

SUPPLIER QUALITY COMMON SUPPLIER REQUIREMENTS	
Author: Central Supplier Quality	Issue Date: January 2, 2019 Effective Date: April 2, 2019

1.0.....Purpose/Scope

2.0.....Responsibility

3.0.....References

4.0.....Acronyms

5.0.....Requirements

5.1.....General QMS Requirements

5.2.....Order of Precedence

5.3.....Record Retention

5.4.....Acceptance Authority Media

5.5.....Air Worthiness/Product Reliability /GIDEP Alerts

5.6.....Control of Nonconforming Product

5.7.....Change Management

5.8.....Obsolescence

5.9.....Supplier Procurement of Designated Parts

5.10.....Supply Kitted Parts

5.11.....Supplier Tooling Gages and Fixtures

5.12.....Product Inspection Certification

5.13.....First Article Inspection

5.14.....Special Processes

5.15.....Certified Supplier Criteria

5.16.....Sub-tier offload Requirements

5.17.....Corrective Action

5.18.....Preservation of Product

5.19.....Drop Shipments

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5.20.....Supplier Performance
5.21.....ZDP Requirements TM
5.22.....Quality Control Action Requirements

1.0 PURPOSE/SCOPE

The requirements herein are supplementary to AS/EN9100, AS/EN9120 and ASQR-01 Aerospace Supplier Quality System Requirements. These requirements are applicable to Collins Aerospace suppliers who furnish product, material, processes and services, as cited by the Collins Aerospace Purchase Order or any other additional contractual requirements. Collins Aerospace businesses may apply additional requirements as applicable.

2.0 RESPONSIBILITY

- 2.1 When this document is referenced on the Collins Aerospace purchase orders or other contractual documents, suppliers are responsible for compliance to all requirements herein.
- 2.2 It is the responsibility of the supplier to ensure that all applicable UTC and Collins Aerospace contract requirements are flowed to their sub-tier suppliers.

3.0 REFERENCES

- ASQR-01– Supplier Quality System Requirements
- ASQR-20.1– Supplier Sampling Requirements
- ASQR-15.1 – Packaging, Preservation and Labeling
- ASQR-09.2 – United Technologies Production Part Approval Process
- AS9100 – Aerospace Standard Quality Management Systems
- AS9102 – Aerospace First Article Inspection Requirements
- AS9103 – Variation Management of Key Characteristics
- AS9131 – Nonconformance Documentation
- AS7004 – NADCAP
- AS13003 – Measurement Systems Analysis

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ASQR-01 Form 2 – Change Notification

ASQR-01 Form 3 – Supplier Communication

ASQR-01 Form 4 – Work Transitions

ASQR-01 Form 6 – NOPQE

UTCQR-09.1 – Process Certification

COL-FRM-0054 – Action Response Supplier Corrective Action Request

COL-FRM-0055 – Containment Supplier Corrective Action Request

Note – For more information please visit: <http://www.utc.com/Suppliers/Pages/Aerospace-Supplier-Quality-Requirement-Documents.aspx>

4.0 Acronyms

AAM - Acceptance Authority Media

AOI - Automated Optical Inspection

ASL - Approved Supplier List

ATP - Test Process

ATR - Authorize to Release

BOM - Bill of Material

C of C - Certification of Conformance

C of C - Certification of Compliance

C of A - Certification of Assurance

CPK - A measure of process capability

CTQC - Critical to Quality Control

DQR - Designated Quality Representative

DSQAR - Designated Supplier Quality Assurance Representative

FAI - First Article Inspection

FOD – Foreign Object Damage

HAZCOM - Hazard Communication

KPC - Key Process Characteristic

MRB - Material Review Board

MSDS - Material Safety Data Sheet

NOPQE - Notification of Potential Quality Escape

OEM – Original Equipment Manufacturer

OTS - Off-The-Shelf

PFMEA - Process Failure Mode Effective & Analysis

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PQR - Product Quality Report

QMS - Quality Management Systems

QN - Quality Notification

RPN - Risk Priority Number

SBU - Strategic Business Unit

SIP - Sustainable Improvement Plans

SPC - Statistical Process Control

SRI - Supplier Request for Information

SQA - Supplier Quality Authority

ZDP - Zero Defect Plan™

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5.0 REQUIREMENTS

5.1 General QMS Requirements

Suppliers and sub-tiers shall not deviate from the requirements within this document unless specifically authorized by the Collins Aerospace SBU. Exception requests shall be submitted per ASQR-01 Form 3, the Supplier Request for Information (SRI) process.

5.2 ORDER OF PRECEDENCE

5.2.1 In the event there is a requirement that appears to be in conflict with any other requirement, the supplier shall contact Collins Aerospace for clarification using ASQR-01 Form 3.

The order of precedence for documents is as follows:

- 1) Contract (i.e. Purchase Order, Long Term Agreement)
- 2) Drawing Referenced
- 3) Collins Aerospace Specifications Referenced on Drawing
- 4) Industry Specifications Referenced on Drawing

5.3 RECORD RETENTION

5.3.1 Record retention shall be per ASQR-01 requirements

5.3.2 If the supplier ceases business with Collins Aerospace, or the supplier is unable to maintain the quality records, the supplier shall provide the option for Collins Aerospace to take possession of the records. Quality records are not to be destroyed without written approval from Collins Aerospace. Any conflicts should be reported to SBU in ASQR-01 Form 3.

