PURPOSE & SCOPE

1. This specification defines supplier quality requirements as agreed upon by the following business entities as members of the ASQR Common Specification Team herein referred to as “member”:

   Aftermarket Operations          AO
   Hamilton Sundstrand              HS
   Pratt & Whitney                  PW
   Pratt & Whitney Canada           PWC
   Sikorsky Aircraft                SAC
   UTC Fuel Cells                   UTCFC

2. This document applies to suppliers and all members of their supply chain who furnish product, material or services to any of the above members.

3. Each member or their representatives and their customers including Government/regulatory agencies, shall have the right of entry into a supplier’s facility or that of their subcontractors, access to quality records, quality system documentation, and the right to verify product and conduct audits.

4. Changes to any paragraph in this document will be annotated by an asterisk (*) to the left of the affected paragraph.

5. References

   5.1 ANSI/NCSL Z540–1          Calibration Laboratories and Measuring & Test Equipment – General Requirements
   5.2 ANSI/NCSL Z540–2          U.S. Guide to the Expression of Uncertainty in Measurement
   5.3 ASQR–01 Form 3            Supplier Request for Information
   5.4 ASQR–01 Form 4            Quality Verification Checklist
   5.5 ASQR – 09.1                Flight Safety Parts Program
   5.6 ASQR – 15.1                Handling, Storage, Packaging, Preservation and Delivery
   5.7 ASQR – 20.1                Supplier Sampling Requirement
   5.8 ISO 10012                  Quality Assurance Requirements for Measuring Equipment
   5.9 ISO 17025                  General Requirements for the Competence of Testing and Calibration Laboratories
5.10 RTCA/DO–178 Software Considerations in Airborne Systems & Equipment Certification

5.11 SAE AIR 5359 Requirements for Registration of Quality Systems to AS9000 or AS9100

5.12 SAE AS 9100 Quality Systems – Aerospace – Model for Quality Assurance in Design, Development, Production, Installation and Servicing

5.13 SAE AS 9102 Aerospace First Article Inspection Requirement

5.14 UTCQR – 09.1 Process Certification Requirements

6. Forms

6.1 ASQR–01 Form 3 Supplier Request for Information (SRI)

6.2 ASQR–01 Form 4 Quality Verification Checklist

6.3 AS 9102 Form 1 First Article Inspection – Part Number Accountability

6.4 AS 9102 Form 2 First Article Inspection – Product Accountability

6.5 AS 9102 Form 3 First Article Inspection – Characteristic Accountability

7. Nature of Changes

Document was completely reformatted including appendices to incorporate the eight element structure defined in AS9100:2000. All requirements that are now covered in AS9100 were removed. Significant changes to the document include:

- Cancellation of Appendices 1 through 3
- Additional audit inspection requirements
- Eye exam requirements defined for two inspection criteria
- Registration to AS/EN/JIS Q 9100:2000 required by June 2004
SECTION 1

1. Application

1.1 This document employs, as a foundation, SAE Aerospace Standard (AS)9100 Revision A which incorporates International Standards Organization (ISO) 9001:2000 requirements and is supplemented by both common and unique business member requirements as defined herein. Suppliers and all members of their supply chain, must be compliant to AS9100 and all applicable common and unique requirements.

1.2 Suppliers who receive a Purchase Order from a UTC member company must be registered to AS/EN/JIS Q 9100 by June 30, 2004. In order to be compliant to this requirement, the Registration Accreditation Board (RAB) or an international equivalent must accredit the other party performing the registration. Additionally, the certificate of registration must specify that the registration activity was based on the requirements contained in the Aerospace Information Report – SAE AIR 5359. The supplier is responsible to provide the AS9100 Certificate of Registration to each UTC Member that issued a Purchase Order. The supplier is also responsible to provide each member with notification of any changes in the registration within 24 hours of receiving notification of the change.

