

# **Finish Thompson, Incorporated**

## **Supplier Quality Manual**

### **INTRODUCTION**

#### **Welcome to Finish Thompson, Incorporated**

Finish Thompson, Incorporated (FTI) specializes in providing fluid transfer pumps and recycling systems for the fluid handling and environmental markets.

#### **Introduction to 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, resulting in high production costs. Even the best receiving inspection program cannot detect all defective material. FTI requires suppliers to control the quality of material shipped to FTI, so that FTI can minimize inspections when the product is received.

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

#### **Scope**

This information applies to all suppliers who have interest in doing business with FTI. It also applies to FTI's outsourced partners or subsidiaries. Suppliers agree to be bound by and to comply with the terms of the Quality Manual. Acknowledgement of purchase orders, including without limitation, by beginning performance of the work called for by this purchase order, shall be deemed acceptance of this manual. The terms set forth in this manual take precedence over any alternative terms in any other document connected with this transaction.

#### **FTI Quality Policy**

Beginning with a clear definition of customers' expectations, we strive to consistently meet or exceed them. We adhere to all applicable standards and customer specific requirements and endeavor to provide processes that ensure we achieve this in order to build a robust and world class business.

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## 1.0 Quality Management System Requirements

### 1.1 Quality Management System

Each FTI supplier is required to maintain an effective quality management system, preferably one that conforms to ISO 9001:2000 Quality Management System – Requirements. Suppliers may have a self-certified quality system, so long as it reflects similar attributes to an ISO system. In addition, the supplier must meet all other requirements of this manual.

### 1.2 Quality Manual and Procedures

The supplier, as requested, will furnish FTI with a copy of the supplier's Quality Manual and supporting procedures. This includes detailed documents and work instructions specific to production of material for FTI.

FTI has documents for all processes described in this manual. In all instances, supplier generated equivalent forms may be submitted so long as they provide the equivalent data and are approved by FTI before submission.

### 1.3 Control of Sub-tier Suppliers

Suppliers are responsible for the quality of materials and components provided by their sub-tier suppliers and sub-contractors. FTI suppliers must impose controls on their sub-tier suppliers that provide quality results and documentation comparable to the controls applied to suppliers by FTI. 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 FTI's requirements
- Controls to ensure that the sub-tier suppliers of components used are those approved by FTI, where applicable.
- Ensure that sub-tier suppliers have an ESD control program that meets or exceeds the needs of FTI if the parts or materials are ESD sensitive.
- Part qualification, including first article inspection and process capability studies of as applicable.
- Control of drawings/revisions
- Control of nonconforming material
- Corrective action and preventive action programs
- A continuous quality improvement program

In instances where sub-tier suppliers provide material where those manufacturing methods are not shared with the FTI supplier (i.e. trade secret methods or black box manufacturing), the FTI supplier will require the sub-tier to provide best evidence that the material meets FTI requirements. If such evidence cannot be provided, the FTI supplier will notify FTI in advance.

Where appropriate, FTI may specify the sub-tier suppliers that may be used, evaluate and qualify the sub-tier supplier's facilities, and 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. *FTI reserves the prerogative to evaluate the quality system and records of such sub-tier suppliers as necessary. In the event of FTI's involvement, it does not absolve suppliers of the ultimate responsibility for the quality performance of their sub-tier suppliers.*

## **2.0 Supplier Qualification Process**

All suppliers of production materials to FTI must be qualified suppliers. The extent of the qualification process is dependent upon the criticality of product purchased and other factors determined by FTI. The qualification process is detailed in the FTI Quality Procedure Manual Section P6.2.

### **2.1 Periodic Reevaluation**

FTI periodically reevaluates current production suppliers through the use of quality performance data and/or on-site assessments. If requested, the supplier shall make their facility available for on-site process verification by FTI personnel, with reasonable notice.

