

**Annex 1.**

# **Customer Specific Requirements**

**For Use With ISO/TS16949**

Issue: May 2017

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## I. Introduction

### **Commitment to Excellence**

In direct support of MAHLE Letrika's commitment to excellence and desire to "exceed **our** customer's expectations", it is expected that our suppliers work toward exceeding the expectations and requirements of the MAHLE Letrika Customer Specific Requirements.

## II. Customer Specific Requirements Document Structure

This document is structured as a companion requirements document to ISO/TS 16949. The paragraphs to this document are numbered to correspond with the paragraphs to ISO/TS 16949. Where guidance by the customer is referenced, a requirement will be stated to clarify the MAHLE Letrika interpretation.

Exceptions need written approval of the respective Head of Purchasing BU/BX and Head of Supplier Quality BU/BX.

## III. Reference Documents

The following reference documents are available through AIAG and should be used to develop the quality system. Production Part Approval Process, PPAP (required) Statistical Process Control, SPC Potential Failure Mode and Effects Analysis, FMEA Advanced Product Quality Planning and Control Plan, APQP Measurement Systems Analysis, MSA

## IV. Scope

ISO/TS 16949 and this document define the fundamental quality system requirements for MAHLE Letrika. This document contains the company specific requirements supplemental to Technical Specification, ISO/TS 16949. These supplemental requirements may also apply to ISO9001 and other similar registrations as applicable and developed within this document. These supplemental requirements shall be in the scope of the registration/certification audit in order to be recognized as satisfying the MAHLE Letrika supplier criteria for third-party certification by an IATF recognized and contracted certification body. This document applies to external suppliers to MAHLE Letrika. All ISO/TS 16949 requirements and the requirements of this document shall be documented in the supplier's quality system. See TS Clause 7.4.1.2 for further clarification of other applicable standards and the requirements. The English language version of this document shall be the official version for purposes of third party registration. Any translations of this document will be for reference only.

## V. Terms and Definitions

### **APQP (Process)**

The required tasks and documentation as defined in section 7.1 Planning of Product Realization to ensure successful launch of product at required quality standards.

### **Capacity verification**

A verification methodology to demonstrate that a supplier can meet the capacity planning volume requirements as defined in the purchasing Request For Quote (RFQ).

### **Family Parts**

These are groups of parts processed on the same production line, using the same control plan, PFMEA and process equipment. The parts differ only in end item value. PPAP for the "family" is approved for using the extreme values to the "family" specification to define the "family" boundary.

**FTQ**

First Time Quality (FTQ) is defined as a measure of the number of pieces rejected in a manufacturing process versus the total number of pieces attempted. First Time Quality can be measured at any step in the manufacturing process where parts are rejected. First Time Quality is reported in parts per million (PPM) defective.

**IMDS**

International Material Data System: This system is used to submit reportable substances.

**Material**

Any item purchased from a supplier that becomes a part of a product and sold to a customer.

**MTBF**

Mean Time Between Failure is a metric to measure the reliability of equipment.

**OEM**

Original Equipment Manufacturer (OEM) is intended to be the end item user of the customer.

**RFQ – Request for Quote**

**CR – Change Request** -form - a supplier must notify the responsible customer of any design and process changes as defined in the PPAP manual.

**Shall**

Word “shall” indicates a mandatory requirement.

**Should**

The word “should” indicates a recommendation.

**SPD – Supplier Performance Development** – process for supplier selection, development, and assessment.

**SQE**

Supplier Quality Engineer (SQE) is the group of engineers within MAHLE Letrika responsible for managing the current quality issues with supplier.

**Sub-supplier** - Providers of production materials, production or service parts, assemblies, heat-treating, welding, painting, plating, or other finishing services directly to any MAHLE Letrika supplier.

**Supplier**

Providers of production materials, production or service parts, assemblies, heat-treating, welding, painting, plating, or other finishing services directly to MAHLE Letrika.

