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AEROSPACE SUPPLIER QUALITY REQUIREMENTS (ASQR-01)

INTRODUCTION

This document defines supplier quality requirements as agreed upon by the following business entities herein referred to as “Member”.

| Member | Abbreviation | Applicability |
|------------------------|--------------|---------------|
| Collins Aerospace | Collins | Chapter 1 |
| Pratt & Whitney | PW | Chapter 2 |
| Pratt & Whitney Canada | PWC | Chapter 2 |

This document has been developed based upon the requirements of the International Aerospace Quality Group (IAQG) AS/EN/JISQ 9100 - Quality Management Systems - Requirements for Aviation, Space and Defense Organizations.

When a supplier provides product or services to PW or PWC (together: “P&W”) and Collins, the requirements contained herein are to be uniquely applied for each individual Member.

Note: For guidelines on implementing supply chain best practices, reference IAQG Supply Chain Management Handbook (SCMH).

REVISION SUMMARY

This document has been significantly revised to provide separate requirements for P&W and Collins business entities including referencing AS13100 for P&W suppliers as outlined in Chapter 2.

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CHAPTER 1: QUALITY MANAGEMENT SYSTEM (QMS) REQUIREMENTS FOR COLLINS

101. SCOPE

The requirements of this document apply to all Suppliers that furnish product, material, processes, or product related services to Collins as a contractual requirement regardless of Supplier's industry, regulatory accreditation, or certification status, and each Supplier shall be responsible for ensuring that all members of its supply chain comply with the requirements set forth herein.

Suppliers should consult Appendix 1 – Applicability to determine which provisions of this document apply based on the products and services provided by the organization and that of any member of their supply chain.

102. INFORMATIVE REFERENCES

102.1 It is the responsibility of Supplier to obtain the latest revisions of all documents specified by this ASQR. These documents include, but may not be limited to, the following:

Table 1: Documents Referenced in ASQR-01

| Document | Title |
|-------------------------|--|
| ARP9136 | Root Cause Analysis and Problem Solving |
| AS5553 | Fraudulent/Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition |
| AS6174 | Counterfeit Materiel; Assuring Acquisition of Authentic and Conforming Materiel |
| AS9100* | Quality Management Systems – Requirements for Aviation, Space and Defense Organizations |
| AS9102* | Aerospace First Article Inspection Requirement |
| AS9103 | Validation Management of Key Characteristics |
| AS9117* | Delegated Product Release Verification |
| AS9120* | Quality Management Systems Requirements for Aviation, Space, and Defense Distributors |
| AS9138 | Quality Management System Statistical Product Acceptance Requirements |
| AS9145 | Requirements for Advanced Product Quality Planning and Production Part Approval Process |

| Document | Title |
|---------------------------------------|--|
| <u>AS9146*</u> | Foreign Object Damage (FOD) Prevention Program - Requirements for Aviation, Space, and Defense Organizations |
| <u>AS13000</u> | Problem Solving Requirements for Suppliers |
| <u>AS13001</u> | Delegated Product Release Verification Training Requirements |
| <u>AS13002</u> | Requirements for Developing and Qualifying Alternate Inspection Frequency Plans |
| <u>AS13003</u> | Measurement Systems Analysis Requirements for the Aero Engine Supply Chain |
| <u>AS9115</u> | Requirements for Aviation, Space, and Defense Organizations – Deliverable Software |
| <u>ASQR-07.5</u> | Control of Software |
| <u>ASQR-09.2</u> | UTC Production Part Approval Process (PPAP) – Refer to AS9145 |
| <u>ASQR-20.1</u> | Supplier Sampling Requirements - Refer to AS9138 |
| <u>IAQG SCM</u> | IAQG Supply Chain Management Handbook |
| <u>IATF 16949</u> | Quality Management System |
| <u>ISO 9001</u> | Quality Management |
| <u>ISO 10012</u> | Measurement Management Systems – Requirements for Measurement Processes and Measuring Equipment |
| <u>ISO 17025</u> | General Requirements for the Competence of Testing and Calibration Laboratories |
| <u>Nadcap AC 7004</u> | Nadcap: Quality Management System |
| <u>UTCQR-09.1</u> | Process Certification Requirements |
| <u>RTX QDL</u> | RTX Qualified Distributor List |

** Developed under the auspices of the IAQG and listed here as SAE International “AS” publications. Equivalent versions may be published by other standards bodies (e.g., European Committee for Standardization (CEN), Japanese Standards Association/Society of Japanese Aerospace companies (JSA/SJAC).*

103. TERMS AND DEFINITIONS

103.1 Delegated Product Release Verification (DPRV) Program

A process whereby a supplier is delegated the authority to act on behalf of the delegating organization to verify and release products/services (reference AS9117).

103.2 Designated Quality Representative (DQR) Program

The DQR program enables a Collins-approved supplier representative to perform over-inspection activities and release product shipments on behalf of Collins DPRV program.

103.3 Operator Certification

A method whereby an Operator, with the required training, has the capability to determine the acceptability or non-acceptability of parts they produce and/or inspect.

103.4 RTX Qualified Distributor List (QDL)

The list of Distributors that are qualified by RTX to provide metals, electronics, and hardware.

Note: *Electronics include electrical, electronic, and electro-mechanical components (e.g., connectors, wire, electronic components, terminals, lugs, pc boards, semiconductors). Hardware includes fasteners (e.g., nuts, bolts, rivets, washers, pins, screws, clamps, springs, seals, O-rings, ferrules, fittings). Metals include metallic raw materials (e.g., bar, sheet, plate, tube, wire, forging, casting, billet, ingot).*

103.5 Supplier Types

The Supplier Types used in this document are as follows:

| | |
|--|---|
| BTP - Collins Design Part Manufacturer | Supplier of products and/or assemblies with Collins-designated part numbers as defined on proprietary Collins drawings or other technical definitions (also known as Build To Print (BTP) parts). Note 1: <i>Castings and forgings are considered BTP - Collins Design Parts</i> Note 2: <i>This includes suppliers that purchase parts from third parties manufactured against Collins proprietary drawings even though they may not add any additional value themselves</i> |
| Calibration Service Provider | Organization qualified to perform calibration services on Measuring and Test Equipment (monitoring and measuring equipment) used in the production of Collins products. |

| | |
|-------------------------------------|--|
| Design Responsible Supplier | Supplier of products defined by a design/drawing proprietary to that supplier and may be linked to a Collins part number through the use of a Collins-referenced drawing and/or other purchase order requirements (e.g., Category 1, Source Control, Source Design, Engineered Item). Note: Referenced drawings may contain requirements in addition to ASQR-01 requirements. |
| Distributor | Organization carrying out the purchase, storage, splitting, and sale of products and not transforming, assembling, or otherwise modifying purchased product. Distributors are limited to raw material, industry standard, and Commercial-Off-The-Shelf (COTS) parts. |
| Industry Raw Material Manufacturer | Manufacturer of raw material that conforms to an established industry or national authority-published specification (e.g., Aerospace Material Specification (AMS)) |
| Industry Standard Part Manufacturer | Manufacturer of parts for which the design, manufacturing, inspection data, and marking requirements necessary to demonstrate conformity of the part are in the public domain and published or established as part of officially recognized standards (e.g., AN (Air Force-Navy Aeronautical Standard), AS (Aerospace Standard), MS (Military Standard), NAS (National Aerospace Standard)). |
| Laboratory Service Provider | Organization qualified to perform testing (e.g., chemical, metallurgical, electrical). |
| Special Process Supplier | Supplier that only provides special processes on Collins products (i.e., not a part manufacturing supplier). |

104. QUALITY MANAGEMENT SYSTEM (QMS)

104.1 General Requirements

104.1.1 Supplier receiving a purchase order from Collins shall be certified by an IAQG accredited Certification Body (CB) to [AS/EN/JISQ 9100](#).

