<https://www.ansi.org>

<https://www.bsigroup.com>

<http://quicksearch.dla.mil>

<https://www.sae.org/standards/>

<https://www.sae.org/iagg/publications/standards.htm>

<https://aesq.sae-itc.com/content/aesq-standards>

SECTION A – GENERAL REQUIREMENTS

A1 QUALITY MANAGEMENT SYSTEM REQUIREMENTS

A1.1 Quality Management System Certification and Approval

The supplier shall:

- a) Establish a documented quality management system (QMS) that addresses Moog and applicable statutory / regulatory requirements.
- b) Work only within the scope of their QMS certification and/or the scope of the approval as communicated by the relevant Moog operating group or business unit.
- c) Maintain a 3rd party / other party QMS approval for the following (as applicable):

Aircraft Group Contracts¹

- Design / Production – AS/EN/JISQ 9100 or National Aviation Authority Approval Part 21.
- Maintenance – AS/EN/JISQ 9100 or 9110 or National Aviation Authority Approval Part 145.
- Stockists and distributors – AS/EN/JISQ 9120.
- Raw material manufacturers – AS/EN/JISQ 9100
- Inspection and testing – A2LA, NAVLAP, NADCAP, UKAS, NABL
- Testing and calibration laboratories – ISO/IEC 17025
- Special Processors – AS/EN/JISQ 9100 or NADCAP².

Industrial Group Contracts³

- Design / Production – ISO9001.
- Stockists and distributors – ISO9001.
- Raw material manufacturers – ISO9001
- Testing and calibration laboratories – ISO/IEC 17025
- Special Processors – NADCAP².

NOTE 1: Aircraft Group suppliers are required to maintain 3rd party approvals except as listed below. The following supplier categories are expected to comply with relevant quality management system standards, but they are exempted from 3rd party approval requirements:

- *Suppliers of outsourced conventional machining operations (OSMs).*
- *Suppliers for the Navigation Aids business at Moog Salt Lake City.*
- *Suppliers granted a formal waiver via SN-type NC (A4. 16) by a Moog Aircraft quality representative considering the nature of products or services supplied.*

NOTE 2: Unless granted a formal waiver via SN-type NC (A4. 16), special process providers for all Moog make-to-print orders must be NADCAP accredited in addition to being Moog approved. Specifically, this concerns the following NADCAP categories for Moog orders: Aerospace Quality System (or AS9100), Heat Treat, Welding, Non-Destructive Testing, Surface Enhancement, Chemical Processing, Coatings.

The following are exceptions to the NADCAP accreditation and Moog approval requirements:

- *If the special process is within the NADCAP categories above, but the specification is proprietary to Moog or to the seller and not specifically covered by NADCAP (e.g. EPS11171, Titanium Nitriding), the processor is required to be NADCAP accredited for the NADCAP categories above, and Moog will separately verify compliance to any proprietary process specifications.*
- *If the special process is outside of the NADCAP categories listed above, the process is not required to be NADCAP accredited, but the supplier must be approved by Moog for that process.*
- *When Moog's customer's specifications are called out on drawings or purchase orders (e.g. BAC spec, Lockheed, etc.), seller shall use processors that are currently approved/certified by the end customer and, in that case, the processor need not also be Moog approved. When indicated on the Moog purchase order, the processor shall be NADCAP approved if contractually required by Moog's end customer.*
- *Suppliers performing touch-up Chemical Conversion Coating using an Applicator Pen listed on QPL-81706 for mechanically damaged areas per MIL-DTL-5541. Suppliers must have a robust plan to apply coating, maintain pen cleanliness and eliminate cross contamination.*

NOTE 3: Moog Industrial Group require suppliers to comply with ISO requirements but unless specified separately, do not require 3rd party QMS approvals.

A1.2 Control of Moog Documents

- ❖ *Moog documents are available to view and download from the Moog global supplier portal at: <https://www.moog.com/suppliers>*
- ❖ *Except a) below, this section does not apply to suppliers of COTS, Modified COTS, or Supplier IP.*

The supplier shall:

- a) Comply with the current revision^{1 2 3} of Moog documents / specifications referenced on the product definition or Moog purchase order / contract.
- b) Take appropriate action when Moog document changes cannot be implemented prior to the shipment of the product (reference A4.16).
- c) Flow down Moog documents / specification to sub-tier suppliers (when applicable). Suppliers, including dealers and distributors, are responsible for ensuring that the applicable requirements of the purchase order are imposed on lower tier procurements for raw material, components or process services being used in the manufacture of products or services being provided.
- d) Ensure that when Moog documents are translated into a supplier's national language, the translation is performed by a competent translator prior to use.

NOTE 1: This includes suppliers with LTAs and Vendor Schedule POs (Refer to A4.3).

NOTE 2: For all Military, Federal, Industry, Moog³ or Moog customer specifications and standards, unless specified on the contract or purchase order, the supplier may use either the latest specification or the specification in effect at the time of the PO. Raw material is excluded as older versions of raw material specifications are backwards compatible. Moog reserves the right to request a different revision of any specification, which would be specified on the purchase order.

NOTE 3: Revision or issue number of all applicable Moog specifications shall be verified against the latest [Process Specification Revision Report](#) found at the Moog external website.

A1.3 Control of Moog Records

- ❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

Control records¹ related to Moog product in a manner that will allow the recovery of a readable version of any records (including electronic records) by ensuring that:

- a) Records are retrievable upon request within 48hrs and provided to Moog at no extra charge.
- b) Documents / records requiring authorization by and/or submission to Moog shall be written in the English language.
- c) Records created by and/or retained by sub-tier suppliers are appropriately controlled in accordance with these requirements.
- d) Hand-written amendments to records shall be dated and signed in ink with the original information being legible after the change.
- e) Records shall be appropriately identified and managed in accordance with customer, regulatory and company defined requirements.
- f) Storage, usage, and disposal of records is performed in a manner appropriate to their security classification and protected from unauthorized access and fraudulent use².
- g) Storage facilities shall provide environmental conditions to prevent deterioration or damage and to prevent loss.
- h) Retain quality records for minimum of (15) years from the date of shipment, unless a longer period is specified, and consult with Moog prior to document disposal or record destruction.

NOTE 1: Records include but are not limited to: Approved Certificates of Conformity, Test Reports, Raw Material Certifications, Special Process Certifications, First Article Inspection Reports (FAIR), Route Cards/Travelers, and Calibration Records.

NOTE 2: The nature of the information in the records, as well as its format, dictates the method by which they shall be destroyed. When records contain sensitive information (such as design detail, proprietary info, ITAR restricted info, etc.), they shall be disposed by irreversible destruction methods such as shredding, or “erasure”/reformatting for electronic/magnetic media.