5.3.3 Quality records approved for destruction shall be rendered unreadable.

5.4 ACCEPTANCE AUTHORITY MEDIA

The supplier shall, within its organization and its supply chain, ensure that the use of Acceptance Authority Media (AAM) is clearly defined within its Quality

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Management System (QMS). The supplier must also be able to demonstrate on request, objective evidence of communication to their employees and supply chain that use of AAM must be considered as a personal warranty of compliance and conformity.

Suppliers shall maintain compliance to the AAM requirements by assessing processes and supply chain as part of their internal audit activities. The areas of focus of this assessment shall include but not limited to:

- AAM application errors (e.g. omission, typos, legibility)
- AAM application untimely use (e.g. documentation is not completed as planned, “stamp/sign as you go”)
- AAM application misrepresentation (e.g. uncertified personnel, falsification of documentation, work not performed as planned)
- AAM application training deficiencies (e.g. ethics, culture awareness, proper use of authority media)

5.5 QUALITY ALERTS/GIDEP ALERTS

5.5.1 Quality Alerts are used to communicate pertinent quality related issues or other approved information to suppliers and/or processors.

Requirements defined within an Alert are amendments within the applicable Collins Aerospace SBU flow down requirements and will typically include an effectivity date.

Suppliers shall perform the following upon receipt of alerts:

- Review the requirements listed in the alert
- Determine contractual impact (if any) to the alert
- Notify the applicable buyer of any potential impact.
- Take necessary actions to ensure compliance to requirements
- Respond as outlined in the alert

Government/Industry Data Exchange Program (“GIDEP”) Alerts when received shall be actioned per the requirements within the Alert correspondence, whether



they come through a Collins Aerospace SBU or through a supplier's supply chain.
(<http://www.gidep.org/>)

5.6 CONTROL OF NONCONFORMING PROUDUCT

- 5.6.1 Suppliers without MRB authority formally approved by Collins Aerospace SBU shall follow the Collins Aerospace SBU's requirements for guidelines of dispositions and control. Suppliers are not authorized to disposition non-conforming product (including supplier Use-As-Is dispositions) unless material review authority is granted in writing from Collins Aerospace SBU to the supplier. Follow the Collins Aerospace SBU's requirements for guidelines for disposition and control.
- 5.6.2 Collins Aerospace acknowledges suppliers with MRB authority via Collins Aerospace SBU letter of delegation from the specific Collins Aerospace business unit. The terms and conditions listed in the letter of delegation shall be accepted in writing by the supplier and is subject to audits and withdrawal at any time.
- 5.6.3 Suppliers are responsible for administrative costs (unless specifically stated by contract) incurred by Collins Aerospace associated with the review and disposition of Supplier- manufactured nonconforming product.
- 5.6.4 Confirmed supplier non-conformances (escapes) found within Collins Aerospace manufacturing processes or Collins Aerospace customers may be assessed and debited for each occurrence.
- 5.6.5 When a supplier has any reason to suspect or knows that non-conforming material has been delivered to Collins Aerospace, the supplier shall notify Collins Aerospace within 24 hours per ASQR-01. Accepted notification forms include ASQR-01 Form 6.
- 5.6.6 SBU's/sites are allowed to have similar process to allow suppliers to ship non-conforming material enabling SBU/site to make appropriate material for disposition.

5.7 CHANGE MANAGEMENT

- 5.7.1 Suppliers shall have a documented process to manage change for product and processes. The change management process, at a minimum, shall include the following elements:

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- a) Change documentation, including configuration control of manufacturing work instructions
- b) Evaluation of risk
- c) Risk mitigation action plans
- d) Product validation plans
- e) Collins Aerospace notification via ASQR-01 Form 2
- f) Submit method of validation along with Form 2

Note – The following is a list of changes that may affect product quality and require notification by ASQR Form 2. This list is not all encompassing and suppliers must assess all changes for applicability

- Production from new, relocated or modified tools (except perishable tools), dies, patterns, etc., including additional or replacement tooling.
- Production following refurbishment tooling or equipment.
Refurbished equipment includes, but is not limited to: Controls are upgraded or changed; power source is changed, including electrical or mechanical drive or motion control; any change of devices that provide a force.
- Production at the same plant that is being performed with new tooling and equipment or tooling and equipment transferred from another plant.
- Change of subcontractors for special processes (e.g. heat treating, plating, etc.) listed in 5.14.1
- Any changes to special process parameters.
- Relocation of equipment within a facility.
- Change in test/inspection methods – new technique (no effect on acceptance criteria).
- Production produced after tooling has been inactive for volume production for 12 months to 24 months.

5.7.2 For supplier planned work transfers within the supplier's supply chain including change from/to distribution or change of a manufacturer by a distributor, whether temporarily or permanently, the supplier shall request approval from each impacted Collins Aerospace SBU/site, along with their transition and risk mitigation plans in accordance with ASQR-01 Form 4. Collins Aerospace shall notify the supplier of acceptance or if additional

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details are required. Supplier Work Transfer execution should not commence until approval from the affected Collins Aerospace SBUs are received.

- 5.7.3 Any design or process risk assessment created or updated for any reason shall be of equivalent content and format to SAE J-1739.

