Sensors and Integrated Systems (SIS)

Quality Requirements for Suppliers

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1. Purpose

This document defines the Supplier Quality Requirements for Sensors and Integrated Systems (SIS)

2. Scope

This document is applicable to suppliers of direct material and services to all SIS Sites.

3. Introduction

The purpose of this document is to provide the minimum quality system requirements to suppliers of direct materials and services to SIS. Suppliers of direct materials and services must initially meet this requirement and maintain a Quality Management System that supports the requirements outlined herein.

MSD 601 supplements the requirements of ASQR-01 and UTAS-SCM-PRO-0003. All requirements of the 3 documents are required as part of compliance to MSD-601. These requirements are in addition to any purchase order requirements that are in effect and do not replace them. Electronic copies of requirements can be found at the following links:

Document	Document Title	Link / Location
MSD 601	SIS Quality Requirements for Suppliers	https://www.utcaerospacesystems.com/supplier-documents/ (in **Sensors & Integrated Systems** section)
UTAS-SCM-PRO-0003	UTAS Supplier Quality Common Supplier Requirements	https://www.utcaerospacesystems.com/supplier-documents/ (in **UTC Aerospace Systems** section)
ASQR-01	UTC Supplier Quality System Requirements	http://www.utc.com/Suppliers/Pages/Aerospace-Supplier-Quality-Requirement-Documents.aspx

MSD 601 also provides minimum requirements for suppliers of products or services that may impact SIS product, such as Maintenance, Repair, and Overhaul (MRO), Calibration, Deliverable Software/Firmware, and Test Services suppliers. These requirements are provided in Appendix R.

4. Definitions

Aerovantix: Corporate Supplier Portal that is used to collect, manage, and communicate supply chain information. Located at http://www.aerovantix.com

Acceptance Authority Media (AAM): The means by which a record is established to signify verification that a product is compliant with all the specified requirements. Traditionally, AAM has been synonymous with inspection stamps, but also includes signatures, electronic approvals, or other unique identification. AAM represents a personal warranty of compliance and conformity.

Attribute Data: Data where there are two possible values, pass or fail.

Certificate of Compliance: A legal document provided by the supplier that includes the requirements of the certificate of conformance, and specifically cites and certifies that all military, industry, material, and special process specifications referenced on the drawing have been met.

Certificate of Conformance: A legal document provided by the supplier that states their compliance to all applicable drawing, specification, and purchase order requirements.

C-Drawings: SIS drawings for off-the-shelf component items. However, in some instances features are added or customized beyond the current off-the-shelf configuration.

Deliverable Software: All software, including software embedded in deliverable hardware and deliverable firmware.

Deviation: A specific written authorization granted prior to the manufacture of an item to depart from a particular requirement (s) of an item's currently approved configuration documentation for a specific number of units or a specified period of time.

Direct Material: Material that goes into and forms a permanent part of the end product. Services that may affect the form, fit or function of these materials is included in this definition.

First Production Article: The first items of a production run that are the result of a planned process designed to be used for future production of these same items. Prototype parts, or parts built using methods different from that intended for the normal production process, shall not be considered as first article production parts.

Frozen Process: A manufacturing process that has been identified by SIS or SIS customers that shall not be changed without prior SIS approval. These include process operating parameters, sequence of operation, material or sources**.**

Non-Conforming Product: Any material or product that does not meet the associated engineering drawing or specification or was not processed in accordance with the proper specification or procedure.

Non-Deliverable Software: Software used in the design, manufacture, inspection, test acceptance, or calibration that has a direct effect on a deliverable product. Examples include but not limited to:

- Computer Numerical Control (CNC)
- Gage Calibration
- Coordinate Measurement Machine (CMM)
- Programmable Logic Control (PLC)

- Performance Acceptance Test
- Burn-in

Product Acceptance Records: Official records to be maintained by the supplier indicating a product passing through planned operations and satisfying planned requirements during product realization (e.g. signed routers, completed ATP data sheets)

Quality Management System (QMS): The collection of documents and procedures and standard practices that are used to define and effectively implement the organizations quality goals.

Raw Material: Unfinished constituents of a finished product, material that requires further processing to become the finished product.

Root Cause Corrective Action (RCCA): Action taken to eliminate or reduce the cause of an existing non-conformity, defect, or other undesirable condition at the most fundamental level.

Special Process: A process which may alter the chemical or physical properties of the item. The impact of such a process cannot typically be evaluated without destructive testing. SIS subscribes to all special processes listed in ASQR-01, the special processes listed in UTAS-SCM-PRO-0003 (with the exception of CMSP), and sealants (SLT).