## 4. Quality Management System

### 4.1. General requirements

The entire facility (producing automotive products for MAHLE Letrika) shall be registered to the applicable standard. Where the entire facility does not do automotive products, a clear definition of what product lines are registered shall be included in the registration scope.

See TS clause 7.4.1.2 for further clarification of other applicable standards and the requirements.

Suppliers are responsible to comply with the MAHLE Letrika Customer Supplier Requirements.

It is the responsibility of distributors or non-manufacturing suppliers to MAHLE Letrika to ensure their suppliers are certified to the current versions of either ISO9001 or ISO/TS 16949.

### 4.2. Documentation requirements

#### 4.2.2. Quality manual

All ISO/TS 16949 requirements and the requirements of this document will be included in the supplier's quality system.

#### 4.2.4. Control of Records

Production part approvals, tooling records, purchase orders and amendments shall be maintained for the length of time that the part (or family of parts) is active for production and service requirements plus one calendar year unless otherwise specified by MAHLE Letrika for their respective products. This includes any MAHLE Letrika owned tooling.

Records of process control data, product inspection data and records of appropriate reaction actions to readings outside the specification shall be retained in a recoverable format for a minimum for entire life cycle of a product + 1 year. For products with critical characteristics the entire life cycle of a product + 15 years (all revision levels) shall be available to MAHLE Letrika upon request. The actual values of process parameters and product test results (variable or attribute) shall be recorded. Simple pass/fail records of inspection are not acceptable for variable measurements.

Maintenance records shall be retained for the current year, plus one calendar year after the year in which they were created. Records of inspection shall be maintained for each inspection or test performed. The actual test result (variable or attribute) should be recorded.

Records of measurement equipment calibration are to be held for one calendar year or when superseded, whichever is longer.

Records related to product traceability shall be retained for the current year plus 15 additional years, unless otherwise specified by MAHLE Letrika Purchasing.

## 5. Management Responsibility

### 5.1.1. Process Efficiency

Supplier top management shall review the product realization processes and the support processes to assure their effectiveness and efficiency.

## 5.5. Responsibility, authority and communication

### 5.5.2.1. Customer representative

The supplier's customer representative is the primary interface to MAHLE Letrika. When the customer representative changes, the supplier shall immediately inform the MAHLE Letrika representative. The Supplier should also notify the impacted MAHLE Letrika functional areas (SQE, Engineering and/or Logistics) within 10 business days. The supplier shall have at least one person for their company, and one back up (preferred) at each of their locations.

In addition, the supplier needs to communicate the important contacts to the MAHLE Letrika representative by using the Contact List.

NOTE: The supplier shall verify information at least every six months.

- Language – All international contacts shall be proficient in reading, writing, and speaking English.
- Supplier's Planned Down Time – Suppliers shall provide annually a listing of planned plant down time for holidays, vacations, etc. to MAHLE Letrika. Suppliers must provide detailed plans to MAHLE Letrika Logistics and Purchasing for protection of supply during these planned down times including 24-hour emergency contacts.
- Union affiliation and contract expiration - If the supplier is unionized, they shall update Union affiliation and contract expiration in Supplier Profile in the DSP. Suppliers are expected to manage these situations, and notify MAHLE Letrika of pending issues that could impact delivery.

## 6. Resource Management

### 6.2. Human Resources

#### 6.2.2.2. Training

This training will include the appropriate MAHLE Letrika systems as identified and required by the appropriate MAHLE Letrika functional area. When an outside training need has been identified by MAHLE Letrika, the supplier must take the courses that have been identified with the recommended training supplier.

### 6.3.1 Plant, Facility and Equipment Planning

To become a Lean Enterprise, a supplier should utilize Value Stream Mapping and other lean tools. See 8.5.1. for further clarification on improvement programs.