104.1.2 All Distributors in the supply chain shall be certified by an industry accredited body to [AS/EN/JISQ 9100](#), [AS/EN/JISQ 9120](#), [ISO 9001](#), or [IATF16949:2016](#).

104.1.3 All Distributors of metals, electronics, and hardware in the supply chain shall be on the RTX QDL unless a directed Distributor is identified on the Purchase Order. (See definition for [RTX QDL](#), paragraph 103.4)

104.1.3.1 For the RTX QDL supplier shall use [ASQR-01 Form 9](#) to request and obtain approval prior to the use of any Distributor not on the [RTX QDL](#) when procuring metals, electronics, and hardware from a Distributor.

104.2 Communication with Collins

104.2.1 General Communication Requirements

104.2.1.1 Supplier shall only accept agreements and instructions in writing (e.g., purchase order, purchase order supplements/amendments, [ASQR-01 Forms](#) and Strategic Business Unit (SBU) forms or processes). Verbal agreements and instructions shall not be construed as Collins approval or authorization.

104.2.1.2 For communication with Collins, Supplier shall have the capability to communicate in English including the following documents unless otherwise approved by Collins:

- Quality manual
- First level Quality procedures
- Process documentation requiring Collins approval
- All formal communication (e.g., ASQR, UTCQR, and Collins-specific Forms, FAI, PPAP documents)

In cases where Supplier maintains copies in their native language as well as in English, and there is a conflict, the English language document shall take precedence.

104.2.2 Methods of Communication

104.2.2.1 Supplier shall adhere to Collins' form submission instructions (e.g., web-based, email) for each form listed in Table 2 or SBU equivalent.

104.2.2.2 Supplier shall notify Collins in writing, prior to implementation of any change that may affect quality and/or product fit, form, or function using [ASQR-01 Form 2](#) or SBU-equivalent (e.g., a change in; design characteristic, manufacturing or assembly process, inspection method, tooling, materials, numerical control program or translation to another media).

104.2.2.3 For all formal communications and requests with respect to Collins specific quality requirements the supplier shall submit [ASQR-01 Form 3](#) or SBU equivalent and may be used for items such as:

- Clarification, interpretation, or identified error with a drawing, specification, or requirement
- A request for an approval to use an alternate method to comply with an RTX and/or Collins quality system requirement (use of an alternate method is not permitted without prior Collins approval)

Note: [ASQR-01 Form 3](#) is used for communication only. It is not used for disposition of product non-conformances.

Table 2: Supplier Communication Forms

| Form | Name |
|--------------------------------|---|
| ASQR-01 Form 1 | ASQR-01 Audit Checklist |
| ASQR-01 Form 2 | Supplier Process Change Notification |
| ASQR-01 Form 3 | Supplier Request for Information |
| ASQR-01 Form 4 | Supplier Work Transfer Request |
| ASQR-01 Form 5 | Compliance Gap Analysis |
| ASQR-01 Form 6 | Notification of Potential Quality Escape |
| ASQR-01 Form 7 | Delegated Quality Representative (DQR) Candidate Application |
| ASQR-01 Form 8 | Letter of Agreement, Delegated Quality Representative Program |
| ASQR-01 Form 9 | RTX Distributor Request |

104.2.3 Prior to any work transfers (e.g., make to make, make to buy, buy to buy, buy to make) the supplier shall notify Collins via [ASQR-01 Form 4](#) . Prior approval shall be obtained when required by Collins.

Note: For guidelines on implementing a process for work transfer, reference the [IAQG SCM](#).

104.2.4 Supplier shall grant accessibility to Level 2 data in OASIS (e.g. registration documentation, certification, audit reports and findings, corrective actions) when requested by Collins.

Note: Collins may input significant/frequent escape data, major audit findings and delinquent responses into the OASIS database feedback process.

104.2.5 Supplier shall notify Collins using [ASQR-01 Form 3](#) or SBU equivalent of any changes in its certification, registration, or accreditation within 48 hours of receiving notification of the change.

104.2.6 Collins, its representatives, its customers and its customer’s governmental agencies and regulatory agencies shall have the right of entry into a supplier’s facility or that of their subcontractors, suppliers and/or business partners. Access will be provided to quality system documentation, quality records as well as the ability to conduct audits, verify product and processes.

104.3 Compliance and Requirements Flow down

104.3.1 Supplier shall comply with the latest revisions of ASQR, UTCQR, or Collins specific quality system requirements, and other documents referenced herein. Supplier shall establish compliance within 60 days of the document effective date unless otherwise specified in a Collins publication notification.

Note: [ASQR-01 Form 1](#) and [ASQR-01 Form 5](#) may be used to perform a gap analysis.

104.3.2 When utilizing Manufacturing, test, or support software or providing deliverable software the supplier shall comply with the requirements of [ASQR-07.5](#) or [AS9115](#) as directed.

104.3.3 Supplier shall reduce process risk and variation through the use of Process Failure Mode and Effects Analysis (PFMEA), control plans, and process control methods as defined in [UTCQR-09.1](#) or [AS9145](#) as required by Purchase Order.

104.3.4 For FOD Prevention, Supplier shall comply with the requirements of [AS/EN/JISQ 9146](#). In addition, this shall include program elements of cleanliness of manufacturing processes and residual magnetism.

Note: *Where a process could potentially induce residual magnetism, control of residual magnetism in product and associated tooling should be maintained within +/- 3 Gauss. Ferrous material should be inspected after all manufacturing operations have been completed and on all parts in the lot.*

104.4 Documented Information (maintained and retained)

104.4.1 Changes to documented information (e.g., work instructions, travelers, routers, test reports, shipping documents) shall be recorded, dated, and traceable to a qualified person making the change (e.g., name, signature, stamp, electronic signature) with a permanent marking method and the original information being legible and retrievable after the change.