Standard Part: A part manufactured in complete compliance with an established U.S. Government or industry accepted specification which includes design, manufacturing, and uniform identification requirements. The specification must include all necessary information to produce the part.

Variable Data: Data available when a characteristic can be measured on a continuous scale using variable gaging.

Waiver: A written authorization to accept an item, which during manufacture or after having been submitted for acceptance is found to depart from specified requirements but is suitable for use as is or after a repair.

5. Supplier Requirements

5.1 General Requirements

5.1.1 Communication Process

Supplier Requests for Information (SRI) using ASQR-01 form 3 and other communication requests per ASQR-01 Table 4 can be made through the responsible SIS buyer.

5.1.2 Special Processes

All suppliers (regardless of tier) shall use only SIS-approved special process sources unless otherwise permitted by contract for the special processes listed in ASQR-01, the special processes listed in UTAS-SCM-PRO-0003 (with the exception of CMSP), and sealants (SLT). A supplier may request that a source be added to the SIS-approved special process listing through the SRI process. However, such sources may not be used prior to being listed. A listing of SIS-approved Special Process Suppliers can be found on Aerovantix.

For all special processing that requires Nadcap accreditation, the supplier shall provide a certificate of conformance verifying each special process or NDT method was performed by a Nadcap-accredited source with each shipment. Certification shall provide evidence of compliance to drawing, specification and/or purchase order and contract requirements in accordance with Appendix H of this document.

5.1.3 Quality Management System

All suppliers of direct material to SIS will be evaluated on-site by SIS per the risk-based program outlined in the following table in accordance with ASQR-01 4.1.8. Suppliers will be evaluated annually for High and Low risk ratings. High risk suppliers will be notified by SIS of their status.

Suppliers with low risk rating may be considered for high risk rating for their next audit if significant performance concerns are discovered during the audit process. Immediate countermeasures may also be put into place including issuing SCAR(s) to the supplier or implementing additional inspection. Examples of significant concerns include:

1) The supplier receives multiple major non-conformances during their audit.
2) The supplier is unable to provide adequate corrective action to findings.
3) The corrective action response is submitted after the due date.

Risk-based Supplier Quality Requirements Audit Frequency

Risk Rating	Certification Level	AS9100 Audit	Compliance to MSD 601	Flight Safety Audit
High	AS9100, 9110, 9120 Certified	Supplier shall permit SIS access to all data in OASIS. SIS will evaluate need for Registrar escalation.	SIS will conduct onsite audit each year. Frequency subject to adjustment based upon SIS risk mitigation activities and/or supplier audit performance.	SIS will conduct onsite audit each year for suppliers with identified flight safety characteristics.
	ISO9001 Certified	Supplier will make available the current ISO9001 certificate to SIS upon request. SIS will conduct onsite AS9100 audit (delta to ISO9001) every 3 years minimum.		
	No QMS Certification	SIS will conduct onsite AS9100 audit every 3 years minimum.		
Low	AS9100, 9110, 9120 Certified	Supplier shall permit SIS access to all data in OASIS.	Supplier will complete an ASQR-01 form 1 self-assessment each year and make available to SIS upon request – and – SIS will conduct onsite audit every 4 years minimum.	
	ISO9001 Certified	Supplier will make available the current ISO9001 certificate to SIS upon request. SIS will conduct onsite AS9100 audit (delta to ISO9001) every 4 years minimum.		
	No QMS Certification	Onsite AS9100 audit every 4 years minimum.		

5.2 Configuration Control Requirements

If any second tier subcontract is required, the sub-tier may not then further subcontract the purchase order.

5.3 Record Retention

Records shall be sent to SIS within 48 hours of requesting them.

5.4 Human Resource Requirements

The supplier shall ensure that all personnel working for or on behalf of the supplier in activities relevant to the realization of product or services provided to or for SIS, are aware of:

- their contribution to product or service conformity;
- their contribution to product safety;
- the importance of ethical behavior.

5.5 Preservation of Product

5.5.1 Material Storage and Environmental Control

When age controlled material is involved, the supplier shall identify each material container with the month, day, and year manufactured, and the time period before expiration (applies to delivered product). Test reports and/or certifications shall include the expiration date in a month, day, and year format. SIS reserves the right to reject and/or return any material with less than seventy-five percent (75%) shelf life remaining unless covered by other SIS documentation.

> Note: Material covered under vendor managed inventory may be excluded from this requirement.