### **2.2 Supplier Qualification Levels**

FTI recognizes that not all suppliers are capable of fully integrating ISO 9001:2000 Quality Management System or equivalent systems. As such, suppliers are encouraged to work towards this level of world class product control. Suppliers who are able to comply fully with the requirements of the FTI Supplier Quality Manual shall be deemed "Preferred Suppliers" and will be considered first for awards of new business. Suppliers who are not able to fully comply with the requirements of the FTI Supplier Quality Manual shall be deemed "Approved Suppliers" and will be in the general pool of all suppliers.

### **3.0 Pre-Production Samples**

Suppliers are required to provide pre-production samples as part of the initial approval of the design. These samples are not considered production capable unless specified by FTI Engineering. These samples are used to check the dimensions and tolerances of parts ahead of First Article runs.

FTI Engineering will specify the number of parts required for the pre-production sample through a purchase order or other written documentation. Suppliers are responsible for producing these parts and providing measurements of all dimensions to FTI. All dimension, specifications, and standards called out on the specification/drawing will be recorded; either on the FTI Sample Inspection Form or a supplier equivalent. All samples must be marked corresponding to the sample number listed on the inspection sheet.

Once the inspection is completed by the supplier, the supplier will send the samples and inspection report to FTI for approval. FTI Engineering and Quality will review the samples and inspection report and provide feedback to the supplier on the approval of the part or if any changes need to be made to the design ahead of the First Article run. Unless otherwise specified, if changes are made to the design suppliers must submit new samples and inspections of the changed design before the First Article run. Once approved, the supplier will co-ordinate with FTI for the Production Part Qualification.

## **4.0 Production Part Qualification**

The supplier is responsible for submitting all First Article data requested by FTI on the First Article Requirements checklist for parts specified by FTI. FTI and the supplier will agree on the number of the samples to be checked and submitted with the first article data. Unless otherwise specified, the sample size will be 30pcs of the subject parts made off production tooling using standard production processes. All samples must be marked corresponding to the sample number listed on the inspection sheet. First Article samples may be considered for production use if approved by FTI Engineering.

All First Article documents should be submitted to FTI Purchasing in electronic format (preferably Adobe Acrobat or Microsoft Office). Suppliers will be responsible for providing material certifications as detailed by FTI specifications when required by FTI customers or FTI manufacturing specifications. Supplier equivalent forms may be used. All data provided must be in English.

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

For any products that are industry standard, off the shelf, or stock items (such as fasteners, catalog motors, or bar stock), the requirements in Sections 4, 5, & 6 may be waived at the discretion of FTI Engineering & Quality.

Product that is normally produced at FTI but needs to be produced off-site at a supplier facility will still be governed by this Quality Manual as directed by FTI quality.

### **4.1 First Article Product Submission Warrant**

For each new or changed part, FTI sends the supplier a First Article Product Submission Warrant, listing the steps and information that must be submitted for qualification of the component or assembly for production. The checklist items selected are based on the type of component or assembly to be supplied. If approved by FTI, suppliers may use their equivalent First Article PSW documentation if it provides the data FTI requires.

FTI Engineering will specify to what level each part evaluated. The First Article Approval Level and required documentation is specified in Tables 4.1 and 4.2 in Appendix 1 of this document. The default level for parts is Level 3. At FTI Engineering's discretion, the Approval Level may be changed on a part and supplier basis. Industry standard, off the shelf, and stock items that require First Article Approval will be at Level 1, unless otherwise noted.

### **4.2 Dimensional Inspection Report**

FTI notifies the supplier of the quantity of parts to be inspected, typically five from each tool, pattern, or cavity or a total of 30 parts. The supplier inspects or tests each sample for all dimensions, drawing notes, and specification requirements listed on the current revision of the FTI drawing and/or specification. Suppliers are responsible for all dimensions specified on the drawing. The supplier records the results on the First Article Report form or equivalent. The supplier numbers a copy of FTI's drawing and/or specification to correspond with the supplier's results. These results will be provided in the same units as the FTI drawing.

The dimensional inspection report must include the specification number, specified requirements, and the inspection/test results for each part measured. A simple statement that the material meets the requirements is not acceptable. 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 FTI. The parts must be produced under volume-production conditions, including material, machines, tooling, processing

parameters, cycle times, etc. Any exceptions to the volume-production conditions must be approved in writing by FTI and included in the data package submitted to FTI.