1.3 Section II identifies common requirements in addition to the AS9100 standard. Deviations from Section II requirements apply only to the member granting exception.

1.4 Section III identifies unique member requirements in addition to AS9100 and common requirements. Certain unique requirements may direct suppliers to use a specific UTC member document in place of an ASQR common document.

1.5 Supplier shall refer to the Specification Revision List date or the specification revisions identified on the Purchase Order to determine the revision of the specification that applies. Requests for member–specific specifications that are needed shall be requested from the applicable member’s Procurement department.

1.6 It is the responsibility of the supplier to ensure that they are working to the latest version of specifications referenced within this document as well as Purchase Order requirements.
1.7 It is the responsibility of the supplier to obtain copies of non–UTC documents specified by this ASQR. These documents include, but may not be limited to, the following:

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SECTION II – Additional Common Requirements

1. **Scope**
   
   No additional requirements

2. **Normative Reference**
   
   No additional requirements

3. **Terms and Definitions**
   
   No additional requirements

4. **Quality Management System**

   4.1 Changes that may affect quality must be documented and communicated to the applicable member(s) Quality Assurance Representative prior to effectivity of the change.

   **EXAMPLE OF CHANGES**
   
   Ownership
   Manufacturing location
   Process or inspection techniques

4.2 Each member has the individual right to disapprove a supplier’s Quality System as well as the Quality System of their subcontractors.

4.3 All communications between the supplier and the UTC member, Quality Systems Manual and Procedures as well as any process documentation which requires approval or source qualification by the UTC member must be written in the English language. In cases where the supplier maintains copies in their native language as well as in English and there is a conflict, the English language document shall take precedence.

4.4 **Control of Quality Records**

   4.4.1 Retain quality records and make them available for the applicable retention period specified below. Electronic imaging/microfilming of records in lieu of storing actual inspection records is permissible.

   - 40 years from time of manufacture for flight safety, Space Shuttle fuel cells/main engine components, critical/major rotor parts (turbine and compressor disks, hubs, shafts, free turbine couplings and turbine disk side plates) and any other articles which also require heat code and suffix number identification; serialized major engine (cast/fabricated) cases (inlet, fan, compressor, intermediate, diffuser, combustion, turbine and exhaust cases) and main shaft bearing supports, which are not integral to a major case
   - 10 years for all other parts except-aftermarket and off-the-shelf/industry parts
   - 8 years for aftermarket parts
   - 4 years for off-the-shelf/industry standard parts (i.e. AN, AS, MS, JAN, etc.)
4.4.2 Examples of records to be retained are, but not limited to:

- Procurement documents (supplier placed orders)
- Receiving inspection Records (e.g., test reports and material certifications)
- Manufacturing/fabrication records (e.g. planning sheets, routers, etc.)
- Process control records (used as acceptance criteria)
- First article inspection reports
- In process/final inspection & test records
- Radiographs, technique sheets and related acceptance reports
- Records of nonconforming material disposition
- Records of deliverable and nondeliverable software

4.4.3 Supplier shall retain radiographs for flight safety, critical/major rotor parts (turbine and compressor disks, hubs, shafts, free turbine couplings and turbine disk side plates), Space Shuttle fuel cells/main engine components and other articles which also require heat code and suffix number identification as well as serialized major engine (cast/fabricated) cases, (i.e., inlet fan, compressor, intermediate, diffuser, combustion, turbine and exhaust cases), and main shaft bearing supports which are not integral to a major case and engine components traceable by Engineering Drawing/Quality Assurance Data required serial numbers for 40 years.

4.4.4 Radiographs for parts where serial number traceability to the radiographs is maintained shall be retained for 10 years. Radiographs for those parts where serial number traceability to the radiographs is not maintained shall be retained for 10 years only if no other inspection record is retained that documents completion and final acceptance of radiographic inspection.

4.4.5 All quality records (non–electronic) shall be documented in ink or other permanent marking. Corrections to work instructions or documents must be recorded, dated and signed in ink or other permanent marking method with the original data being legible and retrievable after the change.