When temperature controlled material is involved the supplier shall provide material packaging suitable to maintain proper temperature during transportation from their facility to SIS. Supplier shall provide necessary temperature measuring equipment to monitor the material during transportation to assure compliance to the specifications of the Purchase Order/Contract. Packaging for such material shall be clearly marked as containing temperature controlled material. SIS reserves the right to reject or return any material where temperature storage requirements have been exceeded.

6. Revision History

Revision	Issue Date	CHANGE DESCRIPTION
K	June 19, 2018	Updated links in section 3. Removed sections redundant to UTAS-SCM-PRO-0003-02, specifically 5.5 Identification and Traceability and 5.6 Customer Property. Updated FAI training link in Appendix C. Updated deviation form link in Appendix D. Removed reference to Appendix E in Appendix F. Updated links and changed reference from SISF00127 to ASQR-01 Form 3 in Appendix J. Deleted Appendix L (redundant to ASQR-07.5). Updated MRO requirements in Appendix R and added SISF00243. Replaced 'Value Stream' with 'site' throughout.
J	September 21, 2017	Deleted sections redundant to ASQR-01 (Control of Documents, Purchasing Information). Added definition for AAM. Updated communication instruction in section 5.1.1. Added a requirement for awareness in section 5.4 required by AS9100D 8.4.3. Revised section 5.5 for Identification and Traceability to define AAM requirements. Updated App Q to align with current revision of AS5553. Changed reference from Test Suppliers to Test Service Supplier in Appendix R. Corrected error in CTQP section of Appendix S. Removed all deleted sections, including Appendices B, E, K, N, and P.
H	April 7, 2017	Table of contents and cover page added. Links to UTC and UTAS requirements added to section 3.0. Added section 5.1.3 (QMS). Terminology (i.e. fixed process) removed from Appendix A. Record retention requirements for FAI clarified in Appendix C. Appendix S (critical characteristic management) added. Updated to new document format including changing change order number reference in revision history to issue date reference.
G	November 6, 2015	Revised introduction to specify that MSD 601 includes the requirements of ASQR-01 and UTAS-PRO-SCM-0003. Removed the definition of Qualified Distributor as it is defined as part of the requirements in Appendix H.

The following appendices apply to all suppliers unless specifically excluded by purchase order or other agreement.

Appendix A: Frozen Processes

During the SIS Critical Design Review or during a subsequent Quality review, Frozen Processes may be established for some products per Appendix S. Frozen processes shall be identified as such on the supplier's manufacturing router or shop traveler. These processes shall not be changed without SIS approval. Changes refer to process parameters, equipment, tooling or plant layout as well as a change of sub-tier supplier.

Requests for frozen process change approval shall be submitted to the SIS buyer.

The supplier shall also flow this requirement to applicable sub-tiers.

All changes to frozen processes will require new first article inspection report in accordance with AS9102 and this document.

Appendix C: First Article Inspection Requirement

Form 1, Field 18, "FAI Report Number", is a REQUIRED field. The FAI Report Number shall be given for all component parts listed that are required to have a First Article Inspection per section 4 of the Standard. If the component part is a Standard Catalog Hardware then "n/a" shall be entered.

A first article inspection report is required to be submitted for each drawing revision change (without regard to form, fit, or function). If the revision is only an administrative correction, the FAI shall state that.

Supplier must retain the most recent full FAI for all active part numbers, regardless of record retention timelines, even after a subsequent delta FAI has been submitted.

First article inspections to SIS require certification of compliance or material certification traceable to the original manufacturer. This applies to delta FAI when material is affected.

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

Note – For SIS drawings used to procure supplier Off-The-Shelf (OTS) products (C-drawings), a FAI is only required for the specific characteristics controlled by the SIS drawing (e.g., painting an OTS screw would require an FAI on the paint only).

Note – FAI training material is available at

https://www.utcaerospacesystems.com/wp-content/uploads/2017/12/FAI-Training-Tool.pdf

Appendix D: Non-Conforming Product / Deviations and Waivers

Suppliers shall take the following steps when nonconforming material is found and cannot be reworked—i.e., repair and use-as-is dispositions. A Deviation/Waiver request is not required for conforming reworked material.

1. Identify the nonconforming material and segregate it in a bonded area.

2. Submit a SIS Request for Deviation/Waiver detailing the discrepancy, quantity discrepant, the cause and corrective action to eliminate the discrepancy and the effectivity point of the correction. Deviation/Waiver request forms are available at:
   https://www.utcaerospacesystems.com/supplier-documents/

Repair procedures must be approved by SIS in advance of their use on SIS product. Approval of the repair procedure does not imply final acceptance of the product.

