“Doing Business with Appareo”
(Supplier Quality Manual)

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1.0 Introduction

1.1 Welcome to Appareo

Appareo Systems, LLC (Appareo) /apˈpaː.re.oː / is a product development and technology company based in Fargo, North Dakota USA and it is part of AGCO Corporation. Our company specializes in providing innovative software and electronic hardware solutions for the avionics, off-highway, mobile and defense industries.

Appareo works intensively to identify and conceptualize opportunities where electronics, software, and data management solutions are needed in our served industries, then our company designs, produces, and commercializes such products.

The continual development of new products and the on-time delivery of reliable goods to our demanding customers are not possible without the support of our suppliers. Appareo considers suppliers as key partners and rely on their expertise to deliver components that are effective for the application and competitively priced.

1.2 About this Manual

In today's manufacturing environment, product that is found to be non-conforming at receiving, or during production, causes serious disruptions of the production and shipping schedules. Even the best Receiving Inspection program cannot detect all defective material thus Appareo requires suppliers to control the quality of material shipped to its facility, so that Appareo does not need to inspect the product when it is received.

This manual describes Appareo's expectations for its suppliers to ensure that purchased material meets Appareo's requirements.

1.3 Scope

This information applies to all suppliers who have interest in doing business with Appareo. It also applies to Appareo's outsourced partners or subsidiaries.

1.4 Confidentiality

Appareo manages different types of confidential data and intellectual property that is carefully protected under applicable data privacy, security and intellectual property laws and regulations. Every employee in Appareo is responsible to safeguard the information according to our procedures and supported by our IT security systems.

Appareo requires the same treatment for any information exchanged between Appareo and its suppliers, thus all suppliers are required to sign a Bi-lateral Non-Disclosure Agreement (NDA) to protect confidential information and intellectual property of both parties.

Suppliers are required to ensure that all information is safeguarded by their employees and sub-contractors.

Appareo can provide an NDA template to suppliers but also accepts templates from them. When a business relationship is established, the NDA shall be renewed before it gets expired.

Hereinafter, any mention to provide or exchange information is under the assumption that an NDA with a supplier is both fully executed and current.

2.0 CODE OF CONDUCT

Appareo shall hold ethical and respectful relationships with its suppliers; dealings must be fair, reasonable, and consistent with all applicable laws and regulations.

The following clauses describe the expectations that Appareo look in their suppliers, which should be communicated to their employees and sub-suppliers:

2.1 SOCIAL RESPONSIBILITY

Appareo considers that social responsibility is key for sustainable growth therefore it applies a series of actions in adherence to applicable laws and regulations:

- **Employment:** provide competitive and inclusive work opportunities
- **Workplace:** provide a safe, respectful, and healthy environment to work
- **Environment:** manage its operational processes and its residuals responsibly
- **Society:** promote among employees the contribution to their communities

All suppliers must review the above actions plus any other applicable regulations and shall manage them in accordance with their local laws and regulations.

2.2 CORE VALUES

Appareo has defined a set of core values that reflect its culture and expects that its suppliers can align with them. Values (2) and (5) are non-negotiable:

1) Improve the lives and careers of our people.
2) Act with honesty and integrity.
3) Encourage risk taking and tolerate failure.
4) Push the boundaries of what is possible.
5) Relentlessly pursue quality.
6) Contribute to the community and society.

2.3 CONDUCTING BUSINESS WITH APPAREO

Appareo considers the Honesty, Integrity, Quality, Communication and Awareness the pillars of a business relationship with suppliers:

- **Honesty** – Tell the truth. Do not hold information.
- **Integrity** – Always do the right thing, regardless of other options.
- **Quality** – Deliver to the specification and on-time.

- **Communication** – Inform on time, including the bad news.
- **Awareness** – Engage your employees and sub-suppliers in building and delivering safe and reliable products

2.4 GIFTS, FAVORS AND HOSPITALITY

Appareo highly appreciates the business relationship with its suppliers, however the business decisions shall be based on quality, delivery, price, and other competitive factors only; the company and its employees will not accept gifts or business courtesies to avoid giving the appearance of such an influence in a decision. We kindly ask our suppliers not to offer any gift or courtesy to our employees.

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3.0 Quality Management System

Each Appareo supplier is required to maintain an effective quality management system, one that conforms to the ISO 9001:2015, ideally AS9100D Quality Management System or equivalent (e.g. ISO13485, ISO/TS16949, etc.). In addition, the supplier must meet all other requirements of this manual.

3.1 Quality Manual, QMS certifications and Procedures

The supplier, will provide, on request, to Appareo with a copy of:

- Supplier's Quality Manual and its supporting procedures.
- When certified, Certificates in ISO9001, TS16949 orAS9100
- When certified, the latest third party audit results and its findings.
- Other information like detailed documents and work instructions specific to production of material for Appareo.