A1.4 Communication with Moog

- ❖ *Moog uses TipQA quality management software to communicate with suppliers regarding change management, supplier approval status, supplier performance, management of product non-conformances and corrective actions¹. Suppliers may verify their own approval status for various special processes via the TipQA system (refer A4.4). Process standard work and supporting information regarding TipQA usage is available to view and download from the Moog global supplier portal at: <https://www.moog.com/suppliers>. Please contact the Moog buyer or Supplier Quality Engineer (SQE) if you need further information on how to establish and use a TipQA account.*

The supplier shall:

- a) Establish and maintain a TipQA account and ensure that all individuals needing to communicate with Moog have appropriate level of access and authority to meet these communication requirements (refer A3.1).
- b) Submit an SN-Type NC when notifying Moog of any significant organization changes, key management changes, certification status changes, or other business risks (refer A3.4).
- c) Submit an SN-Type NC when notifying and/or requesting Moog approval for work transfers and process changes (A4.13).
- d) Submit an SN-Type NC when notifying Moog of a product quality escape (A4.15).
- e) Submit an SN-Type NC when notifying and/or requesting Moog approval/concession for any deviation from requirements (A4.16), including various process restrictions (A4.3 c)).
- f) Submit an SR-Type when requesting Moog approval for any concession from requirements for manufactured non-conforming hardware (A4.16).

NOTE 1: The TipQA system facilitates two key processes/methods for communicating with Moog regarding supplier-initiated changes and notifications:

- *SN-type NCs are primarily used to notify Moog of changes and/or request Moog approval for changes. They are also used to notify Moog if/when non-conforming product has been shipped to Moog and to request clarification of requirements and/or deviation from requirements.*
- *SR-type NCs are used for requesting concessions for manufactured non-conforming hardware before shipment.*
- *Moog Industrial Group does not use SN-type NCs and requires that all information related to purchases be transmitted via an SR type NC. Wherever SN-type NC is used throughout this document, Industrial Group suppliers shall use an SR-type NC instead.*

A2 MANAGEMENT RESPONSIBILITY

A2.1 Management Commitment

The supplier shall:

- a) Provide and maintain the resources required to comply with Moog purchase order requirements.
- b) Focus on customer satisfaction with an emphasis on defect prevention, on-time delivery, continuous improvement, and ongoing risk management.
- c) Establish a quality policy and quality objectives for the organization and ensure that quality planning and management reviews effectively consider how the organization is meeting customer requirements.

A2.2 Responsibility, Authority and Communication

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Communicate to employees and sub-tier suppliers the impact of their work on product safety and conformity, and the importance of ethical behavior¹.
- b) Ensure that within their organization and at subcontractors / sub-tiers, the use of Acceptance Authority Media² (AAM) for product release (refer A4.14) is clearly defined within the Quality Management System.
 - Suppliers shall maintain compliance to AAM requirements by assessing its process and supply chain as part of its internal audit activities, including but not limited to: application errors, untimely use, misrepresentation, and training deficiencies.
 - Communication shall reinforce the importance of ethical behavior in daily activities. The use of AAM must be considered as a personal warranty of compliance and conformity.
 - Suppliers shall, upon Moog request, be able to demonstrate evidence of communication to their employees and their supply chain.
- c) Define the personnel responsible for product quality (across all sites and production shifts) and ensure that they have the following:
 - Authority to stop production to correct quality problems.
 - Organizational freedom and access to top management to resolve quality issues.
- d) Establish a procedure, work instruction or equivalent for task / shift handovers and general role changes that ensures all necessary information is communicated (verbally and in written form) between outgoing and incoming personnel.

NOTE 1: Products and services provided by Moog are typically used in mission critical applications where supplier product conformity can have an impact on the safety and well-being of people. Suppliers are required to communicate this to their employees and to their sub-suppliers to ensure the appropriate level of action and control.

NOTE 2: Acceptance Authority Media are the means defined by the organization to document the status of outputs with respect to but not limited to conformity, configuration, monitoring and measurement requirements and identification throughout the product life cycle. Media include inspection stamps, electronic signatures, passwords, wet signatures, and any other means identified by the QMS.

Reference: https://www.sae.org/aaqg/audit_information/2017/minn/acceptance_authority.pdf.

A3 RESOURCE MANAGEMENT

A3.1 Training and Competence

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Establish a documented procedure for identifying training needs, achievement and review of competence of all personnel performing work directly or indirectly impacting conformity to product or production process requirements.
- b) Create role profiles / accountabilities and provide on-the-job training for personnel performing work directly or indirectly impacting conformity to product or production process requirements, including any new or modified jobs, contract, or agency personnel.
- c) Establish a business skills matrix to identify training requirements as well as identifying areas for succession planning and risk management / treatment to maintain continuity of supply.
- d) Maintain records of training and competence for the period that the relevant employee remains within the supplier's organization.

A3.2 Cleanliness of Workplace

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

Maintain its workplace in a state of order, cleanliness, and repair consistent with the product and production process needs¹.

NOTE 1: Tools such as 5S and Visual Management (A4.7) should be used for workplace organization improvement. Refer to A4.9 regarding requirements for FOD prevention/detection for Aircraft Group contracts.

A3.3 Vision Standards

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

❖ *These requirements are applicable to all personnel conducting product verification / inspection that requires unaided visual acuity.*

The supplier shall:

- a) Perform eye tests every 2 years for employees performing inspection activities on Moog hardware. Corrected visual acuity shall be, at a minimum, Snellen 20/40, Jaeger 1 or equivalent with depth perception.
- b) Perform a (one time per person only) color perception test to ensure that personnel are capable of distinguishing and differentiating colors where color perception is required for product verification / inspection activities.
- c) Ensure that supplier employees failing eye tests do not perform acceptance of Moog hardware.
- d) Maintain records for vision standards for the period that the relevant employee remains within the supplier's organization.

A3.4 Business Continuity and Risk Management

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Establish business continuity plans that identify, analyze, evaluate and / or mitigate risk related to business continuity that includes (but is not limited to) the following:
 - Product, facility, or individual skill uniqueness.
 - Access to alternative production facilities.
 - Single points of failure (including sub-tier suppliers) or key process.
 - Remote back-up of computer data, access to information systems.
 - Action plans and timescales for business recovery.
 - Contacts, process owners and procedures to follow in the event of an emergency.
 - A strategy to control, review and communicate plans to all relevant personnel.
- b) Inform their Moog purchasing contact¹ within five (5) working days regarding the following:
 - Changes to third party or other party certification status, including lapse, withdrawal, or major audit findings.
 - Change of the nominated quality representative.
 - Significant change to the quality management system.
 - Change in ownership or discontinuation of business activities.
 - Risks that could impact upon the continuity of the supplier's business / operations.
 - Risks with the supply of substances used in the production or physical make-up of products, due to laws and regulations concerning the control or use of such substances that may be published from time to time.
- c) Submit risk register and contingency plans to Moog upon request.

NOTE 1: Notifications shall be submitted to Moog in accordance with the requirements stipulated in A1.4.

