SUPPLIER QUALITY REQUIREMENTS FOR ETQ PRODUCT CAR

APPROVALS:

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Table of Contents

1.0 PURPOSE

Collins Aerospace is a Raytheon Technologies Corp (RTX) company. This document is applicable to the following Collins Aerospace business units: Power & Controls (P&C) and Global Operations.

The purpose of this document is to define the requirements specific to P&C and Global Operations suppliers for obtaining root cause analysis and corrective and preventative action on purchased parts using the ETQ Product Corrective Action Request (CAR) system.

Note: Collins Aerospace Power & Controls and Global Operations, formerly UTAS ES, Electric, Environmental & Engine Systems (heritage Hamilton), will be referred to as Collins in this document.

Technical Data Note: Every entry by a supplier external to Collins will default to "Yes" Technical Data is included as the ETQ system is saved on a server based in the United States. Once entry is saved, it will be locked to the supplier until the SQE reviews for technical data. International suppliers will be locked from all technical data entries; these suppliers should archive their 8D entries outside of ETQ.

2.0 POLICIES

Responsibilities by 8D step are depicted in the process flow in Appendix 1. Additional guidelines for reviewing and completing a CAR is in Appendix 2.

Initiation of required corrective action for a purchased part nonconformance can originate from a Collins customer escape, a Collins plant site escape, or a supplier Notice of Potential Escape (NOPQE) or Supplier submitted QNs. Suppliers are not to void a CAR, containment, or any sub-actions, reach out to the Collins Supplier Quality Engineer (SQE) to discuss concerns.

Collins Supplier Quality may contact supplier to expedite their corrective action response ahead of system due dates when there is impact to production or customers.

If the person assigned to the CAR as Supplier Contact within the D1 Team will be out of office for an extended period of 5 days or more, Collins requests that they reassign the Supplier Contact to another focal to continue progress on the 8D.

2.1 Validated Vendor Liability

Notify the Collins SQE of a confirmed escape or No Fault Found (NFF), with evidence, within 5 business days of CAR notification or receipt of part.

- Notification may contain photographic evidence in which the part return is not needed to validate the defect (i.e. photo of part marking error).
- Provide to SQE via email or discuss during call.

All CARs over 30 days with no response will be dispositioned supplier liability until a complete response is received. If an extension is needed, please send SQE an email with rational and detailed plan to complete ***prior*** to due date.

3.0 REFERENCES

- RM13000 – 8D PROBLEM SOLVING METHOD (*https://aesq.sae-itc.com/supplemental-material*)
- HSM17 – SUPPLIER QUALITY REQUIREMENTS
- AS9145 - Aerospace Series – Requirements for Advanced Product Quality Planning and Production Part Approval Process

4.0 DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

- 8D: A structured, problem-solving methodology that steps through problem identification, root cause, corrective action, preventive action, etc. All projects executed to resolve product nonconformances should use this approach.
- Containment: To identify all potential suspect populations and locations of material and define and implement an action plan to stop or prevent additional escapes. This includes addressing further material movement, as well as coordinating communications and actions with customers.
- Corrective Action / Mistake Proofing: Changes to processes, work instructions, workmanship practices, training, inspections, tests, procedures, specifications, drawings, tools, gauges, equipment facilities, resources, or material that are intended to result in preventing or minimizing the probability of the subsequent generation of nonconforming material.
- ETQ Product Corrective Action Request (CAR): Vendor software used for managing root cause /corrective actions in an 8D format.
- NOPQE (Notice of Potential Quality Escape): is an escape management process to report potential product non-conformances and non-compliances. COL-ASQR-FRM-0006 is used to document supplier non-conformances and non-compliances found at a supplier's facility concerning product that has shipped.

- Supplier Quality Engineer (SQE): A Collins associate highly trained in CORE tools & techniques, Lean Manufacturing, and the 8D Problem Solving Methodology. The SQE works on resolving complex, tactical, or high pain supplier investigations and escape issues. The SQE works cross functionally with peers throughout Collins to resolve common quality issues.