104.4.2 Retention periods for retained documented information, needed to provide evidence of conformance, by part types are specified in Table 3:

Table 3: Retention Periods for Retained Documented Information

| Time Period (from date of manufacture) | Part Type |
|--|--|
| 40 years | Flight Safety Parts, Safety Parts, Flight Critical Parts as defined in ASQR-09.1 |
| 30 years | Manned Space Program Hardware |
| 10 years | All other parts |

104.5 Control of Non-Conforming Product

104.5.1 Supplier shall have a root cause and corrective action process consistent with the methodology in [ARP9136](#).

- 104.5.2 Within 24 hours of discovery of suspect non-conforming product having been shipped regardless of destination the supplier shall inform Collins using [ASQR-01 Form 6](#) or SBU equivalent.
- 104.5.3 All product rework shall have documented work instructions. Supplier shall request and obtain approval for rework of product subject to frozen process control.
- Note:** *Non-conforming product not subject to frozen process control, that can be reworked to meet all product requirements within the existing manufacturing process does not require Collins notification or request for approval/disposition.*
- 104.5.4 Upon implementation of corrective action, to ensure effectiveness, Supplier shall have a documented process in place to ensure that 100% over-inspection (i.e., additional independent measurement of the affected characteristic(s)) is performed of the deviated characteristics for a minimum of the next three consecutive manufactured lots (quantities of parts produced under conditions that are considered uniform) unless otherwise specified by Collins.
- 104.5.5 Collins may assign Key Characteristic requirements as specified in [UTCQR 09.1](#) or [AS9103](#) for significant escapes, repeated escapes, or recurrent concession requests.

105. PRODUCTION PLANNING AND CONTROL

105.1 Management of Supply Chain

- 105.1.1 The supplier shall ensure members of its supply chain are compliant to the applicable requirements of [AS/EN/JISQ 9100](#) and ASQR-01 (refer to Appendix 1 – Applicability).
- 105.1.2 To prevent and mitigate the use of counterfeit parts, supplier and all members of their supply chain, including Distributors, shall comply with the requirements of [AS5553](#) for electronic components and [AS6174](#) for non-electronic product.
- 105.1.3 The use of material and hardware with broken traceability or sourced from a non-authorized supplier is prohibited unless approved by Collins. Supplier shall request and obtain approval using [ASQR-01 Form 3](#) or SBU equivalent prior to shipment.

105.2 Production Process Validation

- 105.2.1 First Article Inspection (FAI)
- 105.2.1.1 An FAI shall be documented for all Collins product and performed in accordance with [AS9102](#).
- 105.2.2 Production Part Approval Process (PPAP) shall be implemented per the requirements contained in [ASQR-09.2](#) or [AS9145](#) when invoked by drawing related documents and/or purchase order(s).
- 105.2.3 When specified by Collins the supplier shall use identified systems to capture production process verification data (e.g., PPAP, FAI) and audit data.

105.3 Monitoring and Measurement of Equipment

- 105.3.1 Supplier management systems for the control of monitoring and measuring equipment shall meet one of the following requirements: [ISO 10012](#), [ISO 17025](#), or [ANSI/NCSL Z540.3](#). If using [ANSI/NCSL Z540.3](#), Supplier shall implement the requirements using the Handbook for the Interpretation of [ANSI/NCSL Z540.3](#).
- 105.3.2 Supplier shall document an impact review whenever monitoring and measuring equipment is identified with a Significant-Out-Of-Tolerance condition (an out of tolerance condition exceeding 25% of the product tolerance or when measured error of the monitoring and measuring equipment is greater than two times the calibration tolerance when product tolerance is not known) and notify Collins by submitting [ASQR-01 Form 6](#) or SBU equivalent within 24 hours of discovery if impacted product has been shipped.

105.4 Monitoring and Measurement of Product

- 105.4.1 Supplier shall select monitoring and measuring equipment with a minimum accuracy ratio of 4 to 1 (product tolerance to equipment tolerance) unless otherwise specified.
- 105.4.2 Supplier shall perform Measurement System Analysis (MSA) on all measurement systems used to measure KCs as defined in [UTCQR-09.1](#) or [AS9103](#).
- 105.4.3 When performing MSA, the supplier shall comply with the requirements listed in paragraph 105.4.2 with the following exception:
- The acceptable precision to tolerance ratio (Gage R&R) is $\leq 20\%$
- Note:** When determining critical, major, and minor features (characteristics) refer to AS9138.
- 105.4.4 Supplier shall have a process for on-going verification of visual acuity and color vision for individuals performing product inspection.
- 105.4.5 Inspection Sampling
- 105.4.5.1 Supplier shall comply with the requirements of [ASQR-20.1](#) or [AS9138](#) as required by the Collins SBU.
- 105.4.5.2 Product acceptance inspection shall be 100% for all characteristics until the inspection requirements of [ASQR-20.1](#) or [AS9138](#) have been achieved.
- 105.4.5.3 Approval of alternate inspection frequency plans shall be obtained from Collins using [ASQR-01 Form 3](#) or SBU equivalent.
- 105.4.6 Supplier shall request and obtain approval for the use of an Operator Certification program or special manufacturing methodologies (e.g., manufacturing controlling features, die/mold control and method of manufacturing), from Collins using [ASQR-01 Form 3](#) or SBU equivalent.

105.5 DQR/DPRV Programs

- 105.5.1 Supplier participation in Collins DQR/DPRV programs
- 105.5.1.1 When the supplier is defining its minimum system and personnel requirements for Collins DQR/DPRV programs it shall comply with AS9117.
 - 105.5.1.2 Approval for acceptance in Collins DQR Programs shall be requested and obtained using [ASQR-01 Form 8](#) once every three years.
 - 105.5.1.3 Collins approval for DQR candidates shall be requested and obtained using [ASQR-01 Form 7](#).
 - 105.5.1.4 For DQR training requirements, the supplier shall comply with [AS13001](#).
 - 105.5.1.5 DQR personnel shall successfully complete supplementary Collins's product, process, and procedural training within Collins-required timeframe to receive authorization to release product to Collins.
- 105.5.2 When Supplier has its own DPRV program (i.e., Supplier is the delegating organization), Supplier shall comply with the requirements of [AS9117](#) and [AS13001](#).

105.6 Special Processes

- 105.6.1 Special Process Suppliers shall have their QMS certified to [AS/EN/JISQ 9100](#) or Nadcap [AC7004](#).
- 105.6.2 All Special Process Suppliers in the supply chain shall be Nadcap accredited for the following special processes:
- Chemical Processing
 - Coatings
 - Heat Treating
 - Materials Testing Laboratories
 - Nonconventional Machining and Surface Enhancement
 - Nondestructive Testing
 - Welding
- Note:** *Special process categories are defined by Performance Review Institute (PRI). Additional Nadcap or International Laboratory Accreditation Cooperation (ILAC) requirements may be further defined by Collins.*
- 105.6.3 Design Responsible Supplier shall have a comprehensive special process management program in place for the special processes listed in paragraph 105.6.2.
- 105.6.3.1 The program shall include maintaining a list of qualified Special Process Suppliers along with their Nadcap approval status.