### 4.3 Material Certification/Test Report

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

### 4.4 Gage Repeatability & Reproducibility (R&R) Studies

For those characteristics specified by FTI, the supplier must perform gage R&R studies. A sample plan for conducting R&R studies is available from Purdue University [here](#). FTI must approve R&R values greater than 10 percent of the tolerance.

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

#### 4.4.1 Gage Correlation Studies

For characteristics specified by FTI, the supplier must perform a gage correlation study. This consists of the supplier identifying, measuring, and recording a specified number of production parts. The supplier then sends the parts to FTI for measurement. FTI compares their measurements with the supplier's measurements to determine the correlation between the gages.

#### 4.4.2 Process Capability Studies

Process Capability ( $C_{pk}$ ) 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. FTI prefers suppliers must use methods defined in Statistical Process Control (SPC) published by AIAG for determining process capability and process performance. FTI can accept alternate methods of process control so long as they provide control and accountability equivalent to SPC.

A  $C_{pk}$  of at least 1.33 is required for FTI critical dimensions.

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

$$C_p = \text{Process capability ignoring process centering} = \frac{USL - LSL}{6\hat{s}}$$

$$C_{pk} = \text{Process capability including centering} = \text{the minimum of either: } \frac{USL - \text{Avg.}}{3\hat{s}} \text{ or } \frac{\text{Avg.} - LSL}{3\hat{s}}$$

USL = Upper Specification Limit

LSL = Lower Specification Limit

Avg. = Process Average =  $\bar{X}$

$$\hat{s} = \text{Estimated Standard Deviation} = \frac{\bar{R}}{d_2}$$

$\bar{R}$  = Average Range

$d_2$  = Constant from statistical tables

For unilateral tolerances, the same logic is employed, except that only the specified side of the tolerance is used to calculate  $C_{pk}$ . When  $\bar{X}$  &  $R$  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.

#### **4.5 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. Based on the potential seriousness and likelihood of the problem, the supplier develops manufacturing controls. 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.

#### **4.6 Control Plan**

When requested, the supplier must develop a control plan, and submit it for approval. The control plan is a detailed description of the supplier's proposed processing steps required to produce the part, and the controls that are put into place to control the quality at each step. The control plan must include all in-house processing, external processing, inspection, packaging, and shipping. Suppliers may use their own format. Measuring devices and fixtures designed and built to check FTI parts must be identified with a gage number and drawing and must be listed on the control plan.

The control plan must include all critical characteristics. Suppliers are responsible for all dimensions specified on the drawing. Where detailed instructions are required, the supplier details those instructions in a work instruction, or equivalent, which must be listed in the control plan. Inspection methods, sample sizes, and sampling frequencies should be based on the process capabilities, seriousness and likelihood of potential non-conformances, and process stability. Critical characteristics that do not meet FTI's process capability requirements must be inspected 100%, unless FTI approves alternate control methods in writing.

#### **4.7 Appearance Approval Reports**

For all parts that have designated appearance call outs within the specification (such as color or texture) suppliers shall complete an appearance approval report. This report shall provide detail on the color as well as the specific texture for the part.

#### **4.8 Other Requirements**

##### **4.8.1 Electrostatic Discharge (ESD) Susceptibility**

When components or assemblies supplied to FTI 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 FTI. ESD failure modes shall be considered in PFMEAs, and ESD controls shall be included in control plans and packaging.

##### **4.8.2 Safety Data Sheets (SDS)**

As applicable, Safety Data Sheets (SDS) must be provided during First Article process.

##### **4.8.3 Agency Approvals and Compatibility Reports**

The supplier is responsible to provide the proper agency approval test reports per FTI 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. FTI products are specifically compliant to ATEX and CSA standards and our suppliers must meet these standards as well, when specified.

The supplier is responsible to submit test results that verify compatibility as required (USB, 1394 etc.). Testing may be done by the supplier or by a test facility certified by the supplier.