Known defective parts/material is not to be sent to SIS without an approved Deviation/Waiver. This approved document shall be shipped with parts.

Appendix F: Supplier Nonconformance Charge Back Program

Suppliers are responsible for administrative costs incurred by SIS associated with the review and disposition of supplier-manufactured nonconforming product. Once a supplier nonconformance has been confirmed, the following charges may be withheld for payment:

- A debit of $2,500 USD for each validated supplier-caused nonconformance identified at the time of receipt. This debit may also be imposed for any missing or incorrect documentation received (or omitted) with the products that prevents the material from being received or available for use.
- A debit of $2,500 USD for each validated supplier-caused nonconformance identified at the point of use within the manufacturing processes across SIS
- A debit of $2,500 USD for validated supplier-caused nonconformance identified in conjunction with returned products and failure analysis from SIS customers
- Validated repeat defects may incur an additional $2,500 USD per repeat occurrence

Note 1 - All products associated with the lot found to be nonconforming will be counted as a single nonconformance for the purposes of the charge back process.

Appendix G: Scorecards

In order to keep suppliers apprised of their level of performance in the delivery of goods and services to SIS, scorecard data will be compiled and used as a metric. There are metrics for both on-time delivery and quality. Scorecard data will be sent to suppliers. Suppliers are responsible for keeping contact information up to date.

The delivery metric is the percent of lots delivered "On Time Delivery" OTD. OTD is measured from the receipt to SIS dock vs. the purchase order due date. A tolerance window of zero calendar days late to three calendar days early has been established. The goal is 100% OTD.

The standard quality metric for all suppliers is the quantity of parts nonconforming divided by the quantity of parts received. The goal is zero defects for all delivered products.

Suppliers are expected to work with SIS personnel to continuously find process and cycle time improvements as well as cost reductions.

Suppliers shall maintain an acceptable SIS performance rating. Failure to meet the SIS performance rating requirements may result in supplier disapproval.

Scorecards for Key Suppliers

Additional UTC Supplier Gold scoring criteria are applied to suppliers identified by SIS as key suppliers. These criteria are established as a means to facilitate our key suppliers' ability to achieve stated objectives and include the following:

- Supplier Health Assessment (SHA)
- Market Feedback Analysis (MFA)

Your buyer or supply chain quality representative can provide your status as a key supplier and provide the detailed criteria.

Scorecards for the key SIS suppliers can be provided by your buyer or supply chain supplier quality representative.

Appendix H: Certificates of Conformance/ Compliance

In addition to requirements specified in UTAS-SCM-PRO-0003, C of Cs shall include Government contract number where applicable. Certifications from a sub-tier to the supplier shall provide traceability to the manufacturer and manufacturing lot.

Suppliers performing special processes shall list the number and revision level of the applicable process specification (s), lot size, lot number or heat number, sample size, applicable process specifications/controls and applicable test results. If the job was processed using a Nadcap accredited process, the supplier shall include a statement indicating the job was processed per their Nadcap accreditation and shall include their accreditation number and expiration date.

For raw components purchased from circuit card assembly suppliers: The supplier shall provide a Certificate of Conformance, and if required, the original component manufacturer's Certification.

Material purchased from SIS, and then subsequently repurchased, shall show traceability via the original PO to SIS used to acquire the material.

Certificate of conformance documentation requirements from distributors can be met in one of the following ways:

1) Original manufacturer's certifications shipped with material or parts plus the distributor's certification.
2) Distributor's certification referencing OEM documentation that is maintained on file. Distributors in this category are designated as "Qualified Distributors" and must be licensed by the manufacturer to distribute product or registered to ISO-9001, AS-9100, or AS-9120. Additional SIS requirements may also apply.
3) For distributors of raw material, documentation with shipments must include physical and chemical properties reports traceable to heat code or lot number.

Appendix I: Communication and Responsibilities

When SIS source inspection is required at the suppliers facility it shall be after supplier inspection and prior to packaging and shipment. In-process inspection or witness of ATP when required by purchase order need not be performed prior to customer inspection. Supplier shall supply the purchase order or contract including amendments, drawings, specifications, and applicable records, certifications and all necessary measuring equipment. Evidence of source inspection must be indicated on the inspection or ATP record and the shipping paperwork.

The SIS buyer must be notified at least forty-eight hours (48) in advance of the time product is to be inspected. SIS reserves the right to waive source inspection.

When a purchase order specifies "**Government Source Inspection required**," the supplier shall immediately furnish a copy of the purchase order to the government representative who has delegation for the suppliers' facility. If the supplier does not have such a representative, the supplier shall notify the government inspection service fourteen (14) days in advance, when possible, of the time when such inspection will be required.

