Ichor Supplier Quality Manual

Table of Contents

INTRODUCTION 3

SUPPLIER CODE OF CONDUCT 3

1.0 QUALITY SYSTEM REQUIREMENTS 3

1.1 QUALITY MANUAL 4

2.0 SUPPLIER APPROVAL PROCESS 4

2.1 SUPPLIER QUALIFICATION 4

3.0 GENERAL REQUIREMENTS 4

3.1 COMPLIANCE TO CONTRACTUAL REQUIREMENTS 4

3.2 ICHOR DESIGNATED SOURCES 4

3.3 SUPPLIER QUALITY STRATEGY 5

4.0 PRODUCT QUALIFICATION 5

4.1 FIRST ARTICLE INSPECTION 5

4.2 PRODUCTION PART APPROVAL PROCESS 5

5.0 PROCESS CONTROL 7

5.1 ERROR-PROOFING 7

5.2 WORK INSTRUCTIONS 7

5.3 CONTROL OF MONITORING AND MEASURING DEVICES 8

5.4 STATISTICAL PROCESS CONTROL 8

5.5 PREVENTIVE MAINTENANCE 8

5.6 SOURCE INSPECTION 8

5.7 SHELF-LIFE CONTROL 8

5.8 SAMPLING INSPECTION 8

6.0 CHANGE CONTROL 9

6.1 CHANGE CONTROL PROCESS 9

6.2 SUPPLIER CHANGE REQUESTS 9

6.3 SUPPLIER CE! /POR CLASSIFIED/CRITICAL PARTS CHANGE RESTRICTIONS 10

7.0 CONTROL OF NONCONFORMING PRODUCT 10

7.1 SUPPLIER REQUEST FOR DEVIATION 10

7.2 CONTROL OF REWORKED PRODUCT 11

8.0 PACKAGING, LABELING, DELIVERY & RECORD RETENTION 11

8.1 PACKAGING, LABELING, AND PRESERVATION 11

8.2 CERTIFICATE OF CONFORMANCE (C of C) 11

8.3 RECORD RETENTION 12

9.0 CONTINUAL IMPROVEMENT 12

9.1 CORRECTIVE ACTION REPORT 12
9.2 Supplier Corrective Action Request (SCAR) 13
10.0 SUPPLIER PERFORMANCE 13
10.1 PERFORMANCE MEASURES 14

INTRODUCTION

Our Suppliers

Ichor recognizes the important role our Suppliers have in the value we offer our customers. As an extension of our own operations, we rely on our supply chain to provide material, products, and services which meet all of the requirements of Ichor contracts, applicable specifications, and the quality management requirements outlined herein.

Purpose

Ichor serves diverse market sectors, such as semi-conductor, aerospace, and biomedical. The purpose of this manual is to inform Ichor Suppliers of our core expectations regarding the Suppliers' quality management systems, design requirements, and manufacturing process controls required for the purpose of doing business with Ichor. This manual describes what Ichor expects its Suppliers to do to ensure that all Ichor requirements and expectations are met.

Scope

This manual applies to all Suppliers providing Ichor with materials, products, processing, and related services, including intra-company Suppliers, and when applicable, Supplier sub-tier sources. The general requirements outlined herein do not supersede conflicting requirements in the Ichor contract, or drawing, including applicable engineering specifications, process specifications, or applicable long term agreement(s).

In this manual, the terms "shall" and "must" mean that the described action is mandatory; "should" means that the described action is necessary and expected with some flexibility allowed in the method of compliance; and "may" means that the described action is permissible or discretionary.

Questions?

Questions concerning this manual should be directed to your Ichor Supplier Quality Engineer

SUPPLIER CODE OF CONDUCT

Reference: **CSCM3-SUPPLIER HANDBOOK** *ICHOR SUPPLIER HANDBOOK & CODE OF ETHICS*

http://www.ichorsytems.com

1.0 QUALITY SYSTEM REQUIREMENTS

Suppliers shall maintain a Quality Management System (QMS) suitable to the products and services provided to Ichor.