4.2 Abbreviations

- ATP: Acceptance Test Procedure
- CAR: Corrective Action Request
- 8D: A structured problem-solving methodology
- ILOT: Inspection Lot
- NFF: No Fault Found
- NOPQE: Notification of Potential Quality Escape
- RCCA: Root Cause, Corrective Action
- SQE: Supplier Quality Engineer
- WIP: Work in Process
- PPAP: Part Production Approval Process

5.0 PROCESSING AN ETQ PRODUCT CAR

Note: Please refer to training and guide documents on the Supplier Portal for general work instructions for the ETQ Product CAR system. This document is a supplement specific for P&C and Global Operations requirements.

If an extension for completing the 8D is needed, including corrective action implementation, ***prior*** to due date please provide a detailed plan to the SQE that includes but is not limited to the following: action, action owner, due date and rational for the need for extension. Plan should include how supplier plans to validate corrective action.

Collins may reject 8D steps back to the supplier for more thorough root cause analysis, more robust corrective actions or evidence of implementation, or other additional details. The ETQ Comments field or Approval & Disposition comments should detail the reasons for rejection, reach out to SQE for more details if needed.

5.1 Initial Review

When the ETQ system notification emails are received for the Product CAR and Containment activities, conduct an initial review of the nonconformance details within D0 through D2. Request further information from SQE if needed.

Notify SQE if part return is required to support the investigation with testing or inspections.

5.2 D3 Containment

Initial containment is due 24 hours from ETQ Containment Notification email. The supplier is to define and implement interim containment actions to isolate the problem from any customer, such as additional testing or inspection, or blocking stock until such can be developed.

- Consider what steps need to be taken to get conforming parts to the customer to prevent production stoppage.
- The supplier is to coordinate the over-inspection or testing of suspect material from a bounded population, and segregate nonconforming material, to keep shipping only conforming product to the Customer.

The supplier to identify quantities for each required location area, even if quantity is zero, to confirm each area was checked for potential nonconforming material. Include location areas (supplier terminology for the below may vary):

- Collins Aerospace
- Collins Customer (including drop ship)
- Parts inventory (including sub-assemblies)
- WIP
- Finished Goods
- MRB (internal supplier MRB or submitted for Collins MRB)
- Transit (product in transit)
- Distribution Center

For suspect material that has shipped, the supplier shall include purchase order number, shipment date, and serial number or other traceability information.

The supplier is to create actions and attach objective evidence of containment when applicable. Examples of containment actions include:

- Quality alerts
- Outgoing Test Data (Original) – Always required for test failure nonconformances
- Inspection record reviews
- Pictures of outgoing parts
- Certification reviews
- Material segregation of suspect nonconforming material

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5.3 D4 Identify, Describe, and Verify Root Cause

Refer to the D4-D5 Questions Form link in the CAR for root cause considerations.

In D4 (Identify, Describe, and Verify Root Cause), suppliers may only choose Supplier, No Fault Found, or Undetermined responsibility. Suppliers are not to select Collins responsibility; this will be determined by internal Collins investigation.

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5.3.1 Supplier Confirmed Responsibility

For confirmed non-conformances that are supplier responsibility, suppliers shall use the 3x5-why tool or other quality root cause logic tool; a 3x5-why Root Cause Analysis tool is available under the References and Resources tab of the ETQ CAR. The supplier shall create and define a root cause line item for each of the 3 contributing root causes as a:

- Direct Root Cause: What was the specific cause of the defect? What is the technical cause of the problem? Explain why the problem occurred (e.g. design/drawing error, manufacturing process error, assembly/installation instructions error)

- Detection Root Cause: Why was the defect not detected by the supplier? How did it escape to the customer? Explain why the problem was not detected by the quality/inspection management system.

