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## Supplier Quality System Requirements

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### INTRODUCTION

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

Pratt & Whitney	PW
Pratt & Whitney Canada	P&WC
UTC Aerospace Systems	UTAS

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. This document identifies unique requirements for UTC Member companies.

When a supplier provides product or service to more than one Member, 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 \(SCMH\)](#).

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**REVISION SUMMARY**

This document has been significantly revised and restructured to be independent of the AS9100 numbering scheme.

**1. SCOPE**

The requirements of this document apply to all suppliers that furnish product, material, processes, or product related services to any Member 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.

**2. NORMATIVE REFERENCES**

- 2.1 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
<a href="#">ANSI/NCSL Z540.3</a>	Requirements for the Calibration of Measuring and Test Equipment
<a href="#">AS5553</a>	Fraudulent/Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition
<a href="#">AS6174</a>	Counterfeit Materiel; Assuring Acquisition of Authentic and Conforming Materiel
<a href="#">AS9100*</a>	Quality Management Systems – Requirements for Aviation, Space and Defense Organizations
<a href="#">AS9102*</a>	Aerospace First Article Inspection Requirement
<a href="#">AS9117*</a>	Delegated Product Release Verification
<a href="#">AS9120*</a>	Quality Management Systems Requirements for Aviation, Space, and Defense Distributors
<a href="#">AS9146*</a>	Foreign Object Damage (FOD) Prevention Program - Requirements for Aviation, Space, and Defense Organizations
<a href="#">AS13000</a>	Problem Solving Requirements for Suppliers
<a href="#">AS13001</a>	Delegated Product Release Verification Training Requirements
<a href="#">AS13002</a>	Requirements for Developing and Qualifying Alternate Inspection Frequency Plans



Document	Title
<a href="#">AS13003</a>	Measurement Systems Analysis Requirements for the Aero Engine Supply Chain
<a href="#">ASQR-07.5</a>	Control of Software
<a href="#">ASQR-09.1</a>	Flight Safety Parts Program
<a href="#">ASQR-09.2</a>	UTC Production Part Approval Process (PPAP)
<a href="#">ASQR-20.1</a>	Supplier Sampling Requirements
<a href="#">IAQG SCMH</a>	IAQG Supply Chain Management Handbook
<a href="#">IATF 16949</a>	Quality Management System
<a href="#">ISO 9001</a>	Quality Management
<a href="#">ISO 10012</a>	Measurement Management Systems – Requirements for Measurement Processes and Measuring Equipment
<a href="#">ISO 17025</a>	General Requirements for the Competence of Testing and Calibration Laboratories
<a href="#">Nadcap AC 7004</a>	Nadcap: Quality Management System
<a href="#">UTCQR-09.1</a>	Process Certification Requirements
<a href="#">UTC QDL</a>	UTC 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).*

### 3. TERMS AND DEFINITIONS

#### 3.1 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](#)).

#### 3.2 Designated Quality Representative (DQR) Program

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

### 3.3 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.

### 3.4 UTC Qualified Distributor List (QDL)

The list of Distributors that are qualified by UTC 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).*

### 3.5 Supplier Types

The Supplier Types used in this document are as follows:

BTP - UTC Member Design Part Manufacturer	<p>Supplier of products and/or assemblies with Member-designated part numbers as defined on proprietary Member drawings or other technical definitions (also known as Build To Print (BTP) parts).</p> <p><b>Note 1:</b> <i>Castings and forgings are considered BTP - UTC Member Design Parts</i></p> <p><b>Note 2:</b> <i>This includes suppliers that purchase parts from third parties manufactured against Member proprietary drawings even though they may not add any additional value themselves</i></p>
Calibration Service Provider	<p>Organization qualified to perform calibration services on Measuring and Test Equipment (monitoring and measuring equipment) used in the production of Member products.</p>
Design Responsible Supplier	<p>Supplier of products defined by a design/drawing proprietary to that supplier and linked to a Member part number through the use of a Member-referenced drawing and/or other purchase order requirements (e.g., Category 1, Source Control, Source Design, Engineered Item).</p> <p><b>Note:</b> <i>Member-referenced drawings may contain additional Member requirements in addition to ASQR-01 requirements.</i></p>



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 Member products (i.e., not a part manufacturing supplier).

**4. QUALITY MANAGEMENT SYSTEM (QMS)**

**4.1 General Requirements**

- 4.1.1 Supplier receiving a purchase order from Member shall be certified by an IAQG accredited Certification Body (CB) to [AS/EN/JISQ 9100](#).
- 4.1.2 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](#).
- 4.1.3 All Distributors of metals, electronics, and hardware in the supply chain shall be on the UTC QDL. (See definition for [UTC QDL](#), paragraph 3.4)
  - 4.1.3.1 Supplier shall use [ASQR-01 Form 9](#) to request and obtain approval prior to the use of any Distributor not on the [UTC QDL](#) when procuring metals, electronics, and hardware from a Distributor.

