anchor
manufacturing group, inc.

# SUPPLIER QUALITY ASSURANCE MANUAL

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# Anchor Supplier Quality Assurance Manual

## Goal

The goal of this Manual is to promote the development and effective implementation of a Quality Management System at all Anchor Manufacturing Group, Inc. and Anchor Metal Processing, Inc. (hereafter "Anchor") Suppliers. This System is to be built on:

- Process Approach
  - Plan-Do-Check-Act Cycle
  - Risk-Based Thinking
- Product Life Cycle Management
- Continual Improvement
- Defect Prevention
- Product Safety
- Waste Minimization

## Confidentiality

All information gained from interactions with Anchor is to be held strictly confidential.

## Purpose and Scope

This Manual describes the Quality Management System expectations for all Anchor Suppliers. Anchor is committed to working with its Suppliers in order to provide the highest quality and service at a competitive cost that benefits the final Customer, the supply base and themselves. It applies to all Suppliers of parts, materials, and services that directly affect the products shipped to Anchor Customers.

## Certification Status

Anchor is committed to operating within the guidelines of IATF16949:2016 and ISO14001:2015 for automotive Suppliers, and ISO 9001:2015 for non-automotive Suppliers.

Anchor Suppliers must be third party certified to ISO 9001:2015 at a minimum. IATF16949:2016 is used during the Supplier Approval and Performance Evaluation Process.

Suppliers who perform laboratory work must be certified to ISO/IEC 17025:2017 or national equivalent.

Small and/or unique Suppliers may be engaged following an Anchor on-site assessment using the Anchor Supplier Quality Assessment form (ATF 6.2).

## Zero Defects Policy

Anchor has a Zero Defects Policy and will not accept any shipments containing nonconforming or defective product unless preceded by a formal deviation approval from Anchor. Suppliers are required to monitor their shipments to assure a quality level of Zero Parts Defective.

# 1.0 SUPPLIER APPROVAL AND EVALUATION PROCESSES

## 1.1 Supplier Approval Process

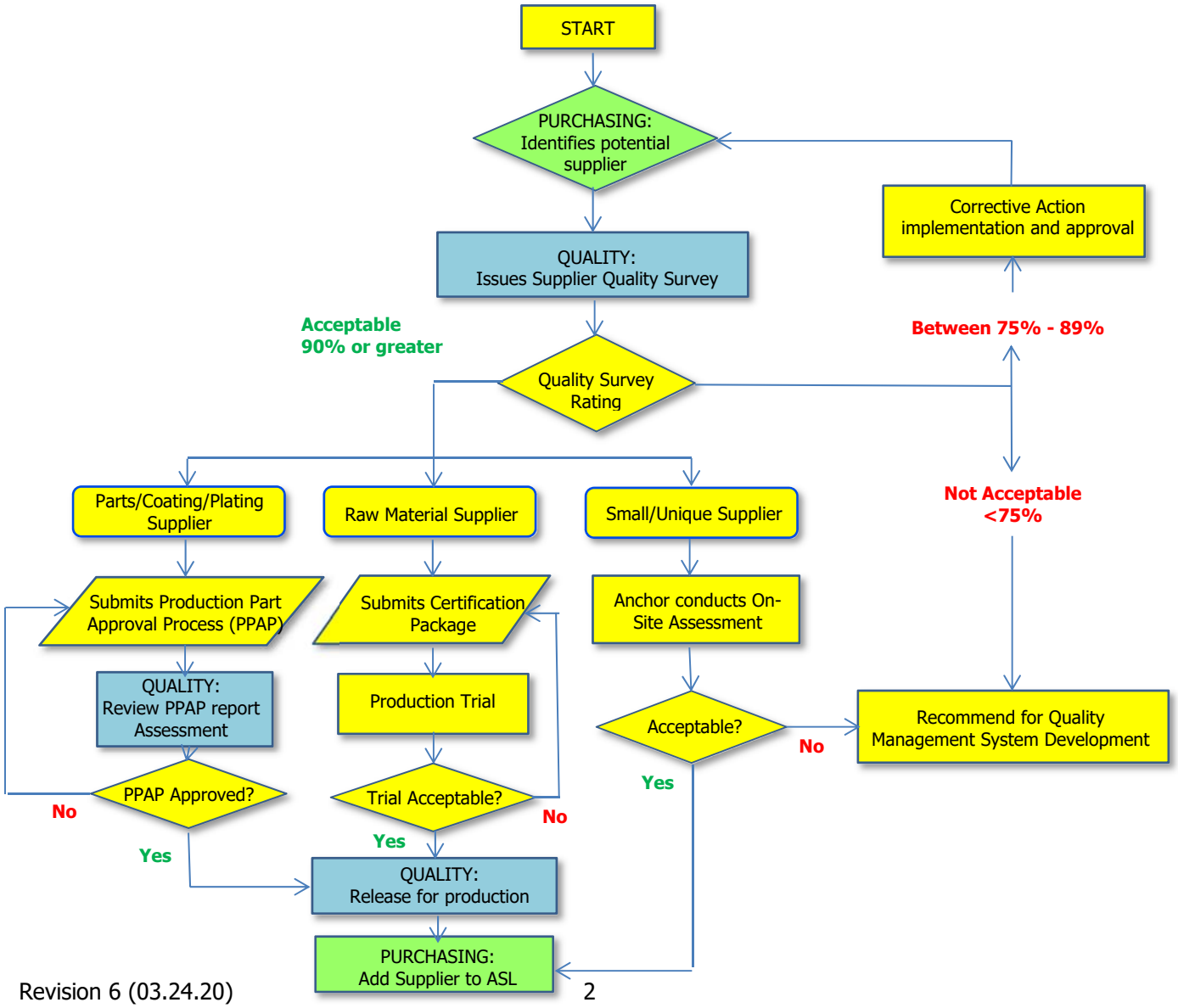
Anchor maintains an Approved Supplier List that is used for purchases of product and services.

Suppliers not on the current Approved Suppliers List may be used if a Purchase Order is marked "temporary Supplier" or "90-day limited purchase period from this Supplier ". The Purchase Order must be reviewed and approved by the Purchasing Director before issuing.

Prior to adding a new Supplier to the Approved Supplier List, Anchor Supplier Quality sends a copy of the Anchor Supplier Quality Assurance Manual, the Manual Confirmation of Receipt, Anchor Supplier Assessment form (ATF 6.2), and the Anchor Supplier Contact List form. The Manual Confirmation Letter, the Assessment, and the Contact List must be completed, signed, dated and returned to the Anchor. Suppliers scoring less than 75% are not added to the Approved Supplier List but may be targeted for development so that they may be added at a later time. Suppliers scoring between 75% - 89% may be added after a corrective action plan to get them to 90%.

The Purchasing Director / Quality Management reviews the performance of the new Supplier and if acceptable, could result in the addition to the Approved Suppliers List.

**Supplier Approval Process Flow Chart**



## 1.2 Supplier Performance Evaluation Process

Performance ratings are calculated on a quarterly basis.

As a part of Anchor's system for Supplier control and development, the following metrics are used to rate performance:

a. **Quality** - Measures parts/pounds per million rejected, and number of reject occurrences.

b. **Delivery** – Measures On-Time Delivery performance and premium freight

c. **Support** – A measure of the Supplier's Certification Status and Corrective Action Response Time.

d. **Customer Disruptions** – Ratings may also be impacted for any customer disruptions at receiving plants which includes yard holds and stop ships due to supplier issues.