1.1 QUALITY MANUAL

Upon request, the Supplier shall provide access to a copy of the Supplier's Quality Management System Manual, which is to be current and approved by the Supplier's management, including or making reference to related documents. The quality management system documentation shall include Supplier's statements of a quality policy and quality objectives. Top management shall define quality objectives and measurements which should address customer expectations and be achievable within a defined period of time. The Supplier shall promptly notify the Ichor Buyer of any significant changes to the Supplier's quality management system or personnel.

2.0 SUPPLIER APPROVAL PROCESS

Ichor requires all Suppliers to be approved prior to the issuance of contracts. All Suppliers must be approved by Ichor regardless of approvals by customers or other entities.

2.1 SUPPLIER QUALIFICATION

Ichor maintains an ISO: 9001:2015 certification and relevant processes for supplier qualification. Suppliers are evaluated on alignment to Ichor commercial terms, delivery capability, quality management systems, operational capability, geographic support, financial health and competitive cost. Ichor's supplier qualification process varies depending on the nature of the service or product provided. Ichor Supply Chain and Supplier Quality representatives are responsible to ensure suppliers are qualified per Ichor process requirements.

3.0 GENERAL REQUIREMENTS

The following set of general quality requirements applies to all Suppliers.

3.1 COMPLIANCE TO CONTRACTUAL REQUIREMENTS

Ichor Suppliers are responsible for compliance to all contract requirements. All documents, drawings, and specifications are applicable to the Supplier when specified in the contract, and are required to be flown down to all levels of the supply chain as needed to ensure compliance to the contract. Unless otherwise specified in the contract, most current revision of the document at the time of product manufacture of the contract applies to the contract.

3.2 ICHOR DESIGNATED SOURCES

Where specified by contract, the Supplier shall purchase products, materials or services from Ichor- designated sources. The Supplier is responsible to ensure that items procured from such sources meet all applicable technical and quality requirements.

3.3 SUPPLIER QUALITY STRATEGY

Ichor Suppliers are responsible for meeting all requirements, including work performed by sub-tier Suppliers. When the Supplier uses sub-tier sources to perform work on products and/or services scheduled for delivery to Ichor, the Supplier shall flow-down all of the applicable technical and quality requirements contained in Ichor requirements. Ichor and its customers reserve the right- of-entry to sub-tier facilities, subject to proprietary considerations.

4.0 PRODUCT QUALIFICATION

This section defines the generic requirements for production part qualification and approval. The purpose is to determine if all Ichor design and specification requirements are properly understood by the Supplier and that the manufacturing processes have the capability to consistently meet these requirements.

Qualification may be required prior to the first production shipment in the following situations:

- A new material, service, or product supplier
- A new material, service, or product not previously supplied to ICHOR
- A material, service, or product modified by an engineering change
- Re-qualification of material, service, or product, which was disqualified due to a major quality issue

When qualification is required, certain requirements will apply to provide inspection data with each production shipment. One or more of the following requirements will be noted in the purchase order or product print/specification, when applicable. Data requirements specified will be one or more of the following:

4.1 FIRST ARTICLE INSPECTION

Upon request, suppliers with new build-to-print parts will submit first articles to Ichor for review and approval. Suppliers are responsible for documenting verification results for all parameters, and providing this documentation with the part submission. Up to three parts with full FAI data may be required when a First article is requested on the PO. Each part measured for FAI is to be bagged and tagged with appropriate identification so that it can be traced to the corresponding FAI data for each part.

4.2 PRODUCTION PART APPROVAL PROCESS

All Ichor Suppliers shall control processes used in fulfillment of Ichor purchase orders utilizing the following:

A. Control Plan

The Supplier should have a Control Plan that defines all methods used for process monitoring and control of special product/process characteristics. A single control plan may apply to a group or family of products that are produced by the same process at the same source.

B. Cosmetic/Workmanship Acceptance Requirements

The Supplier shall follow Ichor's acceptance criteria for the cosmetic/workmanship visual inspection of materials and parts. Included are machined, plated, anodized, coated, and non-coated surfaces used in the production of piece parts and assemblies. Records of inspection shall be recorded. Reference Cosmetic Acceptance requirements on the purchase order and prints.
If no cosmetic/workmanship acceptance criteria are defined, the Supplier shall define, document and record the cosmetic/workmanship criteria.