4.4.6 All electronic records must be controlled, retained, and retrievable per the same requirements identified for hard copy records. For electronic records that are transferred from computer files, the storage media must be capable of maintaining the data integrity for the full retention period.

5. **Management Responsibility**

   No additional requirements
6. **Resource Management**

6.1 Unless otherwise specified, procedures shall be implemented to ensure that eye examinations, including visual acuity and color vision, as applicable, are administered to all individuals performing visual inspection by a medically qualified/trained person.

6.1.1 Individuals performing visual inspections on welds or nondestructive test (NDT) inspection shall have the following vision in at least one eye, either corrected or uncorrected:

- **Near Vision:** Jaeger Type 1 or equivalent
- **Color Vision:** Must be able to distinguish and differentiate between the colors used in the inspection, process activity or NDT method performed. Testing for color vision is required one time only.

6.1.2 Individuals performing normal visual inspection (i.e. calibration, non–weld, inprocess, layout, dimensional) shall have the following vision in at least one eye, either corrected or uncorrected:

- **Near Vision:** Stellen14/18 or better (20/25 or better), Jaeger Type 2 at 14 inches or greater, Ortho–Rater 8 or equivalent
- **Color Vision:** Must be able to distinguish and differentiate between the colors used in the method for which certification is required, process being performed or inspection activity. Testing for color vision is required one time only.

6.1.3 For individuals who do not meet the vision requirements in paragraph 6.1.2, supplier supervision shall review each individual’s job assignment to determine if this assignment can be effectively performed and to ensure these individuals do not perform inspection tasks where these vision requirements are necessary in determining product conformance. The review by supervision shall be documented and available for review upon request by a UTC member.

6.1.4 Eye exam intervals shall not exceed one year, and records shall be retained for each individual.

7. **Product Realization**

7.1 **Contract Review**

7.1.1 Upon receipt of a UTC Member Purchase Order requiring Government Contract Quality Assurance (GCQA), promptly notify the Government Representative who services your facility, or, if there is none, the Government Inspection office nearest to your facility.

7.1.2 Verbal agreements or instructions are not allowed.
7.2 The use of directed sources does not relieve the responsibility for subcontractor control (i.e., an approved source for Non–Destructive Testing, Plating, Coating, etc.).

7.3 Provide UTC members Supplier Quality Assurance with a World Wide Web internet e–mail address belonging to the supplier (not a private e–mail account) to permit communications with the suppliers quality department. The e–mail address and any changes shall be sent to the applicable UTC Member Supplier Quality Assurance (SQA) organization.

7.4 Where a member owns the design of an article purchased from a supplier (first–tier) who further subcontracts all or portions of that work to other subcontractors (second–tier), the first–tier supplier’s Purchase Order must state that the articles are for applicable member’s “end use” and must be controlled per applicable Purchase Order requirements.

7.5 Product identified with member acceptance symbols can only be shipped to the member or a member–approved destination.

7.6 Supplier Request for Information (SRI), ASQR–01 Form 3, shall be submitted to applicable Procurement personnel and may be used for items such as:

- An anomaly noted in a drawing or specification that could result in a nonconformance
- Lack of clarity or definition in a drawing or specification
- A request for an alternate method to a quality system requirement. Any alternate methods to a quality system requirement must receive approval from the applicable UTC Member prior to incorporation.

**Note:** SRIs are not used for processing product nonconformances.

7.7 Return all documents, records, gaging, stamps, or other customer supplied product upon written notification from UTC member or when business with the UTC member has ceased.

7.8 The use of an operator certification program or other special manufacturing methodologies (e.g. manufacturing controlling features, die/mold control, method of manufacturing, etc.) must be approved by the appropriate member via ASQR–01 SRI process.