The Supplier Performance rating is based on a point system, with 5 points being the highest score achievable. Suppliers are assigned a status based on their rating as follows:

| Performance Rating | Performance Status | Consequence |
|---|---|---|
| 4.00 – 5.00 | Preferred | None |
| 3.00 – 4.00 | Acceptable | None |
| 2.00 – 3.00 | Improvement Required (Targeted for Development) | Submit Action Plan(s) within 30 days to improve performance |
| 1.00 – 2.00 | Probationary | |
| Less than 1.00 | Unacceptable | |

To meet Anchor's minimum requirements, the Supplier must maintain a rating of 3.00 or better.

In the event that a Supplier's rating is below 3.00, the Supplier must submit a written Action Plan to their Anchor Quality Engineer within 30 days, and they will be targeted for development. This Plan must detail the actions, responsibilities and timing to improve the Performance Rating to an "Acceptable" status. Meetings may be held at Anchor or the Supplier's facility to review the Action Plan.

If the Supplier fails to achieve the necessary performance rating after 2 consecutive rating periods, that may result in the Supplier to be placed on hold for new business. If the Supplier fails to achieve the necessary performance rating beyond the 2 consecutive rating periods, Anchor will initiate a search for a qualified alternate source and remove the current Supplier from the Approved Suppliers List. The purchase of products and services is limited to those Suppliers on the Approved Suppliers List that have demonstrated their commitment to Quality, Delivery and Support.

**Definitions:**

1. **Quality (40%) = 2 points out of possible 5 points**

   1.1 ppm = 80%
   1.2 Number of Reject Occurrences = 20%

2. **Delivery (40%) = 2 points out of possible 5 points**

   2.1 On-Time Delivery = 100%
   2.2 Incidents of Premium Freight = 0.5-point reduction for every incident

3. **Support (20%) = 1 point out of possible 5 points**

3.1 Certification Status = 50%
3.2 Corrective Action Response Time = 50%

Ratings are calculated for the current (rolling) 12-months and Year-To-Date (YTD).

**Rating Metrics**

1. **ppm (Quality)** – Based on accumulation of parts per million (ppm) defective and reflects the rate of defective material experienced with Supplier's product. The rating scale below is used to assign points based on ppm defective.

| ppm Rating | Parts per Million Defective |
|---|---|
| 5.00 | 0.00 – 3.40 |
| 4.90 | 3.41 – 10.00 |
| 4.80 | 10.01 – 20.00 |
| 4.70 | 20.01 – 30.00 |
| 4.60 | 30.01 – 40.00 |
| 4.50 | 40.01 – 50.00 |
| 4.40 | 50.01 – 60.00 |
| 4.30 | 60.01 – 70.00 |
| 4.20 | 70.01 – 80.00 |
| 4.10 | 80.01 – 90.00 |
| 4.00 | 90.01 – 100.00 |
| 3.80 | 100.01 – 200.00 |
| 3.60 | 200.01 – 300.00 |
| 3.40 | 300.01 – 400.00 |
| 3.00 | 400.01 – 500.00 |
| 2.00 | 500.01 – 600.00 |
| 1.00 | 600.01 – 1,000.00 |
| 0.00 | Greater than 1,000.00 |

2. **Number of Reject Occurrences** – Based on a 12-month rolling period

| Rating | Number of Reject Occurrences |
|---|---|
| 5.00 | 0 |
| 4.50 | 1 |
| 3.50 | 2 |
| 2.00 | 3 |
| 1.00 | 4 |
| 0.00 | Greater than 4 |

3. **On-Time Delivery** – Based on the number of shipments received relative to the agreed to or scheduled date. On-Time Delivery is defined as 5 days early/late for raw material and 2 days early, 0 days late from the purchase order release due date

| Rating | Description |
|---|---|
| 2.00 | >= 80% |
| 1.00 | <80% |

4. **Certification (Support)** – Reflects the Supplier's Certification Status

| Rating | Description |
|---|---|
| 5.00 | Certified to IATF 16949 through third party audits |
| 4.50 | Certified to ISO 9001 through third party audits with compliance to IATF 16949 through second party audits |

| | |
|---|---|
| 4.00 | Certified to ISO 9001 with compliance to other customer-defined QMS requirements for Sub-Tier Suppliers through second party audits |
| 3.50 | Certified to ISO 9001 through third party audits. |
| 3.00 | IATF 16949 - or ISO 9001 certification being developed |
| 0.00 | No quality system in place and no plans to implement |

5. **Corrective Action (Support)** – The number of Corrective Action Request that were issued.

| Rating | Description |
|---|---|
| **3.00** | No Corrective Action Requests issued |
| **2.00** | 1 Corrective Action Requests issued |
| **1.00** | 2 Corrective Action Requests issued |
| **0.00** | 3 or more Corrective Action Requests issued |

6. **Corrective Action Responses (Support)** – Based on issued Corrective Action Requests and resulting Supplier Responses.

| Rating | Description |
|---|---|
| 5.00 | No Corrective Action Response required. |
| 4.50 | Initial Response and Containment received within 24 hours of Notification. Root Cause and Permanent Corrective Action implemented within 15 days. Verification received within 30 days. |
| 4.00 | Initial Response and Containment received within 24 hours. Root Cause and Corrective Action Response received after 15 days but less than 20 days. |
| 3.00 | Initial Response and Containment received after 24 hours. Root Cause and Corrective Action Response received within 15 days. |
| 2.00 | Initial Response and Containment received after 24 hours. Root Cause and Corrective Action Response received after 15 days. |
| 1.00 | Initial Response and Containment received after 24 hours. Root Cause and Corrective Action Response received after 20 days. |
| 0.00 | No response received. |

# 2.0 MANUFACTURING PROCESS PLANNING

## 2.1 Quality Planning

An effective Quality Management System uses multi-disciplinary resources for Advanced Product Quality Planning (APQP). The Automotive Industry Action Group (AIAG) has established the basis of an effective quality planning system in the Advanced Quality Planning and Control Plan reference manual.

Anchor expects each Supplier to use Advanced Product Quality Planning and promote continual improvement. This planning must include identification of product requirements and technical specifications, logistical requirements, determination of manufacturing feasibility and acceptance criteria, project planning, education and training of employees, employee involvement, and the tracking, analysis and reporting of cost of quality data. All Quality Planning efforts must focus on error prevention rather than detection. Suppliers are also encouraged to implement the applicable phases of Product Life Cycle Management (see Appendix II for an overview).

Feasibility reviews must be conducted prior to committing to supply products/services to Anchor, and Suppliers must ensure that personnel with process design responsibilities are competent to achieve requirements.

Suppliers must review and acknowledge Anchor purchase orders prompty or communicate if purchase orders do not match Supplier commitments. Should Anchor's requirements for the Supplier be revised, the Supplier must again review and approve them for feasibility, revise all relevant documents, and inform all relevant employees of the changes.

## 2.2 Process Design and Development

In order to design the manufacturing processes, Suppliers must have documented process that includes the identification, documentation and review of product and process requirements during quoting and other subsequent interactions with Anchor. Suppliers must have to ability to communicate data in Anchor's specified computer language(s), and these requirements may include:

- Functional and performance product requirements, including Special Characteristics (see below)
- Characteristics identified as a result of the Supplier's knowledge of their products and processes
- Risk assessments relative to input requirements, including potential consequences of failure due to the nature of products and services
- Targets for conformity (including product preservation, reliability, durability, serviceability, productivity, process capability, health, safety, ergonomic, recycling and other environmental impacts, developmental timing, and cost)
- Process controls to be implemented
- Boundary and interface requirements
- Documentation requirements
- Identification, traceability and packaging requirements
- Consideration of process design alternatives
- Statutory and regulatory requirements, and codes of practice to which the Supplier has committed
- Anchor requirements, if any
- Embedded software requirements, if any.