## 5.0 Manufacturing Control

### 5.1 Process Control

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

### 5.2 Statistical Process Control

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 may 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.

FTI can accept alternate methods of process control so long as they provide control and accountability equivalent to SPC.

### 5.3 Process Performance Requirements

Process Performance ( $P_{pk}$ ) is the comparison of the actual process variation to the specification limits. When required to submit process performance data to FTI, 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 FTI. When specified by FTI, other characteristics failing to meet the minimum requirement also require a containment and improvement plan.

$P_{pk}$  = the minimum of either

$$\frac{USL - Avg.}{3s} \quad \text{or} \quad \frac{Avg. - LSL}{3s}$$

USL = Upper Specification Limit

LSL = Lower Specification Limit

Avg. = Process Average =  $\bar{X}$

s = Estimated Standard Deviation

n = Total number of parts inspected

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{(n-1)}}$$

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

### 5.4 Process Improvement

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

## 5.5 On-going Inspection

For each manufactured lot, unless otherwise specified, the supplier at a minimum is to randomly sample and inspect critical to quality (CTQ) dimensions per ANSI/ASQ Z1.4-2003 and as outlined below. CTQ dimensions are identified on FTI drawings by an oval around the dimension. General inspection level II is to be used to set the inspection lot quantity and an acceptable quality level (AQL) of 2.5 is to be used to determine lot acceptance or rejection. Lot size, inspection level quantity, and acceptance and rejection criteria can be found in Appendix 1, Table 5.1. Suppliers are responsible for all dimensions specified on the drawing.

If a lot is deemed acceptable the inspection results must be sent to FTI. For Dock-to-Stock part numbers (see section 9) the inspection results are to be retained by the supplier and available to FTI upon request.

If a lot is deemed rejected it is at the supplier's discretion to sort, reject, or submit a Supplier Deviant Material Request (see section 6). The entire lot is not permitted to ship to FTI without FTI's prior approval. If sorting, 100% inspection and conformance of CTQ dimensions is required for all parts shipped to FTI.

## 5.6 Lot Control

A lot consists of product of one part number and revision that are made at the same time, under the same processing conditions, from the same lot of raw materials. The primary purpose for identifying lots is to determine the scope of actions that must be taken when problems arise during further manufacturing or with customers. Each part or container of material shipped to FTI must be identified with the Supplier's lot number as per section 7.1 of this Manual. 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

## 5.7 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 should be identifiable throughout FTI's processes.

The supplier must plan for traceability of components. The supplier will provide a written plan specifying how components will be marked with serial or lot numbers and date codes as specified on the FTI drawing, and how containers will be identified with lot numbers or date codes. The plan will also include sizes of lots or batches. Where possible, batch sizes should be minimized to aid in containment should quality problems be found.

## 5.8 Workmanship

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

## **5.9 Safety**

At no time should any customer, or person at an FTI 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, SDS sheets must be provided during the First Article process.

## **5.10 Maintenance**

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

## **5.11 Electrostatic Discharge (ESD) Controls**

If the supplier furnishes ESD-sensitive materials, the supplier must maintain an effective ESD program that meets all requirements for the material produced.

## 6.0 Drawings/Changes

### 6.1 Drawing and Change Control

The supplier must have a documented system for assuring that the latest FTI drawings specified on the purchase order 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.

### 6.2 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.

**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 may not make any changes in their process, location, material, or to the part without written approval from FTI.** The supplier must formally request a process change on all FTI components. If multiple sources of supply are used for one-part FTI is design responsible for, each source must be individually approved by FTI. Once approved, suppliers are authorized to use any source they are approved with as the supplier sees fit.

### 6.3 Supplier Change Request (SCR)

A Supplier Change Request (SCR) is used to request a change to a released part, process, drawing, or specification. FTI encourages SCRs for process improvement with the stipulation that before an SCR is submitted, the supplier thoroughly reviews their FMEA and control plan to assure that all process-related issues have been addressed and resolved. FTI can accept supplier originated SCR forms if the supplier already has a system in place and the supplier SCR provides the same data as the FTI SCR.