5.8 OBSOLESCENCE

- 5.8.1 Suppliers shall provide evidence of an obsolescence management process that includes risk as well as definition of affected or potential parts and assemblies Suppliers shall provide evidence of compliance per planned internal and external assessments with the supply base.
- 5.8.2 Notification of any potential, known or planned obsolescence or if planning to procure obsolescent product shall be submitted on ASQR-01 Form 2 to the affected Collins Aerospace SBU buyer.

5.9 SUPPLIER PROCUREMENT OF COLLINS AEROSPACE DESIGNED PARTS

Note: (Applies only to distributors of Collins Aerospace designed parts)

- 5.9.1 The designated source supplier shall have a process in place to ensure the latest Collins Aerospace requirements are flowed to sub-tier suppliers.
- 5.9.2 The procuring supplier shall maintain a record of complete traceability and provide a CofC (Certification of Conformance) or C of A (Certificate of Analysis) from the original manufacturer.
- 5.9.3 First Article Inspections shall be performed per AS/EN9102 and Collins Aerospace requirements (ASQR-01, and all applicable references).
- 5.9.4 Where the source is not designated on the drawing, the supplier must ensure that product is procured from a current Collins Aerospace approved supplier.
- 5.9.5 Parts produced to “build to print / detailed drawings” which have Part Number Specific Approved Supplier List (ASL) must be procured from that supplier per 5.7.2.
- 5.9.6 Distributors providing parts to “build to print / detailed drawings” shall have a process in place to ensure they are using Collins Aerospace approved suppliers/processes.

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5.10 SUPPLY OF KITTED PARTS

5.10.1 The supplier's configuration system shall ensure that the Bill of Materials (BOM) provides assurance of compliance with Collins Aerospace design, engineering and technical data as applicable.

5.10.2 Where kits of parts are supplied, the supplier shall establish a documented process within the QMS for the Management and Control of Kit Configurations, covering the following requirements:

- Kit to be configured within the Suppliers Bill of Materials system or equivalent.
- Route cards/ picking list established for each Kit
- Verification of issue status for each part in the Kit
- Provision and control of identification and traceability within the Kit
- Provision of adequately trained personnel
- Items subjected to concession/ production permit action shall be identified with the Collins Aerospace concession number prior to delivery

5.11 COLLINS AEROSPACE/CUSTOMER SUPPLIED OR OWNED TOOLING, GAGES AND FIXTURES

5.11.1 Suppliers shall maintain an Accountable Property List to monitor activity and location of customer or government owned tooling/gages/fixtures in their custody.

5.11.2 Suppliers shall notify the SBU prior to any alterations of accountable property and ensure all calibration requirement activities are coordinated with the applicable SBU.

- This list will include both the tooling/gages/fixtures supplied by a facility and the tooling/gages/fixtures fabricated by the supplier to manufacture contracted components but owned by its customer(s).
- The supplier receiving Collins Aerospace owned tooling/gages/fixtures shall return these after purchase order requirements are completed unless written authorization is received from buyer.
- The supplier shall submit a written request and receive a formal approval before any alteration or repair is performed on customer tooling/gages/fixtures.

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- The supplier is responsible for the repair of all loaned tooling/gages/fixtures damaged after receipt by the supplier, and for the preservation of tooling/gages/fixtures which are not in use.
- The supplier is responsible for the replacement or replacement costs of any tooling/gages/fixtures that are lost, damaged beyond repair, or not returned.
- All furnished tooling/gages/fixtures in the custody of a supplier are subject to periodic inventory audits and calibration.
- The supplier shall return all COLLINS AEROSPACE loaned gages on or before calibration due dates.
- For modifications required by SBU/site (Government owned tools)

5.12 PRODUCT INSPECTION CERTIFICATION

- 5.12.1 A Certification of Conformance / Compliance (CofC) shall accompany each shipment. A Certificate of Analysis may replace a CofC for raw materials and chemicals that assures conformance to all applicable material specification requirements.
- 5.12.2 When required, either an 8130 tag or EASA Form 1 shall be included with the provided hardware.
- 5.12.3 Chemical / Raw material certifications shall reflect actual values (not range), including mill data, and material certifications match the drawing, specification requirements including part number and revision.
- 5.12.4 Supplier shall verify product compliance from the certification received from processors.
- 5.12.5 The Certificate of Conformance shall provide a statement of conformity (e.g. “I hereby certify the materials / service supplied was produced in accordance with the Purchase Order, applicable drawings and specification.”) and as a minimum include the following if applicable unless referenced on table or utilizing SBU electronic release system.