For products with internally embedded software, Suppliers must comply with ISO/IEC 15504 or Automotive SPICE™ Standards and must have a software development assessment methodology in place to assess the development process. Using risk-based thinking, Suppliers must perform a recorded self-assessment on their software development capabilities, and the software development process must be included in the Internal Audit System.

Suppliers must also have a documented process for the identification, documentation and review of the manufacturing process design outputs, and documentation must be in terms that enable verification against manufacturing process design inputs. These outputs include, but are not limited to the following:

- Specifications and drawings
- Special Characteristics for product and manufacturing process
- Identification of process inputs that impact characteristics
- Tooling and equipment to be used for process and control, including capability studies
- Process flow charts/layouts, including linkages between product, process, and tooling
- Capacity analysis
- Process Failure Mode and Effects Analyses (PFMEA) – see "Risk Mitigation" below
- Maintenance plans and instructions
- Control Plan(s)
- Process approval acceptance criteria
- Quality, reliability, maintainability and measurability data

- Results of error-proofing identification and verification, as appropriate based on risk analyses
- Methods of rapid detection, feedback and feed-forward, and correction of product and manufacturing process nonconformities.

Process design and development processes must be conducted using an established methodology that ensures that verification reviews are conducted to ensure outputs meet inputs, outputs are validated to ensure they meet the intended use requirements, and actions taken accordingly to address any issues identified during the reviews.

During product and process design and development, measurements such as risks, costs, lead times, and critical paths must be defined, analyzed, and reported, with summary results serving as an input to Management Review. When required, program status reports must be sent to Anchor. Also, if required by Anchor, Suppliers must have a prototype program and related Control Plan, with the same Sub-Tier Suppliers being used as will be used in production, if possible.

## 2.3 Special Characteristics

A Special Characteristic is classification of a product or process characteristic that can affect safety or compliance with regulations, fit, function, performance, requirements, certifications, or subsequent product processing. Suppliers must use a multi-disciplinary approach to establish, document, and implement processes to identify Special Characteristics, including those identified by the Customer and risk analyses.

Suppliers must conform to Anchor requirements for designation, approval, and control and monitoring of Special Characteristics, and they must be detailed in the PFMEA and Control Plan. GMW15049 (Key Characteristic Designation System Process) applies for GM-related products with Key Characteristics. For Daimler "DS" and "DZ" Characteristics, Mercedes-Benz Special Terms 13/18 applies.

All control characteristics require demonstrated process capability as described in this Manual.

## 2.4 APQP Documents

Suppliers must submit a Process Flow, PFMEA, and Control Plan in advance. All documents must carry issue and revision dates, and collectively must include measurement techniques, sampling plans, acceptance criteria, and the reaction plans and escalation process if the acceptance criteria is not met.

### 2.4.1 Process Flow

Once approved by Anchor, the Process Flow becomes the authorized manufacturing method. **Any changes to the manufacturing process or product must be communicated to and approved by Anchor prior to its implementation.** All related documents/systems are to be revised, communicated internally, and available for review by Anchor Supplier Quality.

### 2.4.2 Process Failure Modes and Effects Analysis (PFMEA)

Based on product requirements, process risk must be studied so that prevention and detection controls are in place to adequately address the Severity of each risk (those for the Supplier, Anchor, and end-user) and the Occurrence of each cause.

### 2.4.3 Control Plan

Suppliers are required to develop and maintain Control Plans and submit them to Anchor for approval. All Control Plans are to be developed as the result of Process Flow and PFMEA development processes and other organized multi-disciplinary efforts. If required by Anchor, the Supplier must develop and implement a Control Plan for both Pre-Launch

and Production processes. Also, if required, the Supplier must provide measurement and conformity data collected during the implementation of either or both Plans.

Control Plans must include the product and process controls used during the manufacturing process, including job set-up verifications, First-Piece/Last-Piece validations as applicable, Special Characteristic monitoring methods, Reaction Plans, Error-proofing test frequencies with reaction plans for any test failures, all drawing characteristics, and any other requirements requested by Anchor.

They must be reviewed and revised as necessary whenever the Supplier determines that it has shipped nonconforming product, and whenever a change occurs that affects the product, manufacturing, supply, measurement or logistical processes.

## 2.5 Risk Mitigation

During risk analysis, Suppliers identify risks and opportunities. By addressing both, the Quality Management System can achieve its intended results, enhance desirable outcomes, reduce or eliminate undesirable effects, and foster continual improvement.

Risk Analyses must be performed consistently using a documented process that is based on the AIAG's Potential Failure Mode and Effects Analysis (PFMEA) reference manual or equivalent. Using this process, Suppliers can lessen the impact of risk by determining potential nonconformities and their causes, evaluating the need for action to prevent the occurrence of nonconformities, determining and implementing the necessary actions within the Quality Management System processes, recording the actions taken, evaluating the effectiveness of actions taken, and using lessons learned to prevent recurrence in similar products/processes. Actions taken must be appropriate based on the severity of the risk, and at a minimum, lessons learned should be determined from the analysis of product audits, Customer complaints, and scrap and rework data.

A key risk mitigation effort is then to maintain a documented contingency plan that is appropriate to the severity of the risk and impact to the Customer. At a minimum, the Plan must consider key equipment failures, interruption of product/service supply from Sub-Tier Suppliers, natural disasters, fire, utility interruptions, labor shortages, and infrastructure disruptions (including cyber-attacks). If any situation may impact Anchor, reaction plans must include notification to Anchor as to the extent and expected duration. In addition, reaction plans must include the validation process to be taken following re-start of production following an emergency stoppage. Contingency plans must be tested periodically for effectiveness, and Plans reviewed and revised as necessary on at least an annual basis by a cross-functional team that includes Top Management.

Another important risk mitigation effort includes using a multi-disciplinary team to develop and improve facilities and equipment. A suitable environment can be a combination of human and physical factors, such as social, psychological, and physical. Plant layouts must optimize material flow, material handling, and the value-added use of building envelope. For all new and revised products and processes, Suppliers must use a multi-disciplinary team to determine manufacturing feasibility, and if processes are capable of consistently producing products/services that meet all Customer requirements. Suppliers should validate their ability to manufacture product to specifications at the required rate through production runs, benchmarking studies, or other means. Manufacturing feasibility assessments are to serve as inputs to Management Review.

### 2.5.1 PFMEA Risk Review and Reduction

Multi-disciplinary teams must use a systematic approach to proactively reduce risk. Monthly reviews focus on preventing defects from leaving the workstation. Using a documented process for prioritizing top issues based on the Risk Limiting Method or equivalent, Suppliers must maintain action plans that include recommended actions, responsibilities and timing. Suppliers should conduct Reverse PFMEA events at the workstations and transfer knowledge back through the Process Flow, PFMEA and Control Plan.

### 2.5.2 By-Pass/Deviation Management

Suppliers must identify and maintain documentation of processes and process controls (including inspection devices and error-proofing systems) that may be by-passed or placed in deviation. The PFMEA for these processes/systems must include the use of primary and alternate control methods, and the internal approvals needed prior to implementation of the alternate control methods.

By-pass/deviation determinations must consider safety, failure mode severity, and the overall RPN rating for that process. Suppliers must implement Standardized Work Instructions that include Anchor notification and use of each alternate control method. When in place, Suppliers must verify the effectiveness of the alternate control methods on a daily basis, at a minimum, with the goal being to return to the standard process as soon as possible. Examples of daily verification include quality-focused checks via Layered Process Audits, daily Fast Response, Pre-Shift or similar leadership meetings.