3.2 Control of Sub-tier Suppliers

Suppliers are responsible for the quality of materials and components provided by their sub-tier suppliers and sub-contractors. Appareo suppliers must flow-down controls on their sub-tier suppliers that provide quality results and documentation comparable to the controls applied to suppliers by Appareo. The extent of the controls may vary, depending on the nature and complexity of the product and processes, but should normally include:

- Evaluation and qualification of sub-tier supplier facilities
- Control to ensure that raw materials used meet Appareo's requirements, including a method for all appropriate requirements changes from Appareo are effectively communicated
- Controls to ensure that the sub-tier suppliers of components used are those approved by Appareo, where applicable
- Ensure that sub-tier suppliers have special control program (ex. an ESD control) that meets or exceeds the needs of Appareo if the parts or materials require special preservation controls
- Part qualification, including first article inspection (FAI), Production Part Approval Process (PPAP), and process capability studies, including Statistical Process Controls (SPC) as applicable
- Security measures to protect Intellectual Property (IP), materials, and tools
- Control of drawings/revisions
- Control of nonconforming material and counterfeit material avoidance program
- Technical and procedural failure analyses to root cause
- Corrective action and preventive action (CAPA) programs, including CAPA programs for suppliers
- Expectations of product safety, as well as employee PPE safety in accordance to applicable laws and regulations
- Considerations of environmental impact
- Expectations of ethical behavior, see section 9 – Supplier Code of Conduct and Values
- A continuous quality improvement program

Appareo may specify what sub-tier suppliers shall be used, and may aid the supplier for evaluating, and qualifing their facilities; Appareo may also assist the supplier in controlling the sub-tier supplier. Typically, this occurs when the sub-tier supplier is an essential component of the supply-chain process. *Appareo, and by default, Appareo's customers and regulatory agents, reserves the prerogative to evaluate the quality system and records of such sub-tier suppliers as necessary. In the event of Appareo's involvement, it does not absolve suppliers of the ultimate responsibility for the quality performance of their sub-tier suppliers.*

4.0 Supplier Qualification Process

Appareo looks for competitive procurement and the selection of suppliers is based on objective criteria like quality, delivery, technical expertise, responsiveness, and price. All suppliers for productive material must be qualified to become part of the supply base, the qualification consists of three steps:

1. Onboarding for new suppliers
2. Capabilities assessment
3. Periodic performance reviews

4.1 The degree of the qualification process tis dependent upon the criticality of product purchased and other factors determined by AppareoOnboarding process for new suppliers

In the early stages of the supplier selection process, when new potential suppliers are considered for providing products or services to Appareo, they are sent four documents for review and response; these documents must be completed and signed then returned to Appareo:

- **Supplier Information form** - Self-assessment to know the company capabilities required to provide products or services to Appareo. Such a form will require to attach copies of Quality Management System documents and certificates to support the approval process.
- **Terms & Conditions** – The supplier must understand Appareo's expectations for suppliers for doing business.
- **Declaration form for REACH and RoHS** – The supplier must testify if it is capable for meeting compliance regulations.
- **Commitment to Report Quality Escapes and Nonconformities** – The supplier must acknowledge that it shall notify Appareo upon realization of issues of quality or material that is non-conformant.

4.2 Capabilities Assessment

For suppliers of critical components, an assessment of the supplier's facility is performed. The assessment includes three components:

- A quality assessment to determine whether the supplier's quality management system is in place and functioning effectively.
- A business assessment to determine whether the supplier has financial resources, production capacity, and other business resources needed to fulfill Appareo's production needs.
- A technology assessment to determine whether the supplier has the needed technical resources, including production and inspection equipment, facilities, engineering resources, etc.

If the assessment team determines that the supplier meets Appareo's requirements, Appareo qualifies the supplier to bid on new business and supply production materials.

4.3 Periodic performance reviews

Appareo periodically evaluates current production suppliers using performance data and/or on-site assessments. If requested and with reasonable notice, the supplier shall make their facility available for on-site process verification by Appareo, customers, and/or regulatory agents..

For key suppliers, as determined by Appareo, periodic meetings will be arranged to review key performance data and including commercial discussions. Key suppliers are those suppliers that make up the top 80% of Appareo's spend and/or supply unique components or processes to Appareo. Other suppliers will be managed on a case-by-case basis.

Appareo will review all key suppliers annually for performance in:

- Quality
- On-time delivery
- Responsiveness
- Cost competitiveness

Suppliers with poor performance may be requested for attending escalation meetings, implementing corrective actions; and depending on the critically of the situation, they may be visited for performing an on-site assessment.

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5.0 Part Qualification

The supplier is responsible for submitting all data requested by Appareo on the pre-production requirements checklist. Depending on the requirements of the program, a PPAP (Production Part Approval Process) warrant or a First Article Inspection (FAI) unit will be requested by Appareo. Appareo and the supplier will agree on the number of the samples to be checked and submitted. Where possible, all required documents should be submitted to the quality engineer in an agreed electronic format.

In some cases, Appareo personnel may wish to be present during the initial production run. This will allow Appareo to validate and verify the process before any product is shipped.

5.1 Pre-Production Requirements Checklist

For each new or changed part, Appareo sends the supplier a list of either PPAP or FAI requirements, the selection of items is based on the type of component or assembly to be supplied:

- **First Article Inspection Report (FAIR)** shall follow the requirements defined on the SAE AS9102 standard (latest revision) from the Americas Aerospace Quality Group (AAQG) that can be found at https://www.sae.org/aaqg. Otherwise, the supplier can find Appareo's supplier-facing document on our Supply Chain website
- **Production Part Approval Process (PPAP)**, Appareo recommends the use of the AIAG (Automotive Industry Action Group) PPAP manual that can be found at: https://www.aiag.org/quality/automotive-core-tools/ppap..

Especially for custom components, Appareo will arrange a Design Process Assembly Review (DPAR). This will be a comprehensive discussion on the component, its application, requirements, review the supplier's capabilities for manufacturing, opportunities for improvement for quality or cost, project timing, commercial considerations, etc.

5.2 Dimensional Inspection Report

For engineered components, Appareo notifies the supplier of the quantity of parts to be inspected, typically five from each tool or cavity. The supplier inspects or tests each sample for all dimensions, drawing notes, and specification requirements listed on the current revision of the Appareo drawing and/or specification. The supplier records the results and submits the data, with appropriate comments as part of the submittal.