Table 1 - THE SUPPLIER C of C SHALL INCLUDE THE FOLLOWING INFORMATION:

1. Certificate of Compliance	11. Part name or description per PO line item
2. Name and address of the organization/supplier (PO holder) providing product to Collins Aerospace. Cage Code (as required)	12. Serial number(s) of parts delivered for serialized parts. If serialization is not required, Work Order or Batch/Lot number shall be provided.
3. Name and address of Collins Aerospace facility product is delivered to.	13. Date of Manufacture or Cure Date for elastomeric products
4. Date of CofC issuance	14. Purchase Order Line
5. Country of Origin, including USA manufactured parts	15. If applicable, non-conformance report number (QN, MRB #).
6. Part number including any applicable "dash" number as listed on PO and any other applicable part number if different from ordered.	16. Collins Aerospace Config Request (if applicable) as listed on PO. shall be on the same or later date as PO was issued.
7. Quantity of parts delivered	17. Collins Aerospace Purchase Order number
8. Collins Aerospace Configuration Requirements	18. Signature and title of authorized supplier representative with date.
9. Full drawing revision including all applicable engineering documents (including ATP/ATR).	19. Source or DQR/DSQAR or Third Party inspection stamp with date.
10. For assemblies ONLY, list of components (part of the assembly) with the following information: Part Number Drawing Revision, Part Name, Serial Number/Lot #(cure date), QN Number, Detail Part (As applicable)	20. The Special Process Certification shall include the special process being performed (must match the drawing note including, the specification, class, type and color where applicable).

5.12.6 In cases where the parts are procured from authorized distributors; traceability back to the manufacturer shall be maintained. The supplier Certificate of Conformance shall also reference the approved manufacturer's catalog part number provided with the shipment.

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5.12.7 Name changes are acceptable with proper documentation containing linkage to the original design authority; and in compliance with trade laws and regulations, as applicable.

5.13 FIRST ARTICLE INSPECITON

In addition to ASQR-01 requirements, the following additional requirements shall apply.

- ASQR-01 Form 1, Field 18, “FAI Report Number”, is a REQUIRED field. The FAI Report Number shall be given for all component parts listed that are required to have a First Article Inspection per section 4 of the Standard. If the component part is Standard Catalog Hardware, then “n/a” shall be entered.
- A first article inspection report is required to be submitted upon request for each drawing revision change (without regard to form, fit, or function). If the revision is only an administrative correction, the FAI shall state that.
- Supplier must retain the most recent full FAI for all active part numbers, regardless of record retention timelines, even after a subsequent delta FAI has been submitted.
- First article inspections shall require certification of compliance or material certification traceable to the original manufacturer. This applies to delta FAI when material is affected.

Note: AS9102 FAI forms are available at: www.sae.org/aaqg/publications/as9102a-faq.htm.

5.14 SPECIAL PROCESSES

5.14.1 Any additional special processes requiring Nadcap accreditation for product procured beyond what is listed in ASQR-01, will be determined by the individual Collins Aerospace SBU/site and flowed down accordingly within the SBU’s/sites purchasing documents:

- a) Composites
- b) Conventional Machining (When needed or stated by COLLINS AEROSPACE flowdown requirements (contracts, PO, drawing)
- c) Electronics (Bare boards, circuit card assemblies, cable and wire harness)

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- d) Non-Metallic Material Manufacturing
- e) Non-Metallic Material Testing

5.14.2 When Collins Aerospace requires approved special processes per ASQR-01 or this document the drawing or specification references a special process, the supplier and/or sub-tier suppliers performing the special process shall be approved for the special process being performed by the Collins Aerospace SBU. A legible Special Process Certification verifying conformance to the specification drawing requirements shall be included with each production shipment. At a minimum, the Special Process Certification shall include the SBU Purchase Order number, the name and location of the certified special processor and the special process being performed (must match SBU's drawing note including, I.E., the specification, class, type and color where applicable). (Refer ASQR-01 section 7.5.2 a)

5.14.3 Based on Product or Supplier Risk, Collins Aerospace may require:

- 5.14.3.1 Custom Certificate of Conformance which certifies predetermined special process parameters.
- 5.14.3.2 Frozen process plan monitoring requires management of manufacturing plans.
- 5.14.3.3 Supplemental Collins Aerospace Special Process audits
- 5.14.3.4 When special processing requiring Nadcap accreditation is performed by a non-Nadcap accredited processor, prior to the use of that processor the Collins Aerospace must approve the use of the processor and will require a formal Collins Aerospace waiver. Contact the Collins Aerospace SBU focal for waiver process requirements.

5.15 CERTIFIED SUPPLIER CRITERIA (Supplier Quality Classification levels)

5.15.1 Suppliers Classification:

- Certified – A supplier that has demonstrated sufficient levels of process capability, such that the requirement for source or DQR inspection can be completely removed. By maintaining the required quality performance and successfully completing a process audit, suppliers are eligible to ship parts

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under the Collins Aerospace SBU dock to stock program.

- Designated – A supplier approved by the Collins Aerospace SBU to participate in the Designated Quality Representative (DQR) program. Incoming inspection requirements are removed from Collins Aerospace and replaced by source inspection performed by a designated supplier quality representative.
- Approved – Initial status assigned to a production supplier. Incoming inspection will be required at Collins Aerospace until such time that quality performance results are consistently being met
- Directed Inspection - In the event a supplier fails to meet quality performance expectations, Collins Aerospace may elect to employ a 3rd party source inspector to oversee the processing and release of product to Collins Aerospace. Any costs associated with the implementation of directed inspection would be the responsibility of the supplier.
- Collins Aerospace SBU may impose source inspection until demonstration performance is achieved.