A4 OPERATIONAL MANAGEMENT

A4.1 Critical Items, Assurance of Product Safety and Integrity

The supplier shall:

- a) Ensure personnel are aware of critical items incorporated into a Moog product and the potential consequences of delivering product that does not conform to requirements.
- b) Specify, as applicable, any critical items during purchasing / subcontracting, product design and development, and production design and development, including any key characteristics, and specific actions to be taken for these items.
- c) Abide by the following key process restrictions/requirements, which apply unless otherwise directed by the drawing or Moog purchase order:
 1. **Glass Beads** are prohibited from use in processing or manufacturing of parts related to Moog Purchase Orders unless allowed by a specific note on the Moog drawing. Requests for exemption/deviation shall be submitted to Moog for approval (A4.16) for each specific part number. Suppliers using glass beads in their normal processing are required to have an effective method of segregation to prevent contamination of Moog hardware.
 2. **Life-limited items** such as adhesives, compounds and elastomers, shall have 75% or greater storage life remaining upon receipt at Moog. Elastomers shelf life shall be based on [ARP5316](#). The supplier shall identify on the shipped paperwork the manufacturers name, compound trade name, batch number, cure date, expiry date, specific gravity range and QPL approval status, as applicable, by Moog print for each lot received.
 3. **Electronic Components** (i.e. transistors, integrated circuits, connectors, etc.) ordered to military specifications must have the component manufacturer and lot / date code for each component identified on the shipping paperwork.
 4. **Electrical Discharge Machining** (EDM) is not permitted for manufacture of parts related to all Moog purchase orders unless allowed by specific note on the Moog drawing, or via an explicit written authorization subsequent to a formal approval by Moog Engineering. Suppliers performing EDM on Moog parts shall meet the testing and data submission requirements defined in EPS54649 provided by the Moog Buyer. The supplier will raise an SN type NC (A4.16) and submit a data card for the part/feature specific process for Moog Engineering approval. The approved data card will then constitute a *frozen process*, and any proposed changes must also be approved via SN type NC. Requests for exemption/deviation of this requirement shall be submitted to Moog via SN type NC for each specific part number/feature.
 5. **Electrostatic Discharge Protection** - Devices designated by the drawing as static sensitive, or otherwise applying static sensitive technology, must be properly handled, packaged, and labeled in conformance with ANSI/ESD S20.20 (<http://www.ansi.org>), BS EN 100015-1 (<http://www.bsigroup.com>) or MIL-STD-1686 (<http://quicksearch.dla.mil>).
- d) Assume full responsibility for conformance of all product shipped to Moog¹.

NOTE 1: Acceptance by Moog of supplier product shall not be used as evidence of effective control of quality by the supplier and shall not absolve the supplier of responsibility to furnish acceptable products or preclude subsequent rejection by Moog customers.

A4.2 Counterfeit Parts Prevention

❖ *This section does not apply to OSP suppliers and suppliers of castings and forgings.*

The supplier shall:

- a) Establish a program in place to prevent the delivery of counterfeit parts and materials to Moog. All parts, materials, and assemblies (electrical, mechanical, raw material) included in the hardware delivered to Moog shall be procured directly from the Original Component Manufacturer (OCM) / Original Equipment Manufacturer (OEMs), or from the OCM/OEM authorized distributor¹. If it is determined in a specific instance that this is not possible, a deviation/concession request (A4.16) shall be submitted to Moog within (5) working days of this determination.
- b) Communicate (flow down) this requirement to subcontractors / sub-tier suppliers and assure their compliance to it.

NOTE 1: Further guidance on counterfeit parts avoidance can be found in SAE documents AS5553 (Electronics) and AS6174 (Material) (www.sae.org).

A4.3 Contract Review

The supplier shall:

- a) Conduct contract and purchase order reviews for all purchase orders, by personnel having the relevant knowledge and experience.
- b) Ensure the capability, capacity and resources are available to meet all Moog requirements.
- c) Review the requirements of drawings, specifications, SQR-1 and all supplementary quality clauses (S-clauses), packaging requirements, standard terms and conditions, and all other flow-downs referenced on the Moog purchase order^{1 2}.
- d) Retain documented information on the result of the reviews and notify the Moog purchasing contact of any instances where Moog requirements cannot be met prior to production^{2 3}.

NOTE 1: Suppliers on Vendor Schedule Purchase Orders (indicated on the Moog PO) shall follow a formal documented method to ensure they are working to the latest version of all flow-downs and that they remain in compliance with Moog requirements. Part number mismatches are communicated to suppliers via a vendor schedule report. For non-vendor schedule POs (discrete POs) suppliers are required to work to the latest revision of all flow-downs (refer to A1.2). Suppliers with Long Term Agreements (LTAs) shall also review compliance to requirements for discrete and vendor schedule POs.

NOTE 2: All requests for clarification, waiver or change of any Moog requirement shall be submitted via a TipQA SN type NC (A4.16), and suppliers must not commence manufacturing of parts for Moog orders until the NC is closed and the supplier has received a response from Moog.

NOTE 3: Suppliers shall not accept purchase order or produce parts based on “red-line” drawings or any instructions other than officially released drawings/specifications. Engineering models provided by Moog are often lacking in the detail needed to manufacture compliant parts. Suppliers who use Moog models to produce CAM programs must ensure those programs produce parts that are compliant to the Moog drawing as the ultimate requirement. Suppliers should contact their Moog buyer for assistance for any questions or conflicts.

A4.4 Purchasing / Sub-Contracting

- ❖ *This section does not apply to suppliers of COTS or Modified COTS¹.*
- ❖ *Supplier IP is also exempted, except b) applies when Moog defines the processing requirements.*

The supplier shall:

- a) Only purchase from / subcontract to a Moog approved source, unless purchasing the following:
 - Conventional machining² operations (excluding final product verification/release).
 - Castings or forgings.
 - Conventional rough machining on castings and forgings.
 - Raw material from a material stockist / distributor³.
 - Purchased standard catalog hardware (COTS).
 - Customer specified special processing (A1.1 NOTE 3, also see b) below).
 - Products or services from a Moog end-customer directed source, in which case the supplier shall only purchase from the customer directed source.
- b) Only purchase from a Moog or end-customer approved source for **special processing**⁴.
 - When processing requirements are defined by Moog (e.g. ASTM E1417) or by Moog's end-customer (e.g. BAC 5728), processors must be approved for the process specification by Moog (for Moog defined requirements) or by the end-customer (for customer defined requirements). The use of a Moog or end-customer approved sub-tier does not relieve the supplier from responsibility to furnish acceptable products.
 - When Moog's customer's specifications are called out in the drawings (e.g. BAC spec, Lockheed spec, etc.), supplier shall use processors that are currently approved/certified by the end-customer for the process specification and, in that case, the processor need not also be Moog approved.
 - Moog approved special process suppliers (<https://www.moog.com/suppliers/asps>) shall be used on parts related to all Moog purchase orders where Moog defines the processing requirements, unless the supplier is themselves approved for the process specification by Moog⁵, or is otherwise directed by a Moog supplemental quality requirement.
 - Suppliers shall establish and follow a formal documented process to verify, during contract review and prior to processing the parts, that either they or their chosen sub-tier are an approved processor for the Moog or end customer specification. When requested by Moog, suppliers must be able to furnish objective evidence (e.g. internal production records, certifications from sub-tiers) that the process has been followed, and that parts have been processed by approved suppliers according to defined process specifications.
- c) Ensure that all purchasing information / documentation:
 - Accurately specifies the supplier's requirements and Moog's requirements, including the requirements of this document, and is flowed down to subcontractors / sub-tier suppliers.
 - Specifies the supporting documentation to be provided with the purchased product on receipt that states the product meets specified purchase requirements.
- d) Ensure that final product verification of contracted parts before shipment to Moog is not delegated to sub-tiers unless formally approved by a Moog quality representative (refer A4.16).
- e) Maintain records of purchasing / subcontracting per the requirements of A1.3.
- f) Any Lab (Third party) that performs confirmatory testing to verify conformance to applicable specifications shall be either a Moog approved or a NADCAP, UKAS, A2LA, NAVLAP or NABL accredited certified testing supplier.
- g) Only purchase from the named source on source-controlled drawings.