- Systemic Root Cause: How did the system contribute to the problem? Did any business processes fail? How was the problem introduced to production? How did the product development / production / support processes contribute to the problem?

- The completed 3x5-Why or other quality root cause logic tool used shall be attached to the CAR.

- If the defect was generated at a sub-tier, the D4 should identify the Subtier Name, Address and if applicable Collins vendor code. The supplier also to include the sub-tier root causes (Direct, Detection and Systemic), with supporting logic tool, at the sub-tier level. How will the Collins PO holder detect this nonconforming condition in the future?

5.3.2 No Fault Found

No Fault Found is to be used to state that no nonconforming condition exists.

Supplier is to include what was done to confirm unit was fully compliant upon leaving their facility and provide objective evidence.

The CAR response is intended to justify the supplier has a robust process in place to prevent reported issue and complies with all Collins requirements and flow down.

- Clearly outline how product definition and requirements are met, including references to specific paragraph numbers or drawing notes.
- Include copy or pictures of relevant evidence such as work instructions, ATP data, handling procedures, inspection/checklist, protective packaging.
- ATP Test Data: The objective evidence for test failures to include ATP test data, statement that the part passed ATP and if applicable any reports (shop findings). Include ATP number and paragraph that tests for the failed condition reported. If the customer reason for return does not correlate to the ATP, please state so and include ATP number. The original ATP and incoming tested ATP result to be compared and reviewed for conformance by the supplier's quality and engineering group to ensure compliany test to customer requirements. Include summary of comparison disposition to support NFF disposition.
- If dimensional issue where the supplier believes their method of inspection is correct and reliable for the characteristic, a Gage R&R should be completed to validate the inspection method and attached to ETQ CAR as evidence. Reference HSM17 for product and process validation.

5.3.3 Undetermined Responsibility

Undetermined is to be used to confirm the nonconforming condition does exist, but it cannot be confirmed when or where it was induced.

- Supplier is to provide evidence of justification including a mistake proof process that would not allow this condition to leave their facility. Justification may include but is not limited to:
    - Outgoing photos
    - Inspection records/shop record report

  - Robust packaging instructions
  - Internal handling procedures
  - Test Data (see section 5.3.2 ATP Test Data)
- For units with damage, the supplier is to provide their documented handling practices in manufacturing, internal transportation, storage and protective packaging for shipping. The justification to also include in process and/or final inspection detailed documented inspection and sign off pertaining to damage.

5.4 D5 Corrective Action Plan

Per HSM17 and AS9145, if PPAP is invoked on a part by AS9145 flowed on a purchase order, any changes proposed that may affect previously approved PPAP elements must be submitted for approval prior to implementation. If unsure if part number is on PPAP, refer to purchase order.

If CAR liability is Supplier Confirmed Responsibility, the supplier shall create a minimum of one corrective action per each direct, detection, and systemic root cause. Create a D5 action item per corrective action for the associated root cause(s). (this also applies to the supplier's sub tier (s))

- Example corrective actions:
  - Direct Corrective Action: Design changes, improved work instruction, process changes or controls, sub-tier supplier change. Corrective action must directly affect the part conformity.
  - Detection Corrective Action: Screening, ATP updates, visual examples for inspection, go/no-go gages. Corrective action must prevent nonconformance from leaving supplier's system again.
  - Systemic Corrective Action: Changes to the supplier's system and processes or policies that would protect future designs from similar defect creation, such as: design processes, contract reviews, sub-tier management process. Updates to DFMEA and PFMEA when applicable. Corrective action should address the process break down or gaps.

Suppliers are to consider the most effective corrective actions feasible.

- Mistake Proof Effectiveness

  - Level 1 (Best) – Corrective action eliminates the defect from occurring at the source.
  - Level 2 (Better) – Corrective action detects defect as it happens, alerts Operator to take appropriate action.
  - Level 3 (Good) – Corrective action detects defect after it is created but stops from further processing.