**4.2 Communication with the UTC Member**

**4.2.1 General Communication Requirements**

- 4.2.1.1 Supplier shall only accept agreements and instructions in writing (e.g., purchase



order, purchase order supplements/amendments, [ASQR-01 Forms](#)). Verbal agreements and instructions shall not be construed as Member approval or authorization.

- 4.2.1.2 For communication with the Member, Supplier shall have the capability to communicate in English including the following documents unless otherwise approved by the Member:
- Quality manual
  - First level Quality procedures
  - Process documentation requiring Member approval
  - All formal communication (e.g., ASQR, UTCQR, and Member-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.

#### 4.2.2 Methods of Communication

- 4.2.2.1 Supplier shall adhere to Member form submission instructions (e.g., web-based, email) for each form listed in Table 2.
- 4.2.2.2 Supplier shall notify Member in writing, prior to implementation of any change that may affect quality and/or product fit, form, or function using [ASQR-01 Form 2](#), as required by member. (e.g., a change in; design characteristic, manufacturing or assembly process, inspection method, tooling, materials, numerical control program or translation to another media)
- 4.2.2.3 Supplier shall submit [ASQR-01 Form 3](#) for all formal communications and requests with respect to UTC and Member-specific quality requirements unless otherwise listed in Table 2. [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 a UTC and/or Member quality system requirement (use of an alternate method is not permitted without prior Member 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**

<i>Form</i>	<i>Name</i>	<i>Paragraph Referenced</i>
<a href="#">ASQR-01 Form 1</a>	<i>ASQR-01 Audit Checklist</i>	4.3.1
<a href="#">ASQR-01 Form 2</a>	<i>Process Change Notification</i>	4.2.2.3
<a href="#">ASQR-01 Form 3</a>	<i>Supplier Request for Information</i>	4.2.1.1 4.2.2.1 5.1.3 5.2.2.5 5.4.5.3 5.4.6
<a href="#">ASQR-01 Form 4</a>	<i>Supplier Work Transfer Request</i>	4.2.3
<a href="#">ASQR-01 Form 5</a>	<i>Compliance Gap Analysis</i>	4.3.1
<a href="#">ASQR-01 Form 6</a>	<i>Notification of Potential Quality Escape</i>	4.5.2 5.3.2
<a href="#">ASQR-01 Form 7</a>	<i>Delegated Quality Representative (DQR) Candidate Application</i>	5.5.1.3
<a href="#">ASQR-01 Form 8</a>	<i>Letter of Agreement, Delegated Quality Representative Program</i>	5.5.1.2
<a href="#">ASQR-01 Form 9</a>	<i>UTC Distributor Request</i>	4.1.3

4.2.3 Supplier shall notify the Member via [ASQR-01 Form 4](#) prior to any planned work transfers (e.g., from one supplier facility to another, from the supplier to a member of its supply chain, from one member of its supply chain to another). Prior approval shall be obtained when required by Member.

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

4.2.4 Supplier shall permit Member access to all data in OASIS and Nadcap databases (e.g., registration documentation, certification, audit reports and findings, corrective actions).

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

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

4.2.6 Each Member, 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.

### 4.3 Compliance and Requirements Flow down

- 4.3.1 Supplier shall comply with the latest revisions of ASQR, UTCQR, Member-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 the Member publication notification.

**Note:** *The recommended method to perform a gap analysis of the requirements of this document is with [ASQR-01 Form 1](#) and [ASQR-01 Form 5](#).*

- 4.3.2 Supplier shall comply with the requirements of [ASQR-07.5](#) when
- utilizing Manufacturing, Test, or Support Software
  - providing Deliverable Software

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

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

**Note:** *Some Member-specific designations for Flight Safety Parts (FSP) include Flight Critical Parts, UTAS Flight Safety Part, UTAS Safety Part, P&W Prime Reliable Part, P&WC Critical Part, P&WC Critical Rotating Part, P&WC Engine Structural Integrity Program (ENSIP) Critical Part.*

- 4.3.4 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](#).

- 4.3.5 Supplier shall comply with the requirements of [AS/EN/JISQ 9146](#) for FOD Prevention Programs and include cleanliness of manufacturing processes and residual magnetism as additional program elements.

**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.*

### 4.4 Documented Information (maintained and retained)

- 4.4.1 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.