C. Critical Parts and POR Requirements – CE! (COPYEXACTLY!)/POR

Control of a Critical Part and Process of Record (POR) is required from part development activities, First Article inspection, final POR and critical output parameters and POR audits for compliance.

All dimensional characteristics shown as Key or Critical on the product print or referenced by product specification are to be inspected according to an industry standard or Ichor approved sampling plan. Inspection results shall be provided to Ichor buyer in electronic format at the time of shipment and clearly indicate manufacturing lot, PO, and PO line for which the data is applicable.

Inspection data is required to be approved by Ichor prior to shipment - Submit lot inspection data in accordance with an industry standard, or Ichor approved sampling plan to the Ichor Supplier Quality Engineer in electronic format prior to shipment and hold until notified of Ichor data approval. Shipment will not be accepted by ichor without data approval.

The Supplier shall have a process by which to develop, document, baseline, and request approval for changing their manufacturing and assembly processes for Ichor's critical parts.

COPYEXACTLY!/POR training will be conducted yearly for all associates and records are retained.

D. Reports

The Supplier shall provide evidence that the verifications required by the specifications and control plan have been completed and that results indicate compliance with specified requirements:

- Dimensional Results – for each unique manufacturing process, e.g., cells, lines, molds, patterns, a record of actual results of all characteristics.

- Material Certificates of Conformance and Performance Test Results – for all parts and product materials with chemical, physical, metallurgical, and functional performance requirements, including visual acceptance.
- Records of Compliance – copies of records showing compliance to all applicable Ichor specific requirements.

E. Records, Change Documents, and Change Approvals

The Supplier shall retain all quality, manufacturing, and change approval records used or generated in the fulfillment of the contract for a period of at least 5 years, or as specified in the contract.

F. Eligibility for Supplier Part Dock-to-Stock Status

Dock to Stock status will only apply for Ichor Approved Suppliers whose quality metrics are in good standing. Dock to Stock parts will be eligible on a part by part basis. To recommend a part for DTS a representative from the Materials and/or Quality Department, shall review the part's quality history, from the specified supplier.

When required by Ichor, the Supplier shall submit to Ichor a more comprehensive Production Part Approval Process (PPAP) qualification package. The level of PPAP will be determined by Ichor Supplier Quality Engineering as defined in the PPAP workbook. The Supplier is responsible to use the appropriate method to substantiate the PPAP.

For guidance on product and process design and development methodology and techniques contact your Ichor Supplier Quality Engineer.

5.0 PROCESS CONTROL

This section defines the basic requirements for Suppliers to control their manufacturing processes.

5.1 ERROR-PROOFING

The Supplier should use error-proofing devices and techniques as a form of process control; especially for repetitive functions, difficult tasks prone to mistakes, or where the cost of error is high.

5.2 WORK INSTRUCTIONS

The Supplier shall prepare documented work instructions, as necessary, for all employees having responsibilities for the operation of processes that impact product quality. These instructions shall be maintained and accessible for use at the work station.

5.3 CONTROL OF MONITORING AND MEASURING DEVICES

The Supplier shall determine the monitoring and measurement to be undertaken and the monitoring and measuring devices needed to provide evidence of conformity of product to determined requirements. As a minimum, where necessary to ensure valid results, measuring equipment shall:

- **A.** be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification shall be recorded; and
- **B.** Be identified to enable the calibration status to be determined.

5.4 STATISTICAL PROCESS CONTROL

Where specified by contract requirements, the Supplier shall apply effective statistical process controls and process capability. Ichor may also request to review these records at the supplier site or via email.

5.5 PREVENTIVE MAINTENANCE

The Supplier should identify key process equipment and provide resources for machine/equipment maintenance activities and develop an effective planned total preventive maintenance system.