The dimensional inspection report must include the specification number, specified requirements, and the inspection/test results. Each report must be traceable to the supplier's material, through lot/heat/coil/batch numbers or equivalent and must be signed by the organization that performed the testing. For any requirements that the supplier does not have the equipment to inspect or test, the supplier may obtain reports from their sub-supplier or other test agency.

Parts inspected for the dimensional inspection report are randomly selected from a production run of parts. The minimum quantity for the production run is agreed upon between the supplier and Appareo. The parts must be produced under volume-production conditions, including material, machines, tooling, processing parameters, cycle times, etc.

5.3 Component Validation / Test Report

When requested, the supplier must provide a material certification/test report. Appareo and the supplier shall discuss the tests to be completed for validation, including which tests are the supplier's responsibility. This report must include the specification number, specified material and/or physical requirements, and the inspection/test results. Each report must be traceable to the supplier's material and must be signed by the organization that performed the testing. A simple statement that the material meets the requirements is not acceptable.

Component validation also includes Declaration of Conformity reports in accordance with industry standards, material safety datasheet (MDS) and compliance regulations (RoHS, REACH, etc.). For details see clauses below.

5.3.1 Measures to Block Counterfeit Material

Suppliers must put processes in place to prevent the use of counterfeit parts in their products, all materials used in the manufacturing of the component must be genuine and are compliant with the specification. Counterfeit Parts avoidance processes can be based on the standard SAE AS5553 available at https://www.sae.org/aaqg. The supplier shall be cognizant that:

- Certificate of Compliance (CoC) affirms the authenticity and compliance to specification of the supplied component.
- Certificates of Analysis (CoA) is key to the component records and shall be kept on-file and available upon request.
- Non-conforming material shall be rendered unusable to avoid its refurbishment and availability in the counterfeit market.
- Materials records shall be kept by the supplier to validate concerns by Appareo.

Suppliers shall flow-down its counterfeit avoidance requirements to their sub-suppliers to ensure compliance.

Counterfeit problem is growing worldwide and Appareo takes it seriously and expects the same from its suppliers, so in case that a potential counterfeit component made its way in the supply source, the organization will initiate an investigation to determine its authenticity and the supplier is responsible to support Appareo in clarifying the situation. At the end of the investigation if the:

- Authenticity condition is confirmed. Appareo will define its disposition as any other nonconformant material.
- Counterfeit condition is inconclusive. Appareo will not use the material and will make the decision to destroy the material inhouse or to send it back to supplier for further destruction. Supplier is responsible to cover expenses of external labs tests and the material cost.
- Counterfeit condition is confirmed. Appareo will act in accordance with AS5553 and will report the incident and material to the respective authorities, and it will ensure that such material is destroyed. The supplier must cover all expenses caused by the investigation, material cost and any other subsequent actions to clarify the situation with the authorities or OEMs.

5.4 Pre-Production Component Deliveries

Any pre-production components, as either sub-assemblies, component samples, or function prototypes shall be clearly identifiable as such. Functional prototypes must have a mark or label identifying the component as a guard against the component's misapplication or perception as a production part.

5.5 Special Processes

For Appareo, unless otherwise specified by contract, the Supplier shall only use special process sources that are approved by Appareo. This requirement applies to all external providers and processors who perform special processing such as heat treating, plating, etc., as part of their internal operations. The Supplier shall flow-down all applicable Appareo requirements to its entire supply chain. NOTE: Source Control Design items are excluded as they fall under the design authority Quality Management System.

5.6 Risk Management

The Supplier shall establish a risk management program in accordance with the guidelines to effectively assess those elements from all aspects of the business that could affect the quality of the products and/or services scheduled for order execution. A copy of the Supplier's risk management program shall be furnished upon request.

5.7 Gage Repeatability & Reproducibility (R&R) Studies

For those characteristics specified by Appareo, the supplier must evaluate the measurement system related to such characteristics by performing gage R&R studies in accordance to the Measurement Systems Analysis (MSA) manual published by the AIAG, this manual can be found at https://www.aiag.org/quality/automotive-core-tools/msa.

Appareo will approve Gage R&R values equal to or under 10 percent and may accept values under 30 percent for certain applications, any greater value will not be accepted.

Normally for variable gages, three different operators measure ten samples in random order three times each. For attribute gages, the Attribute Gage Study (long method) is required. Appareo must approve any alternative methods.

5.8 Gage Correlation Studies

For characteristics specified by Appareo, the supplier must perform a gage correlation study, which consists of the supplier identifying, measuring, and recording a specified number of production parts. The supplier then sends the parts to Appareo for measurement. Appareo compares measurements from both Supplier and Appareo to determine the correlation between the gages.

5.9 Process Capability Studies

Process Capability Index (C_{pk}) is a comparison of the inherent variability of a process output to specification limits *under statistically stable conditions*. There are a number of techniques for assessing the capability of processes. Appareo suppliers must use methods defined in Statistical Process Control (SPC) published by AIAG for determining process capability and process performance unless an alternate method is approved in writing by Appareo.

A C_{pk} of at least 1.33, ideally 1.6 or greater is required for Appareo critical dimensions.