Suppliers must implement traceability of all product produced while any alternate control methods are being used, for example verification and retention of First-Piece and Last-Piece from each shift.

Suppliers must obtain written approval from Anchor before shipping product that was inspected/tested using the alternate control method. Suppliers must maintain and periodically review the documentation of alternate control methods.

Once the primary controls are re-instated, verification must be recorded for a defined period based on severity, and confirmation that all features of the primary control system have been effectively re-instated.

### 2.5.3 Error-Proofing/Detection Verification

Suppliers must maintain a list of error-proofing devices and identify which can be by-passed and which cannot. These devices must be verified for function (that is, tested to failure or simulated failure) according to Standardized Work Instructions at the beginning of each shift at a minimum and documented in the Control Plan, and verification events must be recorded. Error-proof Verification Samples (when used) must be clearly identified and available at the workstation, and if applicable, calibrated/verified for the intended purpose. The Standardized Work Instructions must include a reaction plan and employees must be knowledgeable about the reaction plan.

## 2.6 Managing Change

### 2.6.1 Process Change Control

Using a documented process for process change evaluation and control, Suppliers must evaluate all process changes after initial product approval, including those proposed by Anchor, the Supplier, or its Sub-Tier Suppliers, for potential impact on form, fit, function, performance, and/or durability, and including the Design, Man, Machine, Material, Methods, and Environment components.

The process must include a requirement that the proposed changes be validated against Customer requirements (including the consideration of a production trial run (PTR) being conducted) and formally approved internally. In the case of changes proposed by the Supplier or its Sub-Tier Supplier, the Supplier must notify Anchor, obtain recorded approval prior to implementation, and complete additional verification and identification requirements.

Suppliers must retain records detailing the employees authorizing the changes, the review of changes, and any necessary actions arising from the reviews. For products with

embedded software, the Supplier must record the revision level of the software and hardware as part of the change record.

Applicable documents, such as PFMEAs, Control Plans, and Standardized Work Instructions, must be updated as necessary, and relevant employees must be made aware of the revised requirements.

### 2.6.2 Inspection Gates

Suppliers must use inspection gates such as Job Set-Up Verifications, Start-Up Verifications, and Final Inspection to verify that product requirements have been met prior to shipping. The sampling frequency must be based on risk, and during high-risk periods (e.g., product launch, shut-down/start-up periods, product/process changes, Fast Response issues), the sampling frequency must be increased. Suppliers must retain records of product release that includes evidence of product conformance, and the identity of the person authorizing the release.

Job Set-ups must be verified when performed, such as during the initial run, a material change, or work cell changeover. Documented information must be available for set-up personnel, First-Piece/Last-Piece validations (as applicable) must be conducted, and the Last-Piece retained for comparison to First-Piece of next production run. Product and process compliance must also be verified after a planned or unplanned production shutdown period.

## 2.7 Sub-Tier Supplier Control

Suppliers must have a documented process to identify outsourced processes, and evaluate, select, monitor, and re-evaluate Sub-Tier Suppliers. The process must include the criteria and actions to be taken in order to escalate or reduce the type and extent of controls based on the Sub-Tier Supplier's performance, and assessment of risk to product conformity and the uninterrupted supply of product. Actions arising from these evaluations must be recorded.

The process must also ensure that the purchased products and services comply with the current applicable statutory and regulatory requirements of the country of shipment and receipt, and in the Anchor-identified destination country, if provided.

When a Sub-Tier Supplier is responsible for control characteristics, it is the responsibility of the Supplier to adequately define and monitor the control system for these characteristics in their Control Plan. Quality requirements for a Sub-Tier Supplier are the same as those for the Supplier, therefore Suppliers must ensure that all such quality requirements are adequately communicated to the Sub-Tier Suppliers.

At a minimum, Sub-Tier Supplier monitoring must include product conformance to requirements, the number and extent of process disruptions, delivery schedule performance and the number of premium freight occurrences.

If Anchor directs the Supplier to a Sub-Tier Supplier ("directed-buy"), all requirements of this section are applicable unless specific agreements are defined in the Supplier's contract with Anchor.

## 2.8 Total Productive Maintenance

Suppliers must implement and maintain a documented total productive maintenance system. At a minimum, this system must include identification of key equipment, availability of replacement parts for key equipment, adequate resources to support the equipment, packaging and preservation of equipment, tooling and inspection devices, documented maintenance objectives, regular review of the maintenance plan and objectives and a documented action plan to address non-achievement of the objectives, use of preventive and predictive maintenance methods, and

periodic overhaul of equipment. Preventive and predictive maintenance schedules and maintenance must be recorded and made available for review upon request.

Suppliers must maintain a system for production tooling management, whether owned by the Supplier or Anchor, including maintenance and repair facilities and personnel, storage and recovery, set-up, tool change programs for perishable tools, and tool identification, including ownership. As detailed in Control Plans, periodic inspection and tooling layouts are necessary for monitoring the tooling. Any tooling not owned by the Supplier must be clearly and permanently marked so that ownership can be easily determined. When Anchor provides tooling, it will be marked according to requirements upon receipt, unless otherwise formally arranged by Anchor. If this is the case, marking requirements will be provided to the Supplier.

# 3.0 MANUFACTURING PROCESS VALIDATION

Suppliers must demonstrate product conformance to all material, dimensional and processing requirements. This conformance must be established in accordance with the process capability requirements described below. Suppliers must provide a product certification in the format detailed in Appendix V or equivalent.

Process design and development validation must be performed in accordance with Anchor requirements, and any applicable industry or regulatory standards. Validation timing must be planned in alignment with Anchor-specified timing. When contractually agreed upon, validation must include the evaluation of the product (including embedded software as applicable) within the final Customer's product.

## 3.1 Process Capability

Process capability must be demonstrated for the control characteristics identified in the Control Plan. Records must be maintained as evidence of the ability to achieve planned results.

3.1.1 Critical Characteristics are noted as "CC" or as otherwise defined by Anchor's Customer, for example "DS" for safety-related, and "DZ" for Daimler for certification- or registration-related. These characteristics require a 2.0 Ppk at PPAP and 1.67 Cpk for continual process monitoring once process stability using control chart methodology has been achieved.

3.1.2 Significant Characteristics are noted as "SC" or as otherwise defined by Anchor's Customer. These characteristics require a 1.67 Ppk at PPAP and 1.33 Cpk for continual process monitoring once process stability using control chart methodology has been achieved.

3.1.3 An Action Plan is required if data does not meet the minimum requirements stated above. Suppliers must also notify Anchor's Quality Department of any nonconformance to a Special Characteristic for material already shipped.

3.1.4 Any Critical Characteristic not meeting capability requirements must be checked 100% on a device that is free from operator interpretation.

3.1.5 Once the Control Plan for Special Characteristics has been approved by Anchor Supplier Quality, the Supplier must not change the control of that characteristic without written approval from Anchor.

3.1.6 The Supplier of products containing Special Characteristics may be required to submit process capability data with each shipment upon request or per purchase order agreement. Capability records for Critical Characteristics must be kept for minimum of 15 years

## 3.2 Product/Service Approval Process

Suppliers must establish, implement and maintain documented product and manufacturing process approval process that conforms to Anchor requirements. This includes approval of Sub-Tier products and services prior to part submission to Anchor. When all requirements have been met, Anchor provides formal approval prior to shipment, and this record must be maintained by the Supplier.