NOTE 1: Allowable alterations within the Modified COTS category exclude special processes. If special processing requirements for COTS parts are modified, they are deemed Build-to-Print or Build-to-Specification parts (refer Section 3.0) and so all requirements of A4.4 apply.

NOTE 2: Conventional machining operations involve direct contact between tool and workpiece (e.g. turning, milling, grinding etc.), whereas unconventional machining does not (e.g. EDM, ECM).

NOTE 3: Traceability to the raw material manufacturer is required. Suppliers procuring raw material to manufacture hardware for Moog shall comply with S275 when applied on the PO. For simplified

compliance, raw material may be purchased pre-inspected to S275 from a Moog approved raw material supplier listed at: <http://www.moog.com/suppliers/arms>.

NOTE 4: The following are considered special processing, as a minimum: Heat treatment, Plating operations, Chemical processing, Chemical cleaning, Nondestructive Testing, Welding/Brazing, Shot Peening, Ion Vapor Deposition (IVD), High Velocity Oxygen Fuel (HVOF), other specialty coatings.

- Suppliers need not be Moog approved for in-process stress relief when parts are subsequently heat treated to a final condition. The supplier must adequately control pyrometry and select temperatures and cycle durations that will not be detrimental to fit, form, or function.
- Suppliers of nameplates using photosensitized aluminum material are deemed compliant with MIL-PRF-8625 Anodic Coatings for Aluminum and Aluminum Alloys and are therefore exempt from the requirement to use a Moog approved processor to comply with this specification.
- Suppliers of nameplates that perform only the sealing process portion of MIL-PRF-8625 are not required to be Moog or Nadcap approved for the sealing process.

NOTE 5: Suppliers may verify their own approval status via the TipQA Supplier Portal (refer A1.4).

A4.5 Receipt Inspection / Verification of Purchased Product

The supplier shall:

- a) Have a receipt inspection process to verify that purchased product meets the supplier's requirements, which shall include Moog's requirements.
- b) Ensure that required documentation has been provided with the purchased product that states the product meets specified purchase requirements (refer A4.14).
- c) Maintain records of receipt inspection and supporting documentation per the requirements of A1.3.

A4.6 Subcontractor / Sub-tier Supplier Monitoring

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Monitor subcontractor / sub-tier supplier performance through the following indicators:
 - Delivered product quality.
 - Customer disruptions / customer returns.
 - Delivery schedule performance.
- b) Conduct load and capacity reviews with key subcontractors / sub-tier suppliers annually or following significant load increases.
- c) Take appropriate corrective action with poorly performing subcontractors / sub-tier suppliers.
- d) Maintain records of subcontractor / sub-tier supplier monitoring per the requirements of A1.3.

A4.7 Manufacturing Process Control

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Maintain a traveler, router, process flow sheet or equivalent control mechanism that directs procedures for the control of quality and configuration through all stages of production.
- b) Develop inspection procedures and control plans, and maintain records of inspection that include evidence of inspection for all features (e.g. first article inspection, acceptance test data) of products / processes supplied to Moog, showing the product has been inspected and/or tested during all stages of manufacturing, identifying the name of the individual (i.e. with stamps, etc.) who certified the results, and where applicable include the results of the inspections and tests.
- c) Ensure that 100% of all features on all parts produced are in accordance with the Moog requirements. This shall be accomplished by the following minimum requirements:
 - Understand and reduce variation within processes, by using SPC and control-charting techniques and/or appropriate inspection¹. Suppliers using sample (incl. Moog approved) inspection plans remain responsible for all attributes on the part/assembly.
 - In-process inspection shall occur throughout processing of a *manufacturing lot*.
 - The method of inspection shall be suitable and capable² for each type of feature or inspection being performed. For example, measurement instruments should have 10 times the resolution of the tolerance being measured.
 - Parts shall be 100% visually inspected for loose or hanging burrs, machining chips, handling damage, and FOD (Foreign Object Debris) prior to shipment.
 - Suppliers shall buy thread/spline gauges from commercial manufacturers (commensurate to the tolerance of the part) and shall not use internally manufactured gauges.
- d) Ensure that calibration of measuring and test equipment used for product acceptance is performed and is traceable to established international or national measurement standards (e.g., BSI, NIST, UKAS, etc.). Procedures for periodic calibration, certification, maintenance of tools and equipment, and an action plan, should measuring and/or test equipment be found to be out of calibration, shall be established and followed. The action plan shall contain, as a minimum, item identification (model, manufacturer, and serial number), found condition (including span/range and accuracy), date condition found, date of previous calibration, notification details, and any other pertinent measurement details.
- e) Ensure that parts subjected to machining and special processes, and selected other build-to-print parts, must meet the workmanship standards and requirements defined by Moog³.
 - In general, parts shall have consistent appearance with respect to color, texture, machine marks, etc. unless allowed by the drawing, specification, workmanship/visual standard. Parts shall also be free of random marks, blemishes or touch-ups unless allowed by the specification, drawing, workmanship/visual standard.
 - Questions regarding specific appearance concerns should be submitted to the Moog buyer (A4.16) via an SN-type NC (before manufacture) or an SR-type NC (post manufacture) with the appropriate detail (problem description, pictures, cause, recommended actions, etc.)
- f) Establish a visual management process / system that will provide feedback to everyone involved in the process regarding status, the flow of work, priority, and the performance of the process, facilitating timely problem diagnosis and effective intervention.

NOTE 1: Process stability and capability shall be demonstrated before moving to reduced sampling frequencies, and Aircraft Group suppliers (A1.1) shall adhere to AS13002 or AS9138.

NOTE 2: For Aircraft Group orders, inspection equipment shall be validated by Measurement Systems Analysis aligned to AS13003.

NOTE 3: Suppliers of parts for Aircraft Group orders (A1.1) that have been subjected to machining and/or special processes must meet the requirements of MRQ52620 unless alternative or supplementary workmanship requirements are agreed with Moog and specified on the drawing or purchase order.