When required to submit process capability data to Appareo, the supplier must calculate process capability using the following method, unless an alternate method is approved by Appareo:

Symbol	Representing	Test	Detail
Σ	Estimated Standard Deviation	$\sigma = \frac{\overline{R}}{d_2}$	$\overline{R}$: Average Range d_2 : const from statistical tables
C_p	Process Capability, ignoring process centering	$C_p = \frac{USL - LSL}{6\sigma}$	USL: Upper Specification Limit LSL: Lower Specification Limit
C_{pk}	Process Capability Index, including centering	$C_{pk} = \frac{min}{x \in S}$	Where S($\frac{USL-Avg.}{3\sigma}, \frac{Avg.-LSL}{3\sigma}$)
$\overline{\overline{X}}$	Process Average		

For unilateral tolerances, the same logic is employed, except that only the specified side of the tolerance is used to calculate C_{pk}. When $\overline{\overline{X}}$ and $\overline{R}$ charts are used for capability studies, the subgroups must contain pieces taken consecutively from the process and the subgroups must be arranged sequentially in the order they were produced.

5.10 Failure Modes and Effects Analysis (FMEA)

When requested, the supplier must perform a Process Failure Modes and Effects Analysis (PFMEA) and submit it for approval. For parts and assemblies that are designed by the supplier, the supplier should also perform a Design Failure Modes and Effects Analysis. The PFMEA considers all reasonably foreseeable potential failure modes of each process and notes the critical characteristics of the product related to failure modes.

Every failure mode is ranked (from 1 to 10) for severity, occurrence, and detection, where the product of such three values is the Risk Priority Number (or RPN), the higher the RPN the riskier the failure mode. The supplier shall take countermeasures for all failure modes with RPN higher than 100 or with Severity values of 9 or 10 to lower the RPN as much as possible.

The PFMEA should be a living document, and should be updated when process changes occur, or when defective material is produced. PFMEA methods and examples can be found in Potential Failure Mode and Effects Analysis published by AIAG at **https://www.aiag.org/quality/automotive-core-tools/fmea**.

5.11 Control plan

When requested, the supplier must develop a control plan and submit it for approval. The control plan usually utilizes the PFMEA document as baseline to define the quality control plan (inspections, tests, etc.) required at every step of the process to produce a part, including all critical characteristics. The control plan must include all in-house processing, external processing, inspection, packaging, and shipping.

Suppliers may use their own format but also can find a template in the (APQP) Advanced Product Quality Planning manual published by the AIAG and located at: https://www.aiag.org/quality/automotive-core-tools/apqp .

The Control plan form must include measurement gage numbers and drawing; Inspection methods, sampling size and frequency. The selection of measurement methods, frequency and sample size must be based on product criticality and process capabilities and supported by recognized statistical methods (e.g. AS9138, ANSI/ASQ Z1.9-2003, etc.).

Critical characteristics that do not meet process capability requirements must be inspected 100%, unless Appareo approves an alternate method.

Control plan information can be transferred to Work Instructions or equivalent for providing detailed information to operative personnel only if the information shown in the alternative document is complete per control plan requirements.

5.12 Electrostatic Discharge (ESD) and other material susceptibilities

When components or assemblies supplied to Appareo are susceptible to ESD, the supplier shall establish ESD susceptibility information for them. Procedures, methods, and equipment used for determining the ESD susceptibility shall be provided to Appareo. ESD failure modes shall be considered in PFMEAs, and ESD controls shall be included in control plans and packaging.
Similar controls are required for electronic components , solder andassemblies susceptible to moisture, chemicals and/or temperature. Shelf life is another factor that supplier must control in their products.

5.13 Material Safety Data Sheets (MSDS or SDS)

As applicable, Material Safety Data Sheets (MSDS or SDS) that describes the potential health effects of exposure to chemicals or other potentially dangerous substances related to the supplied product must be provided AS REQUIRED.

5.14 Agency Approvals and Compatibility Reports

The supplier is responsible to provide the proper agency approval test reports per Appareo requirement. Examples are UL, CE, FCC, TUV, etc. The supplier is also responsible for agency test reports from their sub-supplier or other outside test agencies.

The suppler is responsible to submit test results that verify compatibility as required. Testing may be done by the supplier or by a test facility certified by the supplier.

5.15 Compliance and regulatory requirements

Some products are subject to regulatory compliance like RoHS, REACH, Prop65, 3TG, etc. when Appareo specifies any of them in the drawing, the supplier is responsible to produce, pack and identify the supplied components in accordance to the defined compliance regulatory standard.

The supplier must provide the Declaration of Conformity (DOC)_ upon request or as part of the PPAP/FAIR that certifies that the product meets the agreed compliance standard(s). Appareo can provide a DOC template if necessary.

Appareo may solicit in a regular basis information about regulatory compliance standards to keep its records up to date, the supplier is responsible to respond these requests and to provide such information.

5.16 Packaging & Labeling

The supplier must adequately plan for packaging of material shipped to Appareo. The supplier will provide a documented packaging plan including container size, number of parts per container, packaging configuration, etc. Packaging shall be designed to provide protection from any damage that may occur. For static sensitive components, ESD packaging shall be provided. Packaging, labeling, and shipping materials must comply with the requirements of common carriers to secure the least transportation costs.

5.17 Setup for Records Retention

The supplier must plan for the proper retention of records for each part number. The record structure must be set up to record individual key measurement and test data. From this data, information will be created to consider quality, traceability, notes for changes and/or manufacturing anomalies.

5.18 Approval for Production

Previous the first shipment of parts built with a released drawing (RXX), the supplier must submit either the PPAP or FAIR with all required documents for review and approval. The supplier cannot ship material without having an approved PPAP/FAIR from Appareo. The supplier can ship with any of the following approvals:

- **Full approval:** PPAP/FAIR documentation meets all requirements and supplier can ship without restrictions.
- **Conditional approval:** PPAP/FAIR is not meeting one or more requirements thus Appareo provides authorization to ship for a limited time or shipments to give time for fixing the non-conforming items. Supplier must re-submit the PPAP/FAIR for review and approval and then Appareo may provide the full approval.