## 3.3 Production Part Approval Process (PPAP)

For automotive applications, the Supplier must make a PPAP submission prior to full production release whenever one of the following is planned:

- Initial submission
- Engineering Change(s)
- Tooling transfers, replacements, refurbishments
- Tooling inactive greater than 1 year
- Change to optional construction or material
- Correction of a discrepancy
- Sub-Tier Supplier change
- Change in part processing
- Parts produced at an additional location
- Other – as specified in the Purchase Order or Anchor's Terms and Conditions.

In each case, the Supplier must submit samples and the appropriate Part Submission Warrant per the AIAG Production Part Approval Process (PPAP) reference manual. PPAP submission records must be maintained for part production and service life plus one calendar year, unless specified by Anchor or a regulatory agency.

In lieu of a level 3 PPAP submission, raw material suppliers may submit 3rd party certified lab results and Part Submission Warrant (PSW) unless specifically instructed otherwise by Anchor.

### 3.3.1 Process Sign-Off (PSO)

A PSO run may be conducted at the Supplier's production facility if required by Anchor's Customer. Anchor will arrange this run with the Customer and Supplier.

# 4.0 MANUFACTURING CONTROL

## 4.1 Quality Monitoring

Anchor has a Zero Defects Policy. Suppliers are required to monitor their own shipments to assure an outgoing quality level of Zero Parts Defective.

## 4.2 Control of Nonconforming Product, and Material Identification and Traceability

Suppliers must have a standardized process for identifying all product in the facility, including inspection status. Nonconforming product must be segregated from conforming, and controls put in place to prevent further processing. Any unidentified or suspect product must be controlled as nonconforming product.

Suppliers must have a documented traceability plans for all automotive products based on the levels of risk for employees, Customers and end-users. These plans must ensure that nonconforming/suspect product can be identified and segregated. If required by Anchor's Customer, the Supplier must identify the components with a unique serial number, the structure of which will be defined by Anchor's Customer.

Records must be retained that detail the nonconformity, actions taken, concessions obtained (if applicable), and identification of the deciding authority.

Suppliers must have a documented disposition process for nonconforming product that is not to be reworked or repaired. This process cannot include diverting nonconforming product to service orders.

Employees must have a method to call for help when an abnormal condition on product or equipment occurs. Alarm limits for escalation of abnormal conditions must be in place, and must match the reaction plan detailed in the Control Plan.

Each container, box, coil or pallet of product shipped to Anchor must carry full identification, including Supplier and Anchor part number(s), lot number(s), heat number(s), quantity, shipment date and deviation number, where applicable. Suppliers must use a barcode system that is compatible with the Anchor barcode system. Identification must permit traceability back to manufacturing and inspection records. In addition, products must be shipped on a lot basis. The Supplier's definition for lot must be acceptable to Anchor to the extent possible.

In the event that nonconforming product has been shipped, the Supplier must notify Anchor **immediately**. Sorting/rework must be performed on all work-in-process and finished goods by the Supplier or their agent.

Suppliers must perform analysis on any field failures, including parts returned from Anchor, and must initiate problem-solving and corrective action to prevent recurrence. Results of the testing and investigation must be communicated to Anchor, and within the organization.

### 4.3 Deviation for Nonconforming Products/Services

No shipments containing nonconforming product or services are accepted unless Anchor has approved a formal deviation request from the Supplier prior to the shipment. Approved deviation requests come with an expiration date that shall be honored. Products shipped under an approved deviation request must be identified as such. If the Supplier approves a deviation request from a Sub-Tier Supplier, these same requirements apply.

### 4.4 Rework/Repair Approval and Control

Suppliers who find it necessary to perform product rework or repair operations must first perform a risk analysis prior to the decision to rework/repair the product. If required by Anchor, the Supplier must obtain formal approval prior to beginning the rework or repair. Suppliers must have appropriate rework/repair process documentation and quality inspection in place, and product must conform to the original requirements.

### 4.5 Material Rejection Notices/Corrective Action Requests

A Material Rejection Notice (MRN) is issued when product is received by Anchor that fails to conform to Anchor specifications on the purchase order.

A written Corrective Action Response is required from the Supplier detailing the immediate steps taken to control the nonconforming product, the root cause of the nonconformance, intended/implemented permanent corrective action(s), responsibilities, and timing.

An immediate response is required within twenty-four (24) hours identifying the containment activity. Follow-up on corrective action status is required within fifteen (15) days or as directed by Anchor's Customer. Verification of effectiveness and closure is required within thirty (30) days following corrective action implementation.

All costs associated with shipping, handling, processing, reworking and inspecting nonconforming product will be charged to the Supplier.

#### 4.5.1 Team Problem-Solving and Fast Response Processes

Suppliers must use a documented team problem-solving process for use at all levels of the organization, and problem-solving efforts must be initiated according to the specified criteria. This process must include initial containment, root cause analysis and the implementation of corrective actions (including those that may be necessary for similar products or processes), verification of corrective action effectiveness, review/revision as necessary of related documentation, and timely closure of the issue, including exit criteria. Records of this process must be retained.

A daily Fast Response Meeting is the means by which significant operational items, including team problem-solving efforts, are tracked via a display board or equivalent. These meetings are conducted by plant management, and staff-level employees participate.

### 4.6 Material Handling, Packaging and Delivery

Suppliers must establish system to prevent damage or deterioration of product throughout their operations. Packaging must conform to all requirements.

Suppliers must maintain a documented process detailing packaging, marking, storage, inventory assessments, First-In/First-Out (FIFO), and shipping requirements. Obsolete product must be controlled in a manner similar to nonconforming product.

Delivery requirements must be clearly understood and communicated within the Supplier's organization to ensure that shipments of material will meet all requirements.

Suppliers who fail to meet 100% On- Time Delivery performance after appropriate planning information and purchase commitments have been provided may be issued a Corrective Action Request to improve delivery performance. Failure to improve delivery performance, or to submit a response to the Corrective Action Request could result in removal from the Anchor Approved Supplier List.

The Material Manager reviews Supplier freight bills to ensure unauthorized premium freight is not charged to Anchor.

### 4.7 Anchor Verification of Supplier Products/Services

Anchor reserves the right to inspect all products received to verify conformance to contractual requirements. Anchor encourages Suppliers to provide statistical data as means of product acceptance.

When purchased product is to be verified at a Supplier's facility, the Purchasing Director will make specific arrangements for inspection and a method of release as agreed to by the Supplier and Anchor. However, the ultimate acceptance of product will be made by Anchor in accordance with contractual requirements. This includes Anchor-supplied product.

## 5.0 ADDITIONAL SUPPLIER QUALITY SYSTEM REQUIREMENTS

### 5.1 Corporate Responsibility

Suppliers must develop, implement and maintain formal Policy(ies) to address a commitment to human rights, acceptable working conditions, business ethics, environmental protection, and anti-

corruption. These principles must be incorporated into the Supplier's business relationship with Anchor, and Supplier personnel must be made aware of these Policies on a periodically scheduled basis. See Appendix I for the Anchor Corporate Responsibility Policy and Code of Conduct.

### 5.2 Responsibility and Authority for Customers, Facilities, and Processes

Suppliers must designate a Customer Representative for Anchor. This person is to be identified on the Contact List and serve as the main contact for all Anchor interactions. In addition, Process Owners must be designated for all product realization and support processes. Employees responsible for product/service conformity must have the authority to stop production in order to correct issues, and employees with corrective action responsibilities must be informed immediately in order to prevent nonconforming product from being shipped.