- 4.4.2 Retention periods for retained documented information, needed to provide evidence of conformance, by part types are specified in Tables 3 and 4:

**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 <a href="#">ASQR-09.1</a>
30 years	Manned Space Program Hardware
10 years	All other parts

**Table 4: 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 <a href="#">ASQR-09.1</a>
10 years	Serialized parts
2 years	Non-serialized parts

#### 4.5 Control of Non-Conforming Product

- 4.5.1 Supplier shall have a root cause and corrective action process consistent with the 8D methodology in [AS13000](#).
- 4.5.2 Supplier shall inform Member using [ASQR-01 Form 6](#) within 24 hours of discovery of suspect non-conforming product having been shipped regardless of destination.
- 4.5.3 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 Member notification or request for approval/disposition.*

- 4.5.4 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 the Member.
- 4.5.5 Member may assign Key Characteristic requirements as specified in [UTCQR 09.1](#) for significant escapes, repeated escapes, or recurrent concession requests.

## 5. PRODUCTION PLANNING AND CONTROL

### 5.1 Management of Supply Chain

- 5.1.1 Supplier shall ensure that members of its supply chain are compliant to the applicable requirements of [AS/EN/JISQ 9100](#) and ASQR-01 (refer to Appendix 1 – Applicability).
- 5.1.2 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.
- 5.1.3 The use of material and hardware with broken traceability or sourced from a non-authorized supplier is prohibited unless approved by Member. Supplier shall request and obtain approval using [ASQR-01 Form 3](#) prior to shipment.

### 5.2 Production Process Validation

- 5.2.1 Supplier shall only ship product which is identified with Member acceptance symbols to Member or Member-approved destinations.
- 5.2.2 First Article Inspection (FAI)
- 5.2.2.1 An FAI shall be documented for all Member product and performed in accordance with [AS9102](#).
- 5.2.2.2 A replication of product part marking (e.g., photograph or sample) that represents production marking shall be included within the FAI Report.
- Note:** *To ensure correct part marking, approval can be obtained from Member prior to FAI submission.*
- 5.2.2.3 For an assembly level FAI, all lower level and detail FAIs shall be included in the FAI Report.
- 5.2.2.4 Additional requirements for [AS9102 FAI Form 1](#):
- Field 11, Supplier Code: Record Member-assigned supplier code
  - Field 12, Purchase Order Number: Record Member purchase order number
- 5.2.2.5 Additional requirements for [AS9102 FAI Form 3](#):
- Field 14, for each characteristic: Record type of inspection measuring equipment used (e.g., gage name, type, description) and inspector identification (e.g., signature, stamp, electronic authorization) of the person that accomplished the inspection
- 5.2.3 Supplier shall implement the UTC Production Part Approval Process per the requirements contained in [ASQR-09.2](#) when invoked by drawing related documents, purchase order, or any other contractual requirement.



5.2.4 When specified by the Member, Supplier shall use the Member online system to capture production process verification data (e.g., PPAP, FAI) and audit data.

### **5.3 Monitoring and Measurement of Equipment**

5.3.1 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](#).

5.3.2 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 the Member by submitting [ASQR-01 Form 6](#) within 24 hours of discovery if impacted product has been shipped.

### **5.4 Monitoring and Measurement of Product**

5.4.1 Supplier shall select monitoring and measuring equipment with a minimum accuracy ratio of 4 to 1 (product tolerance to equipment tolerance) unless otherwise specified.

5.4.2 Supplier shall perform MSA on all measurement systems used to measure KCs as defined in [UTCQR-09.1](#).

5.4.3 When performing MSA, supplier shall comply with the requirements of [AS13003](#) Table 2 with the following exception:

- The acceptable precision to tolerance ratio (Gage R&R) is  $\leq 20\%$

**Note 1:** *Appropriate action should be taken to improve the measurement process when the requirements of [AS13003](#) Table 2 have not been achieved.*

**Note 2:** *Refer to [ASQR-20.1](#) for determination of critical, major, and minor features (characteristics).*

5.4.4 Supplier shall have a process for on-going verification of visual acuity and color vision for individuals performing product inspection.

#### 5.4.5 Inspection Sampling

5.4.5.1 Supplier shall comply with the requirements of [ASQR-20.1](#).

5.4.5.2 Product acceptance inspection shall be 100% for all characteristics until the inspection requirements of [ASQR-20.1](#) have been achieved.

5.4.5.3 Supplier shall request and obtain approval of alternate inspection frequency plans (e.g., [AS13002](#)), from Member using [ASQR-01 Form 3](#).

5.4.6 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 Member using [ASQR-01 Form 3](#).