### 6.3.2 Contingency Plans

The supplier shall prepare contingency plans to satisfy MAHLE Letrika requirements in the event of an emergency such as utility interruptions, labor shortages, key equipment failure and field returns. When the supplier knows in advance of an impending production interruption, the supplier shall notify the MAHLE Letrika receiving plants (Logistics), the Buyer and the SQE at least 24 hours, if possible, before that interruption. The nature of the problem shall be communicated with the immediate actions taken to assure supply of product. Production interruptions may include (but are not limited to) natural disasters, political unrest, war, capacity issues, quality issues, labor strikes or other events that prevent the supplier from meeting the specified capacity volumes. The supplier is required to advise MAHLE Letrika of the plan for recovery and work toward minimizing its effect on the MAHLE Letrika plant.

## 7. Product Realization

### 7.1. Planning of Product Realization

The Advanced Product Quality Planning and Control Plan reference manuals shall be used as a guide to develop and report progress on new programs. Reporting of APQP status shall utilize the forms and process flows provided by or recommended by the responsible SQASQE.

#### **Supplier Performance Development (SPD)**

The supplier specific performance development tasks and accompanying forms are itemized below:

- **Feasibility Letter**
- **Timing Charts**
- **PPAP-Requirements-PSW**
- **Run at Rate Estimation**
- **Change Request**
- **Contact List**
- **Capacity Planning**

All forms are available via MAHLE Letrika SQE or Buyer.

In order to work with suppliers via the SPD process, we will need access to suppliers' facilities and appropriate documents. In some cases, this may require access to sub-tiers' facilities and documents.

### 7.1.3. Confidentiality

Suppliers shall maintain confidentiality of MAHLE Letrika products and information as documented in MAHLE Letrika contracts.

#### **Property Rights**

This section on Property Rights applies when MAHLE Letrika pays a direct charge for engineering and development, even if those charges are amortized into the unit cost.

### 7.1.4. Change Control

**The supplier shall not make any changes without prior written notification and approval from MAHLE Letrika.**

The supplier shall retain approved change requests, for the life of the material. Initial shipments of new or revised material will be appropriately labeled with the change level and clear description of introduced change. After initial shipments of new or revised material no deliveries of superseded materials are allowed.

MAHLE Letrika requested changes require timely response to Buyer requests. Response to product or pack change requests shall be reviewed and responded to within 10 business days. Supplier Change Request shall be communicated through the MAHLE Letrika representative at least 5 months prior to change implementation. This requirement includes changes to part design, material, sub-tier supplier, manufacturing location or process. (Reference AIAG PPAP, current edition).

All proposed changes including but not limited to design, process, component, packaging, component suppliers, or facilities, and site changes including supplier proprietary designs shall be submitted to MAHLE Letrika for approval and obtain concurrence on effect on the part fit, form, function, finish, and durability prior to implementation.

## 7.2. Manufacturing Feasibility

Manufacturing feasibility reviews (Advanced Product Quality Planning and Control Plan, Appendix E) shall include supplier and MAHLE Letrika team members as appropriate. Product volume changes of 20% or more from MAHLE Letrika over a previously verified volume capability shall require full volume feasibility studies. The capacity study shall include identification of the capacity constraints and evaluation of risk to MAHLE Letrika by the supplier. The results of this study shall be provided to the responsible MAHLE Letrika SQE. The capacity information provided with the quote should reflect the available daily capacity and operating plan (hrs. /day, days/week). The operating plan should meet weekly volume requirements and current model service requirements and should be 100 hours per week or less. The Buyer shall be notified and approve of any operating plan using more than 100 hours per week. Suppliers shall have capability to provide 15% above the quoted volume without additional investment from MAHLE Letrika.

## 7.3. Design and Development

### 7.3.1.1. Multidisciplinary Approach

The supplier shall use a multidisciplinary approach to prepare for product realization including the development and finalization and monitoring of special characteristics, development and review of FMEA's, including actions to reduce potential risk and development and review of control plans.

### 7.3.3.2. Manufacturing process Equipment

Suppliers' equipment should meet industry quality; maintenance, safety, changeover and production yield requirements. Supplier's manufacturing process design output shall be expressed in terms that can be verified against manufacturing process design input requirements and validated. The manufacturing process design output should include specifications, drawings, layouts, PFMEA's control plans, work instructions, process approval acceptance criteria, data for quality, reliability,



maintainability, and measurability, error-proofing, and rapid detection and feedback of product/manufacturing problems.