- 105.6.3.2 If Special Process Suppliers do not hold Nadcap certification, Design Responsible Supplier shall maintain appropriate oversight of internal and supplier processes including, but not limited to, onsite special process audits, periodic testing of product, and other means to validate product integrity.
- 105.6.4 Materials Testing Laboratories shall be accredited by either Nadcap or by signatories to the ILAC.

APPENDIX 1 – APPLICABILITY

Table A1 defines which paragraphs of this document apply to a Supplier based on the specific types of products or services provided by Supplier to Collins.

Supplier shall determine which paragraphs of this requirement apply to each Supplier Type by using:

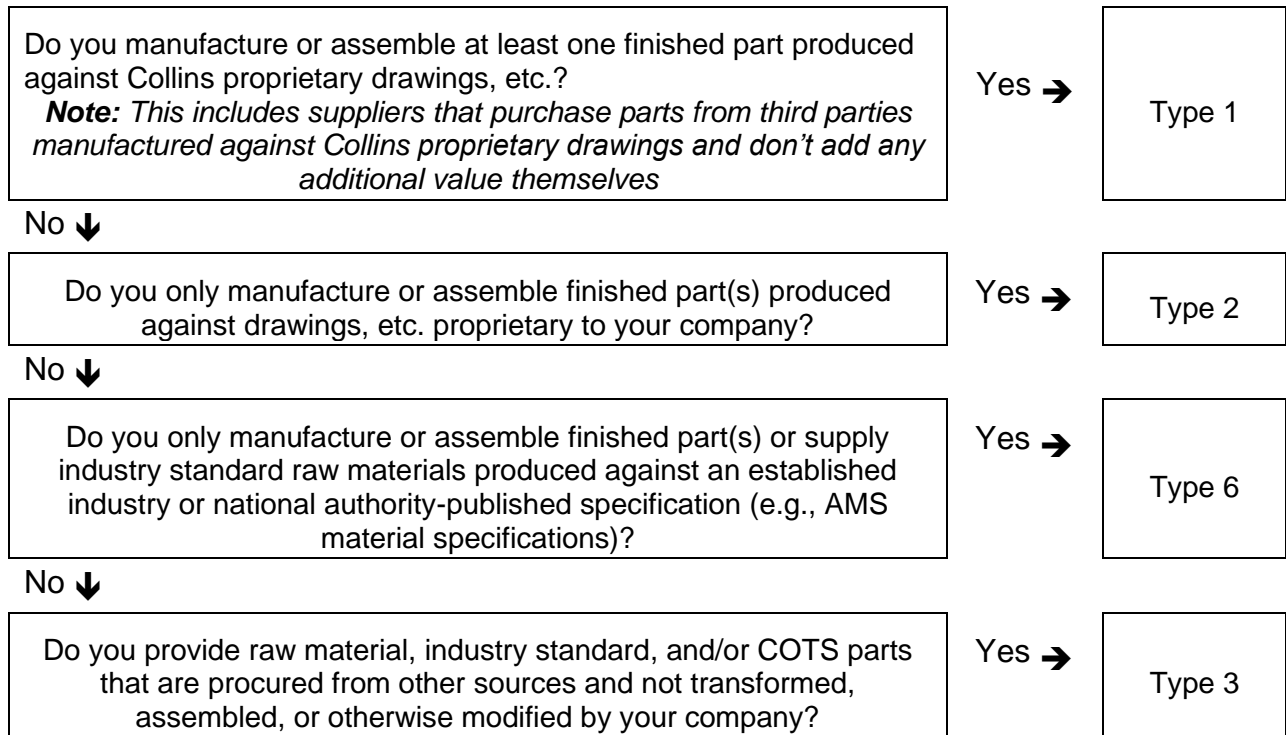
1. Figure A1 to determine their Supplier Type based upon the types of products delivered to and/or services performed for Collins; then
2. Table A1 to complete the appropriate compliance review (see paragraph 104.3.1). In the event that Supplier provides products or services described by two or more Supplier Types, the requirements for each Supplier Type shall apply to those products.

Supplier shall use the same approach to identify flow down contractual requirements that shall be included on Supplier purchase orders to its supply chain when procuring components, raw materials, or services related to products delivered to and/or services performed for Collins (see paragraph 105.1.1).

Figure A1: Supplier Type Identification

Supplier shall use the following flowchart to identify which of the Supplier Types defined in paragraph 103.5 applies to its organization. The same flowchart shall be used by its suppliers where ASQR-01 is a required contractual flow down.

For Hardware Providers:



For Service Providers:

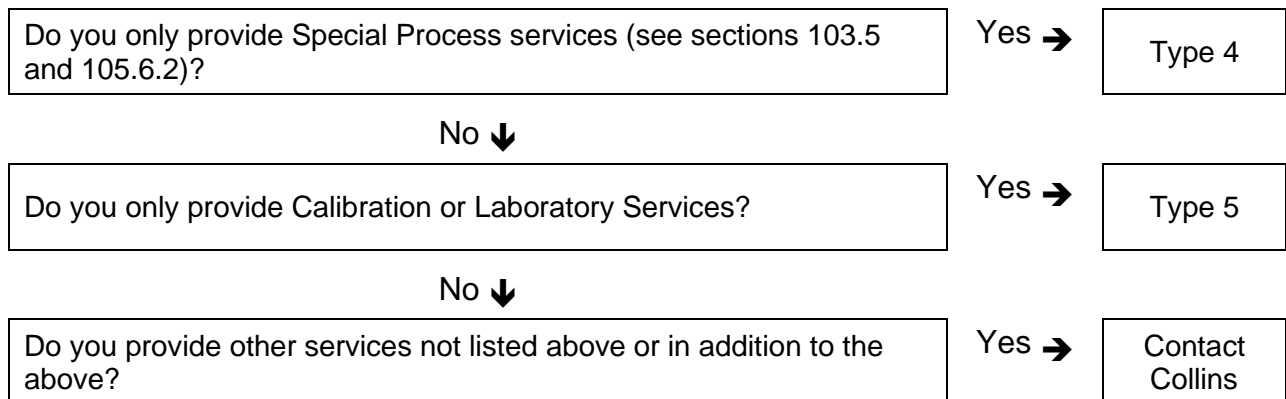


Table A1: ASQR-01 Applicability Table

| ASQR-01 Section | Type 1: BTP - Collins Design Part Manufacturer | Type 2: Design Responsible Supplier | Type 3: Distributor (any product type) | Type 4: Special Process Supplier | Type 5: Calibration or Laboratory Service Provider | Type 6: Industry Standard Part or Industry Standard Raw Material Manufacturer |
|------------------------|---|--|---|---|---|--|
| 104.1.1 | X | X | | | | |
| 104.1.2 | X | X | X | | | |
| 104.1.3 | X | | X | | | |
| 104.1.3.1 | X | | X | | | |
| 104.2.1 | X | X | X | X | X | X |
| 104.2.2.1 | X | X | X | X | X | X |
| 104.2.2.2 | X | | | X | | |
| 104.2.2.3 | X | X | X | X | X | X |
| 104.2.3-104.2.4 | X | X | X | X | | X |
| 104.2.5-104.2.6 | X | X | X | X | X | X |
| 104.3.1 | X | X | X | X | X | X |
| 104.3.2 | X | X | | X | X | |
| 104.3.3 | X | X | | X | | X |
| 104.3.4 | X | X | X | X | X | X |
| 104.4.1 | X | X | | X | X | X |
| 104.4.2 | X | X | X | X | X | X |
| 104.5.1-4.5.4 | X | X | X | X | X | X |
| 104.5.5 | X | X | | X | | X |
| 105.1.1 | X | X | X | | X | X |
| 105.1.2 | X | X | X | X | X | X |
| 105.1.3 | X | X | X | | | X |
| 105.2.1 | X | X | | | | X |
| 105.2.2 | X | X | | X | | X |
| 105.2.3 | X | X | X | X | X | X |
| 105.3.1 - 105.3.2 | X | X | X | X | X | X |
| 105.4.1-105.4.4 | X | X | X | X | X | X |
| 105.4.5-105.4.6 | X | X | | X | | X |
| 105.5.1 | X | X | X | X | | X |
| 105.5.2 | X | X | | | | X |
| 105.6.1-105.6.2 | | | | X | | |
| 105.6.3 | | X | | | | |
| 105.6.4 | X | | X | X | X | X |

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CHAPTER 2: QUALITY MANAGEMENT SYSTEM (QMS) REQUIREMENTS FOR P&W

1. SCOPE

The requirements of this document apply to all Organizations that furnish product, material, processes, or product related services to P&W as a contractual requirement regardless of Organization's industry, regulatory accreditation, or certification status, and each Organization shall be responsible for ensuring that all members of its supply chain comply with the requirements set forth herein.

Note: In this document the term, "Organization" refers to companies receiving a PO directly from P&W and the term "Supplier" refers to companies at a lower level providing product or services to Organizations.

2. INFORMATIVE REFERENCES

- 2.1 It is the responsibility of the Organization to obtain the latest revisions of all documents specified by this ASQR. These documents include, but may not be limited to, the following:

Table I: Documents Referenced in ASQR-01

| Document | Title |
|--------------------------------|---|
| AS9100* | Quality Management Systems – Requirements for Aviation, Space and Defense Organizations |
| AS13100 | AESQ Quality Management System Requirements for Aero Engine Design and Production Organizations |
| ASQR-07.5 | Control of Software |
| ASQR-09.1 | Flight Safety Parts Program |
| ASQR-20.1 | Supplier Sampling Requirements |
| IATF 16949 | Quality Management System |
| ISO 9001 | Quality Management |
| ISO 10012 | Measurement Management Systems – Requirements for Measurement Processes and Measuring Equipment |
| Nadcap AC 7004 | Nadcap: Quality Management System |
| UTCQR-09.1 | Process Certification Requirements |

**Developed under the auspices of the IAQG and listed here as SAE International "AS" publications. Equivalent versions may be published by other standards bodies (e.g., European Committee for Standardization (CEN), Japanese Standards Association/Society of Japanese Aerospace companies (JSA/SJAC).*

3. TERMS AND DEFINITIONS

Distributor

Organization carrying the purchase, storage, splitting, and sale of products and not transforming, assembling, or otherwise modifying purchased product. Distributors are limited to raw material, industry standard, and Commercial-Off-The-Shelf (COTS) parts.

***Note:** Suppliers that do perform per above but in addition purchase parts from third parties manufactured against P&W-proprietary drawings shall not be considered as Distributors.*

Input Data Sheet (IDS)

A summary completed by the RTX Member or Design Responsible Supplier to communicate Key Characteristics as defined by the output of the Design Risk Assessment.

Operator Certification

A method whereby an Operator, with the required training, has the capability to determine the acceptability or non-acceptability of parts they produce and/or inspect.

RTX Qualified Distributor List (RTX QDL)

The list of Distributors that are qualified by RTX to provide metals, electronics, and hardware.

***Note:** Electronics include electrical, electronic, and electro-mechanical components (e.g., connectors, wire, electronic components, terminals, lugs, pc boards, semiconductors). Hardware includes fasteners (e.g., nuts, bolts, rivets, washers, pins, screws, clamps, springs, seals, O-rings, ferrules, fittings). Metals include metallic raw materials (e.g., bar, sheet, plate, tube, wire, forging, casting, billet, ingot).*

Temporary Key Characteristic (TKC)

TKC's are applied to features subject of a dimensional escape and require short-term data collection and usage of process control tools as a means to validate the effectiveness of the corrective action submitted by Organizations.

4. QUALITY MANAGEMENT SYSTEM (QMS)

Organizations receiving a purchase order from P&W shall comply with the requirements of AS13100 and ASQR-01 Chapter 2. The following P&W company-specific requirements are aligned to the numbering scheme of AS9100 and AS13100.

***Note:** Where Reference Material documents (e.g. RM13004, RM13145) are referred to in AS13100, the contents of those Reference Material documents are not to be interpreted as establishing additional requirements to AS13100.*

4.3.1 Determining the scope of Quality Management System – Supplemental Requirements

The wording of AS13100 Section 4.3.1 paragraph 3 is replaced by, "The customer shall be notified in a timely manner of any significant changes per the notification requirements of AS13100 and this document."

The Organization shall comply with the latest revisions of ASQR, UTCQR, P&W-specific quality system requirements, and other documents referenced herein. The Organization shall establish compliance within 60 days of the document effective date unless otherwise specified in the P&W publication notification.

4.3.2 (Deliverable Software)

The requirements of AS13100 Section 4.3.2 are hereby replaced with the following requirement: the Organization shall comply with the requirements of [ASQR-07.5](#) when providing Deliverable Software.

Note: Definitions of Software are contained in [ASQR-07.5](#).

4.3.5 Table 2 QMS Certification Requirements

Organizations receiving a purchase order from P&W and their Suppliers shall be compliant to the requirements of AS13100 Table 2.

Exceptions to the above are the following:

- Type 1: Make to Print and Type 2A: Design and Manufacture Suppliers (i.e., suppliers to Organizations) shall only need to be compliant to [9100](#), not registered.
- Type 3 Distributors shall be certified to [AS/EN/JISQ 9120](#), [AS/EN/JISQ 9100](#), [ISO 9001](#), or [IATF16949:2016](#).
- Type 4: Special Process Suppliers shall be certified to [AS/EN/JISQ 9100](#) or Nadcap [AC7004](#).

Distributors of metals, electronics, and hardware in the supply chain shall be on the RTX QDL.

Distributors not on the RTX QDL (to include lower-tier suppliers) shall use [ASQR-01 Form 9](#) to request and obtain approval prior to delivering parts to Organizations and/or P&W.

Per 13100 Table 2 “QMS Certification Requirements” the QMS Approval requirement for Type 4: Special Process Organizations is replaced with the following: Organizations and Suppliers that only provide the following special processes on P&W products shall be certified to Nadcap [AC7004](#).