Due dates should be reasonable for the action identified. Corrective actions should be implemented as soon as feasibly possible within the final due date of the CAR. Exceptions for long term activities such as new capital equipment or tool molds may be listed as long term.

The plan will be reviewed by Collins Supplier Quality for approval. If not accepted, the plan will be rejected with comments.

Note: For dimensional escapes, the supplier shall reference HSM17 for product and process validation actions. These may be captured within D7 as a long-term action if current stock or production timeline does not meet quantity needed within a feasible timeframe for CAR closure. Validation activities may include:

- Capability study
- Measurement system analysis (MSA)
- 100% inspection until capable

5.5 D6 Implement & Validation

The supplier shall provide objective evidence of each corrective action being implemented as attachments.

- The objective evidence should clearly highlight changes to documents or processes. Please provide the before and after documents as applicable (i.e. Work instructions or inspection checklists show before and after revisions, snips of applicable sections are acceptable in leu of sending entire work instruction. If you chose a snip, include the title page and revision history of final release.)
- Label the objective evidence clearly so it can be identified to the applicable corrective action.

The SQE will approve validation activities or reject with comments.

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5.6 D7 Preventative Action and Final Approval

Once all corrective actions have been implemented and validated, the SQE will create a final action in D7. This action will be assigned to the supplier to enter the next 3 approved ilots, or other inspection records if ilots is not used. The ilots, or other records, must be from after all corrective actions have been implemented.

The action will be set as a long-term action with a due date of 1 year from final corrective action implementation. Supplier to note this action and progress CAR forward, only closing the action once 3 ilots or other records are available.

If any additional preventative actions are realized as critical to implement, the SQE will move the CAR back to the D4-D5 plan phase to capture the actions.
Note: Per section 5.4, long-term actions for product and process validation may be captured in D7.

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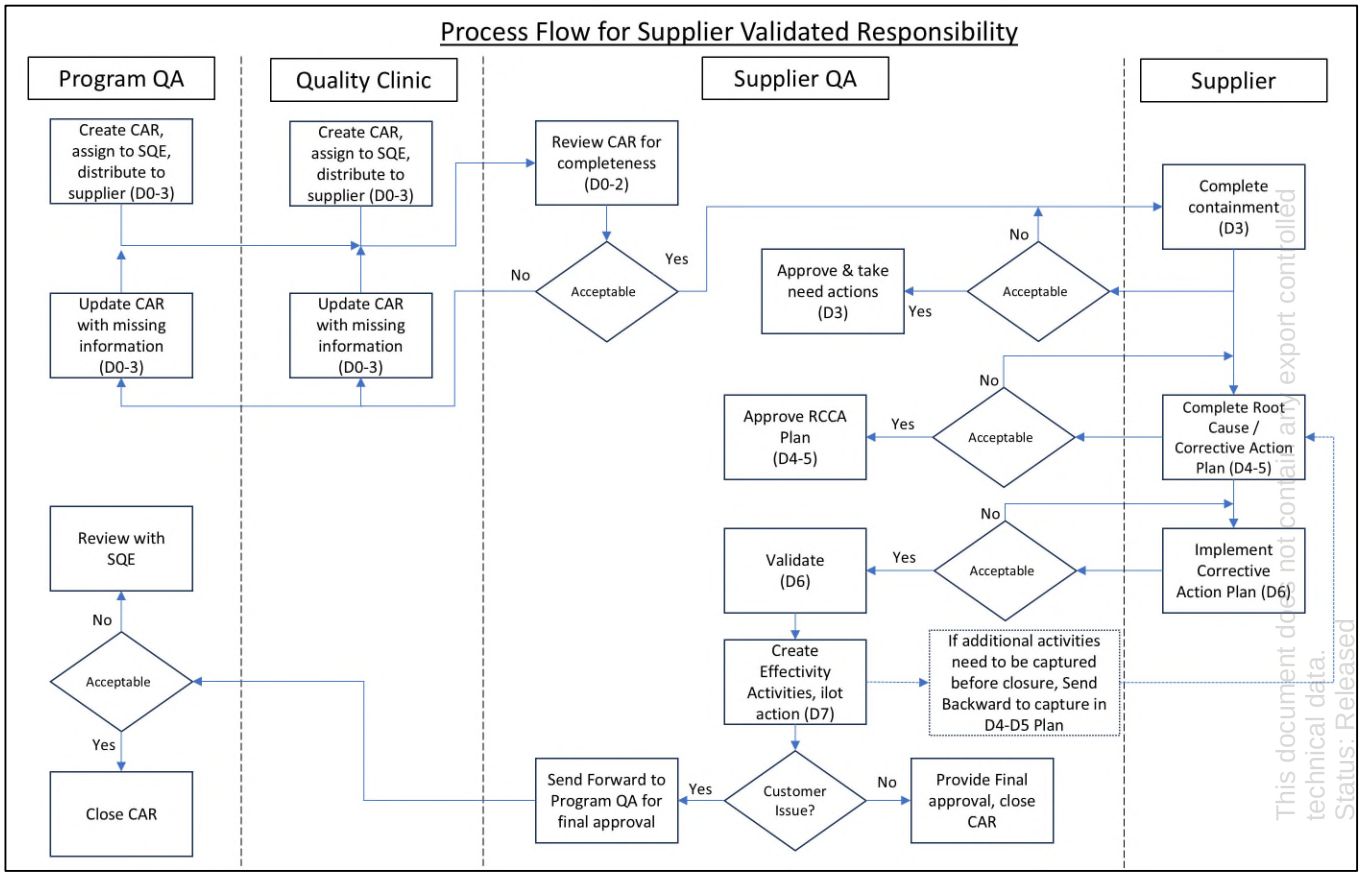
5.7 D8 Closure