Note: Contact Collins Aerospace rep for status performance and requirement status

5.16 SUPPLIER TO SUB TIER OFFLOAD REQUIREMENTS

Suppliers shall ensure all applicable documents and specifications are at the latest revision and available or provided to their sub-tiers. Suppliers shall validate all offloaded features, characteristics and compliance to Collins Aerospace requirements. Evidence of flow-down validation shall be available for audit and/or as requested by Collins Aerospace. Suppliers shall be Collins Aerospace approved suppliers. If purchasing a complete part or assembly, the procuring supplier shall maintain a record of complete traceability and provide a C of C (Certification of Conformance) from the original manufacturer. Offload of work is a work transfer and the requirements of paragraph 5.7.2 shall be met.

5.17 CORRECTIVE ACTION

5.17.1 When requested, the Supplier shall complete the Corrective Action Request and return it to the issuing Collins Aerospace location prior to the assigned due date.

5.17.2 In addition to supplier root cause/corrective action process as required in ASQR-01, supplier shall submit updates and changes made to their Zero

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Defect Plan, and D/PFMEA upon request of the SBU. Utilize COL-FRM-0054 and 0055 if applicable.

5.17.3 Any feature or characteristic associated with a validated customer escape shall be considered Key per UTCQR-09.1 for all future production on all Collins Aerospace product provided by the supplier

5.18 PRESERVATION OF PRODUCT

5.18.1 For shelf life items, the Supplier shall provide information regarding the recommended storage conditions, shelf life, expiration dates, date of manufacturing or pot life requirements. MSDS sheets and HAZCOM labels are applicable to the type of item purchased from the sub tier supplier. This information should be located on either the container and/or requested certifications.

5.19 DROP SHIPMENTS

5.19.1 When authorized by the PO, suppliers can ship directly to customers or other Divisions using the supplier shipping documentation.

5.19.2 The supplier shall provide shipping documentation sent with product direct to Collins Aerospace's upon request.

5.19.3 The Collins Aerospace PO number shall be referenced on the shipping documentation.

5.19.4 When defined by Collins Aerospace SBU serialized drop ship product shall have the serial numbers recorded on the shipping document (shipper) and submitted per SBU's instructions for final clearance. Upon acceptance the Collins Aerospace SBU shall provide to the supplier a stamped and dated shipping documentation. If serialized, the serial number/s shipped shall be recorded on the shipper and submitted to SQA or designee through SBU designated supplier portal or alternate method as specified by the Collins Aerospace SBU.

5.19.5 The supplier shall provide the complete shipping documentation, packing slip and Certification of Conformance to the SQA, PQR, DSQAR or Collins Aerospace approved 3rd Party.

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5.20 SUPPLIER PERFORMANCE

All approved suppliers/processors will be monitored for risk. This information will be used to manage oversight activities, including but not limited to the following:

- Audit frequency
- Corrective action plans
- Continuous improvement initiatives
- Increased level of inspection
- Onsite oversight by Collins Aerospace designated third party (at supplier's cost)
- 100% inspection on identified features
- Commitment to Sustainable Improvement Plans (SIP), Corrective Action Plan or Zero Defect plan (ZDP)[™]

UTC and Collins Aerospace supplier performance is measured in accordance with the guidelines of the Supplier Gold program.

5.21 ZERO DEFECT PLAN[™]

The Collins Aerospace Zero Defect Plan (ZDP[™]) is a systematic implementation of established Quality Engineering tools and processes that focuses on protecting the Customer from receiving non-conforming-materials. The goal of the ZDP[™] is to drive to zero non-conforming products. The ZDP[™] is defined in the Zero Defect Plan[™] document, which can be provided upon request. The ZDP[™] is recommended for Suppliers that meet any of the following criteria:

- If the supplier shipped ≥ 2 escapes in past 12 months
- If a Customer Score Card is yellow or red for more than 6 months (if applicable)

Collins Aerospace reserves the right to require any supplier to implement the ZDP[™], or an approved alternative methodology to protect Collins Aerospace Customers from receiving non-conforming materials.

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5.22 SUPPLIER SAMPLING REQUIREMENTS

5.22.1 In supplement to product sampling requirements outlined in ASQR-20.1 – Supplier Sampling Requirements, Collins Aerospace additionally employs requirements for Statistical FAI as part of ZDP™ philosophy. Statistical FAI requires that for sample inspection to be applicable, every quantitative (variable) feature on the design blueprint is measured on a 25-piece sample. The process performance index (Ppk) is calculated for each feature using only the data from these 25 pieces. Any feature with a Ppk less than 1.67 remains on 100% inspection plan for any new part until the process is demonstrated to be capable of delivering a Ppk greater than 1.67.

The Process Performance Index is defined as:

\bar{x} = sample mean

s = sample standard deviation

USL = Upper Specification Limit

LSL = Lower Specification Limit

The 1.67 threshold is to deliver 5σ performance, and accounts for a possible 1.5σ shift in the feature's mean. The 1.5σ shift accounts for potential drifts in the means over time, as the 25-piece is too small a sample to capture such drifts.

- 5.22.2 If a part or site has a history of dimensional escapes then a high priority corrective action should be to complete a statistical FAI for each part.
- 5.22.3 Using a Process Capability Index (Cpk) instead of a Ppk is acceptable if, and only if, all conditions to the applicability of Cpk are met and demonstrated: normality of data distribution, under-control process, properly defined rational subgroups, etc.
- 5.22.4 A machine capability study can be used for dimensions produced by the same machine and process as an alternative to measuring every dimension on a specific Part Number.
- 5.22.5 Historical data from the past two years can be used if there have not been significant process changes. Pre-production parts may be used in the data set, provided the same production process was used.