5.6 SOURCE INSPECTION

Supplier's products or services may be subject to source inspection by Ichor, representatives of Ichor or applicable government or regulatory agencies. Source inspection requirement will be included on the contract and may apply to any and all operations performed by the Supplier or the Supplier's sub-tier sources, prior to delivery of products to Ichor. The Supplier shall provide the necessary access, equipment and resources required to effectively accomplish the source inspection.

5.7 SHELF-LIFE CONTROL

With each delivery of materials or products that have a limited or specified shelf life, the Supplier shall furnish data that shows (a) the cure or manufacture date, (b) expiration date or shelf life, (c) lot or batch number, and when applicable any special handling or storage requirements. Unless otherwise specified by contract, for all shelf life limited materials or products delivered to Ichor, the remaining shelf life shall be a minimum of 75% of the total shelf life for the material.

5.8 SAMPLING INSPECTION

The supplier is responsible for ensuring that all parts meet PPAP requirements and once that is accomplished, the supplier may elect to use statistical methods for the acceptance of products or processes. Such methods shall be in compliance with a recognized industry

sampling standard.

6.0 CHANGE CONTROL

The Supplier is responsible for controlling changes.

6.1 CHANGE CONTROL PROCESS

The Supplier shall have a process to ensure that relevant versions of applicable documents furnished by Ichor (as well as those specified of external origin) are available at points of use.

The Supplier is responsible for the timely review, distribution and implementation of all standards/specifications and changes in accordance with contract requirements. The Supplier shall maintain a record of the date on which each change is implemented in production. Implementation shall include updated documents.

6.2 SUPPLIER CHANGE REQUESTS

Suppliers shall not make changes to their processes, location, facilities, equipment, material, product design (or any change which may affect product design or function) without submitting an Ichor SPS to the Ichor Buyer for:

A. Correction of a discrepancy on a previously submitted part;

B. Product modified by an engineering change to design records, specifications, or materials; or

C. Any planned changes by the Supplier to the design, process, or manufacturing location, such as:

- Use of other material than was used in previously approved part or product
- Production from new, additional, replacement or modified tools, dies, molds, patterns, etc.
- Production following upgrade or rearrangement of existing tooling or equipment
- Production from tooling and equipment transferred to a different plant site or from an additional plant
- Change of sub-tier Supplier for parts, nonequivalent materials, or services (e.g. heat treating, plating, etc.)
- Product produced after tooling has been inactive for production for 12 months or more
- Change to test/inspection method – new technique (no effect on acceptance criteria)
- For bulk materials: new source of raw material from new or existing Supplier, or change in product appearance attributes, etc.
- Use of any non-conventional manufacturing methods such as electro-discharge

machining (EDM), electro-chemical machining (ECM), laser or abrasive water jet metal cutting, flame spray coatings, etc.

6.3 SUPPLIER CE! /POR CLASSIFIED/CRITICAL PARTS CHANGE RESTRICTIONS

Supplier CE! /POR classified critical parts have additional restrictions for changes to manufacturing and assembly processes including by not limited to: Material, Machines, Methods, Measurement systems, Training, and Environment.

Before making any changes for a CE! /POR classified part or process, the supplier is required to contact the Ichor Supplier Quality Engineer.

7.0 CONTROL OF NONCONFORMING MATERIAL

Material that does not meet Ichor specifications, is not fit for use, or at the sole discretion of Ichor, is deemed to be nonconforming will not be accepted. Nonconforming material may be rejected and returned to the supplier for credit, replacement or rework. Nonconforming material will be identified through Ichor incoming inspection, in-line rejection, customer returns, alerts or supplier recalls.

For nonconforming products supplied to Ichor, including those that reach an Ichor customer, the Supplier may be required to cover all costs to correct the nonconformance.

Ichor will have reasonable time to complete acceptance testing and notify the supplier of rejection. Ichor's payment or delivery receipt does not constitute acceptance of the products. Ichor will determine the level of response required for nonconforming product. Examples include:

- Supplier Corrective Action Request (SCAR)
- Formally issued complaint (in writing) to the supplier.
- Rejection of material - material will be shipped back to supplier, or with supplier's permission, to a 3rd party for repair or replacement. Corrective Action Plan (CAP) - may include: Target area of improvement, documented improvement plan, goals, ownership, timelines, measurement reliability, control plans, and effectiveness verification. 8D format is required.