The originator of an SCR 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 SCR with the revised FMEA and control plan (if applicable) to FTI 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 FTI has completed the review, and concurs with the supplier, FTI will notify the supplier as to the final disposition of the SCR and part submittal requirements and dates. Any changes approved on an SCR will be incorporated into the next First Article approval generated by either FTI or the supplier.

**When monitoring is required, the appropriate markings must be identified on the lots etc. for a specified time frame as decided jointly with FTI and the supplier.**

## 6.4 Supplier Deviant Material Request

A supplier is never permitted to knowingly ship product that deviates from the drawing, specification limits, or design intent without written authorization from FTI. If parts fail inspection at the supplier location, they are considered deviant material. If such a condition exists, the supplier may request FTI to allow shipment of the product. This is accomplished by initiating a Deviant Material Request (DMR). Suppliers must complete, in its entirety, and submit a DMR form to FTI Purchasing before shipment of any suspected deviant parts. FTI can accept supplier originated DMR forms if the supplier already has a system in place and the supplier DMR provides similar data as the FTI DMR.

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

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 FTI.

**Any parts sent to FTI 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 FTI and the supplier.**

**For clarification, a SCR is for a supplier to suggest an ongoing change to a part due to a change in sub-supplier, process, or design. A DMR is for a supplier to notify FTI about a one-off situation affecting conformance of a part to the specification.**

## **7.0 Packaging & Labeling**

### **7.1 Packaging**

Each supplier must adequately plan for packaging. FTI 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. Samples shall be shipped in production packaging, unless authorized by FTI Engineering. When production packaging is not used for samples, suppliers must submit a packaging plan to FTI for approval.

Packaging for ESD sensitive items must meet appropriate ESD packaging requirements. Contamination is a serious concern to FTI. 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 40 lbs. The maximum acceptable weight for manually handled pack is 50 pounds, unless approved by FTI in writing.

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.

### **7.2 Labeling**

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

- FTI part number (if no FTI 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.

This same information shall be recorded on the supplier provided packing list as well.

## 8.0 Corrective Action System

FTI 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 FTI.

### 8.1 Corrective Action Process Approach

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 recurrence.

- Use a team approach
- Describe the problem
- Contain the problem
- Identify and verify root causes(s)
- Implement permanent corrective actions
- Verify corrective action effectiveness
- Close the corrective action

Suppliers may use supplier generated CARs so long as they contain similar data as above.

### 8.2 Supplier Corrective Action

FTI issues a Corrective Action Request (CAR) to a supplier when non-conforming parts are found at incoming inspection, in production, in test, or by a FTI customer. They can also be issued as a result of a supplier audit. The supplier is required to respond by returning the CAR back to FTI with the "Team Response" fields completed. The following provides a brief outline of the CAR procedure that suppliers to FTI should comply with:

- FTI requires that the supplier take immediate containment action upon notification of the nonconformance. The supplier must submit a written response to FTI, reporting the Supplier's initial observation and defining the interim containment plan within 48 hours of notification. The Supplier's Initial Observation is an acknowledgement that the Supplier has been informed of the problem and has begun to gather information about the problem.
- The containment plan must clearly define the containment actions at the supplier's facility to assure that no nonconforming product is shipped to FTI. If suspect product has already been shipped, the supplier must address all suspect stock in transit and any stock at FTI. The supplier will assist FTI in identifying customer risk by identifying all suspect lot numbers and associated quantities involved.
- Within 2 weeks after the original notification, the supplier must report the results of the Supplier's investigation into the cause of the problem.
- Within 3 weeks from the initial notification date, the supplier must submit the corrective action to be taken to prevent recurrence of the problem, and the effectivity date (the date the corrective action will be implemented.). Actions such as "train the operator," "discipline the operator," or "increase inspection," are typically not acceptable corrective actions.
- The supplier is required to keep FTI informed of progress towards implementing the corrective action. When corrective action implementation is complete, the supplier and FTI verify that the corrective action is effective in preventing the problem's recurrence.
- The ultimate goal of all FTI suppliers is to ship saleable parts. As such FTI retains its right as the final arbiter as to whether parts that fail to meet specifications for their ability to complete the build required as well as the acceptability of the CAR as presented by suppliers. Failure to provide quality parts or corrective actions could result in FTI directing actions as may be required to cure all defects and/or bring the goods and/or services into conformity with all requirements of the PO, in which event all related costs and expenses (including, but not limited to, material, labor and handling costs and any required re-performance of value added machining or other service) and other reasonable charges shall be accrued to the supplier's account.