In the event that an item becomes obsolete, SIS requires 12 months prior notification of such and reserves the right to make a 'last buy' to insure uninterrupted delivery to the end customer.

Appendix J: Export / Import Compliance

The supplier, and their sub-tier suppliers as applicable, shall comply with all export-import control laws and regulations including, but not limited to, the U.S. Export Administration Regulations (EAR) and the U.S. International Traffic in Arms Regulations (ITAR) to the extent applicable to the supplier and SIS respective activities under the Purchase Order.

Any supplier who manufactures defense articles or furnishes defense services for SIS is required to register with the U.S. Directorate of Defense Controls per ITAR Part 122.

Follow the link below to register.

https://www.pmddtc.state.gov/?id=ddtc_kb_article_page&sys_id=def5f542dbf8d30044f9ff621f961959

Follow the link below for ITAR Part 122.

https://www.pmddtc.state.gov/?id=ddtc_kb_article_page&sys_id=%2024d528fddbfc930044f9ff621f961987

If the data or product provided under the SIS Purchase Order is controlled for US export-import reasons, such data/product will not be further disclosed, exported or transferred in any manner to any other foreign national person (internal or external to the supplier or sub-tier suppliers) or any foreign country contrary to U.S. export-import law.

Prior to a supplier sub-contracting to a foreign facility for product under SIS design control, they must obtain approval from the SIS International Trade Compliance Group. Supplier is also responsible for obtaining any required export authorizations necessary to allow a foreign facility to product the product under SIS design control. Supplier is required to provide SIS with a certification that such authorization has been obtained, including the number of the authorization. If a supplier has any questions on export jurisdiction for SIS designed product, contact SIS.

When supplying product to SIS that is under supplier design control, the supplier shall provide the export classification jurisdiction (e.g., Export Classification Control Number (ECCN), ITAR USML classification), Harmonized Tariff Schedule (HTS) Code, and the Country of Origin information for that product (e.g., on the shipping documentation).

The supplier is required to notify SIS of part or component status changes in regards to facility, address, and country of origin, export control classification jurisdiction and HTS code. The supplier may use ASQR-01 Form 3 or a form with the required information from their own document system. The form must be signed by an authorized supplier representative.

Appendix M: Direct Ship Authority

A supplier may be granted direct shipment authority allowing them to ship directly to SIS customers. This approval will be granted by a specific SIS business unit and location and would only be valid for that location. Special instructions for direct ship will be contained in the purchase order.

Appendix O: Key Supplier Certification Process (Dock to Stock Requirements)

Suppliers are expected to achieve a Certified Supplier status and become eligible for dock to stock shipments. Suppliers are classified in the following categories:

- Certified – A supplier that has demonstrated sufficient levels of process capability, such that the requirement for SIS inspection can be completely removed. By maintaining the required quality performance and successfully completing a process audit, suppliers are eligible to ship parts under the dock to stock program.
- Designated – A supplier that participates in the Designated Supplier Quality Representative (DSQR) program. Incoming inspection requirements are removed from SIS and replaced by source inspection performed by a designated supplier quality representative.
- Approved – Initial status assigned to a production supplier. Incoming inspection will be required at SIS until such time that quality performance results are consistently being met
- Directed Inspection - In the event a supplier fails to meet quality performance expectations, SIS may elect to employ a 3rd party source inspector to oversee the processing and release of product to SIS. Any costs associated with the implementation of directed inspection would be the responsibility of the supplier.

Appendix Q: Counterfeit Parts Prevention

Suppliers providing electronic assemblies, components, or containing electronic components to SIS shall be compliant to this section. Further guidance can be found in SAE AS5553.

Procurement Precedence

1. **Electronic parts shall be purchased directly from the OEM or their Franchised Distributors whenever available.** Product lead-time and cost shall not preclude adherence to this provision.
   - Parts from the OEM or their Franchised Distributors shall have:
     - Original manufacturer warranty
     - Acquisition traceability to the OEM via proper packaging, handling, storage, and shipping.
     - OEM Certificates of Conformance per Appendix H.
2. Electronic parts that are out of production and not available per section 1 may be procured through a Broker with prior SIS site approval and providing component authenticity has been establish per this section.
   - Certificates of Conformance and acquisition traceability (CoCT) shall be provided.
   - Reasonable effort shall be made to verify authenticity of the documentation by the purchasing company.
   - Brokers shall be AS9120 accredited and have an active counterfeit part detection program in accordance with AS6081. SIS Supply Chain Management shall review relevant databases (ERAI, GIDEP) to evaluate broker's history of supplying counterfeit components prior to approval.
   - Inspection protocols F, A, B of Testing/Analysis Table shall be performed. Test reports shall be reviewed and approved by SIS prior to shipment.
   - Suppliers should notify the appropriate site buyer to request Design activity for component replacement or circuit card re-design per local site procedure.
3. Electronic parts not available per section 1 or 2 may be procured from a Broker without CoCT only after SIS site approval and component authenticity verification per Component Verification section and Testing/Analysis Table.
   - Broker shall be AS9120 accredited and have an active counterfeit part detection program in accordance with AS6081. SCM shall review relevant databases (ERAI, GIDEP) to evaluate broker's history of supplying counterfeit components prior to approval.
   - Suppliers shall notify the appropriate site buyer to request Design activity for component replacement or circuit card re-design.