7.9 Non–Deliverable Software:

For software used in the manufacturing and inspection & testing of deliverable hardware or in the qualification or acceptance of deliverable software or hardware, procedures are required for implementation of the following:

(a) Define the purpose or function of the software and how software requirements are initiated, documented and approved.

(b) Identify coding guidelines (i.e.: naming conventions, comments etc.) documentation and approval required for release test.

(c) Define the process, documentation and approvals used to ensure requirements are met. Ensure software cannot be modified without authorization.
(d) Define the process documentation and approvals required for release to use. Provide objective evidence that the software performs its required function prior to use. (Objective evidence requires recording and retaining variable data.) Inspection, review and approval of software responsible for finished part features must be performed by someone acting in an acknowledged product integrity role. Part specific software used to verify quantitative values requires an independent method of validation, and correlation of the two sets of results. (Acceptable correlation requires the difference to be within 10% of the tolerance for each characteristic. Differences greater than 10% but not exceeding 25% can be acceptable with documented justification. Differences greater than 25% are not acceptable).

(e) Define the process and approvals required to control software and related documentation, including revisions and identification for traceability purposes.

(f) Define the process used to approve/accept software into various libraries, control access and provide for backup and recovery. Master versions must be located in a secure location.

(g) Identify the method for storage, handling and release of software to the user.

(h) Define the process for identifying problems, analysis for problem cause, implementation and verification of corrective action.

7.10 Deliverable Software:

7.10.1 For software embedded in commercial deliverable hardware, maintain a quality system that meets the requirements of RTCA/DO–178.

7.10.2 Create a Software Quality Assurance Plan (SQAP) that will be reviewed and approved as defined by the Purchase Order.

7.10.3 Submit a Software Quality Assurance (SQA) Plan for review and approval by the applicable member. All revisions must be submitted for review and approval.

7.10.4 The plan shall provide:

(a) A description of the SQA environment, including scope, organizational responsibilities and interfaces, standards, procedures, tools and methods.

(b) A statement of the SQA authority, responsibility and independence, including the approval authority for software products.
(c) The SQA activities that are to be performed for each software life cycle process and throughout the product development including,

(1) SQA methods, for example, reviews, audits, reporting, inspections and monitoring of the software life cycle processes.

(2) Activities related to the problem reporting, tracking and corrective action system.

(3) A description of the method used to ensure disposition and retention of any remaining SQA open action items and change requests, and completion of all software development tasks at the conclusion of the program.

(d) Identification of the plans used to establish the software development process, the software verification process and the software configuration management process.

(e) A definition of the records to be produced by the SQA process.

(f) A method to ensure that master versions of such software are maintained in a secure location to prevent unauthorized modifications.

7.11 Certain processes that may affect the structural or functional integrity of parts or assemblies and where the results of these processes may not be fully verified by subsequent inspection are designated as special processes. When specified on the drawing or Purchase Order, suppliers must use only sources approved by the specific member company to perform these special processes (each special process supplier must obtain initial approval from each specific member company).

7.12 Suppliers must provide raw materials test reports / certification results / laboratory analysis requirements (e.g., tensile strength, stress rupture, hardness, chemical composition, etc.), as defined by the Product definition and/or the Purchase Order.

7.13 **Flight Safety Parts**

The requirements and definition for Flight Safety Parts are contained in ASQR–09.1 and applies when invoked by Purchase Order.

7.14 **Process Certification**

Suppliers shall implement Process Certification per the requirements contained in UTCQR–09.1

7.15 **Control of Inspection, Measuring and Test Equipment**

7.15.1 Calibration Systems shall meet the applicable requirements of ANSI/NCSL Z540–1. The ANSI/NCSL Z540 Handbook shall be used as the interpretive guide. Calibration systems that meet the requirements of ISO 10012 or ISO 17025 are also acceptable.
7.15.2 Where the supplier chooses to use a calibration interval analysis to maintain the reliability of M&TE, the system shall meet a 95% reliability target for M&TE in–tolerance at the end of their interval schedule.