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- 5.22.6 Alternatives for demonstrating Ppk can be deployed on a process basis verses a part basis with Collins Aerospace approval. Request approval via ASQR-01 Form 3.
- 5.22.7 If due to nature of complex castings, complex machining, or composite molds destructive analysis is required to perform variable measurements then an alternative approach can be used in place of SFAI to demonstrate process capability. The supplier may submit an alternative inspection plan via ASQR-01 Form 3. This plan shall identify controlling dimensional characteristics (not 100% inspected).The inspection plan shall identify in-process dimensional verification using such methods as laser scan, checking fixture, ultrasonic wall check, and targeting and scribe fixture to ensure that the process is production ready and dimensionally representative of a production part and meets the design requirements.
- 5.22.8 Torque values require use of calibrated torque wrenches and ZDP control per the torque section of table 3 in this document, and do not require SFAI measurements.
- 5.22.9 SFAI does not apply to categorical (attribute) features that have either binary (i.e. presence or absence) or a fixed number of values (i.e. count).
- 5.22.10 Reference dimensions and “approximate” dimensions do not require SFAI measurements
- 5.22.11 Only the variable dimensions or properties in the design requirements created or affected by the supplier require SFAI. SFAI will be performed on lower-level parts and assemblies as ZDP™ is deployed upstream.

5.23 QUALITY CONTROL ACTION REQUIREMENTS

The requirements captured in the table below shall be implemented by all Suppliers per the “Applicability” column in Table 2. Supplier may submit a waiver request to any requirements via ASQR-01 Form 3 for approval. Applicable requirements will only be waived if supplier provides validation that processes are demonstrating a CpK \geq 1.33 per UTCQR-09.1, or if the requirement is not applicable to the supplier’s product or processes.

The requirements in Table 3 are intended to eliminate common categories of non-conforming material that have been identified through an evaluation of the Collins Aerospace value stream’s (Collins Aerospace and Suppliers) past performance and escapes. Table 3 includes the following:

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- New requirements to protect customers from known non-conformances
- Enhance and reinforce existing requirements to ensure uniform

If the supplier cannot comply with the requirements of this procedure by the implementation date, the supplier shall create an implementation plan and submit to supplier quality for approval.

Quality control action applicability – Table 2 is used to communicate where the requirements in Table 3 are applicable.

Any exceptions to these requirements shall have documented approval from Collins Aerospace using ASQR-01 Form 3.

Table 2: Quality Control Action Requirements- Applicability

Requirement Category	Applicability
Assembly	All assembly processes
Circuit Card Assembly	Circuit Card Assembly Processes
Customer Interfaces	All customer interfaces
Dimensional	All measuring & dimensional inspection equipment
Material Integrity	All parts with material certificates of compliance (CofC)
O-rings	All O-ring suppliers and product assemblies with O-rings
Packaging & Shipping	All parts
Part Marking	All parts with required part marking
Product Handling Equipment	All product handling equipment
Rework	All rework operations
Special Processes	All Special Processes as defined by Collins Aerospace.
Torque	All torque operations with a required applied torque value
Cosmetic Defects	Products / product families with historically disputed cosmetic conditions

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Table 3: Quality Control Action Requirements

Category	#	Requirement	Objective
Assembly	1	Overruling of an automated inspection device (i.e. a false call disposition) shall require review and disposition by an independent, site-qualified technician or engineer.	Prevent actual failures from mistakenly being passed and provide feedback to line to correct process variation,
	2	Look-alike parts shall not be stored in adjacent locations, or kitted together in the same container, unless mistake proofing strategies are implemented. These strategies might include unique packaging, coloring, marking, or machine reading of part numbers.	Mitigate risk of an inadvertent use of look-alike parts.
	3	The producer shall assess the build process for points where hidden features are created and align inspection control plans & methods to ensure all features are verified while accessible.	Mitigate risk associated with features that cannot be verified at later steps.
Circuit Card Assembly	1	Circuit card assembly producers shall utilize AOI to ensure correct components, component placement, solder joint integrity, correct heel fillets, absence of lifted leads, and other visually detectable defects per IPC-A-610. 3D AOI should be employed.	Eliminate escapes due to assembly and/or process errors and not limited to both automated and manual inspection methods.
Customer Interfaces	1	<p>100% of interface and alignment features identified by Collins Aerospace shall be verified by physically engaging the feature with a fixture identically mimicking the mating surface where Collins Aerospace has provided the definition of the mating surface or representing the maximum and minimum tolerance conditions of the mating feature characteristics.</p> <p>If physically engaging a feature will compromise its function (e.g. locking threads), then an alternate method to verify proper dimension and physical location shall be documented on the process control plan</p> <p>Visual alignment features (e.g. scribe lines and</p>	Physically engage with every (100%) customer interface point as part of the build and test cycle. This includes connector keying, alignment/bolt holes, threaded holes, alignment bins, orientation features, hydraulic fittings, etc. Verify both correct location and physical features of the interfaces. It is understood that some features (i.e. locking threads) cannot be fully engaged without