In case of a **rejected** PPAP/FAIR then the supplier cannot ship until all issues in the documentation are solved and the PPAP/FAIR is approved.

6.0 Manufacturing Control

6.1 Process Control

Appareo suppliers are required to control all manufacturing processes in accordance with the control plan, which is approved during part qualification.

6.2 Statistical Process Control (SPC)

Where specified in the control plan, the supplier is required to apply effective statistical process controls. Effective controls must include:

- The control chart displays control limits that are correctly calculated (specification limits shall not be used as control limits).
- The control chart is at the process area, visible to the operator, or persons who are responsible for controlling the process.
- For each out-of-control condition, actions are taken to bring the process back into control. Actions taken to bring the process back into control are recorded.
- Product produced during any out-of-control condition is sorted, scrapped, reworked, or dispositioned through the supplier's material review process.

6.3 Process Performance Requirements

Process Performance Index (P_{pk}) is the comparison of the actual process variation to the specification limits. When required to submit process performance data to Appareo, the supplier must report process performance using the following method:

Critical Characteristics: A P_{pk} at least 1.33 is required. Any critical characteristic failing to meet the minimum requirement requires a containment plan and an improvement plan.

Other Characteristics: A P_{pk} of at least 1.00 is required. The supplier is not required to calculate and report process performance for non-critical characteristics, unless requested by Appareo. When specified by Appareo, other characteristics failing to meet the minimum requirement also require a containment and improvement plan.

Symbol	Representing	Test	Detail
P_{pk}	Process Performance Index	Minimum of S($\frac{USL-Avg.}{3\sigma}$, $\frac{Avg.-LSL}{3\sigma}$)	USL: Upper Spec. Limit LSL: Lower Spec. Limit Avg: Process Average
σ	Est. Standard Deviation	$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{\bar{x}})^2}{(n-1)}}$	n = Total parts inspected $\bar{\bar{X}}$ = Process Average

For unilateral tolerances, the same logic is employed, except that only the side of the tolerance that is specified is used in to calculate P_{pk}.

6.4 Process Improvement

Out-of-control or unstable processes (which have assignable causes) and processes that do not meet the minimum Cpk/ Ppk requirements must be identified and corrected. The Supplier must also improve processes with low yield rates.

6.5 Lot Control

A lot consists of produc [SPACE LEFT INTENTIONALLY BLANK] are made at the same time, under the same processing conditions, primary purpose for identifying lots is to determine the scope of lems arise during further manufacturing or

with customers. Each container of material shipped to Appareo must be identified with the Supplier's lot number. Inspection records must be traceable to lot numbers.

The following are typical conditions that result in a change of lot numbers:

- Change of part number or revision
- Change of part number or revision of components
- Interruption of continuous production (typically for more than a few hours)
- Repairs or modification to the tooling or equipment
- Tooling changes (other than minor adjustment or replacement of consumable tooling)
- Change to a different lot of raw materials
- Process changes

6.6 Traceability

Traceability ties finished product back to the components used in the product. When traceability is specified, the traceability marking should be effective down to the individual component, i.e., lot code, batch or serial number should be identifiable throughout Appareo's processes.

6.7 Workmanship

When workmanship standards are not referenced on Appareo drawings or specifications, the supplier is expected to follow industry-accepted standards (e.g. ANSI, IPC). When in doubt, consult with Appareo for clarification.

6.8 Safety

At no time should any customer, or person at an Appareo facility, be exposed to hazardous material or situations that are not inherent in a component's structure. Residues, films, out-gassing products and packaging materials should comply with OSHA (Occupational Safety & Health Association) standards. For items with inherent hazards, safety notices must be clearly observable. As applicable, MSDS sheets must be provided during the First Article process.

6.9 Maintenance and calibration

The supplier must maintain all facilities, manufacturing machines, tools, measuring devices, and other equipment in such a manner that the supplier can support Appareo's production requirements, and the quality of parts manufactured for Appareo is not degraded in any way.

Suppliers are required to have a formal process to manage and maintain in good shape the tools, tooling, fixtures, and equipment used for producing the supplied parts, as well as to have a calibration system in place for tools, tooling, fixtures and equipment that measures in any shape or form the supplied part to ensure its compliance to specification.

The system should include the clear identification of tools, tooling, fixtures, and equipment; and to have all their registers in order and up to date.

The supplier is responsible to define the required preventive maintenance methods and its frequency.

The supplier is responsible to define the calibration plan and frequency for their measurement devices, and must only utilize calibration services accredited in ISO/IEC 17025 or equivalent; internal calibration of equipment is valid if the utilized devices to calibrate were calibrated by accredited entities and the method adheres to either the equipment manufacturer manual or a recognized standard.

6.9.1 Out of spec conditions related to maintenance and calibration

In case that supplier detects an out-of-spec condition in either an equipment or a calibrated device, the supplier is responsible to have a reaction plan that allows to contain the situation and prevent that nonconforming material is shipped to Appareo.

If potential or confirmed defective material was shipped to Appareo already, then the supplier shall inform Appareo immediately in order Appareo can take action to contain such issue.

6.9.2 Customer or third party owned property

In case that the production of the supplied product requires the use of equipment or tooling provided by Appareo or by any of its customers, the supplier is responsible to take care of such property and provide all the required maintenance to keep its fitness and good shape; the supplier must inform Appareo immediately if this equipment or tooling is damaged in order that the situation can be solved at the earliest convenience.

