QUALITY
OPERATING PROCEDURE

QOP-00-01

TITLE

SUPPLIER QUALITY GUIDELINES

Note: The revision level of this document and any referenced documents must be verified for latest issue before use

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REVISION HISTORY

REVISION	ECN	DESCRIPTION	DATE	APPROVA
A	None	Original Issue	10/28/98	DH
B	9224	Completely Revised Procedural Updates	1/2/01	JAL
C	16285	Procedure completely revised	7/31/10	JAL
D	16552	Revised section 1; added 1.1 associated documents list, revised section 2.12 added requirements specific to printed wiring boards	12/16/10	JAL

CURTIS
SUPPLIER QUALITY GUIDELINES

1.0 INTRODUCTION

The purpose of this document is to provide a clear definition of Curtis' minimum requirements for Suppliers. These requirements complement other terms and conditions cited in Curtis' Purchase Orders, Engineering Documents, Quality Standards and Warranty Agreements. In the event of conflict between various procurement documents, the following order of precedence exists:

1. Purchase Order Requirements including Terms and Conditions, followed by:
2. Drawings, Specifications, and Procedures/Instructions
3. Curtis' Supplier Quality Guidelines and Warranty Agreements

Curtis' Supplier Quality expectations are based on the following principles:

- The Customer/Supplier relationship is based on a clear understanding of the Customer's requirements and Supplier's capabilities.
- Each Supplier is to develop an effective Process Control system based on defect prevention.
- Suppliers must continually improve product quality and manufacturing productivity by reducing variability within the specification tolerance.
- To assure end-use product quality, the Supplier must give careful consideration to the selection of packaging materials, material handling and packaging equipment.
- Suppliers shall coordinate transportation and routing through Curtis' Purchasing.

1.1. Associated documents

Curtis Instruments Inc. Purchase Order
Curtis Instruments drawings and standards as applicable
ISO9001 Quality management Systems (reference)
IPC-16001 Printed Board Handling and Storage Guidelines

2.0 QUALITY SYSTEM REQUIREMENTS

2.1 Quality Organization

The Supplier's organization responsible for the management of Quality must be clearly defined and have the authority necessary to assure that product quality is maintained.

2.2 Quality Planning and Documentation

The Supplier's system to control product quality shall define and document (Quality Manual or equivalent) how the requirement for quality will be met. The Quality Manual shall be approved by the Supplier's senior management. An ISO 9001 system based company Quality system is the preferred model.

Suppliers are to conduct appropriate reviews to ensure that they have the capability to meet stated order requirements to ensure that finished product, components, and materials delivered to Curtis fulfill the requirements set forth in the order or contract. Each supplier must develop a means of correctly identifying and transferring amendments within their organization to ensure effective communication of changes.

The Supplier is expected to pursue continual improvement through the use of Process Control and Statistical Methods and analysis.

2.3 Personnel Qualifications

The Supplier shall provide for training of personnel performing activities affecting quality, including critical production and inspection operations.

2.4 Drawings and Specifications Control

The Supplier shall maintain on file the latest drawings and specifications provided by Curtis. A system shall be in place to ensure only the latest revisions are utilized and obsolete revisions are removed. Contact Curtis' Purchasing if copies of drawings or specifications are needed.

2.5 Design and Process Change Control

Following any product or process change that may affect the form, fit, function, reliability, appearance, or interchangeability of products provided to Curtis, the Supplier is to submit a FIRST ARTICLE INSPECTION REPORT (FAIR) to Curtis. Changes incorporated by Sub-Suppliers are also included in this requirement. See Section 4 for FAIR and sample requirements.

2.6 Inspection Program Requirements

The Supplier shall establish and maintain procedures for inspection and testing activities in order to verify that the specified requirements for the products are met. All devices, gages, measuring, and test equipment used to verify conformance of product to specification, as well as production tools and fixtures used as a medium of inspection and to control part configuration, shall be calibrated prior to use and at established intervals to assure continued accuracy.

2.7 Calibration of Measuring and Test Equipment

A Calibration system must be established to provide for periodic verification of the accuracy of measuring and test equipment. Calibration intervals are to be reviewed and adjusted, based on calibration history. Measurement standards are to provide traceability to the National Institute of Standards and Technologies. Personal owned measuring and test equipment shall be included into the calibration system.

2.8 Tooling/Equipment Maintenance

Preventive Maintenance

A Preventive Maintenance Program shall be in place to ensure tooling used is maintained in good condition. All production tooling shall be identified with the part number and revision level.

Curtis' property must be permanently identified as the property of Curtis.