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		connector labeling) shall be 100% visually inspected. Poke-Yoke inspection fixtures should be used wherever possible for these inspections.	compromising the feature. In this case verification of the proper thread size and location without fully exercising the feature meets the intent of this action.
	2	100% of un-mated electrical connectors shall be inspected at final inspection for bent pins, pushed pins, and FOD. (redundant per ASQR-20.1 Table C)	Ensure no installation escapes to Customer
Dimensional	1	All measurement and dimensional inspection equipment must comply with AS13003.	Reduce dimensional escapes associated with gage variation
Material Integrity	1	For all material Certificates of Conformance (CofC), the supplier shall verify 1) raw material back to original mill 2) CofA matches PO/Drawing requirement 3) CofA material properties report as required by material specification.	Ensure that the material represented by the CofC's is the material specified by the design.
O-Rings	1	100% O-rings shall be lubricated prior to installation. Only appropriate lubricates shall be used unless otherwise specified or approved by Collins Aerospace. Petroleum shall not be used unless approved by Collins Aerospace.	Ensures all lessons learned regarding best practices for O-ring assembly are acknowledged by supply base and incorporated into suppliers' processes to minimize risk of O-ring failures
	2	Plastic or protected metal caps shall be used to protect O-rings or other seals from damage during handling or installation. Protected metal caps must always be kept in protective enclosure to prevent raised burrs due to damage.	
	3	Slide or push O-rings or other seals into place (i.e. do not roll into place).	
	4	When mating parts with O-rings or other seals, positive alignment tooling shall be used to prevent	

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		blind cutting of seal due to misalignment.	
Packaging, Shipping & Handling	1	All shipments shall comply with ASTM D 3951 unless otherwise specified by purchase order or contractual flow down.	Assure parts are adequately protected for shipment.
	2	Qualified individuals shall define and execute a process compliant with DOT 49 CFR and/or IATA Dangerous Goods Regulations for all dangerous goods shipments.	Assure we are in compliance with DOT & FAA regulations for shipping Hazardous Materials to avoid danger & potential fines.
	3	With the exception of Bulk Bought hardware parts, all parts shall be protected from part-to-part contact during shipment. Parts damaged during shipment due to inadequate packaging shall be considered escapes to Collins Aerospace.	To eliminate escapes caused by part to part damage while in transit.
	4	O-rings shall be packaged and marked in accordance with AMS2817.	To assure O-rings are adequately protected & identified per industry standards to eliminate escapes.
Part Marking	1	Part marking inspection and verification procedures shall include a photo or other replica of required content, format, marking method, and location per contract specifications. All features of marking shall be 100% verified including machine readable matrix marking, human readable markings related to 2D machine matrix, independent human readable markings where specified, traceability (serialization, lot date codes, etc.), and radio-frequency identification	Contain non-conformances in part marking prior to shipment.
	2	All 2D machine readable matrix marks shall be verified with software capable of creating validation and verification. Reports of this verification shall be included in shipping	Contain errors in 2D machine readable matrix marks prior to shipment.

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		paperwork.	
	3	Prior to shipment, all producers shall have a process to detect and contain serial number duplication.	Prevent the shipment of duplicate serial numbers.
	4	If Part Marking process is not fully automated (e.g. vibrabeeping, ink marking, manual data entry is required), then second person verification of the output shall be implemented in addition to final inspection. Note: A best practice for an over inspection is to have one person read the part marking data on the part out loud while the second verifies the data in the associated paperwork.	Contain non-conformances in part marking prior to shipment.
Product Handling Equipment	1	The receiving, manufacturing, assembly, special process, test, storage, shipping processes, and transitions between processes shall be reviewed to eliminate material-to-material contact that could damage the part / product. a. Material handling containers and equipment shall be visually identified and designated for specific use. Material handling containers include any totes, bins, boxes, etc. used to handle the product or parts throughout the product life cycle at the targeted facility. b. Materials and construction of product handling equipment shall be compatible with part materials, part geometry, and environmental conditions.	Prevent handling damage in process operations, transportation between processes, storage, and shipment.
	2	All product handling equipment shall be on a Total Productive Maintenance (TPM) schedule to validate that the product protections are still in place, free of contaminants, and have not diminished or been damaged over time.	Ensure that part protection is maintained over time and to mitigate the generation of FOD as protective materials break down.

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Rework	1	<p>Any characteristics which may be directly or indirectly affected by rework operations shall be identified and re-verified (e.g. re-inspected, retested, environmentally screened, etc.) immediately following rework operations to ensure that operations have not cause direct damage, collateral damage, or introduce contamination.</p> <p>Sampling inspection shall not be permitted for characteristics affected by rework.</p>	<p>Identify any potential non-conformances introduced during rework operations. Ensure previously verified requirements are not impacted as a result of the rework or repair operation.</p>
Special Processes	1	<p>Special Process (SP) Change Management:</p> <p>Supplier is responsible to ensure special process sources meet the drawing/specification requirements through initial validation of either a number of pieces and/or lot testing. Unless otherwise notified by the Collins Aerospace SBU the default is validation of 25 pieces, spanning at least 3 lots where lot processing is conducted. Subsequent validation shall be accomplished by sampling for each part number at each supplier or source. Validation shall be completed by the Supplier Quality Manager/designee or responsible NDT L3.</p> <p>The following special processes categories as listed by Nadcap shall require validation: Chemical Processing (CP), Coatings (CT), Composites (Collins Aerospace SBU dependent) (COMP), Conventional Machining as a Special Process (COLLINS AEROSPACE SBU dependent) (CMSP), Electronics (ETG), Heat Treating (HT), Materials Testing (MTL), Metallic Materials Manufacturing (MMM), Non-Destructive Testing (NDT), Non-Conventional Machining (NM), Surface Enhancement (SE), Welding (WLD)</p>	<p>Ensure Special Processes are controlled. Assure that all special processes are locked down and no changes are made unless reviewed. Assure that any changes to special processes are thoroughly justified before being implemented to mitigate the creation of new non-conformances.</p>