Appareo can request reports of maintenance, calibration, or proofs of existence of customer owned property to suppliers to ensure its condition is well maintained.

6.10 Preservation of supplied product

The supplier is responsible to have effective programs and controls for the preservation of the material throughout the manufacturing process from receiving of components to shipping of final products in order to avoid its degradation or damage. Some types of products that require special care are:

- ESD sensitive material
- Moisture sensitive material
- Temperature sensitive material
- Material sensitive to shelf life

6.11 Drawing and Change Control

The supplier must have a documented system for assuring that the latest Appareo drawings are in effect at their facility. The supplier's quality management system must contain a documented procedure that describes the method used for the receipt, review, distribution, and implementation of all changes to drawings and specifications. In addition, the procedure must address control of obsolete drawings and specifications. A documented procedure should also detail the method used to contain new or modified parts until approved by the customer.

6.12 Process Changes, Engineering Changes

Suppliers must have systems in place to control changes to drawings, specifications, processes, or produced parts. Systems should be capable of handling changes being requested by the customer, and also changes requested by the supplier. Changes that affect sub-tier suppliers must be communicated by the supplier to Appareo. Email SPCR (see 5.13) or Deviation (see 5.14) to purchasing@appareo.com AND quality@appareo.com.

NOTE: The First Article approval process is directed at a given part number for a specified revision level produced in a specific area of the manufacturer's facility. **Suppliers shall not make any changes in their process, location, material, or to the part without written approval from Appareo.** The supplier must formally request a process change on all Appareo components.

6.13 Supplier Process Change Request (SPCR)

A Supplier Process Change Request (SPCR) is used to request a change to a released part, process, drawing, sub-tier supplier change, or specification. Appareo encourages SPCRs for process improvement with the stipulation that before an SPCR is submitted, the supplier thoroughly reviews their FMEA and control plan to assure that all process-related issues have been addressed and resolved.

The originator of an SPCR includes the following information:

- Drawing or part number
- Drawing or part title
- Description of problem or recommended change
- Reason for change or "rationale"
- Proposed effective date

The supplier submits the SPCR with the revised FMEA and control plan (if applicable) to Appareo for evaluation of the following:

- Supplier-demonstrated process capability and stability
- Comparison to First Article data
- Industry standards
- Supplier process engineering capabilities
- Supplier's adherence to control plan

After Appareo has completed the review, and concurs with the supplier, Appareo will notify the supplier as to the final disposition of the SPCR and part submittal requirements and dates. When monitoring is required, the appropriate markings must be identified on the lots etc. for a specified time frame as decided jointly with Appareo and the supplier.

6.14 Supplier Deviation Request

A supplier is never permitted to knowingly ship product that deviates from the print, specification limits, or design intent without written authorization from Appareo. If such a condition exists, the supplier may request Appareo to allow shipment of the product. This is accomplished by initiating a Deviation Request.

If directed by Appareo, the supplier must send samples of non-conforming items to Appareo for evaluation. The cost of any testing required to determine the acceptability of the product will be charged to the supplier. Appareo will determine the item's acceptability and what corrective actions (if any) are required beyond the deviation. If approved, Appareo will send a written deviation approval to the supplier.

The deviation is only intended to be an interim action and is not to be construed as an engineering change. The supplier must begin work immediately to correct the condition in question. This must be accomplished within the time frame stated on the deviation. Failure to comply with the mutually agreed upon closure date for the deviation may result in the supplier's rating being affected.

In all cases, the supplier must fully contain all product suspected of being non-conforming at their facility. In addition, the supplier may be required to sort any suspect product at Appareo.

Any parts sent to Appareo that have been approved on a Deviation must be clearly identified on the box, container, or other packaging method with the appropriate markings decided jointly by Appareo and the supplier.

6.15 Statement of Work (SOW)

Appareo may draft a statement of work for some component development. The purpose of the statement of work is not limited to but shall include information of this sort:

- Define the component
- Identify objectives of the development
- Define communication protocols
- Identify key milestones in the development, tied to payment schedules
- Identify assumptions and risks of the design
- Define First Article or PPAP requirements
- Define prototype and production requirements
- Define unit cost expectations at certain build quantities
- List objective deliverables to indicate completion of development

7.0 Certificates, Packaging & Labeling

7.1 Shipping Terms

Appareo, by default, pays all shipping to the destination. Contact the buyer if the shipping terms are not clear. Shipping terms also define responsibility for the components during transit. By default, the company that contracts the shipping is responsible for damage during transit. Appareo uses Incoterms as a standard for communicating shipping terms to determine the handoff of responsibility between the supplier and Appareo.

7.2 Certificate of Compliance

With every PO line item, Appareo requires the supplier to include with all commercial submissions a Certificate of Compliance (CoC). A CoC is a document issued by the supplier to confirm that the delivered products fulfill the relevant specification, applicable design data (e.g. drawing) and purchase order requirements. This must be submitted for all PO line items. Deviations from this requirement (no submission of CoC) must be approved by Appareo's Quality department or Buyer. Each CoC must include the following items:

1. Supplier name and Address
2. Customer name and Address
3. Date in which the CoC is being issued
4. Appareo PO number
5. Appareo Part number & revision level
6. Supplier/Mfr part number and revision number (if applicable)
7. Quantity shipped
8. Material used and specification (if applicable) - This needs to match exactly to what we are calling out in our drawing (e.g. Stainless Steel 303 per ASTM A582)
9. Material lot / Job (Run) number
10. Secondary processes used and spec followed (if applicable) - This needs to match exactly to what we are calling out in our drawing. e.g. *Plating: MIL-DTL-5541F TYPE II, CLASS 3 CHEM FILM*. Some other examples of secondary processes: Anodization, Powder coating, passivation, etc.
11. A statement certifying that the product supplied conforms to the drawing, specification, and purchase order requirements. Statements shall not contain ambiguous language such as, “To the best of my knowledge…” or “I believe the product meets…”
12. Signature and title of a company officer or designee of operations, engineering, or quality management that has the authorization to release products to customer

Appareo does not require a specific template to be used for CoC. Supplier has the option to use their own template if it meets Appareo's minimum requirements listed above.