Ichor expects the supplier to prioritize Rework / Replacement / Credit for nonconforming material and to close all returns at a lead time no greater than 2x (two times) the quoted standard product lead time.

7.1 SUPPLIER REQUEST FOR DEVIATION

Suppliers may request (in writing) a SPS (Supplier Problem Sheet) from Ichor for minor non-conformances where the product may not completely meet Ichor requirements, but fit, form, or function are not impacted. Ichor is under no obligation to approve such requests. All

approved requests will be communicated by Ichor to supplier via Ichor's SPS process. Suppliers may not make changes without receipt of Ichor SPS form.

7.2 CONTROL OF REWORKED PRODUCT

Rework is defined as additional operations that are not part of the basic production process flow, which will bring product in full compliance with applicable drawings and specifications. Instructions for rework, including re-inspection requirements, shall be accessible to and utilized by the Suppliers appropriate personnel. All rework shall be documented and accepted by the Supplier's quality department.

A. CE!/POR classified critical parts cannot be reworked without documented approval from Ichor. Repair is defined as using alternative manufacturing techniques, methods, materials, or processes which may not bring product into full compliance with applicable drawings and specifications. Repairs are not allowed without written approval from Ichor.

7.3 SUPPLIER CONTAINMENT

For product quality problems reported by Ichor to the Supplier, until formal corrective action has been taken and approved, the Supplier shall provide documented evidence with subsequent shipments that such product has been inspected for the identified nonconformance's and meets all applicable requirements.

8.0 PACKAGING, LABELING, DELIVERY & RECORD RETENTION

Preservation, packaging, labeling, and shipping methods must comply with common industry practices and per Ichor requirements.

8.1 PACKAGING, LABELING, AND PRESERVATION

The Supplier must adequately plan for packaging designed to prevent product contamination, deterioration or loss and to eliminate shipping damage. Suppliers should provide expendable packaging or returnable containers, where appropriate, that provide for sufficient density and protection from any likely damage that may occur. Expendable materials and packaging must meet local and national standards for safe disposal and/or recycling.

In order to detect deterioration, the condition of product in stock should be evaluated at appropriate planned intervals. The Supplier should use an inventory management system to optimize inventory turns over time and should assure stock rotation, such as "first-in-first-out" (FIFO).

Labeling and bar code requirements may vary per part. The Ichor Buyer will provide the Supplier with the necessary specifications.

8.2 Certificates of Conformance (C of C)

Material Certificates of Conformance (C of C) may be required for critical suppliers on a corrective action plan (CAP), or when requested (in writing), by Ichor. The C of C, when required, must be included with each shipment to Ichor, and must include the following information:

- Manufacturer's name and address
- Item number/supplier part number
- Lot/date code(s) as applicable
- Quantity in shipment
- Statement certifying product conformance and traceability
- Name and date of transaction
- Purchase order number
- Specification number and revision
- Drawing number, if applicable
- Signature of a supplier technical or quality Representative, with typed name, title, and date the certification was signed off.

NOTE: The signer must be competent to certify that the product meet specifications and assume product quality responsibility for supplier

8.3 RECORD RETENTION

The Supplier shall retain quality records as specified by the Ichor contract or related reference documents. Upon request, the Supplier shall be capable of retrieving and delivering required records to Ichor within forty-eight hours from time of request by Ichor

9.0 CONTINUAL IMPROVEMENT

Suppliers should define a process for continual improvement. Suppliers should use a closed-loop corrective action process whenever a problem is encountered internally or upon notification from Ichor.

9.1 CORRECTIVE ACTION REPORT

Material that does not meet Ichor specifications, is not fit for use, or at the sole discretion of Ichor, is deemed to be nonconforming. Ichor will not accept material that does not conform to specified requirements or is not fit for use. Nonconforming material may be rejected and returned to the supplier for credit, replacement or rework. Nonconforming material will be identified through Ichor incoming inspection, in-line rejection, customer returns, alerts or supplier recalls.