** Refer to A4.4 Note 4 for further description / definition of special processes.*

A4.8 Control of Reworked Product

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Only rework product in accordance with controls specified within the process specifications on the product definition or to an agreed rework procedure authorized by Moog.
 - For Moog designed hardware when Moog changes P/Ns, dash numbers, or P/N revisions AND there is work in process (WIP) for a given contract, the rework instructions must be submitted in writing to the Moog purchasing contact to obtain Moog Engineering approval prior to rework.
- b) Ensure that instructions for rework, including reverification / inspection requirements are accessible to and utilized by the appropriate personnel.
- c) Maintain records of reworked product per the requirements of A1.3.

A4.9 Foreign Object Debris

❖ *These requirements are only applicable to Moog Aircraft Group orders.*

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Maintain a Foreign Object Debris/Damage (FOD) control program in accordance with the requirements of AS9146 available from <https://saemobilus.sae.org/content/AS9146/>.¹
- b) Shall use appropriate tools/techniques to manage part-level FOD risk throughout the manufacturing process, documenting risks, and associated mitigation actions in a part-level risk register, PFMEA or Control Plan².
- c) Ensure that all incidents of actual or potential FOD are reported, investigated, and corrected.

NOTE 1: Suppliers of castings, forgings, conventional/rough machining (OSMs), OSP and raw material are required to maintain a clean operating environment and good 5S practices (A3.2) but are not required to fully comply with AS9146.

NOTE 2: Moog reserves the right to require use of PFMEA and Control Plans to identify and mitigate FOD risk. Moog also reserves the right to require suppliers to undertake appropriate containment actions pending implementation of robust preventative and control actions.

A4.10 Storage, Identification and Traceability

The supplier shall:

- a) Provide secure storage facilities for product, equipment, tools, and material. Ensure the conditions of storage prevent deterioration and damage of stored items. Assess the condition of product in stock at appropriate planned intervals to detect deterioration.
- b) Ensure that individual articles and materials and lots thereof are always identified and segregated from all other articles, materials, and lots. Ensure segregation of serviceable product, equipment, tools and material from unserviceable product, equipment, tools, and material.
- c) Records for articles shall indicate the part number, revision level, lot number and if applicable the serial number and associated detailed information.
- d) Records for materials shall indicate type, applicable serial numbers, manufacturing lot numbers, heat numbers, batch, date code, cure date, etc.
- e) Material or articles furnished by Moog for outside operations must remain identifiable by the Moog supplied lot or serial number. This number must be recorded on all applicable supplier paperwork.

A4.11 Preventive Maintenance

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Identify key process equipment and provide resources for machine / equipment maintenance and develop an effective planned total preventative maintenance system that includes the following:
 - Planned maintenance activities
 - Packaging and preservation of equipment, tooling, and gauging.
 - Availability of replacement parts for key production equipment.
 - Documenting, evaluating, and improving maintenance objectives.
 - Identification and control of all safety-critical plant and equipment.
 - Loss to available capacity related to planned maintenance activities.

A4.12 Part Preservation, Packaging and Delivery

The supplier shall:

- a) Comply with the freight, preservation and packaging guidelines stipulated by Operating Group¹ and/or Region at the Moog global supplier portal at <https://www.moog.com/suppliers>.
- b) Ensure that the packaging and preservation is adequate to protect the products during transportation, handling, and storage. In general, packaging containers shall be appropriate for the size, weight, and fragility of the products being packed, and shall ensure there is no metal-to-metal contact of finished features.
- c) Ensure that preservation methods (e.g. oils) will allow storage without degradation/corrosion for a minimum of 12 months from the date of receipt.
- d) Not use preservatives that congeal over time and/or are difficult to clean.
- e) Use part separation dividers or unitized packing to prevent part to part contact or packaging damage.
- f) Ensure that different manufacturing lots of the same part number are not mixed within a package. Each manufacturing lot shall be clearly identified and segregated in separate packages¹.
- g) Ensure that packaging labels contain the following information: date of shipment, purchase order number, part number and quantity in both numerical and barcode 3 of 9 format.
- h) Label fragile packages as such.
- i) Clearly mark the shelf life/expiration date on the packaging and the shipping paperwork for material with shelf life requirements.
- j) Ensure that all chemicals are accompanied by a relevant Safety Data Sheet (SDS) (formerly called Material Safety Data Sheet (MSDS)) with each shipment.
- k) Communicate with Moog as necessary, to establish other appearance, packaging and preservation techniques required.

NOTE 1: Individual lot packages may be combined in a single outer container if each inner container is clearly labeled with the lot information and the lots are individually listed on a shipping list as separate line items.

A4.13 Control of Work Transfers & Process Changes

- ❖ *Control of Work Transfers & Process Changes is applicable to suppliers planning the temporary or permanent transfer of work, or change to the manufacturing process, and is used to control and verify that the product conforms to requirements during and after the following types of transfers/changes:*
 - *From the supplier's facility to another facility.*
 - *Outsourcing from or insourcing to the supplier's facility.*
 - *From one subcontractor / sub-tier supplier to another subcontractor / sub-tier supplier¹.*
 - *Within the supplier's facility that could influence the continuity of supply of product.*
 - *Any change in either the product design or the associated manufacturing process that could impact critical items (3.2).*
- ❖ *Control of Work Transfers & Process Changes is not applicable to.*
 - *Suppliers of deliverable software, COTS or Modified COTS.*
 - *A source that holds a current valid First Article Inspection Report (FAIR) for the product.*
 - *Raw material purchased from a stockist / distributor.*

The supplier shall:

- a) Establish a documented procedure for the control of work transfers & process changes to plan, control and verify the conformity to specified requirements before, during and after the change. The procedure shall contain (but not be limited to):
 - Formal notification to Moog before any change commences².
 - Risk assessment and mitigation.
 - Transfer /change plan.
 - Demonstration of capacity and process capability at the new area to protect customer delivery and quality.
 - Demonstration that generation of buffer stocks are built into load and capacity plans to protect customer delivery.
- b) Complete and submit the necessary forms and qualifying information, including First Article Inspection Report (FAIR) to their Moog purchasing contact.
- c) Proceed with the work transfer or process change only when a response has been received from their Moog purchasing contact and compliance with the stipulated requirements has been achieved.
- d) Ensure that delivery performance is protected prior to any work transfer or process change.
- e) Maintain records of work transfers and process changes per the requirements of A1.3.

NOTE 1: Examples of sub-tier supplier changes that require notification to Moog include; changing supplier of castings/forgings, changing supplier of special processes defined by Moog or Moog's end customer, changing supplier of make-to-print sub-components that impact form, fit, function of the assembled unit, or changing supplier that could negatively impact delivery or cause capacity constraints.