Component Verification

All inspection and testing shall be performed to the original manufacturer's specifications and parameters. Steps A, B, C, D, E, and F should be performed in order. General inspection methodology can be found in ARP6328, AS6081, and IDEA-STD-1010. If a nonconformance is found, stop testing, reject the lot, and notify the site buyer. Testing shall only be performed by test houses pre-approved by the cognizant SIS Supplier Quality Engineer.

A: Visual Inspection

Each lot to be delivered shall be subjected to a visual inspection at an AQL of 1.0 or tighter with 40x minimum magnification. 100% of the remaining lot shall be visually inspected without magnification. Visual inspection shall include but is not limited to: verifying lot/date codes against manufacturers database, correct English spelling, manufacturer's logo, evidence of component remarking, damage, bent leads, chip-outs, scratches, cracks, terminal finish inconsistent with manufacturer's specification for that part number, any discrepancies to the pin one indicating area, and inconsistencies between the upper and lower mold of the component. See ARP6328 section 3.5.1.2 for detailed guidelines.

B: Authenticity Verification

Each lot to be delivered shall be subjected to an inspection at an AQL of 1.0 or tighter. Testing shall include verification of the components physical attributes to the original manufacturer's drawing, swabbing, and other applicable testing to verify authenticity. Swabbing shall be performed in accordance with ARP6328 section 3.5.1.5.

C: X-ray Inspection

Each lot to be delivered shall be subjected to an inspection at an AQL of 1.0 or tighter. X-ray inspection shall include checking for the presence of the die, cracks in the epoxy, checking wire bonds, product or manufacturing markings that are X-ray detectable and any mixed die configurations within the same lot/date code. See ARP6328 section 3.5.1.8 for detailed guidelines.

D: Electrical Testing

Electrical testing of each lot to be delivered shall be completed at an AQL of 1.0 or tighter. Testing shall include verifying electrical specifications from the original manufacturer's

technical data sheets as approved by SIS per ARP6328 section 3.5.10. Testing must be performed at thermal temperatures as identified on the OEM specification.

E: Destructive Physical Analysis

Each lot to be delivered shall be subjected to a DPA inspection of 2% to a maximum of 30 units per lot code. Inspection shall include verification of authenticity of the die and any other internal features that may be shown on the original manufacturer's technical data. See ARP6328 section 3.5.1.14 for guidance.

F: Plating Inspection

Each lot shall be verified for lead finish per manufacturer's specification using appropriate methodology such as X-Ray Fluorescence (XRF) per ARP6328 section 3.5.1.9.

Testing/Analysis Requirements—by Component Type

Component Type	Plating Inspection (F)	Visual Inspection (A)	Authenticity Verification (B)	X-ray Inspection (C)	Electrical Testing (D)	Destructive Physical Analysis (DPA) (E)
Capacitors	X	X			X	
Connectors	X	X	X			
Crystals	X	X	X	X	X	X
Diodes	X	X			X	
Fuses	X	X			X	
Heat sinks		X	X			
IC	X	X	X	X	X	X
Inductors	X	X	X		X	
LED	X	X			X	
Mechanical parts		X	X			
Potentiometer	X	X			X	
Relays	X	X	X		X	
Resistors	X	X			X	
Speakers		X			X	
Switches		X	X			
Transformers	X	X	X		X	
Transistors	X	X			X	

Disposition and Reporting of Counterfeit Parts

Disposition and Segregation

Nonconforming parts shall be segregated and dispositioned per this document. Confirmed counterfeit parts shall be prevented from re-entering the supply chain.

Reporting

All occurrences of counterfeit parts shall be documented and reported, as appropriate, through local SIS site procedures and to external organizations (i.e. GIDEP, ERAI, law enforcement agencies). For contracts in which DFARS is cited, a GIDEP shall be issued. Membership and reporting through ERAI (Electronics Retailers Association International) or other industry organizations is strongly encouraged.