### 5.5 DQR/DPRV Programs

#### 5.5.1 Supplier participation in Member DQR/DPRV programs

5.5.1.1 Supplier shall comply with [AS9117](#) in defining its minimum system and personnel requirements for Member DQR/DPRV programs.

5.5.1.2 Supplier shall request and obtain approval for acceptance in Member DQR Programs using [ASQR-01 Form 8](#) once every three years.

5.5.1.3 Supplier shall request and obtain approval from the Member for DQR candidates using [ASQR-01 Form 7](#).

5.5.1.4 Supplier shall comply with [AS13001](#) for DQR training requirements.

5.5.1.5 DQR personnel shall successfully complete supplementary Member product, process, and procedural training within the Member-required timeframe in order to receive authorization to release product to Member.

5.5.2 When Supplier has its own DPRV program (i.e., Supplier is the delegating organization), Supplier shall comply with the requirements of [AS9117](#) and [AS13001](#).

### 5.6 Special Processes

5.6.1 QMS certification: Special Process Suppliers shall be certified to [AS/EN/JISQ 9100](#) or Nadcap [AC7004](#).

5.6.2 Special Process certification: 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). Nadcap or International Laboratory Accreditation Cooperation (ILAC) requirements may be further defined by the Member.*

5.6.3 Design Responsible Supplier shall have a comprehensive special process management program in place for the special processes listed in paragraph 5.6.2.

5.6.3.1 The program shall include maintaining a list of qualified Special Process Suppliers along with their Nadcap approval status.

5.6.3.2 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.

5.6.4 Accreditation by either Nadcap or by signatories to the ILAC is required for materials testing laboratories.



## **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 Member.

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 Member; then
2. Table A1 to complete the appropriate compliance review (see paragraph 4.3.1). 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.

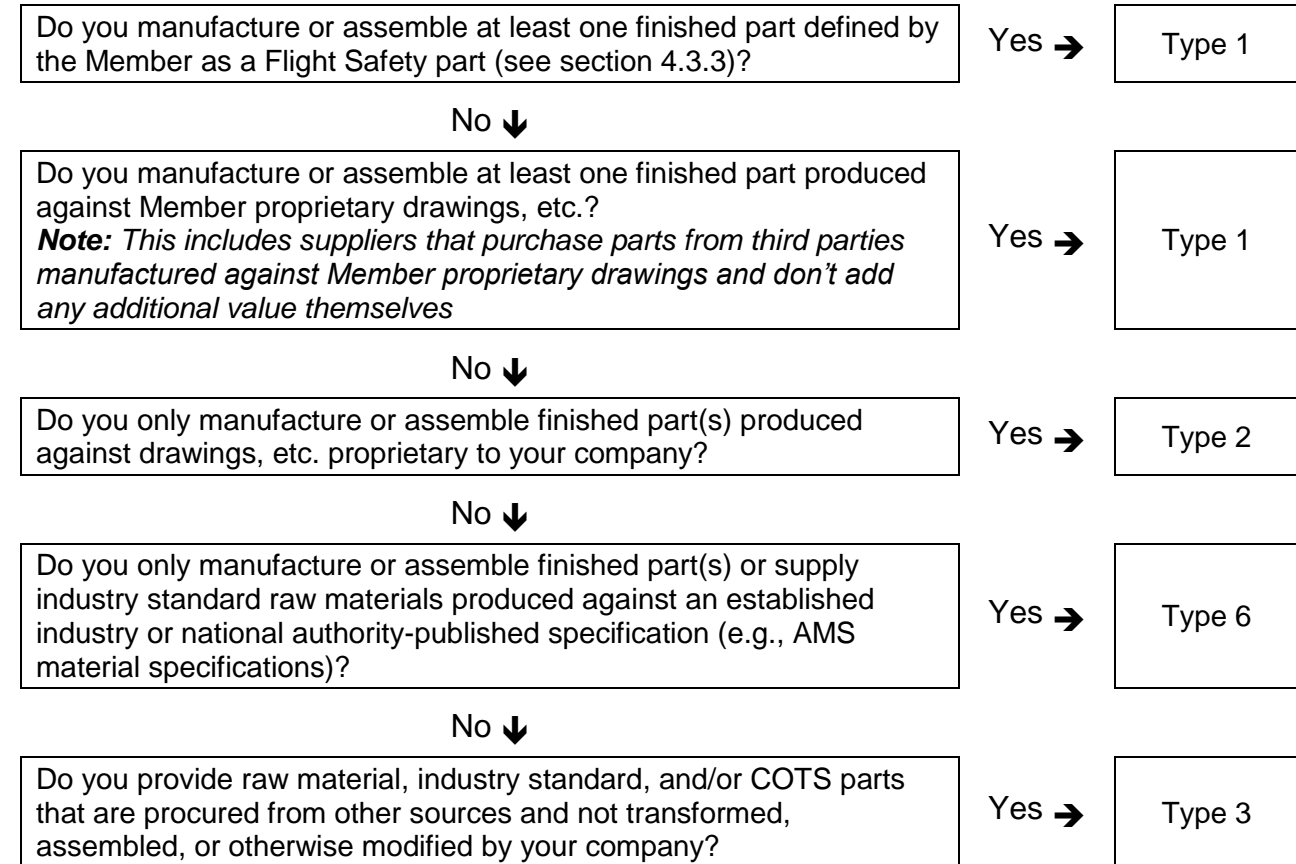
Supplier shall use the same approach to identify flow down contractual requirements that shall be included on Supplier purchase orders to its supply chain when procuring components, raw materials, or services related to products delivered to and/or services performed for Member (see paragraph 5.1.1).