The facilities must be maintained in a state of order, cleanliness and repair that is consistent with product and process requirements. 5S or the equivalent should be in place and maintained.

Suppliers must have adequate support personnel and equipment, on-site and/or through service contracts and consultants across all shifts, to effectively supply conforming products/services on-time, and to support analytical problem-solving and continual improvement.

### 5.3 Competence, Awareness and Motivation

Suppliers must determine and provide the personnel necessary for an effective Quality Management System, including the operation and control of all processes within its scope.

Suppliers must maintain documented process(es) for identifying employee training needs, including awareness, and achieving competence for all personnel performing tasks that affect product and process conformity. Special attention must be paid to the satisfaction of Customer requirements.

On-the-job training must be provided as necessary to achieve competence for new, transferred, temporary or contract employees. Those employees whose work affects quality must be informed of the effect of nonconformities on Customer requirements. Where training is provided to achieve competence, the trainer's competency must be documented. Internal and external communications relevant to the Quality Management System must be conveyed consistently according to an established process.

Records must be maintained that demonstrate that all employees are aware of their impact on product quality, and the importance of their activities towards achieving, maintaining and improving product quality and Customer requirements, and the risks to the Customer if nonconforming products/services are shipped.

Suppliers must have a documented process to motivate employees to achieve Quality Objectives, make continual improvements, and foster an environment that promotes innovation. This process must promote quality and technical awareness throughout the entire organization.

There must be a documented process to verify that internal auditors are competent, and a documented list of qualified internal auditors. Internal auditors include those who audit the Quality Management System, processes, and/or products. At a minimum, they must have an understanding of the process approach for auditing, including risk-based thinking, Customer requirements, applicable ISO9001 and IATF16949 requirements, AIAG Core Tools, and how to plan and conduct audits, and report and close out audit findings.

In addition, process auditors must understand the process they are auditing, including the process risk analysis (e.g., the PFMEA) and the Control Plan. Product auditors must understand product requirements and the use of inspection devices to verify product conformity.

Internal auditor competence must be maintained and continually improved by participating in at least the minimum number of audits per year (as defined by the Supplier) and maintaining knowledge of requirements based on internal and external changes.

## 5.4 Product Safety

For products and materials with product safety-related characteristics, Suppliers must have documented processes relating to the design and development of manufacturing processes to ensure products comply with all requirements, These processes include identification of statutory and regulatory product safety requirements, special approvals in the Process FMEA and Control Plan, defined responsibilities (including the escalation process and information flow process), controls implemented for product safety-related characteristics, reaction plans, training for those involved in the manufacturing of product safety-related products, approval of product or process changes prior to implementation, transfer of requirements to Sub-Tier Suppliers (as applicable), product traceability by manufactured lot (at a minimum) throughout the supply chain, and use of lessons learned during the introduction of new product safety products.

## 5.5 Quality Policy, Objectives and Targets

Top Management must develop, maintain and implement a documented Quality Policy. This Policy is to be appropriate to the organization's purpose and strategic direction and includes commitments to satisfy applicable requirements and to continually improve the Quality Management System.

Based on the framework provided in the Quality Policy, Quality Objectives and Targets must be established, maintained and performance reported at relevant levels in order to support the Policy and the requirements of Customers and other interested parties. Objectives and Targets must be reviewed annually at a minimum and updated as necessary. The Policy and Objectives and Targets must be understood throughout the organization.

## 5.6 Inspection Devices

Suppliers must maintain a system that ensures inspection devices are calibrated and capable for their intended use. The Supplier's applicable personnel must be able to demonstrate competence on device use.

Inspection devices must be referenced in Control Plans and calibrated at assigned frequencies to the appropriate reference standards that are traceable to the National Institute of Standards and Technology (NIST) or equivalent international certification sources. Calibration results must be recorded, and the calibration status of these devices must be evident. If a device fails calibration, the Supplier must **immediately** develop a containment and verification plan to address in-house and shipped products. If it is determined that nonconforming product has been shipped, the Supplier must immediately notify Anchor, then follow-up with a detailed summary of the event.

Suppliers who maintain an internal laboratory for such activities as product and process measurements, testing, and inspection device calibrations/verifications must have a documented lab scope that includes capabilities to perform those functions. The lab must have adequate procedures, a competent staff, and maintain the required records. If required by Anchor, layout inspection and functional testing must be detailed in Control Plans and performed at the required frequency, and results must be made available for review.

If external labs are used for inspection, test or calibration services, they must be accredited to ISO/IEC17025 or national equivalent, and have those services listed in their scope. If this is not the case, Anchor must approve the use of the external lab.

Suppliers must have a documented process for managing calibration/verification records for such devices (regardless of ownership). Related records are to include:

- Records of calibration and maintenance activities
- Revisions to devices following engineering changes that impact measurement systems
- Out-of-tolerance readings as received prior to calibration
- Assessments of risk for any out-of-tolerance condition, including notification to Anchor if suspect product/material may have been shipped.
- Statements of conformity to specification
- As applicable, verification that the software version beings used for product and process control is correct.

For all inspection devices identified in Control Plans, statistical studies (e.g., Gauge Reproducibility & Repeatability (R&R) studies) must be conducted to analyze the variation present. Analytical methods and acceptance criteria must conform to that presented in the AIAG's Measurement System Analysis (MSA) reference manual, or equivalent if approved by Anchor. Results must be studied, and action taken if the results are unsatisfactory.

## 5.7 Continual Improvement

The Supplier's management has the primary responsibility for continual improvement and must provide leadership in the improvement process. Suppliers are expected to continually strive for improvements in their Quality Management System and the reduction of process variations.

They must have a documented process for continual improvement that includes objectives, measurement methodology, determination of effectiveness, a manufacturing process improvement plan with emphasis on the reduction of process variation and waste, and risk analyses. Improvement efforts must determine and implement opportunities to meet Customer requirements and enhance Customer satisfaction.

## 5.8 System Documents and Records

### 5.8.1 Quality Manual

Suppliers must maintain a Quality Manual that meet the requirements of IATF16949, that is, at a minimum includes the scope of the Quality Management System, including details of, and justification for any exclusions, documented processes established for the System (or reference to them), a description of processes (including outsourced processes) and their interactions (inputs and outputs), and a matrix indicating where within the System their Customer-specific requirements are addressed.

### 5.8.2 Document Control

Suppliers must have a documented system that provides for the issue and control of all new or revised documents, availability where needed, the recall, replacement, and retention of those that are obsolete, and a system to evaluate compliance.

Suppliers must have a documented process that details the review, distribution, and implementation of Customer-supplied drawings, process and material specifications, and applicable engineering standards/specifications and related revisions. Reviews must be completed within 10 working days for receipt of new or revised standards/specifications.

### 5.8.3 Standardized Work Instructions

Suppliers must document and implement all operational work using a standardized format that includes safety, quality and element time requirements and includes the answers to what, how and why. These documents must be available for use at the applicable workstations, and personnel responsible for performing the work must understand the requirements. Any visual standards used throughout the organization must also be standardized, controlled, clearly communicated to applicable personnel, and referenced in Standardized Work documents. Suppliers must implement some form of workplace organization, such as 5S to support Standardized Work requirements.

### 5.8.4 Record Control

A documented record retention policy must be maintained. Record control must satisfy statutory, regulatory, Customer, and organizational requirements, including those detailed in GMW15920 for GM-related records. Production part approvals, tooling maintenance and ownership records, product and process design records, Customer purchase orders/contracts and amendments must be retained for part production and service life, plus one calendar year, unless specified by Customers or a regulatory agency.