Once the root cause and corrective action plan and implementation activities are complete and approved, the SQE will close the CAR. If CAR was for a return from a Collins customer, a program quality representative will also review and approve or reject.

The CAR may close with the agreed to long term actions remaining open.

6.0 APPENDIX

6.1 Appendix 1 – Process Flow



6.2 Appendix 2 – Additional Guidelines for Completing a CAR

Findings Information – Define the problem and its Impact.

- Has the problem been properly defined in terms of "What is wrong with what?"
- Does the finding reference the applicable standard, specification or requirement not met?
- Are specific examples or objective evidence provided to confirm and support investigation?

Interim Containment Action

- Has initial suspect population been defined and with clear actions in terms of who, what, when, where, and how much?

Root Causes

- Are there multiple direct causes identified that may indicate the need to further breakdown or "subdivide" the finding into multiple findings?
- Are you able to show the logical links (steps) between the direct cause theory, defect symptom? Can you turn it on and off?
- Have root causes considered any inspection/control point that should have ensured that non-conformances were found? If yes, why did the inspected/control point fail?

Corrective Actions

- Have specific actions been defined that clearly address **each** of the direct and contributing causes?
- Have proposed specific actions been tested/piloted to assure effectiveness?
- Will the detection actions stop the defect as early in the process as possible?

Systemic and Preventive Action

- Looking back at the problem and considering why it happened in the first place, what lessons can be learned? What changes been made to ensure that this and similar problems never happen again?
- What specific improvements can be made in areas such as systems, procedures, machinery, maintenance, people and training?
- Has documentation been updated to reflect identified specific and preventive actions? (i.e. process maps, standardized work, command media, routings, travelers, and engineering documentation, contract and design reviews, etc.)

Final Containment Action:

- Has the team assessed if these problems affect other similar parts: on other lines, in other plants with the same process, other parts with the same materials/process?

- Based on information and knowledge of root cause or contributing causes, is further containment action required? Has final containment been re-defined to protect against further disruption at the customer? At Supplier? In-transit? In-Warehouse?
- Has final suspect population been defined and with clear actions in terms of who, what, when, where, and how much?