NOTE 2: Notifications shall be submitted to Moog in accordance with the requirements stipulated in A1.4. Supplier shall not make any change in materials or design details which would affect the goods or any component parts thereof regarding 1) part number identification, 2) physical or functional interchangeability, or 3) repair and overhaul procedures and processes and material changes which affect these procedures without written approval of Moog buyer. If such approval is granted, all part numbers and the originals of all drawings and data shall be revised accordingly.

A4.14 Release of Products and Services

- ❖ *Release documentation may include the following:*
 - *Certificate of Compliance (CofC).*
 - *First Article Inspection Report (FAIR).*
 - *Production Part Approval Process (PPAP) documentation (Section B).*

The supplier shall:

- a) Provide separate release documentation with each delivery to Moog.
- b) Ensure that release documentation meets the following:
 - Is written in the English language.
 - Refers to a single purchase order / delivery.
 - Is legible and protected from damage / deterioration.
 - Is attached to the outside of secondary packaging (where appropriate)
- c) The CofC submitted to Moog shall contain the following information as a minimum: Unique traceable document number; Moog part number and drawing revision; Military, Federal or Industry specification number and revision; Purchase Order number and line item; Quantity of product; Serial numbers (if applicable); work order number (if applicable); date shipped; supplier name; supplier address; authorized acceptance authority stamp or signature; compliance statement¹
 - For parts returned by Moog to the supplier, the CofC for the reshipment must contain the debit memo number, a summary of work performed or statement that part was replaced.
- d) Provide additional release documentation (when applicable)
 - First Articles and First Article Inspection Reports (FAI, FAIR)².
 - Production Part Approval Process documentation³.
 - Deviation permit number (Ref: SN-Type NC, A1.4, A4.16).
 - Concession permit number (Ref: SR-type NC, A1.4, A4.16).
 - Raw Material traceability certifications, testing and inspection results⁴.
 - In addition, when requested the supplier shall furnish information on source(s) of supply that could include serial numbers, lot numbers, heat numbers, batch, date code and cure dates and Qualified Products List approval status as applicable.
- e) Maintain records of release documentation per the requirements of A1.3.

NOTE 1: The CofC shall include confirmation of compliance to all PO requirements including drawings, specifications, SQR-1 and all S-clauses.

NOTE 2: First Articles and First Article Inspection Reports (AS9102) are required when supplementary quality clause S292 are applied to the Moog PO.

NOTE 3: Production Part Approval Process documentation (Section B) is required when supplementary quality clause S580 is applied to the Moog PO.

NOTE 4: The following requirements apply to suppliers of raw material, castings, and forgings.

- *Suppliers of raw material must comply with supplementary quality clause S275 when applied to the PO. See S275 at <http://www.moog.com/suppliers/ssqr> for more information. Hand forgings (or open-die forgings) are considered raw material and suppliers are therefore also subject to the requirements defined in S275.*
- *Suppliers of Moog build-to-print products, excluding castings and forgings, must comply with S275 when applied to the PO. For such suppliers, compliance to S275 requires completion of the prescribed raw material inspections but does not require submission of the checklist with shipments to Moog. 3rd party lab tests may be required for some materials.*
- *For simplified compliance material may be purchased pre-inspected to S275 from a Moog-approved raw material supplier, found at <http://www.moog.com/suppliers/arms>.*

A4.15 Control of Non-Conforming Product

The supplier shall:

- a) Establish a method of detection and feedback of product nonconformances and process noncompliance.
- b) Contain nonconformances by segregating (or identifying and controlling) the product or process to prevent unintended use or delivery. Only product that conforms to specified requirements shall be shipped to Moog¹.
- c) Take necessary actions (within 48 hours) to contain the effect of the nonconformance on other process or products, i.e. work-in-progress, stores stock, shipping areas, in transit, sub-tier / subcontract activities, similar products, products already dispatched and delivered to Moog.
- d) Immediately notify² their Moog purchasing contact and their Moog quality representative of any delivered nonconforming product, and continually pursue an acknowledgement from Moog that the notification has been received.
- e) Stop shipment of product when notified of nonconformance by Moog until appropriate containment and corrective action has been completed (A5.3).
- f) Clearly and permanently mark (or establish alternative controls to prevent use) product dispositioned for scrap until physically rendered unusable.
- g) Take appropriate corrective action (A5.3).
- h) Maintain records related to the control of non-conforming product per the requirements of A1.3.

NOTE 1: Dispositions of Use-As-Is or Repair for products under Moog design control shall require written authorization prior to shipment (A4.16). Moog does not grant Material Review Board (MRB) Authority to suppliers. Any reworked parts shall be re-inspected and/or tested prior to shipment to Moog. As stated in A4.3, suppliers shall not accept purchase orders for parts to be made to "red-line" drawings or unreleased specifications and such parts are not permitted to be shipped to Moog.

NOTE 2: Notifications shall be submitted to Moog in accordance with the requirements stipulated in A1.4. Suppliers are required to notify Moog within 24 hours of discovering any nonconformance that exists or is suspected of existing on hardware that has previously been shipped to Moog. This notification shall include the following information at a minimum:

- *Affected Part number(s), process(es) and name(s).*
- *Description of the nonconforming condition and the affected requirement.*
- *Quantities, dates, purchase orders, and destination of delivered shipments.*
- *Lots, batch numbers, serial numbers, or date codes as applicable of the affected lot.*

Aircraft Group suppliers are required to submit this information via an SN-type NC (refer A1.4).

A4.16 Deviations and Concessions

The supplier shall:

- a) Ensure that written authorization via an approved SN or SR-type NC has been granted by Moog prior to the shipment of product which does not conform to specified requirements¹.
- b) Ensure the concession permit number (SR-type NC) is included in the release documentation submitted with product shipment(s) to Moog (A4.14). This must be clearly listed on one or more of the following items: the packing slip, or Certification of Conformance, or include a copy of Moog approved SR in with paperwork, and FAIR if applicable.
- c) Ensure that nonconforming product shipped to Moog is clearly identified as non-conforming product and packaged separately from the acceptable product.
- d) Take appropriate corrective action (A5.3).
- e) Maintain records of deviation permits / concessions per the requirements of A1.3.

NOTE 1: Requests for deviation or concession should be submitted to Moog in accordance with the requirements stipulated in A1.4.

- *SN-type NCs are used to request deviations from requirements and should be generated and submitted to Moog during contract review and prior to acceptance of the purchase order and manufacture of parts (refer A4.3). SNs may also be used for clarification of the applicability or relevance of general and quality system requirements even if parts are already manufactured.*
- *SR-type NCs are used for requesting concessions for non-conforming hardware. SR-type NCs are required for all/any non-conforming parts, including parts which may already have a Moog approved SN-type NC. As a rule, suppliers may not ship nonconforming product to Moog without an approved SR-type NC. The single exception to this rule is an open SR-type NC with disposition "MRB HOLD". Suppliers may ship product to Moog on an open SR-type NC with disposition "MRB HOLD" only when authorized in writing by the Moog buyer.*

A5 MEASUREMENT, ANALYSIS & IMPROVEMENT

A5.1 Quality and Delivery Performance

The supplier shall:

- a) Monitor quality and delivery performance using key performance indicators¹ and ensure that quality and delivery performance targets are achieved.
- b) Take appropriate corrective action (A5.3) when quality or delivery performance is not or will not be achieved.
- c) Inform the Moog purchasing contact immediately when delivery schedules are not or will not be achieved and submit a recovery plan (within 24hrs) to the Moog purchasing contact.
- d) Use a cross-functional team to develop a continual improvement policy and plans to meet Moog performance expectations².
- e) Monitor the implementation of improvement plans and evaluate the effectiveness of results.