- Chemical Processing
- Coatings
- Heat Treating
- Nonconventional Machining and Surface Enhancement
- Nondestructive Testing
- Welding

Note: Special process categories are defined by Performance Review Institute (PRI). Nadcap or (ILAC) requirements may be further defined by P&W.

All other Organizations and Suppliers providing special processes on P&W products shall be certified to [AS/EN/JISQ 9100](#) or Nadcap [AC7004](#).

For AS13100 Table 2, “QMS certification requirements”, the certification requirement for External Calibration or Laboratory Service Providers (i.e., Nadcap Materials Testing Laboratories) is replaced with: “ISO/IEC 17025, ISO 10012, Nadcap [AC7004](#), or by signatories to the International Laboratory Accreditation Cooperation (ILAC)”.

7. SUPPORT

7.1.5.1 Monitoring and Measuring Resources - General

Significant-Out-Of-Tolerance (SOOT) condition is defined as an M&TE out-of-tolerance condition that either (a) exceeds 25% of the product tolerance (the maximum acceptable level of deviation from a product’s specification, measurements or standards), or (b) when measured error of the M&TE is greater than two times the calibration tolerance (the maximum acceptable deviation between the known standard and the calibrated device) when product tolerance is not known.

When M&TE is identified as SOOT, the Organization shall:

- Document the SOOT results in calibration records.
- Assess impact of the SOOT condition on product inspected with the SOOT M&TE since its last non-SOOT calibration.
- Notify P&W within 24 hours if it is determined that impacted parts could have been shipped (see section 10.2.3)
- Ensure corrective action measures to eliminate the SOOT condition and minimize product risk. Such measures may include but are not limited to
 - Adjustment or repair or replacement of M&TE
 - Review of future use of similar M&TE
 - Review of conditions that may have caused SOOT (e.g. improper usage, storage, or maintenance)
 - over inspection of potentially impacted production hardware

7.1.5.1.3 Confirm Acceptance - Supplemental Requirements

When performing Measurement System Analysis (MSA), the Organization shall comply with the requirements of AS13100 Table 4 MSA Acceptance Limits, with the following exception: The acceptable Gage Repeatability and Reproducibility (R&R) for all Characteristic Categories is $\leq 20\%$.

7.2.3 Delegated Product Release Verification (DPRV) Representative Training – Supplemental Requirements

DPRV personnel (Delegated Quality Representative (DQR) for P&W) shall be certified per the requirements of Supply Chain Operating Procedure (SCOP) SCOP DQR.

7.5.3.5 Documented Information Retention Periods – Supplemental Requirements

Retention periods shall be calculated based on the date of manufacture (i.e., AS13100 Section 7.5.3.5 Paragraph 2 does not apply to P&W products).

7.5.3.5.2 Retention Periods for Radiographs

Section 7.5.3.5.2 of AS13100 is hereby replaced with the following requirement:

Original nondestructive evaluation/testing process related records including, but not limited to, radiographic film must be maintained, in accordance with the retention period specified in Table II, by the source responsible for the final quality certification of the product, unless the source performing the nondestructive evaluation/testing activity is shipping direct to the customer on behalf of the Organization or Supplier.

Table II. Retention Periods for Radiographs and Images

| Time Period (from date of manufacture) | Part Type |
|---|--|
| 40 years | Flight Safety Parts, Safety Parts, Flight Critical Parts as defined in ASQR-09.1 |
| 10 years | Serialized parts |
| 2 years | Non-serialized parts |

8. OPERATION

8.1.3.1 Product Safety Supplemental Requirements

Organizations supplying Flight Safety Parts shall comply with the requirements of [ASQR-09.1](#).

Note: Some P&W-specific designations for Flight Safety Parts are: PW Flight Safety Part (FSP), PW Prime Reliable Part, PWC Critical Part, PWC Critical Rotating Part, PWC Engine Structural Integrity Program (ENSIP) Critical Part.

8.1.3.2 Product Safety

The Organization shall ensure that regular Product Safety communication is made to internal employees and external providers to ensure all individuals understand their contribution to product and service safety and its importance to overall product safety.

8.2.1.1 Customer Communication – Supplemental Requirements

The Organization shall adhere to P&W form submission instructions (e.g., web-based, email) for each form listed in Chapter 2 Table III.

The Organization shall submit [ASQR-01 Form 3](#) for all formal communications as defined by PW and PWC, and requests with respect to RTX and P&W-specific quality requirements unless otherwise listed in Chapter 2 Table III.

ASQR-01 Form 3 is used for items such as:

Clarification, interpretation, or identified error with a drawing, specification, or requirement.
A request for an approval to use an alternate method to comply with an RTX and/or P&W quality system requirement (use of an alternate method is not permitted without prior P&W approval)

Note: ASQR-01 Form 3 is used for communication only. It is not used for disposition of product non-conformances.

Table III: Organization Communication Forms

| Form | Name |
|--------------------------------|--|
| ASQR-01 Form 3 | <i>Supplier Request for Information</i> |
| ASQR-01 Form 4 | <i>Supplier Work Transfer Request</i> |
| ASQR-01 Form 5 | <i>Compliance Gap Analysis</i> |
| ASQR-01 Form 6 | <i>Notification of Potential Quality Escape</i> |
| ASQR-01 Form 7 | <i>Delegated Quality Representative (DQR) Candidate Application</i> |
| ASQR-01 Form 8 | <i>Letter of Agreement, Delegated Quality Representative Program</i> |
| ASQR-01 Form 9 | <i>RTX Distributor Request</i> |

8.4.2.1 Type and Extent of Control – Supplemental Requirements

AS13100 Section 8.4.2.1 Paragraph 4 is replaced by the following: The Organization shall ensure that the counterfeit part prevention process includes a mechanism for reporting counterfeit parts to the organization’s purchasing representative within 24 hours of it being confirmed.

When required by P&W, the Organization shall notify P&W via [ASQR-01 Form 4](#) prior to any planned work transfers (e.g., from one Organization facility to another, from the Organization to a member of its supply chain, from one member of its supply chain to another). When required by P&W, prior approval is required. P&W reserves the right to require additional substantiating data or quality controls.

8.5 Release of Product and Services

When specified by P&W, the Organization shall use the P&W online system to capture production process verification data (e.g., PPAP, FAI) and audit data.

8.5.1.1 Control of Equipment Tools and Software programs

The Software Quality Assurance program requirements of AS13100 Section 8.5.1.1, are replaced by the following: Organization shall comply with the requirements of [ASQR-07.5](#) when utilizing non-deliverable software such as, Manufacturing, Test, Inspection or Support Software.

Note: Definitions of Software are contained in [ASQR-07.5](#)

8.5.1.4.1 Control of Product and Service Provision – Supplemental Requirements

The use of handheld spectrometry devices, or equivalent, to verify 100% of material input at the part manufacturer only applies if required by P&W.