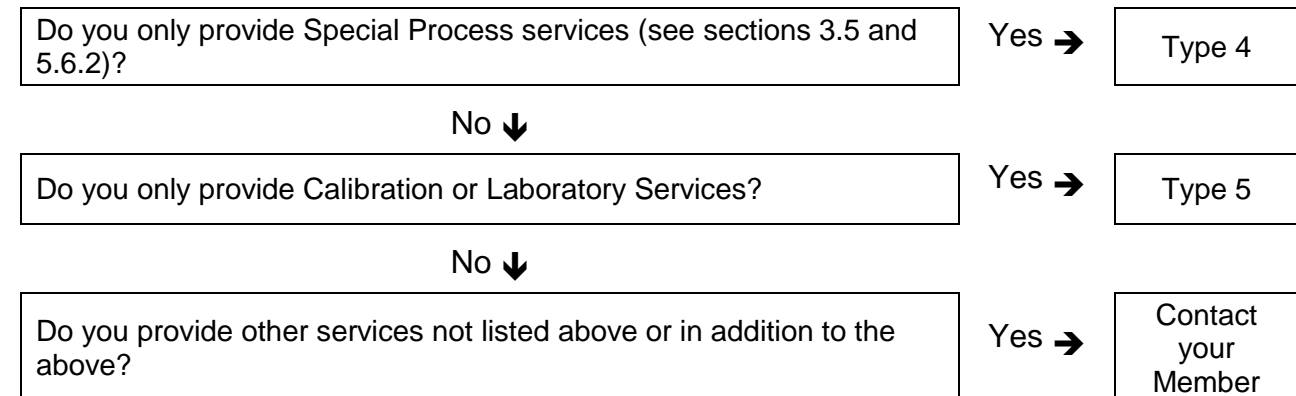
### Figure A1: Supplier Type Identification

Supplier shall use the following flowchart to identify which of the Supplier Types defined in paragraph 3.5 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 - UTC Member Design Part Manufacturer	Type 2: Design Responsible Supplier	Type 3: Distributor (any product type)	Type 4: Special Process Supplier	Type 5: Calibration or Laboratory or Service Provider	Type 6: Industry Standard Part or Industry Standard Raw Material Manufacturer
4.1.1	X	X				
4.1.2	X	X	X			
4.1.3	X		X			
4.2.1	X	X	X	X	X	X
4.2.2.1	X	X	X	X	X	X
4.2.2.2	X			X		
4.2.2.3	X	X	X	X	X	X
4.2.3-4.2.4	X	X	X	X		X
4.2.5-4.2.6	X	X	X	X	X	X
4.3.1	X	X	X	X	X	X
4.3.2	X	X		X	X	
4.3.3	X	X		X		
4.3.4	X	X		X		X
4.3.5	X	X	X	X	X	X
4.4.1	X	X		X	X	X
4.4.2	X	X	X	X	X	X
4.5.1-4.5.4	X	X	X	X	X	X
4.5.5	X	X		X		X
5.1.1	X	X	X		X	X
5.1.2	X	X	X	X	X	X
5.1.3	X	X	X			X
5.2.1	X	X	X	X	X	X
5.2.2	X	X				X
5.2.3	X	X		X		X
5.2.4	X	X	X	X	X	X
5.3	X	X	X	X	X	X
5.4.1-5.4.4	X	X	X	X	X	X
5.4.5-5.4.6	X	X		X		X
5.5.1	X	X	X	X		X
5.5.2	X	X				X
5.6.1-5.6.2				X		
5.6.3		X				
5.6.4	X		X	X	X	X