Liability

Suppliers shall be held liable for any counterfeit parts entering SIS supply chain up to and including all costs incurred by SIS resulting from the counterfeit parts.

Appendix R: Requirements for Suppliers of Maintenance, Repair, and Overhaul (MRO), Calibration, Deliverable Software/Firmware, and Test Services

Suppliers providing MRO, Calibration, Deliverable Software/Firmware, and Test Services to SIS shall meet the following minimum requirements unless specifically excluded by purchase order or other agreement. Any change in status of the quality management system shall be communicated to SIS.

1. ***MRO Suppliers***

   All MRO suppliers must meet all applicable requirements of MSD 601 including any other specifications on purchase order or contract. MRO suppliers shall provide, at a minimum, a Certificate of Conformance for the service provided. In addition, all **U.S.-based MRO service-suppliers** for commercial articles must obtain a FAA approved drug and alcohol program per 14 CFR Part 120 and retain it on file with SIS.

   Non-certificated MRO Suppliers

   MRO suppliers who do not hold a repair station certificate shall be monitored and maintained in accordance with SIS procedures. An on-site audit of the supplier to the current checklist, SISF00243, will be performed for inception of the MRO supplier by or on behalf of SIS and every two years at a minimum.

   Certificated MRO Suppliers

   A certificated MRO supplier shall have, at a minimum, FAA Part 145 certification and/or an equivalent national aviation repair authority certification. An initial onsite audit to the current checklist, SISF00243, must be performed by SIS or on behalf of SIS for inception of certificated MRO service providers, to include appropriate rating and capability.

2. ***Calibration Suppliers***

   Calibration suppliers shall be compliant to ISO/IEC 17025. Original Equipment Manufacturers of the equipment to be calibrated that are providing calibration services shall be compliant to AS9100 or ISO9001.

3. ***Deliverable Software/Firmware Suppliers***

Deliverable Software/Firmware Supplier Requirements

- All plans discussed in this section shall be submitted to SIS for review and approval prior to the start of the development process. All subsequent revisions/changes shall also be submitted for review and approval.
- RTCA/DO−178 and AS 9115 shall be the preferred approach for all software/firmware development and quality management. The supplier shall complete and maintain a checklist that defines the RTCA/DO−178 and AS 9115 requirements and supplier compliance to these requirements.
- DO-254 and AS 9100 shall be the preferred approach and quality management system for firmware product realization requirements.
- The Software Quality Assurance (S/W QA) Plan shall include the following:
  - A description of the S/W QA environment, including the scope, organizational responsibilities and interfaces, standards, procedures, tools and methods.
  - A statement of the S/W QA authority, responsibility and independence, including the approval authority for software products.
  - The S/W QA activities that are to be performed for each software life cycle process and throughout the product development including:
    - S/W QA methods, (e.g., reviews, audits, reporting, inspections, and monitoring of the software life cycle processes, etc.)
    - Activities related to the problem reporting, tracking and corrective action system
  - A description of the method used to ensure disposition and retention of any remaining S/W QA open action items, change requests, and completion of all software development tasks at the conclusion of the program
  - A definition of the records to be produced by the S/W QA process
- The Software Development Plan (SDP) shall include the following:
  - Identification of software being developed
  - Resources (e.g., requirement, design code and verification environment, etc.)
  - Organizational structure and responsibilities
  - Software Development process (e.g., including prototype and flight test software, etc.)
  - Software Development schedule and milestones
  - Quality and project records
  - Integrated Product Teams
  - Formal reviews

- Computer resource utilization
- Corrective action process
- Risk management
- Control and development of software tools
- Software metrics
- Subcontractor management
- Security and safety requirements
- Data Management/Software Development libraries including documents to be produced
- Program language(s)
- Standards (e.g., requirements, Design code, etc.)
- Development and formal configuration management (if included in the SDP)

o The Software Configuration Management Plan shall include both the developmental and formal configuration management process and the following:

Note: This plan can be included as part of the SDP.

- Configuration Identification of all life cycle artifacts (e.g., Software unique identifier, etc.)
- Configuration Control (e.g., Developmental and Formal, etc.)
- Subcontractor Configuration Management
- Organization and Resources
- Software Configuration Management Roles and Responsibilities
- Storage, Handling and Security
- Authorization including the release of project media and master versions of software
- Version Control
- Configuration Status Accounting
- Configuration Audits (e.g., Physical, Functional and Software Development Library Audits, etc.)
- Access Control

o The Software Test or Verification Plan shall address Computer Software Unit or Module Test and Computer Software Configuration Item (CSCI) Test and include the following:

Note: This plan can be included as part of the SDP.