2.9 Purchased Material and Subcontractor Control

The Supplier is responsible for assuring that products and services purchased conform to specifications.

The control of purchased material must follow a formal program with documented Receiving Inspection Instructions, a record of inspection results and material certifications. Sampling Plans are to be based on C=0 (reject lot on 1 defect).

2.10 Manufacturing Process Control and Documentation

During processing, the Supplier must systematically apply procedures and controls in order to meet the requirements of pertinent specifications, reduce variation, document inspection and test results, and maintain the identity of materials.

All rework, repair or salvage operations required to bring the material into compliance must be approved by the Supplier's Engineering, Quality, and Manufacturing Departments with documentation of procedures and approvals available upon request. If deliverable material requires repair to bring it into compliance with Curtis requirements, written approval from Curtis is required.

Materials, which cannot be processed to conform to applicable Curtis requirements, are to be dispositioned by Curtis prior to shipment. Nonconforming conditions are to be documented on a Curtis or Supplier Material Review Report (MRR) form. Pack slips and invoices for any materials shipped against a Quality Material Review form is to have the MRR number printed on them.

It is the Supplier's responsibility to maintain accountability for the number of parts shipped against a MRR deviation authorized quantity.

Requests for Curtis dispositions of nonconforming materials shall be routed through Curtis' Purchasing.

2.11 Outgoing Product Control

The Supplier is responsible for outgoing product quality and must verify and document that the product conforms to all Curtis standards and specifications.

Acceptance of product by a sampling plan does not relieve the Supplier of responsibility that all parts must meet specifications. Curtis may request that copies of inspection/test results accompany each shipment.

2.12 Product Identification, Protection and Preservation

Products and materials are to be properly identified at all points from receiving through processing and storage. Minimal identification should include Part Number, specification revision, and manufacturing lot. The Supplier's system shall include controls that will assure satisfactory protection against damage, contamination, and corrosion during manufacturing, storage, and shipment.

Suppliers are to establish and maintain documented procedures to ensure that product supplied by Curtis is verified, stored, and maintained in a manner that reduces the possibility of damage or loss. Any such product that is lost, damaged, or is otherwise unsuitable for use must be recorded and reported to Curtis.

Suppliers of Printed Wiring Boards (PWB) manufactured to Curtis Instruments drawings and specifications including IPC standards, shall handle these PWB's during fabrication, packaging, storage, and shipment in accordance with IPC1601.

2.13 Transportation Policy and Routing Requirements

The Supplier shall coordinate packaging, transportation and routing instructions with Curtis' Purchasing.

Any freight costs associated with movement outside of these guidelines will be the responsibility of the Supplier. Freight costs associated with return of Supplier Responsibility nonconforming materials are the Supplier's obligation.

2.14 Certification of Conformance

Shipment of the following product is to be accompanied by a Certification of Conformance which may include actual dimensional and physical characteristics as required by the purchase order. Certifications are to be identified with the Curtis' Purchase Order number and delivery date.

1) All molded parts
2) All parts that have a specific finish and plating specification
3) All parts that have a specific material or test requirement

* For printed Circuit Board suppliers, besides a certificate of conformance, each date code lot of boards shall include a cross sectioned coupon of a representative board of the date code shipped. Each subsequent date code shall include with its initial shipment a new coupon for that date code.

* When coupons are not received, supplier may be charged for time and material resources utilized by Curtis to determine product acceptability.

2.15 Record Retention Requirements

The Supplier shall retain records of inspection and test results for a minimum of three years from the date of shipment to Curtis.

2.16 Internal Quality System Auditing

The Supplier is expected to provide for routine documented evaluation of their quality system performance. This system audit is to determine the effectiveness of the introduction, continued execution, and adequacy of quality policy, procedures, and practices. Effort should be taken to identify areas of noncompliance that exist or where improvement is needed.

A system of addressing and resolving areas of noncompliance through formal written corrective actions is required.

Product audits should be conducted periodically to assure that products meet all drawing/specification and quality requirements.

3.0 NONCONFORMING MATERIALS

3.1 Detected at Supplier Location

Upon detection, nonconforming materials are to be removed from the production area and placed in a suitable quarantine area. Access to the nonconforming material storage area is to be limited to authorized persons. The Supplier must immediately determine the extent of the problem and take action to correct the condition and prevent shipment of all non-conforming material.

The Supplier shall immediately notify Curtis' Purchasing regarding any suspected quality problems in shipments already released. This notification is to be documented on the Supplier's Nonconforming Material Report or other suitable format.