## 9.0 Dock To Stock (D2S)

FTI utilizes a Dock To Stock (D2S) policy to reduce the problems associated with receiving nonconforming product from suppliers, while minimizing incoming inspection and speeding up the process of moving product to production. Suppliers are expected to internally inspect parts before shipment to FTI based on the On-going Inspection criteria (section 5.5) within this document and both retain the results and provide the results to FTI as directed.

Suppliers with all parts on D2S and high ongoing quality performance are Preferred Suppliers. Preferred Suppliers are given first opportunity to quote for new business and are given preference for increased volumes when consolidating suppliers for multiple-source items.

FTI administers the D2S program on a part-by-part basis. D2S applies to all material and components purchased for use in released product at FTI. It does not include pre-released parts, samples, prototypes, pilot runs, First Articles for new tooling, and other low volume applications. D2S material will be moved directly into production, bypassing incoming inspection.

### 9.1 D2S Requirements

To become a D2S candidate for each part or part family, the supplier must achieve:

- A performance level of 100% lot acceptance without failures, concessions, or rework based on the 5 most recent shipments received by FTI.
- A performance level of 100% for submission of pre-shipment inspection reports as approved by FTI Quality.
- No open or late corrective actions for the part number or part family.
- No Service or field related “negative” incidents over past six months, as determined by FTI service.

The supplier’s part will continue to be randomly inspected with frequency determined by FTI Quality. Not all parts are eligible for D2S consideration. Some parts deemed critical by FTI Engineering and Quality will not be candidates for D2S due to the cost of rework if failures are detected after manufacturing into finished goods has begun. It is solely at FTI’s discretion parts are included in the D2S process.

### 9.2 D2S Procedure

Suppliers shall perform pre-shipment inspections and submit the inspections to FTI Purchasing before shipment of any material. Suppliers shall inspect the designated sample based on the lot size in Appendix 1, table 5.1 and provide the inspection report to FTI Purchasing before shipment. The inspection sheet will designate which measurements are critical to quality (CTQ). These CTQ measurements will be reflected in FTI drawings as they are created or updated.

Each individual line item on a Purchase Order shall be considered one lot for inspection. FTI Purchasing, Quality, and Engineering shall review the inspections before shipment of material to ensure sampled parts meet the inspection criteria.

Shipments that meet the acceptable quality level (AQL) in Appendix 1, table 5.1 will be approved for shipment by FTI Quality and Engineering. FTI Purchasing will communicate the approval to the Supplier. Inspection results shall be recorded in the Inspection Result worksheet. Parts approved for D2S shall be designated there as well. Shipments that fail to meet inspection criteria shall be evaluated per the Non-Compliant Parts procedure, detailed below.

### **9.3 D2S Suspension and Non-Compliance**

If a lot fails to meet AQL at the supplier's facility based on pre-shipment inspection, the supplier will need to submit a Deviant Material Request and FTI Engineering will make the determination if the lot can be accepted.

If the deviation cannot be accepted, the parts will be rejected at the supplier's facility. The supplier will be responsible for any costs associated with rework or late shipment (including premium freight) of the suspect parts in order to meet FTI's need date. The part will no longer be considered D2S eligible until it meets specification.

Any lot of material that fails to meet AQL at FTI will be removed from D2S and will no longer be considered D2S eligible until it meets specification. A CAR will be requested from the supplier to address the quality issue as well as how a quality escape happened.