#### **7.3.4. Design and Development Review**

When reviewing product design and development stages, the supplier shall participate in and execute APQP requirements.

#### **7.3.5. Design and Development Verification**

The supplier shall perform design verification to show conformance to MAHLE Letrika design validation and qualification requirements. At component levels, the supplier will develop a qualification plan with the design engineering activity at MAHLE Letrika. Verification methods shall be recorded with the test results. Go/No Go results shall be avoided and where applicable the actual value for variables data will be recorded. Requirements documents are available from Engineering.

#### **7.3.6.2. Prototype Program**

The supplier shall be responsible for the quality of the parts it produces and subcontracted services including sub-suppliers directed by MAHLE Letrika.

The supplier shall request confirmation of the need for prototype control plans, FMEA's, etc. from MAHLE Letrika engineering.

##### **Prototype Parts Provision**

Delivery date(s) for samples of prototype components shall be established by MAHLE Letrika and noted on the purchase order. The delivery date(s) reflect the date(s) parts are to be received at MAHLE Letrika's docks. All prototype components and shipments shall be identified as prescribed in any relevant documents. The supplier shall submit inspection reports with sample delivery as required by the MAHLE Letrika Buyer. If review of the inspection report indicates that the parts do not agree with the prints or examination of the parts discloses an unsatisfactory condition not covered by the report, it shall be the supplier's responsibility to resolve all discrepancies with the MAHLE Letrika Product Design Engineer prior to prototype delivery. The supplier will notify MAHLE Letrika Product Design Engineer upon the root cause of the discrepancy occurred together with corrective action plan. This needs to be communicated in writing to the MAHLE Letrika Buyer. If resolution of the discrepancy results in a tooling, material or processing change, the supplier will correct the situation (at the supplier's expense) and resubmit an inspection report on the revised parts. This needs to be communicated in writing to the MAHLE Letrika Buyer.

#### **7.3.6.3. Product Approval Process**

The supplier complies with the AIAG Production Part Approval Process (PPAP) manual unless otherwise specified by MAHLE Letrika. Copies of supplier PPAP's will immediately be made available upon request from MAHLE Letrika. Suppliers may impose a similar product and manufacturing process approval procedure on their suppliers. When specified in the APQP process, Run at Rate shall be performed as a method for production capacity verification. The supplier is expected to develop and implement a FTQ improvement process with appropriate alarms and reaction plans defined. Top 5 issues should be developed with action plans showing continual improvement over time. A FTQ improvement process should be implemented during APQP and PPM calculations verified at PPAP and Run at Rate. The goal of FTQ should be zero PPM.

NOTE: Commodity or batch based products may demonstrate run at rate by a process analysis to determine constraints and show sufficient capacity is in place to support the product release rates. On new or revised materials, notification of PPAP acceptance by MAHLE Letrika does not authorize shipment.

Shipping authorization for the initial shipment will be issued by Logistics and will contain the delivery due date, quantity to be shipped, and change level to which the material will comply.

## 7.4. Purchasing

### Material Expectations

Suppliers will provide samples, testing, environmental and MSDS (Material Safety Data Sheet) information in the timeframe requested. MSDS is required for bulk or raw materials. MSDS is also required for any rust preventative, grease, lubricating oil, or other chemical material that is on a part or assembly provided to MAHLE Letrika. Suppliers should be able to provide same material on a global basis, if requested.