Contacts by telephone shall be confirmed promptly by a letter or email. Product involved shall be retained by the Supplier pending receipt of specific instructions from Curtis.

The Supplier is responsible for sorting, reworking or removing suspect parts at Curtis or its customer's location. If the problem cannot be corrected immediately, shipments shall be held, pending specific instructions (or deviation authority) from Curtis' Purchasing.

3.2 Detected at Curtis Location

When a Supplier responsible non-conformance is detected at Curtis, Curtis' Purchasing Department will notify the Supplier and arrange for disposition.

Costs incurred in returning shipments of Supplier responsible nonconforming materials are the Supplier's responsibility. Costs associated with sorting, repackaging, and reworking Supplier responsibility nonconforming material at Curtis is the responsibility of the Supplier. These costs can include material, shipping, handling, Curtis direct and indirect labor, and contracted services. The Supplier will be notified of the need to rework material at the Supplier's expense, prior to commencing rework.

3.3 Returned Material Analysis

Failure analysis is to be performed upon receipt of returned materials. This analysis should:

1. Confirm the presence of the reported and other related nonconforming conditions.
2. Include the identification and location of additional nonconforming products.
3. Assign responsibility (Curtis or Supplier)

*Notify Curtis' Purchasing of any additional nonconforming material, either previously shipped or pending shipment.

3.4 Corrective Action for Supplier Responsibility Nonconformances

In reaction to Supplier responsibility nonconformance's, a plan shall be developed and documented which includes:

1. Investigation of root cause of nonconformance related to products and processes.
2. Identification of product affected, for both finished goods and work in-process
3. Short term actions to prevent production of additional nonconforming materials with dates of implementation.
4. Long term actions to prevent recurrence with dates of implementation.
5. Application of controls to ensure that corrective action is followed and is effective.

Curtis utilizes a corrective action system that is web based. Suppliers will receive an email identifying the nonconformance and other pertinent information. Supplier shall review data provided and respond to the originator of the corrective action prior to the due date established in the corrective action.

NOTE: If the supplier requires additional time to complete their investigation and provide a response, they are to contact the originator immediately and request such response extension.

3.5 8D Corrective Actions

When nonconformance'ss of a serious nature or supplier actions such as repetitive rejections, poor delivery indicate that a standard corrective action will not be sufficient, Suppliers will be required to investigate and provide an 8D (Discipline) corrective action response. The corrective action request will be annotated that an 8D response is required. Instructions and forms to complete the 8D are part of the corrective action request.

4.0 INITIAL SAMPLE REQUIREMENTS, First Article Inspection

Curtis requires Suppliers to furnish representative production samples with INSPECTION REPORTS in advance of first production shipments. Curtis' First Article Inspection Report report forms are required and can be obtained through Curtis' Purchasing. Inspections are to be performed to a Curtis drawing, a copy of which shall accompany the report.

Any exceptions to the requirements stated below must be obtained through Curtis' quality management group.

4.1 Conditions Requiring INSPECTION REPORT and Sample Submission

The INSPECTION REPORT with identified samples is to be submitted to Curtis under the following conditions:

1. Upon initial production prior to shipment or when pre-production samples are generated
2. When changes in tooling or processes occur which affect form, fit or function
3. When Engineering specifications are revised, except when specifications are revised to reflect preexisting part configuration/condition
4. Upon a change in the Supplier's or sub-Supplier's manufacturing facility location
5. Quality level has decreased.

4.2 INSPECTION REPORT Scope and Sample Size

Suppliers are required to perform inspection of all drawing/specification characteristics on a minimum of five **(5)** samples representative of production parts. Contact Curtis' Quality Assurance to request deviation from the five piece sample size requirement.

The Supplier shall perform those inspections and tests necessary to assure that the sample conforms to the applicable specifications. This applies to dimensional, performance, chemical and physical specifications and other requirements called out directly or referenced as extensions of engineering requirements or purchase order.

INSPECTION REPORTS submitted due to specification revision or tooling changes or resubmitted due to nonconformance on a prior INSPECTION REPORT need only report characteristics affected.

Suppliers who are unable to perform the necessary inspection and tests within their facilities are responsible for having these services performed by an outside source. The sources shall be identified on all INSPECTION REPORTS submitted to Curtis.

4.3 Inspection and Laboratory Reports

Curtis' INSPECTION REPORT forms are to be used by the Supplier to report the inspection and test results, listing specified and actual conditions. When reporting features having varying measurements, record the full range of values and a description of the feature geometry. Sketches, photographs, or other attachments are appropriate.