If a supplier does not implement effective corrective action, or if the supplier is put on suspension repeatedly, FTI determines whether the supplier's D2S status should be discontinued. This decision may also include a decision to move the business to an alternate supplier. In all cases, FTI Purchasing will communicate decisions on D2S eligibility to the supplier through email.

## **10.0 Supplier Monitoring**

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

- A quality management system 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 FTI to review supplier performance and progress

### **10.1 Supplier Audits**

Periodically, FTI may audit the supplier's quality management system. The supplier must make their facility available for on-site process verification by FTI personnel 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, FTI may also audit the supplier's continuing conformance to the control plan approved in the First Article process.

### **10.2 Inspection Audits**

FTI expects its suppliers to furnish material that conforms to all requirements, and that does require inspection when FTI receives it. Material that has not achieved D2S status, or that is on D2S suspension is inspected on a lot-by-lot basis. FTI uses an AQL 2.5 sampling plan (see Appendix 1, table 5.1) that rejects the entire lot when non-conforming parts are found in the sample exceeding the stated threshold. At FTI's discretion, in order to meet production requirements, 100% sorting may be done as necessary at the supplier's expense.

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

### **10.3 N<sup>th</sup> Article Inspection**

The supplier must perform annual Nth Article inspections of each critical part to verify continuing conformance of the part to the specification if directed by FTI. 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 FTI, 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.

### **10.4 Supplier-Furnished Lot Documentation**

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

When specified by FTI, 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 FTI's requirements for process stability and process performance, and if the characteristic has caused no problems in FTI's production. FTI will notify the supplier in writing if the data submission may be discontinued.

## Appendix 1

**Table 4.1 First Article Approval Levels**

Level	Requirements
1	Part Submission Warrant (PSW) only submitted to FTI
2	PSW with product samples and limited supporting data
3	PSW with product samples and complete supporting data
4	PSW and other requirements as defined by the customer
5	PSW with product samples and complete supporting data available for review at the supplier's manufacturing location

**Table 4.2 First Article Approval Document Requirements & Retention**

Item	First Article Document	Level 1	Level 2	Level 3	Level 4	Level 5
1	PSW	S	S	S	S	S
2	Dimensional Results (ISIR)	R	S	S	S	S
3	Material Test Results	O	O	O	O	O
4	Performance Test Results	R	S	S	S	S
5	Gage R&R	R	R	S	S	S
6	Design FMEA	O	O	O	O	O
7	Process FMEA	R	R	S	S	S
8	Process Flow Diagrams	O	R	S	S	S
9	Control Plan	O	R	S	S	S
10	Appearance Approval Report	O	O	O	O	O
11	Sample Product	S	S	S	S	S
12	Master Sample	R	R	R	R	R
13	Customer Required Documentation	N	N	N	O	O

S – Submitted – Documentation submitted to FTI with PSW

R – Retained – Supplier completes the document and retains it, but is not required to submit to FTI

O – Optional – Supplier does not have to complete the documentation unless specified by FTI

N – Not Applicable

**Table 5.1**

Below is a summary of general inspection level II sample size and AQL 2.5 acceptance/rejection quantity. Complete charts showing all inspection levels and all acceptable quality levels are commonly available online.

<i>Lot Size</i>	Gen. Inspection Level II		
	<b>Inspection QTY</b>	<b>Accept</b>	<b>Reject</b>
<i>2 to 8</i>	2	0	1
<i>9 to 15</i>	3	0	1
<i>16 to 25</i>	5	0	1
<i>26 to 50</i>	8	1	2
<i>51 to 90</i>	13	1	2
<i>91 to 150</i>	20	1	2
<i>151 to 280</i>	32	2	3
<i>280 to 500</i>	50	3	4
<i>501 to 1,200</i>	80	5	6
<i>1,201 to 3,200</i>	125	7	8
<i>3,201 to 10,000</i>	200	10	11
<i>10,001 to 35,000</i>	315	14	15
<i>35,001 to 150,000</i>	500	21	22
<i>150,001 to 500,000</i>	800	21	22
<i>500,001 and Up</i>	1,250	21	22