NOTE 1: Where Moog has provided the supplier with a 'scorecard' the supplier will use the scorecard as a key performance indicator.

NOTE 2: Moog performance requirements may be continually refined relative to evolving industry and customer expectations. Moog will apply supplier maturity assessment and supplier development tools such as IAQG SSCA as necessary to develop, recover and improve performance to meet expectations.

A5.2 Audit Process

❖ *This section does not apply to suppliers of COTS or Modified COTS.*

The supplier shall:

- a) Establish a periodic audit program (product and process audits) that includes internal production and subcontract services, to verify compliance to planned arrangements related to Moog contracts. The audit program shall be prioritized based on product and process risk.
- b) Audit products at appropriate stages of production using a product that has been selected at random from the current production process to determine the following:
 - Production method provides a record to demonstrate that all operations are complete.
 - Verification / inspection records demonstrate that all operations are appropriately verified.
 - Dimensional acceptability to product definition.
 - Visual acceptability to product definition.
 - Functional performance test to product definition (where applicable).
- c) Audit each manufacturing process to determine if the resource and controls used to transform inputs into outputs are effective and comply with requirements.
- d) Have internal auditors who are appropriately trained and competent (A3.1) to perform audits.
- e) Establish specific checklists to be used for each audit.
- f) Increase audit frequencies when internal / external nonconformances or customer (Moog) complaints occur.
- g) Take immediate action when an audit result identifies a product nonconformance (A5.3).
- h) Take appropriate corrective action (A5.3) within 90 days or prior to shipment of product to Moog.
- i) Maintain records of internal audits per the requirements of A1.3.

A5.3 Corrective Action

The supplier shall:

- a) Perform structured problem-solving activities to establish the root cause(s) of nonconformances.
- b) Take appropriate corrective action(s) to eliminate the cause of nonconformances and prevent recurrence.
- c) Verify that a permanent fix has prevented any further nonconformances.
- d) Flow down corrective action requirements to subcontractors / sub-tier suppliers (when applicable).
- e) Take corrective action whenever a concession request has been submitted to Moog (SR-type NC).
- f) Take corrective action whenever a Supplier Deviation Notice (SDN) has been identified to the supplier by Moog.
- g) Take and submit details of corrective actions whenever a formal corrective action response is requested by Moog^{1 2}.
- h) Review and update the Process Failure Mode and Effects Analysis (PFMEA) and Control Plan (or equivalent risk management tools) whenever the corrective action has been identified³.
- i) Maintain records of corrective actions per the requirements of A1.3.

NOTE 1: Requests for formal corrective actions (RC, SA, SU and SC types) are issued by Moog from the TipQA system (refer A1.4). Suppliers should submit their corrective action response via TipQA.

NOTE 2: Suppliers must respond promptly and effectively to corrective actions issued by Moog. Expectations and best practices for CA responses are available [here](#) and at the Moog supplier portal <https://www.moog.com/suppliers>. For the Moog Aircraft Group, when issued a MAJOR corrective action request, the supplier shall conduct root cause investigation, problem solving and corrective/preventive action management using a formal 8D (AS13000) or 9S (ARP9136) problem solving approach. Suppliers shall submit their responses and supporting artefacts through the TipQA system using their own 8D/9S format or the Moog format available [here](#).

CA responses must address the following robustly:

- **Containment** (within 48hrs) – action to contain the problem and prevent further escapes. Perform initial 'look across'.
- **Root cause (process)** – define why the escape happened (drill down to process failure).
- **Root cause (detection)** – define why the problem escaped detection.
- **Corrective action** – immediate actions taken or planned to correct the root cause(s) of the specific escape.
- **Preventative action** – actions taken or planned to prevent problem reoccurrence at the systemic level. Perform a 'look across' to other similar parts or processes.

NOTE 3: Repeated failure to promptly and effectively contain non-conformances and address underlying root-causes may result in escalation, including but not limited to:

- Moog or 3rd party source inspection and audits of supplier's products and processes.
- Participation by the supplier in Moog's supplier improvement and recovery processes.
- Suspension, disapproval, and removal from the Moog Approved Suppliers List (ASL).

SECTION B – REQUIREMENTS FOR ADVANCED PART QUALITY PLANNING & PRODUCTION PART APPROVAL PROCESS

0.1 Introduction & Scope

APQP drives a quality focused approach to product development using a phased planning process within which specific deliverables are established, monitored, and tracked to closure. PPAP is an output of APQP confirming that the production process has demonstrate the potential to produce product that consistently fulfill all requirement while operating at the customer demand rate.

APQP has five phases (conceptually illustrated in Figure 1).

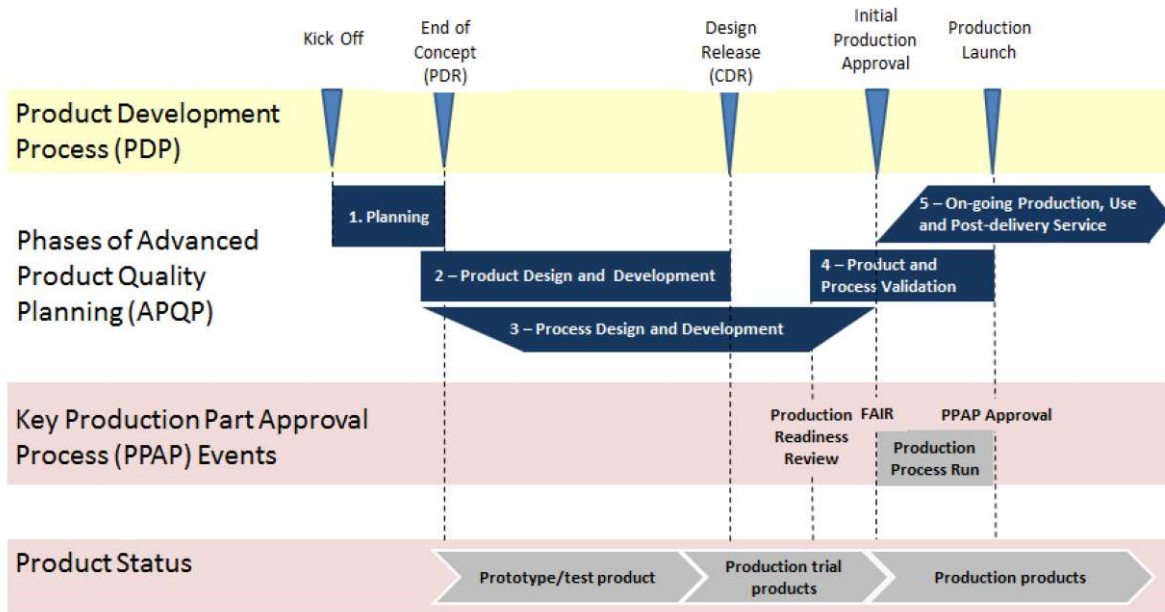


Figure 1 – Product development process and advanced product quality planning (conceptual illustration)

Section B requires compliance with AS/EN/SJAC 9145:2016 as a minimum. The sections below list additional Moog requirements, if any, corresponding with each section of the basic standard.