The INSPECTION REPORT is a two part form. All drawing/specification characteristics are to be recorded on the DATA SHEET. Nonconforming characteristics are to be recorded on the COVER SHEET for disposition by Curtis.

4.4 Sample Identification and Shipping Instructions

The sample parts and reports are to be packaged and shipped to Curtis' QA Incoming inspection department. The container (shipment) is to be clearly marked "First Article SAMPLES" and labeled with the Supplier's name, Curtis' part number, drawing revision letter, and purchase order number.

4.5 Release of First Production Shipment

The FAIR and samples shall accompany the production materials when scheduling does not allow the FAIR, sample submittal and disposition prior to shipment of production material. CURTIS' Purchasing shall be informed that shipment of production material is being made prior to the FAIR disposition.

4.6 Payment for Tooling

Tooling invoices will be paid after Curtis approves the Supplier's INSPECTION REPORT and samples. Coordination of tooling approval and payment is through Curtis' Purchasing department.

4.7 Manufacturing Site Approval

When First Article samples have been approved, supplier shall not change manufacturing site without prior approval of Curtis Instruments.

5.0 EVALUATION OF SUPPLIERS

5.1 Supplier Qualification Procedure

The purpose of the Supplier survey is to determine the level of compliance of the Supplier's Manufacturing and Quality systems to Curtis' Supplier Quality Guidelines. Representatives of the Curtis Sourcing, QA and Mfg Engineering departments conduct the Supplier survey. The rating is based upon observation of the following factors:

- Degree to which Supplier meets the requirements set forth in this document
- Evidence of a commitment by the Supplier's management to providing quality products and for continuing improvements in product quality
- Performance history and evidence of the Supplier's effectiveness toward correcting conditions responsible for production of non-conforming materials
- The capability, capacity and condition of the Supplier's physical manufacturing facilities and equipment on critical material
- The capability of the Supplier to adhere to certification requirements

Refer to COP-01-12 for specific requirements relating to surveys of suppliers.

5.2 Current Suppliers

Surveys to establish or update Supplier ratings for current Suppliers may be initiated prior to placement of significant new business, as a result of current quality performance records, when a Supplier changes manufacturing facilities, or if a new order is for product that differs significantly from the product previously purchased from the Supplier.

6.0 Supplier verification at subcontractors facility

When the supplier proposes to verify the acceptability of purchased product or services at its subcontractor facility, the supplier shall specify the verification arrangements and the method of product release.

6.1 Curtis Customer verification at supplier's facility

Supplier must allow Curtis Instruments' personnel and their customers' access to Supplier's facility to inspect product prior to release. The supplier to Curtis shall allow representatives of Curtis and its customer access to their facility and assistance in performing such verification. In the event that this requirement is invoked, prior notification will be provided by Curtis Inc. Purchasing department.

Verification by Curtis representatives and /or its customer does not absolve the supplier from the responsibility of providing acceptable product. Nor shall it preclude subsequent rejection by Curtis or its customer.

6.2 Curtis periodic Supplier Evaluation.

Suppliers, who are actively doing business with Curtis, supplying goods and services that ultimately are included into its final product, shall be periodically evaluated. These evaluations typically take place at six month intervals. The evaluation is based upon two scoring criteria; Quality (incoming inspection) and Delivery. Each characteristic is equally weighted at fifty points each for a total possible score of one hundred points. Each receipt into Curtis incoming inspection is scored; based on received quality and on time delivery.

Quality Score

Accepted = 50 points
Accepted with an MRR/UAI = 40 points
Rejected Rework at Curtis = 10 points
Rejected Return to Supplier = 00 points

Delivery Score

On time (dock date per PO requirement) = 50 points

Two days late delivery = 40 points	Up to ten days early = 50 points
Three days late delivery = 25 points	Ten to twelve days early = 45 point
Five days late delivery = 0 points	Fourteen days early = 25 points

Note: These are calendar dates. An item scheduled for a Friday delivery that does not arrive until the following Monday will be scored as three days late, causing the supplier to loose 50% of the total points for delivery.

A third evaluation score is determined and provided - A suppliers PPM score. PPM scoring is only concerned with part quality and is provided as a part per million defective.

Supplier scores required

Obviously Curtis wishes to maintain a good and progressive relationship with those suppliers who constantly work to improve their processes, reduce variation and provide high quality parts on time. Scores necessary to achieve such a standing are reviewed by Curtis Management periodically and adjusted as necessary.

Evaluations are emailed to a supplier contact on record. It is in the supplier's best interest to provide a name and email address to Curtis Quality Administration or any changes to this contact in a timely fashion.