8.5.1.4.3 Control of Product and Service Provision – Supplemental Requirements

AS13100 Section 8.5.1.4.3 Bullet 3, is replaced by the following: Unless otherwise specified, the lighting intensity for inspection where visual acceptance is performed shall be 100 foot candles or 1076 LUX minimum, measured at the inspection surface of the part.

8.5.1.5 Product Process Verification – Supplemental Requirements

Upon request of P&W, Organizations shall compute PFMEA risks using the Action Priority method. (see RM13004 for the preferred Action Priority method).

8.5.1.6 First Article Inspection (FAI) – Supplemental Requirements.

The following is added to bullet #4:

- If part marking re-approval is required when process changes occur that may impact the accepted conditions on the original part marking approval.

Note: On an exception basis where part marking process changes affect a group of parts, with prior approval from P&W, part family/grouping validation may be acceptable.

Note: Where part marking changes are related to a new revision of the part, and with submission of an appropriate photo for archive purposes, a side-by-side inspection could be used for validation purposes.

The following is added as bullet #9:

- Include a replication of product part marking (e.g., photograph or sample) that represents production marking within the FAI Report.

Note: To ensure correct part marking, approval can be obtained from P&W prior to FAI submission.

8.5.1.9 Appointment of Competent Person, Including Any Required Qualification – Supplemental Requirements

The Organization shall request and obtain approval for the use of an Operator Self-Verification Program – also known as Operator Certification Program - or special manufacturing methodologies (e.g., manufacturing controlling features, die/mold control and method of manufacturing) from P&W using ASQR-01 Form 3, unless otherwise specified.

9. PERFORMANCE EVALUATION

9.1.1.2 Alternate Inspection Frequency Plan

Product acceptance inspection shall be 100% for all characteristics unless the Organization meets to the requirements of [ASQR-20.1](#).

Alternate sampling plans as defined in [ASQR 20.1](#) and sampling plans requiring Customer approval per [ASQR 20.1](#) shall be submitted for approval using [ASQR-01 Form 3](#). Documented P&W approval is required prior to implementation.

Note: Any alternate sampling plan outlined in [RM13002](#) is considered an alternate sampling plan and requires P&W approval prior to implementation.

9.2.3 Internal Audit – Supplemental Requirements

The Organization shall determine their Audit Plan per AS13100 Section 9.2.3. Requirements stated in Table 9 Internal Audit Types and Frequency - for Production Process and Product Audits, the requirements of Table 9 are replaced with the following: Organization shall ensure that Product and Production Process Audits are incorporated into the Organization's annual risk analysis (see AS13100 Section 6.1.3).

10. IMPROVEMENT

10.2.3 Problem Solving Methods for Customer Escapes - Supplemental Requirements

10.2.3.1 Corrective Action Verification

The Organization shall inform P&W using [ASQR-01 Form 6](#) within 24 hours upon discovery of suspect non-conforming product having been shipped regardless of destination.

Upon implementation of corrective action, to ensure effectiveness, the Organization shall have a documented process in place to ensure that 100% over-inspection (i.e., additional independent measurement of the affected characteristic(s)) is performed of the deviated characteristics for a minimum of the next three consecutive manufactured lots (quantities of parts produced under conditions that are considered uniform) unless otherwise specified by P&W.

10.2.3.2 Temporary Key Characteristics

P&W reserves the right to assign TKC's to parts in the event of a dimensional escape with the purpose of validating the effectiveness of the Organization's corrective action. TKCs shall be treated in the same manner as more permanent KC's (e.g. KPC1, KPC2, IDS KC, KPC-M) as defined in this document. In the event a TKC is deployed, P&W may require the Organization to:

Conduct a Gage Repeatability & Reproducibility study per RM13003 with the goal of achieving a Percent-To-Tolerance Ratio \leq 20%.

Conduct a short-term Process Capability Study (Ref RM13006) by collecting a minimum of 25 consecutive pieces over two different manufacturing lots, demonstrating on a SPC control chart statistical control, and achieving a Cpk \geq 1.33. Unless otherwise approved by P&W, once these thresholds are met all TKCs are removed and the Organization's corrective action is considered to have been validated.

AS13100 Chapter B: 9145 – Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP) - AESQ Supplemental Requirements

Organizations shall comply with the requirements of AS13100 Chapter B and C when PPAP is invoked pursuant to a Purchase Order (PO) or any other contractual document issued by the P&W. (e.g. PW - QA 6100, PWC - PO clause).

17. (5. - 9145) PRODUCTION PART APPROVAL PROCESS (PPAP) REQUIREMENTS

17.1 P&W-specific submission requirements for PPAP

The Organization shall submit a PPAP project plan (reference AS9145 Section 4.3 Phase 1 Requirements - Planning) with the commit dates to complete each PPAP Element to their P&W Member Focal Point (MFP) for approval within 15 business days of P&W Purchase Order issuance. Failure to meet these commit dates may result in revoking the ability to ship hardware and require submission of new dates with a detailed justification.

The Organization shall submit all PPAP planning & objective evidence utilizing P&W's electronic system/PPAP software application. In the event the software system is not available, the Organization shall contact their P&W MFP for submission requirements.

The PPAP requirement is applicable to all members of the supply chain. The Organization shall flow down the requirements of PPAP to all levels of the supply chain (internal and external) and maintain records of their compliance. A risk-based decision process may be used to assess PPAP applicability of supply chain components and operations when approved by P&W. Any risk-based process used to determine applicability of PPAP to any level of the supply chain shall be documented and approved by the MFP. Upon a satisfactory internal review, the Organization shall submit all approved PPAP Approval Forms and objective evidence from all levels of its supply chain.

The Organization shall initiate a deferral request at the time that it is identified the planned PPAP timing cannot be met via the P&W online PPAP software application or using the ASQR-09.2 Form 1 and PPAP Deferral Form (ASQR- 09.2 Form 2), attaching a PPAP Element 9 (FAIR) and Element 10.1 (Part Marking Approval) to authorize the shipment of production parts prior to achieving Full or Interim Approval.

Note: Reference 9145 Section 5.4 for PPAP resubmission based on product or process changes.

17.2 Production Part Approval Process File and Submission

The PPAP File shall:

- Be part number specific. The following Elements may be satisfied using a part or process family methodology with all unique characteristics accounted for with approval from P&W:
 - 2 Design Risk Analysis (DRA)
 - 3 Process Flow Diagram (PFD)
 - 4 Process Failure Modes and Effects Analysis (PFMEA)
 - 5 Control Plan
 - 6 Measurement Systems Analysis (MSA)
 - 8 Packaging, Preservation and Labeling Approvals
- Be maintained by the Organization at the manufacturing location
- Be maintained with all applicable items up-to-date and represent the current production process regardless of whether P&W requests a formal submission
- Contain copies of all PPAP approvals including objective evidence

When PPAP requirements have not been completely fulfilled, the Organization may submit the PPAP Package and partially completed Elements for review. Elements identified as incomplete shall contain an action plan to achieve closure of any open item(s) including the commitment of actions, target dates, and owners to achieve Full Approval.