A template for CoC (and guidelines) can also be downloaded from the IAQG Supply Chain Management Handbook (www.iaqg.org/scmh) Section 5 "Deliver".

7.3 Certificate of Analysis

Certificate of Analysis (CoA) (a.k.a. Material Certificates, Material Test Reports, Certificate of Analysis, Test Reports, Certificate of Test, Laboratory Report, Metallurgical Test Report, etc.) are not a standard requirement with every PO line item unless otherwise indicated.

Appareo will indicate the requirement of Material Certificates in a case by case basis. Depending on the component specification, a Certificate of Analysis shall be kept on-file at the supplier’s facility. It shall be

available upon request. A CoA shall be sent with every shipment ONLY when required as part of the product drawing, specification, or purchase order requirements.

If the supplier should provide a Certificate of Analysis without Appareo requesting it (due to Supplier's policies or other situations that cannot be accommodated), it is Appareo's preference that the CoA is a separate document than the CoC.

Even if a CoA is not requested, it is Appareo's requirement (and expectation) that test results are securely stored and readily available upon request for any given Purchase Order/Lot.

7.4 Packaging

Each supplier must adequately plan for packaging. Appareo encourages supplier-initiated packaging improvements. Suppliers will provide packaging that provides protection from any damage that may occur. Packaging, labeling, and shipping materials must comply with the requirements of common carriers, in a manner to secure the lowest transportation costs.

Packaging for ESD sensitive items must meet appropriate ESD requirements. Contamination is a serious concern to Appareo. Packaging must protect the components from contamination, including fibers from the packaging materials.

Expendable materials and packaging must be legal and safe for standard “light industry” disposal. The preferred maximum weight of manually handled packs is 40lb / 18Kg. The maximum acceptable weight is 44lb / 20Kg, unless approved by Appareo in writing. Pallets must be made of renewable and environmentally friendly material. The preferred pallet size is 48” x 40” or 1200mm x 1000mm.

Whenever possible, only one part number and one supplier lot is to be packaged in a shipping container. When more than one part number or lot number is packaged in a shipping container, each part number and/or lot number must be separately packaged (i.e. bags or boxes) inside the container, with each labeled as to the contents.

7.5 Labeling

Each shipping container or inside package must contain the following information:

- Appareo part number (if no Appareo number exists, supplier part number is used)
- Quantity
- Supplier’s Name
- Purchase Order Number
- Lot identification (if required)
- Required ESD Susceptibility Label on packaging for ESD sensitive items, using the Electronic Industries Association Standard EIA-471 symbol or equivalent.

8.0 Corrective Action System

Appareo requires suppliers to utilize a closed-loop corrective action system when problems are encountered in their manufacturing facility, or after nonconforming product has been shipped to Appareo.

8.1 Corrective Action Process Approach, AKA "8-D"

The corrective action system utilized should be similar to the process outlined below. The focus should be on identifying the root cause(s) of the problem and taking action to prevent its reoccurrence.

- Use a team approach
- Describe the problem
- Contain the problem
- Identify and verify root cause(s)
- Define the permanent corrective action plan
- Implement permanent corrective actions
- Verify corrective action effectiveness
- Congratulate the team and close the corrective action

For more information and education, use the American Society for Quality website at http://asq.org/learn-about-quality/eight-disciplines-8d/.

8.2 Corrective Action Request

Appareo issues a Corrective Action Request (CAR) to a supplier when non-conforming parts are found at incoming inspection, in production, in test, or by an Appareo customer. They can also be issued because of a supplier audit.
When a CAR is created and notified, the supplier is required to acknowledge upon notification and to respond the CAR as described in the following process:

- **CONTAINMENT**. The supplier has 48 hours upon notification to inform the countermeasures taken to contain the problem and prevent that more nonconformant material reaches Appareo. If more suspect material has left supplier's facilities, then they shall inform Appareo about the suspect lots that need to be also located either in transit or stock for further isolation.
  As requested, Supplier shall assist Appareo in identifying the risk for the customer, as well as to determine suspect lots and quantities.
- **ROOT CAUSE ANALYSIS**. The supplier has two weeks upon notification to inform the root cause analysis results, the supplier is required to utilize Root Cause Analysis tools like 5 Why's or Fishbone diagrams.
- **CORRECTIVE ACTION PLAN.** The supplier has 3 weeks upon notification to describe the corrective actions that will eliminate or prevent the problem to happen, as well as to provide the estimated completion dates. Appareo encourages the pursue of effective corrective actions, hence actions like "Train the operator", "discipline the operator", or " increase inspection" are typically not acceptable.
- **IMPLEMENTATION OF CORRECTIVE ACTION**S. The supplier is required to keep Appareo informed of progress towards implementing the corrective action.
- **VERIFICATION OF EFFECTIVENESS.** When corrective action implementation is complete, the supplier and Appareo verify that the corrective action is effective in preventing the problem's reoccurrence.