These combined requirements are applicable to suppliers when supplementary quality clause S580 is applied on the Moog PO.

B1 ADVANCED PART QUALITY PLANNING (APQP) REQUIREMENTS

B1.1 General Requirements

- ❖ *All or some phases of APQP are applicable to:*
 - *New product design or change to existing design (Design-Make parts) ¹.*
 - *New product design or change to existing design (Make to Print parts) ².*
 - *New location or change in production location or change in source producing the part ³.*
 - *New process or process change, unless change is negligible ⁴.*

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) Establish a documented procedure to comply with Moog APQP and PPAP requirements.
- b) Include Moog specific requirements within the scope of APQP procedures.

NOTE 1: All phases are applicable.

NOTE 2: Phases 1, 3, 4, 5 are applicable, and Phase 2 is limited to feasibility of the proposed design requirements (AS9145 clause 4.4.6) and approval.

NOTE 3: Phases 1, 3, 4 and 5 are applicable.

NOTE 4: Some examples of negligible changes are:

- *Change that does not potentially impact the performance of the process (quality, cycle time).*
- *Change that does not impact process stages that control or monitor key characteristics.*
- *Change that does not require a change to inspection / test methods.*
- *Change that does not introduce additional or alternative processing.*

B1.2 Advanced Part Quality Planning Project Management

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) When requested by Moog, provide the plan and status report of APQP progress.

B1.3 Phase 1 Requirements – Planning

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) N/A.

B1.4 Phase 2 Requirements – Product Design and Development

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) N/A.

B1.5 Phase 3 Requirements – Process Design and Development

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) Develop a Value Stream Map¹ as part of the process design deliverables.
- b) Develop a Measurement Systems and Analysis² (MSA) Plan that is consistent with AS13003.
- c) Conduct Process Failure Mode and Effects Analysis² (PFMEA) in accordance with AS13004 and select, validate, and operate process controls in accordance with AS13006.
- d) Identify Process Key Characteristics for initial process capability studies.
- e) When Key Product Characteristics have been identified by Moog, identify these within the PFMEA and Control Plan, and control in accordance with AS/EN/SJAC 9138.
- f) Include the requirements of this section when conducting a Production Readiness Review (PRR).

NOTE 1: Value Stream Map relates to an evaluation of the product supply chain (internal and external) and production processes, from the beginning of the process up to the delivery of the product, including as a minimum: physical flow, information flow and key stakeholders/contributors. A single value stream map may apply to a group or family of products.

NOTE 2: An element of PPAP file required for submission.

B1.6 Phase 4 Requirements – Product and Process Validation.

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) Produce a minimum of twenty-five¹ (25) products during the production process run(s).
- b) Use product and data from the production process runs to support Moog PPAP elements.
- c) Conduct MSA for the test / inspection criteria in accordance with AS13003.
- d) Provide initial process capability studies to Moog for features designated as key product characteristics or key process characteristics. Data analysis to be completed in accordance with AS13006.

NOTE 1: An alternative minimum number of parts may be agreed with the Moog technical representative and may be authorized only via explicit instruction on the Moog purchase order.

B1.7 Phase 5 Requirements – On-going Production, Use and Post Delivery Services

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) N/A.

B2 PRODUCTION PART APPROVAL PROCESS (PPAP) REQUIREMENTS

B1.1 Process Requirements for Production Part Approval Process

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) N/A.

B1.2 Production Part Approval Process File and Submission

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) N/A.

B1.3 Production Part Approval Process Disposition

Comply with AS/EN/SJAC 9145:2016.

In addition, the supplier shall:

- a) N/A.

Change History			
Revision	Date	Description of Changes	MOOG Approvals
1.0	January 2020	This document is the initial issue of an updated compilation and consolidation of Moog supplier quality requirements across Aircraft and Industrial operating groups and business units. It includes almost all content included in earlier revisions of SQR-1.	Will Brady (Aircraft) Joe Pattacciato (Industrial)
1.1	June 2021	Key changes include: <ul style="list-style-type: none"> • Requirement to use Moog approved or 3rd party accredited labs (A1.1, A4.4) • Added note on chemical conversion coat touch-up (A1.1) using applicator pen • SRs to be submitted per delivery (A1.4) • EDM invoke new EPS54649 (A4.1) • Hierarchy of drawing requirements over engineering models (A4.3) • Requirement to use named sources only for source-controlled parts (A4.4) • Confirming MRQ52620 applicability to OSP providers (AG, A4.7) • Requirement for 8D/9S format for Major corrective actions (AG, A5.3) 	Will Brady (Aircraft) Mike Wawrowski (Industrial)
1.2	August 2021	Key changes include: <ul style="list-style-type: none"> • New cover page. • Reversal of SR change (per delivery) implemented in revision 1.1. (A1.4) • Exemption from requirement to use Moog/Nadcap approved sources when only performing sealing portion of MIL-PRF-8625. (A4.4) 	Will Brady (Aircraft) Mike Wawrowski (Industrial)
Document Update Policy This document may be updated periodically. Major amendments will be shown as an update from one revision number to a higher revision number (e.g. revision 1.0 to revision 2.0). A minor amendment will be shown as a number change after the decimal point (e.g. revision 1.0 to revision 1.1). The content of the higher revision is regarded as the latest requirements.			

PRINTED COPIES ARE FOR REFERENCE ONLY

Front Cover:

TOP ROW

Gulfstream G600 Courtesy of Phil Hosking

UH-60 Black Hawk Courtesy of U.S. Air Force / Alejandro Peña

Steel Mill Controls

MIDDLE ROW

Computer Tomography-CT Slip Rings

EA-18G Growler Courtesy of U.S. Navy / MC Spec. 3rd Class Michael Singley

Oil and Gas Exploration Applications

BOTTOM ROW

Construction Crane Slip Rings

Machine Controls, Extrusion Blow Molding

F-35B Lightning II Courtesy of U.S. Marine Corps / Warrant Officer Bobby J. Yarbrough

COVER BACKGROUND IMAGE

Original Patent Drawing of Electrohydraulic Servovalve

Patent No. 2,767,689 – William C. Moog, Jr., East Aurora, New York

The appearance of U.S. Department of Defense (DoD) visual information does not imply or constitute DoD endorsement.