7.15.3 The supplier shall generally select measuring and test equipment (M&TE) with an accuracy ratio of 10 to 1 (product tolerance to M&TE tolerance) however accuracy ratios as low as 4 to 1 are acceptable unless otherwise specified. Use of M&TE with accuracy ratios less than 4 to 1 are not permitted unless a detailed measurement uncertainty analysis in accordance with ANCI/NCL Z540–2 indicates an uncertainty ratio of 1.5 to 1 or better and the measurement process is maintained under statistical quality control.

7.15.4 Significant Out–of–Tolerance conditions are defined as any M&TE out–of–tolerance condition exceeding 25% of the product tolerance. These conditions require documented review of impact on quality and notification to the effected UTC member.

7.16 When specifically required by Purchase Order, the Supplier shall provide a ASQR–01 Form 4 (Quality Verification Checklist).

7.17 Handling, Storage, Packaging, Preservation and Delivery

The requirements for Handling, Storage, Packaging, Preservation and Delivery are contained in ASQR–15.1.

8. Measurement, Analysis and Improvement

8.1 First Article Inspections (FAI) shall be performed in accordance with SAE AS 9102 – Initial Issue dated 08/2000.

8.1.1 The Supplier holding the UTC Member Purchase Order is responsible for assuring completion of the FAI Report for all finished part characteristics generated by Sub–tier Suppliers. UTC Members reserve the right to perform onsite sub–tier FAI audits to confirm conformance with part requirements. At any time, a UTC Member may request a complete FAI to be performed in lieu of a partial (delta) FAI.

8.2 Audit Inspections

8.2.1 In addition to the First Article Inspection, follow on audit inspections are to be performed annually on 100% of the characteristics on one part for each part number produced.

8.2.2 All audit inspection results are to be recorded on a SAE AS 9102 Form(s).

8.2.3 If the supplier can demonstrate that the process for producing the product has a Cpk of 1.33 or greater, then the requirements of paragraph 8.2 are waived.
8.3 When functional performance/test data is required, include the following minimum requirements:

- test specification number, revision status, amendment number and addendum
- part number/serial number and rev. letter of material/component being tested
- test paragraph, required reading, actual reading (use positive statement, e.g., “No Leakage” if actual reading is not quantifiable).
- date test was performed
- operator identification
- inspection approval signature/stamp
- blank entries that are not applicable shall be noted “N/A”

8.4 Ensure that related characteristics which may be affected by rework or repair operations are identified and re–inspected after these operations are performed.

8.5 Control of Nonconforming Material

8.5.1 The cognizant member must be informed immediately (not to exceed 24 hours or the next business day) of suspect nonconforming product shipped regardless of destination. Method of notification is determined per applicable UTC member requirements.

8.5.2 Articles deemed scrap must be clearly identified and rendered unusable within 30 days of final disposition unless otherwise instructed in writing by the applicable UTC Member.

8.5.3 Suppliers shall coordinate all reports of nonconformances for UTC member supplied material in accordance with the applicable UTC member’s requirements.

8.5.4 In addition to paragraphs 8.5.1, 8.5.2, and 8.5.3, suppliers must comply with the applicable UTC member’s unique requirements identified either by Purchase Order or within Section III.

8.6 Corrective and Preventive Action

8.6.1 When requested to provide corrective action, prepare a report documenting the occurrence, findings, and assessment of the affected product and submit to the applicable UTC member. Provide objective evidence of relentless root cause analysis and implementation of preventive action that eliminates risk of reoccurrence.

8.6.2 To ensure effectiveness of the corrective action, suppliers shall perform 100% inspection of the deviated characteristics for the next (3) three consecutive shipments.

8.7 Internal Quality Audits

Audits of the entire Quality Management System must be conducted annually.

8.8 Statistical Techniques

Provide for inspection of articles/characteristics per ASQR–20.1.

*** End of Document ***