The Organization shall obtain authorization via the P&W online PPAP software application or the MFP via ASQR-09.2 Form 1 with the following possible PPAP dispositions:

- Full Approval
- Interim A Approval
- Interim B Approval
- Rejected (not authorized to ship)

Interim B Approval indicates a gap between the PPAP requirements and the Organization's current status on the following Elements:

- 2 – Design Risk Analysis (DRA)
- 4 – Process Failure Modes and Effects Analysis (PFMEA)
- 6 – Measurement Systems Analysis (MSA)
- 7 – Initial Process Capability Studies
- 9 – First Article Inspection Report (FAIR)
- 10.2 – Production Process Run(s)

Interim A Approval indicates a gap between the PPAP requirements and the Organization's current status on the following Elements:

- 7 – Initial Process Capability Studies
- 10.2 – Production Process Runs

Interim Approval expires with the PPAP plan date for Interim A and/or Full Approval. A new submission or updated commit dates dispositioned by the MFP is required to continue shipment of production parts.

The Organization shall initiate a deferral request at the time that it is identified the planned PPAP timing cannot be met via the P&W online PPAP software application or using the PPAP Deferral Form (ASQR- 09.2 Form 2), attaching a PPAP Element 9 (FAIR) and Element 10.1 (Part Marking Approval) to authorize the shipment of production parts prior to achieving Full or Interim Approval.

Note: *Deferrals are only approved on a very limited basis.*

A deferral shall contain a detailed justification with the reasoning PPAP approval cannot be met at that time, the need for the deferral, and an action plan for meeting PPAP requirements. All deferral requests must be accepted and concurred with by the MFP, Quality, and Procurement leadership.

Where there are current technology limitations or it is prohibitively expensive to satisfy the process stability, process capability, and/or production yield requirements of this section, the Organization shall submit a request for exception via the online PPAP system. P&W-specific forms may be used in the event the online system is not available.

Note: *Requests for exemptions are only available for Initial Process Capability Studies and Production Process Run(s) Elements.*

The Organization shall review applicable Elements as part of any corrective action (e.g., QNs, escapes, P&W/Certification Body/Regulatory audit findings, negative trending of Cost of Poor Quality, Product KC (e.g. KPC1, KPC2, IDS KC) and Process KC (e.g. KPC-M)) to determine the impact and update affected Elements where appropriate as per 9145 Section 5.4. (Reference AS13100 & RM13000)

17.2.3 Production Part Approval Process File and Submission - Supplemental Requirements

Table 13 - AESQ PPAP elements requirement

PPAP ELEMENT 6: Measurement System Analysis - Supplemental Requirements

Gage Repeatability & Reproducibility (Gage R&R) studies shall have a Precision-to-Tolerance (P/T) ratio of $\leq 20\%$ unless a lower maximum ratio is required by P&W.

Where attribute data is used to assess feature acceptability (e.g., pass/fail criteria), the following criteria shall be used to determine acceptance of the measurement system: Pass/Fail: Attribute agreement $\geq 90\%$ or Kappa ≥ 0.8

PPAP ELEMENT 10: PW SPECIFIC REQUIREMENTS: Part Marking Approval

The Organization shall document all part marking requirements are met by obtaining approval from P&W.

PPAP ELEMENT 10: PW SPECIFIC REQUIREMENTS: Production Process Run(s):

A Production Readiness Review (PRR) should be completed prior to the Production Process Run to verify that the manufacturing process is documented and ready for production while operating at the customer demand rate. Upon P&W request, the Organization shall record and submit the results of the review, including corrective action to resolve any identified risks or issues.

The Production Process Run(s) shall be performed at the intended production site(s) under production conditions (i.e., tooling, gauges, processes, sequence, operations, instructions, materials, personnel, environment) to demonstrate the ability to satisfy P&W requirements.

The Organization shall track and document the defect rate of all parts produced during the Production Process Run.

Subsequent to the complete FAIR the Organization shall perform and document one additional dimensional report (AS9102 Form 3 or equivalent form may be used) at the end of the Production Process Run yielding 25 consecutive pieces with no QNs.

The following acceptance criteria for the evaluation of the Production Process Run results shall be applied.

Table 2

| Approval Level | Results | Interpretation |
|----------------|--|--|
| Full | Minimum 25 consecutive parts with no QNs and second dimensional report | The process satisfies the acceptance criteria. |
| Interim A | 90% part yield. Minimum 25 consecutive samples | The process does not meet the acceptance criteria. The Organization shall implement Corrective Action as necessary and continue data collection. |
| Interim B | FAIR with data from any additional parts available at time of submission | |

18. AESQ SUPPLY CHAIN RISK MANAGEMENT PROCESS - SUPPLEMENTAL REQUIREMENTS

The requirements of AS13100 Section 18 are presented as a best practice and not mandatory deliverables for P&W.

21. KEY REQUIREMENTS FOR THE DEPLOYMENT OF QUALITY PLANNING TOOLS – SUPPLEMENTAL REQUIREMENTS

21.8 Initial Process Capability Studies - Supplemental Requirements

The following acceptance criteria for the evaluation of initial process study results shall be applied:

Note: Data collected from development or pre-production parts can be considered, provided the same tooling, equipment, and processes intended for production are used.

Table1

| Approval Level | Results | Interpretation |
|----------------|--|--|
| Full | IDS KC: Cpk > 1.33 Process KC: Cpk > 1.00 Attribute: 45 in a row with no QNs Sample Size: Minimum 25 consecutive samples for Variable data | The process satisfies the acceptance criteria. The Organization shall determine acceptability of Organization defined process KCs based on internal requirements |
| Interim A | IDS KC: Cpk > 1.00 Process KC: Cpk > 1.00 Attribute: Yield > 90% Sample Size: Minimum 25 consecutive samples for both Variable and Attribute data | The process does not meet the acceptance criteria. The Organization shall investigate root cause, implement corrective actions and process control methods to ensure conformance. Mitigation plans shall be approved by P&W. |
| Interim B | Cpk < 1.00 Attribute: Yield < 90% Out-of-control conditions Insufficient sample size | |

Note 1: Ppk may be used in place of Cpk when capability is being calculated for non-normal distributions.

Note 2: Execution of this PPAP Element does not automatically grant any sampling authorization. For RTX Supplier sampling requirements, refer to [ASQR-20.1](#).

When an Organization reaches PPAP Interim A/Full Approval levels, process capability shall be maintained per Table 1 above through life of production. Organization shall monitor stability, control (i.e., use of SPC control chart) and process capability index (e.g., CpK/PpK). When the process is not meeting the required control and capability thresholds, the Organization shall assure the appropriate reaction plan if followed that is documented in the Control Plan and/or work instructions and take improvement actions to bring the process capability back to a minimum of Cpk/Ppk =1.33 for KPC/KC features and a minimum of Cpk/Ppk = 1.0 for Organization identified KC's, while under statistical control.