## 5.9 Incoming Product Control

Suppliers must ensure that all incoming materials conform to the requirements specified in applicable specifications/documents. Incoming material may be withheld from use pending verification by one or a combination of the following methods:

**5.9.1 Receiving Inspection:** The incoming material must be controlled through inspection and analysis of results. Records are maintained to provide evidence of conformance to specification.

**5.9.2 Sub-Tier Supplier Control:** Records must exist that verify the control of incoming material through the Sub-Tier Supplier control systems.

**5.9.3 Verification by Production Process:** The control of incoming product quality can be measured through the manufacturing process. Material or Specific Characteristics can be qualified in manufacturing when the process assures that production or assembly could not take place if the incoming material failed to conform to the specified requirements.

All documents that substantiate the Supplier's option of verification method must be available for Anchor review upon request.

## 5.10 Special Requirements for Heat-Treated Parts

As applicable, Suppliers must control heat-treating processes, furnaces and auxiliary equipment in accordance with the applicable process specification.

## 5.11 Management Review

Top Management must review the Quality Management System at planned intervals to ensure its continuing suitability, effectiveness and alignment with the organization’s strategic direction. Inputs include a review of internal and external issues, Customer feedback, and Quality Objective, process, internal audit, and Sub-Tier Supplier performance. An action plan must be developed and implemented whenever Customer performance targets aren’t met.

Outputs include opportunities for improvement, the need for Quality Management System changes, and resource needs.

Records of management reviews must be maintained.

## 5.12 Process Effectiveness and Efficiency

The Supplier’s Top Management must review product realization and support processes to ensure that they are achieving their intended outputs and improve their effectiveness and efficiency. This review must include the review of Customer-reported performance. These activities are to serve as inputs for Management Review.

Suppliers must monitor internal and external performance indicators to ensure compliance to all requirements. These indicators may include delivered product quality performance, Customer disruptions, delivery schedule performance, including incidents of premium freight and incidents of Customer notifications related to quality or delivery issues.

Suppliers must use a production scheduling process such as Just-In-Time to ensure that Customer order requirements are met.

## 5.13 Internal Audits

Suppliers must have a documented internal audit process that includes audits of the entire Quality Management System, process audits, and product audits. The audit frequency and sample size must be prioritized based on risk, performance trends, and the criticality of processes. Frequency must be reviewed and revised as appropriate based on the occurrence of process changes, internal and external nonconformities. Internal auditors must be competent and be selected based on objectivity relative to the subject of the audit. Results of audits must be reported to relevant management, and corrective actions must be implemented without undue delay. The effectiveness of the internal audit program must be a Management Review agenda item.

### 5.13.1 Quality Management System

Using an annual schedule, the Quality Management System must be audited for efficiency and effectiveness using a process approach and including a sampling of Customer-specific Quality Management System requirements.

### 5.13.2 Product Audits

Suppliers must audit products at appropriate stages of production and delivery in order to verify conformance to specified requirements.

Suppliers must have a process for final inspection, which must be done on all finished product prior to shipping. This inspection can be at 100% frequency, or less based on the risk assessment. Successive checks must be increased during high risk scenarios, such as product launch, major process changes, production shut-down, or customer feedback.

Suppliers must maintain inspection systems and/or tests that will ensure conformance with all requirements. In-process controls and associated documents must be readily available for review by an Anchor representative. For products designated by Anchor as "appearance items", Supplier must provide appropriate resources (including lighting) for evaluation, controlled Appearance Masters as appropriate, and verification of competency for employees making appearance evaluations.

Audits of ready-to-ship product should be conducted on a regular basis with appropriate documentation. Records are to be made available upon request.

## 5.14 Customer-Specific Self-Assessments

Anchor requires Suppliers of special processes (e.g., Coating, Plating, Heat Treating, Welding and Molding) to perform annual AIAG CQI self-assessment audits. Completed audits are to be forwarded to Anchor Supplier Quality on an annual basis (within 365 days of prior the assessment). Any findings of "Not Satisfactory", "Needs Immediate Attention", "Failed", and Process Table items "Not Meeting Minimum Requirements" must be closed within 90 days, then re-submitted to Anchor. This requirement extends to Suppliers with special processes performed by their Sub-Tier Suppliers on product supplied to Anchor.

## Appendix I: Anchor Corporate Responsibility Policy and Code of Conduct

1. **Human Rights**. Anchor expects respect and support for compliance with internationally accepted human rights policies:
   a. Forced Labor: Anchor expects the condemnation of all forms of forced and compulsory labor. Anchor does not use forced or involuntary labor, whether bonded, prisoned or indentured, including debt servitude.
   b. Child Labor: Anchor expects the support of the abolition of exploitative child labor. Anchor does not employ individuals in violation of local mandatory school age, or under the legal employment age in each country where they operate.
   c. Harassment and Discrimination: Anchor expects the upholding of equal opportunities with respect to employment, and refrains from discrimination in any form, unless national law expressly provides for selection according to specific criteria. Discrimination against employees based on gender, race, disability, origin, religion, age or sexual orientation is not acceptable.
   d. Freedom of Association: Anchor respects the right of all workers and all employees to form and join groups for the promotion and defense of their occupational interests. During organization campaigns, Management will remain neutral; and the trade unions and Management will comply with basic democratic principles, ensuring the employees' ability to make a free decision.

2. **Working Conditions.** Anchor expects opposition to all exploitative working conditions:
   a. Protection of Health and Safety: Anchor ensures health and safety in the workplace to a level no less than that required by national legislation and support the continual improvement of working conditions.
   b. Compensation: Anchor and its Suppliers honor the right to reasonable compensation of a level no less than the legally established minimum wage and the local job market, based on local laws and regulations. Within the scope of national legislation, Anchor and its Suppliers respect the principle of "equal pay for work of equal value."
   c. Working Hours: Anchor and its Suppliers comply with national provisions and agreements regarding working hours and regular paid holidays.

3. **Environment.** Anchor expects stewardship of natural resources:
   a. Anchor supports a precautionary approach to environmental challenges, and participates in and encourages initiatives to promote greater environmental responsibility. Anchor encourages the development and diffusion of environmentally friendly technologies.
   b. Suppliers will comply with all applicable environmental laws and regulations, and will promptly develop and implement plans or programs to correct any non-compliant practices.

4. **Corruption and Ethics.** Anchor works against corruption in all its forms, including extortion and bribery.
   a. Anchor does not offer or take receipt of any gift, loan, fee, reward or other advantage to or from any person as an inducement to do something which is dishonest, illegal or a breach of trust, in the conduct of the enterprise's business, even in areas where it may be tolerated.
   b. Anchor strictly adheres to all local and applicable U.S. laws and regulations, including the Foreign Corrupt Practices Act, and requires its Suppliers to act in a similar manner.
   c. Anchor expects business decisions to be made in the best interest of Anchor. Any situation that creates or appears to create a conflict between personal interests and the interests of Anchor must be avoided.

5. **Suppliers.** Anchor expects its Suppliers to introduce and implement equivalent principles in their own companies and their own supply chains.
   a. Suppliers are to train their employees regularly on these principles, and they must incorporate them as a basis for relations with Anchor.
   b. Suppliers must comply with all applicable laws and regulations, which include national and local laws, rules, codes and regulations as well as applicable treaties. Anchor strongly encourages any Supplier who feels pressured to violate the law or any provision of this document by an Anchor employee to contact Steve Wivell immediately at (440) 554-7850.