Ichor will have reasonable time to complete acceptance testing and notify the supplier of

rejection. Ichor's payment or delivery receipt does not constitute acceptance of the products. Ichor will determine the level of response required for nonconforming product. Examples include:

9.2 Supplier Corrective Action Request (SCAR)

The Supplier Corrective Action Request (SCAR) is a formally issued complaint (in writing) to the supplier. Rejection of material - material will be shipped back to supplier, or with supplier's permission, to a 3rd party for repair or replacement. Corrective Action Plan (CAP) - may include: Target area of improvement, documented improvement plan, goals, ownership, timelines, measurement reliability, control plans, and effectiveness verification. 8D format is required. Ichor expects the supplier to prioritize Rework / Replacement / Credit for nonconforming material and to close all returns at a lead time no greater than 2x (two times) the quoted standard product lead time.

Unless otherwise requested by Ichor when notified, the Supplier shall respond to a request for corrective action as follows:

A. ***Within 24 Hours:*** The Supplier shall promptly acknowledge receipt of notification and communicate to Ichor the immediate containment actions to be taken.

B. ***Within 72 Hours:*** The Supplier shall provide an update of the containment plan to protect Ichor during the interim period. This update must include:

- Confirmation that the Supplier has identified all suspect product in process, in stock, in transit, and potentially at any Ichor site by lot number, Ichor contract number, and quantity.
- Additional specific containment actions needed to be taken by the Supplier and/or Ichor.

C. ***Within 10 Business Days:*** The Supplier must submit the completed Corrective Action Plan indicating the permanent actions taken, or to be taken, to prevent recurrence of the same problem, to prevent the occurrence of similar problems, applicable affectivity dates. Corrective Action Plans are expected to be closed as committed in the plan.

10.0 SUPPLIER PERFORMANCE

To assure the performance and development of the suppliers related to the products and services supplied and the lifecycle these products and services are in, Ichor expects suppliers to perform in Quality, Logistics, and Technology, Total Cost and Sustainability at the required level and continuously drive for improvement.

At Ichor's discretion, the Ichor Buyer may determine that to address the Suppliers performance deficiencies, a meeting with Supplier's management is necessary and a Supplier documented corrective action and improvement plan is required.

10.1 PERFORMANCE MEASURES

All suppliers are expected to perform and compete on a basis of cost, quality and delivery. Ichor's supplier management process provides for a select set of suppliers based on spend, criticality of items provided and volume of business to fall under our active supplier management system. This process measures suppliers on cost competitiveness, quality, delivery performance as well as alignment and support of Ichor design and development activities. Suppliers falling under the supplier management process are expected to complete a risk assessment to identify supply chain weak points to guide improvement plans. The risk assessment spans multiple elements such as capacity, financial health, raw materials, and production control systems. Actively managed suppliers are provided with score cards bi-annually containing both objective and subjective feedback on their performance and risk assessment. Suppliers are expected to develop and execute plans resulting in demonstrated improvements to all areas measured.

This means that each delivery is:

- According to the requirements (Quality)
- Delivered at the agreed moment in time (Logistics)
- Built using the agreed craftsmanship and processes (Technology)
- Generated against the agreed total Cost (Costs)
- In compliance with Ichor's sustainability requirements (Sustainability).

A. Quality

This metric defines the Defective Parts per Million (DPPM) shipped. The definition of "defective parts" is the total number of parts returned to the Supplier for any valid quality reason (including those caused by shipping and administrative errors). The supplier goal for DPPM is less than 1000 on a rolling 6-month basis.

Suppliers will also be required to submit to onsite quality audits to ensure parts and processes meet the requirements of this manual. The results of these audits will be communicated to Ichor management as well as the Supplier. Communication of this metric may be during the supplier scorecard meeting or by email.

B. Delivery

This metric defines the delivery performance rating based on total number of parts received vs. total number of parts ordered. Supplier goal for delivery performance is > 90% to contract date.
Equal or > 90% Exceeds Expectations
70% to 89% Meets Expectations
Less than 70% Needs Improve