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	2	<p>Revalidation shall be accomplished through testing the parameter change or new source processing review and measurement or testing to validate that the process changes or source change maintain drawing or specification requirements and that the product is not adversely affected. This will include measurements, review of the processing information and non-destructive means up to and including destructive testing where required. Collins Aerospace SBUs will have prescriptive requirements for parts as required. Validation of any SP will be documented and submitted to Collins Aerospace SBU for review per paragraph 5.7</p> <p>In addition, validation of Special Processes shall be required for the following events at a SP supplier: SP Disclosures, Supplier Advisories, Potential Product Impact findings, change in facility location or management/ownership, and/or catastrophic event at the supplier (e.g. fire affecting the SP).</p> <p>These validation requirements as listed above are in addition to ASQR-20.1, Supplier Sampling Requirements - paragraph 4.2.4.2 requirements. Once the validation is completed then the requirements of ASQR-20.1 are invoked.</p> <p>When specified on the drawing or PO, suppliers must use only sources approved by the specific SBU company to perform these special processes (each special process supplier must obtain initial approval from each specific SBU). Use of approved sources does not relieve the supplier or subcontractor performing the special process of the responsibility for ensuring conformance to requirements.</p>	<p>Ensuring conformance to Special Process requirements. Assure that all special processes are controlled and verified with changing of process or suppliers and any major events at the SP supplier.</p>
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	3	Suppliers that utilize parts that have been Heat Treated shall verify that material properties test results identified in the associated specification are included on the CofC (e.g. hardness, conductivity, tensile, etc.).	Address systemic gap in Heat Treat supplier compliance across Collins Aerospace
	4	Suppliers that utilize anodized parts shall verify that material properties test results identified in the associated specification are included on the CofC (e.g. conductivity, etc.).	Address systemic gap in Anodize supplier compliance across Collins Aerospace
Torque	1	<p>A validation of torque tool settings and output shall be performed and recorded against acceptance criteria, using a torque tester, per the following:</p> <p>For manual torque tools validation shall be performed a minimum once per shift using a stationary tester and defined validation range requirements for each torque tool.</p> <p>For auto or clutch torque tools, validation shall be performed a minimum once per month using a rotary tester and defined validation range requirements for each torque tool.</p>	Validate that the torque tool is set properly and that the tool output is within defined validation range requirements
	2	<p>After final torquing, all fasteners shall be re-checked with a torque tool set between the original set point or lower (within the specification range), or to the set point less prevailing torque.</p> <p>For automated torque tools with angle monitoring enabled, this does not apply.</p>	Ensure that each torqued fastener has been torqued to at least the minimum value. This also ensures that none of the torqued fasteners were loosened by torquing additional fasteners within the operation.

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	3	<p>When selecting a torque tool the following requirements shall be adhered to:</p> <ul style="list-style-type: none"> -The increment between two graduations marks of a scale shall be in compliance with ISO 6789 - The increment between two graduation marks of a scale shall not exceed 10% of the total torque tolerance on the drawing. - The torque setting of the tool shall be within a set range in compliance with ISO 6789 	<p>Ensure that the gage used in applying torque is capable of providing the required resolution.</p>
	4	<p>If used, torque tool extenders shall be defined on the work instructions with tool identification numbers and specific use configuration.</p> <p>The torque range values shall be defined on the work instructions, including the impact of the angle of the extender with respect to the handle during the application of the torque.</p> <p>Torque tool extenders will change the effective torque and shall be validated in the as-used configuration per Torque Requirement 1.</p>	<p>Prevent accidental over-torqueing of fasteners due to the use of unspecified or improperly utilized torque wrench extensions (e.g. crow foot, or dog bone).</p>
<p>Visual Standards for Cosmetic Defects</p>	1	<p>The producer shall establish mutually agreed to visual standards for acceptable and unacceptable cosmetic conditions with the customer for features, parts, and product families that have historically disputed defects. (e.g. provide common photo set to OEM inspector and Customer inspector)</p> <p>These standards shall be documented in a revision controlled document and a copy will be provided to the customer for their review and comment.</p> <p>Note: Examples of cosmetic conditions include nicks, scratches, dents, surface finish characteristics, etc.</p>	<p>Eliminate ambiguity between customer and supplier expectations regarding visually detectable anomalies that are neither explicitly prohibited nor allowed by existing design documents.</p>

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6.0 SUPERSEDED DOCUMENT(S)

UTAS-SCM-PRO-0003

7.0 FLOWCHART(S)

None

8.0 REVISION HISTORY

00	Initial Issue	January 2, 2019
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