- Identification of the CSCI
- Software Test Environment including hardware and software elements

- How installation and Test activities are controlled
- Configuration and Change Control including test environment
- Regression Analysis
- Data Recording, Reduction, Analysis, and Retention including a plan for formal results

4. Test Service Suppliers

Test service suppliers shall be compliant to ISO/IEC 17025.

Appendix S: Critical Characteristic Management

When critical to quality (CTQ) characteristics have been identified by SIS, the six symbols defined below are typically used. The characteristics are either safety critical or non-safety critical.

KPC1 and KPC2 are generally applied when variable data can be used to statistically control the process. Management of Process Variation per ASQR-01 4.1.13 and gage R&R of ≤ 20% per ASQR-01 8.2.4 apply.

Frozen process characteristics are often used in association with attribute data or when destructive testing is required. Appendix A applies when frozen process characteristics are present.

CTSC and CTQC designations apply to supplier designed equipment.

	Variable Data	Frozen Process	Supplier Designed
Safety Critical	KPC1	★	CTSC
Non-safety Critical	KPC2	CTQP	CTQC

The following table provides detailed descriptions for the standard UTAS characteristics:

Symbol	Description	Objective and Requirements
KPC1	An observable safety characteristic (such as a dimension or feature) of a Safety Part, assembly, subassembly or system, that if not produced within the prescribed acceptance limits, could directly result in an unsafe condition.	Statistical Management – Safety Applied to safety characteristics that benefit from variation management and thus require the use of Statistical Process Control – Due to safety significance of the characteristic 100% inspection is also required.
KPC2	An observable quality characteristic (such as a dimension or feature of a part, assembly, subassembly or system) if varied from the prescribed acceptance limits may impact performance, form, fit, function, reliability, service life or possible mission abort, failure to launch, prevent readiness for use resulting in extreme customer dissatisfaction.	Statistical Management – Non-safety Applied to quality characteristics that benefit from variation management and thus require the use of Statistical Process Control.
★	Frozen Safety Characteristic (FSC) typically cannot be directly inspected, such as material flow, grain structure, cold work depth, metallurgy, etc. shall be subjected to periodic comprehensive (destructive) testing. May be used for assembly sequence or presence of a detail or feature where absence or mis-assembly may result in an unsafe event.	Frozen Process Management – Safety Processes that create, affect or inspect this characteristic shall be managed under safety frozen process control. Initial process and all changes, including nonconforming material assessment, to a frozen process shall be approved by the SIS Frozen Process Review Board prior to implementation. Per ASQR-01 4.2.4 3., a 40 year record retention applies. Per ASQR-01 8.3 b), rework of nonconforming product is not allowed.

Symbol	Description	Objective and Requirements
CTQP	Critical-to-Quality Process (CTQP). Applied to quality characteristics that are not directly observable and can benefit from control of the process that produces them. Based on an assessment of risk by UTAS Engineering, processes specified on the Engineering drawing (i.e. cleaning, soldering, torque, etc.) that have the greatest impact on the quality or operation of the product.	Frozen Process Management – Non-safety Processes that create, affect or inspect this characteristic shall be managed under frozen process control. Initial process and all changes to a frozen process shall be approved by the SIS Quality Authority (and/or designee) responsible for the design prior to implementation.
CTSC	Critical-to-Safety Characteristic (CTSC). Elements or functions of a part or assembly that have the greatest impact to the safety of the product. This designation is only used for producer designed items procured via Source Control or Vendor Item (Spec Control) drawings. CTSCs drive the selection of FSCs and KPC1s.	Safety Function communication Applied to UTAS engineering procurement documents to communicate safety function to be managed by the producers design and manufacturing system. Additional approval of the SIS Product Safety Review Board or their documented designee is required to assign or change this characteristic at the design level, including non-conforming material reviews.
CTQC	Critical-to-Quality Characteristic (CTQC). Elements or functions of a part or assembly that have the greatest impact to the quality or operation of the product. This designation is only used for producer designed items procured via Source Control or Vendor Item (Spec Control) drawings. CTQCs drive the selection of KPC2s.	Critical To Quality Function communication Applied to UTAS engineering procurement documents. Characteristic to be managed by the producers design and manufacturing system.
SAFETY PARTS DRAWING / DOCUMENT	Will be included in an area adjacent to the title of all product definition documents where a safety part is identified or contained.	Product Definition document annotation – Safety