Should the supplier need more time due to complexities of process, logistics, or other circumstances, the timeline on the CAR deliverables can be agreed with the Appareo team.

9.0 Supplier Monitoring

Appareo continually monitors its suppliers to ensure they continue to meet Appareo's requirements, and to ensure that the supplier continues to ship acceptable parts. This may consist of:

- A quality management system (QMS) surveillance audit at the supplier's facility
- An on-site audit of the supplier's control plan
- A random incoming inspection audit of a batch of product
- Source inspection of product at the supplier's facility
- Nth Article Inspection
- Review of supplier-furnished data packages
- A supplier progress review meeting conducted periodically at the supplier's site or at Appareo to review supplier performance and progress

9.1 Supplier Audits/Assessments

Periodically, Appareo may audit the supplier's quality management system. The supplier must make their facility available for on-site process verification by Appareo personnel, including Appareo's customer, Regulatory agent, at any time, with reasonable notice. This may be a full or abbreviated documentation and on-site audit. The purpose is to evaluate any changes that may have occurred in the supplier's quality management system, and to assess the supplier's continuing commitment to quality improvement.

Periodically, Appareo may also audit the supplier's continuing conformance to the control plan approved in the First Article process.

9.2 Inspection Audits

Appareo expects its suppliers to furnish material that conforms to all requirements, and that does not need to be inspected when Appareo receives it. Material that has not achieved Ship-to-Use status, or that is on STU suspension is inspected on a lot-by-lot basis. Appareo uses the "AS9138 Statistical Product Acceptance Requirements" section 6 "Accepting product by individual lots" and the utilized statistical product acceptance technique is "Screening failed lots and Scrapping Nonconformances" that rejects the entire lot when a single non-conforming part is found in the sample. At Appareo's discretion, in order to meet production requirements, 100% sorting may be done as necessary at the supplier's expense.

Appareo may inspect product at the supplier's facility to detect potential problems prior to shipment. Appareo may also inspect product at sub-tier suppliers.

9.3 N^{th} Article Inspection

The supplier must perform annual Nth Article inspections of each critical part to verify continuing conformance of the part to the specification. This is also required if an engineering change affecting form, fit, or function occurs. The Nth Article requirement is not applicable to non-critical parts.

For all sub-components, the manufacturing supplier is responsible to ensure that the components that make up each assembly are qualified and monitored through the supplier's own part qualification system.

At the discretion of Appareo, Nth Article can be postponed beyond, or required prior to, the annual expiration. Considerations such as component volume, program life cycle and supplier/part performance are used in the decision to pull in or extend the requirement for Nth Article.

9.4 Supplier-Furnished Lot Documentation

Appareo may require the supplier to furnish inspection, test, process performance, or other quality data with each shipment to ensure that the product meets Appareo's requirements. When data submission is required, the data must accompany each shipment, or be e-mailed or faxed to Appareo at the same time the lot is shipped. All documentation must be clearly identified with Appareo's part number, and the supplier's lot number.

When specified by Appareo, the supplier must submit monthly data packages. Data packages typically consist of copies of control charts and process capability calculations for specified characteristics.

Once the supplier has completed two consecutive quarters of data submissions, the supplier may request elimination of the data submission if records show that the characteristic consistently satisfies Appareo's requirements for process stability and process performance, and if the characteristic has caused no problems in Appareo's production. Appareo will notify the supplier in writing if the data submission may be discontinued.

10.0 Records Management

The supplier shall maintain a records system that is capable of extracting production information regarding:

- Date/time stamps for all items below
- Customer purchase orders, with receipt, confirmation, and commitment
- Job/lot information
- Test data
- Control plans for affected processes
- Work instructions for affected processes
- Calibration data for tools and machinery utilized in the manufacture of the component
- Serial numbers logs
- Production re-work
- Raw material data validation
- Quality documents, including deviations, holds, etc.
- Drawing/specification review and control
- Other documents and data important to the quality, delivery, and cost of the component

The supplier shall have policies to retain records during the product life with a minimum of 10 years total. The location of all customer and component records shall be available to the Supplier's sales and quality contacts. The status of all records shall be categorized in a manner that clearly identifies their location. The final disposition of all documents will be certain destruction.

11.0 Revision Record

Record of Revision			
Revision Number	**Change Description**	**Revision Date**	**Inserted By**
1.0	Initial Release	2.27.2018	Steven Gurulé
1.1	Changes based on AS9100D audit suggestions	4.26.2018	Steven Gurulé
1.2	Changes based on ISO/IEC 80079-34 audit suggestions. Inserted Section 9. Changed some verbiage throughout the document for clarity.	12.20.2018	Steven Gurulé
1.3	Changed some verbiage throughout the document for clarity. Removed Appendix A (C=0 plan), see 8.2 for details. Changed and complemented content in 4.1, 4.3.1, 4.7, 4.10, 4.11, 4.12, 5.9, 5.10, 7.1, 7.2, 8.2. Added clauses: 4.15, 5.9.1 & 5.9.2.	9.10.2020	Victor Gallegos
2.0	General revision. 1.1 Improved Appareo description, added 1.3 Scope and 1.4 Confidentiality clauses; extended 2.0 Code of Conduct section. Changed and complemented clauses in 3.1, 4.0, 4.1, 4.3, 5.3, 5.3.1, 5.12, 5.15 and 5.18	1.18.2022	Victor Gallegos
2.1	Changed wording on section 10 to “product life” instead of “production life”. Change retention period to a minimum of 10 years per CAR-2420.	11.15.2022	David Salazar

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