# Appendix II: Product Life Cycle Management

Product Life Cycle Management considers five main elements that are achieved in four phases:

1. Engineering: Meeting all internal and external requirements, and coordinating the design process by involving all relevant stakeholders. Reliability Engineering is an important component.
2. Project Planning: Managing the allocation of resources, tracking progress, and planning for new product development. Portfolio Management assists management in the tracking of new products and services, and making trade-off decisions when resources are scarce.
3. Product Design: Creating a new product/service.
4. Manufacturing Process Planning: Defining how products are to be manufactured or services delivered.
5. Product Data Management: Capturing and maintaining information on products and/or services through their entire life. Change Management is an important component.

**Phase 1: Introduction (Product Definition)**

The first step is the definition of the product requirements based on customer, market, organization, market and regulatory bodies' requirements. These requirements lead to the definition of the product requirements, and the main technical parameters and functional aspects. The main activities are:

- Generation and filtering of ideas
- Product definition
- Project plan
- Final review.

The filtering process considers whether the idea is consistent with the organization's strategic focus, whether the market size and growth potential are appealing, and the manufacturing feasibility.

Product definition determines which product characteristics are necessary to meet customer needs and business objectives. It transforms feasible ideas into economically-competitive product concepts, and then produces the initial design concept.

The project plan details time and resource allocation, and the scheduling of tasks. A final review is conducted to determine if the organization should commit resources to the product design and development stage.

**Phase 2: Growth (Product Design and Development)**

If the decision is to proceed with product design and development, this phase starts with the detailed product design, and then advances to through an iterative prototype testing and design refinement process. It eventually ends with a full product launch and can also involve redesign and improvement of existing products.

Reliability Engineering in the design and development stage includes reliability assessments, development testing, and reliability improvement. Test data is gathered from experiments, and statistical techniques are used to estimate reliability. Development tests, such as testing to failure, design limit testing, and accelerated life testing, are then conducted to further evaluate and improve product reliability. Reliability improvement can be attained through efforts such as redundancy design, stress-strength analysis, reliability growth, and preventive maintenance design.

**Phase 3: Maturity (Manufacturing Process Design and Implementation)**

Once the product design is complete, the manufacturing process must be defined and implemented. A well-designed manufacturing process achieves a low production cost and the desired productivity and quality levels. The main activities involved in manufacturing process design are:

- Supply chain design
- Process planning
- Process layout
- Equipment selection.

Supply chain design involves a variety of decisions, including supplier selection, transportation method, and inventory management policies. Supplier selection includes considerations such as quality, price, and lead time.

Process planning determines how the product will be manufactured. Key elements to consider are:

- Set-up planning: arranging manufacturing features in a sequence of setups that ensures quality and productivity
- Tolerance analysis: the design and allocation of manufacturing tolerance
- Process capability indicators: used to predict a proposed production system's performance.
- Key drivers of quality: approaches include Quality Function Deployment (QFD), Design of Experiments (DOE), and Failure Mode and Effects Analysis (FMEA).

Process layout impacts manufacturing flexibility, complexity, and robustness. Manufacturing flexibility is the ability to build several different products in one system with no production delays due to product differences. Manufacturing complexity is characterized by the number of components and products, the types of processes, and schedule stability. In general, complexity negatively impacts manufacturing performance indicators, including quality. Robustness refers to the ability to minimize or eliminate process fluctuations and drift.

Equipment selection determines key operating characteristics and reliability, and therefore impacts quality. The goal is to achieve a good balance between productivity and quality.

**Phase 4: Decline (Post-Manufacturing)**

The final phase of the life cycle involves managing information and services. This can include providing customers and support staff with the information required for maintenance and repair, as well as waste management.

The decline phase can be divided into three stages:

- Marketing
- Post-sale support
- Retirement.

Marketing includes internal and external considerations, such as logistics, price, promotion, and warranty, competitors, economy, and customer feedback.

Post-sale support is necessary to ensure satisfactory operation of the product and can add value to the product from both manufacturer's perspective (e.g., sales) and customer's perspective (e.g., postponing product replacement). Support activities including providing spares parts, information, and training, installation and maintenance service contracts, and warranties. Product Data Management and Change Management play crucial roles in the post-sale support stage.

There is an end-of-life to every product. Whether it be disposal or destruction of product, life cycle management should be carefully considered, as it may be legislated or required and therefore not free from consequences.

# Appendix III: Product Certification

Suppliers who provide raw materials such as strips, coils, bars, castings, forgings, and non-metallic materials, and services such as heat-treatment, plating, coating and contract services must supply certification on a lot basis.

## 1. Certification

Measurements and tests must be performed to determine the chemical, mechanical, and harden-ability properties specified in applicable material specifications. Results must be documented to certify specification conformance.

All product lots must be traceable to certifications that must be submitted to Anchor Receiving in advance of, or with product shipment.

Product received without certification will be placed on-hold and/or rejected. Material will not be used until the acceptable certifications are received. Payment may be withheld until certification is received.

Specific variable data is to be presented on each certification to the extent required by the applicable material specification.

## 2. Testing and Control Requirements for Non-Metallic Materials

2.1 These requirements apply to:

- Molded, extruded rubber, and elastomeric parts including seals
- Molded, extruded and formed plastic parts
- Non-Decorative painted, plated, and chemical finishes on metal parts
- Materials such as resins, fillers, catalysts, paint, rust inhibitors, lubricants, thinners, solvents, adhesive, gaskets, and sealers.

2.2 Definitions:

2.2.1 Product Tests: Engineering specifies tests for product qualification and/or continued acceptance. These tests are indicated directly on the engineering drawing or contained in material specifications, product performance specifications or product design specifications which may be referenced on the engineering drawing.

2.2.2 Lot: Lot defines a homogeneous quantity of parts produced during a specified period of time from the final operation, and which can be clearly identified and isolated. Unless otherwise specified by the applicable engineering material specification (s), lot size shall normally represent parts produced during a period not exceeding one working shift.

2.2.3 Batch: Batch defines a specific quantity of raw material either blended or compounded at a supplier's location for use at that facility. Normally a batch of raw materials will represent that quantity processed in a given vessel at a given time. Batches can vary significantly in weight and/or volume, but generally can be defined by the total quantity of constituent materials mixed at one time.

2.3 Product Test Requirements:

The Supplier must perform all product tests described in the product specifications and submit results in accordance with the applicable requirements.

2.4 Certification Requirements:

2.4.1 All product, by lots, must be traceable to a certification. Certification must be submitted in advance of or with product shipment.

2.4.2 Variable data, whenever possible, is to be used on each certification to the extent required by the applicable material specifications.

## Change Record

| Rev. | Date | Responsible Person | Description of Change |
|---|---|---|---|
| 1 | 04.14.15 | S. Wivell | Re-issue with more detail defining Process Capability in Sections 2.3.1 – 2.3.7 |
| 2 | 05.23.16 | S. Wivell | Added section 4.9 to include specific requirement for performing CQI Assessments. |
| 3 | 04.03.18 | S. Wivell | Added Product Life Cycle Management, BiQS Elements 1 through 13, revised to IATF16949:2016 requirements, GM's and Daimler's Customer-Specific Requirements for IATF16949: 2016. |
| 4 | 01.03.19 | S. Wivell | Revised cover sheet with changed Approval Authorities |
| 5 | 03.03.20 | S. Wivell | Removed BIQS requirements and Quality Focus Checks; minor reformatting throughout |
| 6 | 03.24.20 | J. Carr | Revised section 3.3 that raw material suppliers may submit 3rd party certified lab results and Part Submission Warrant (PSW) in lieu of level 3 PPAP |