Reportable substances should be submitted via IMDS data sheet. For all new components and materials, suppliers shall submit with the validation package a copy of ELV/IMDS Reporting verification and screenshot from IMDS system showing acceptance. This form verifies the submission of End-of-Life Vehicle component content. Based on the absence of this document, MAHLE Letrika will not approve the PPAP submission

### Regulatory Conformity Material Expectations

Suppliers shall provide samples, testing, and supporting documentation in the form of MSDSs (Material Safety Data Sheets) or GHS-compliant SDSs (Safety Data Sheets) for all purchased materials or items that pose a potential health & safety, storage, transportation, use, or environmental risk to MAHLE Letrika or its employees. MAHLE Letrika review and approval of such is required prior to delivery of these items. (Reference TS Clause 7.4.1.1)

Suppliers shall ensure that products provided to MAHLE Letrika comply with all relevant legal regulations, safety and environmental rules or regulations from time to time in force in the countries where products or customers products equipped with MAHLE Letrika's products are being manufactured, used or sold. This includes, but is not limited to, requirements that address governmental chemical registration (REACH), transportation (Dangerous Goods), and environmental restrictions as set forth by the applicable governmental agencies for the MAHLE Letrika point of receipt from the supplier. Furthermore, Suppliers shall observe all rules and regulations of these countries relating to products, materials substances and procedures that are subject to special treatment, inter alia regarding their transportation, packaging, labelling, storage, handling, manufacture and disposal on account of laws, ordinances and other regulations or on account of their composition and their impact on the environment.

### Conflict Minerals

All suppliers shall be able to determine the locations where the tin, tantalum, tungsten, and gold, contained within products sold to MAHLE Letrika, originated within the Democratic Republic of the Congo OR be able to verify that the tin, tantalum, tungsten, and gold contained did not originate within the Democratic Republic of the Congo. Suppliers shall be required to submit this conflict minerals information upon the request of MAHLE Letrika using the electronic version of the Electronic Industry Citizenship Coalition and Global e-Sustainability Initiative (EICC-GeSI) Conflict Minerals Reporting Template. Suppliers are to refer to AIAG for more information and details ([www.AIAG.org](http://www.AIAG.org)).

#### 7.4.3.1. Incoming Product Quality

The supplier shall manage their sub-suppliers. When the supplier determines incoming inspection of sub-supplier material is necessary, this activity shall be consistent with the risk and quality impact of the supplier. These inspections shall include variables data where appropriate and be used as a key indicator for sub-supplier quality management. For attribute data sampling, the acceptance level shall be zero defects.

The selection and performance of all suppliers is very important and key to MAHLE Letrika's ability to meet or exceed our customers' requirements; however, critical processes performed by Sub Suppliers can result in increased processing risk opportunities. Ineffective management of Sub-Suppliers can

and has caused significant quality issues for MAHLE Letrika and for our customers. All risks must be carefully and correctly evaluated, and actions must be taken that eliminate any potential risks to MAHLE Letrika.

Tier 1 suppliers are responsible for the performance of their suppliers. They must select Sub Suppliers (i.e. Heat Treat, Plating) based on MAHLE Letrika's expectation of Zero Defects, and on the Sub Supplier's capability to continually maintain robust processes throughout the life of the product that meet all of MAHLE Letrika's product requirements.

An assessment document should be initially completed and periodically repeated for each Sub-Supplier. The review documents shall be available for MAHLE Letrika's review as requested. Suppliers should seek any additional expertise that is necessary, based on the particular sub-processing technology to ensure they are able to select a capable supplier and ensure on-going performance. Where high risk has been identified in the sub-contracted process, the Tier 1 supplier must ensure containment is in place to protect the customer.

## 7.5. Production and Service Provision

### 7.5.1.1. Control Plans

Product Quality Planning and Control Plan manual, available from AIAG, should be used as a guide in developing and maintaining control plans. A change history shall be maintained as part of the control plan to document implementation of changes.

The control plan shall cover three distinct phases as appropriate.

a) Prototype: a description of the dimensional measurements, material and performance tests that will occur during building of the prototype. The supplier shall have a prototype control plan if required by MAHLE Letrika.

b) Pre-launch: a description of the dimensional measurements, material and performance tests that occur after prototype and before full production. Pre-launch is defined as a production phase in the process of product realization which may be required after prototype build.

c) Production: documentation of product/process characteristics, process controls, tests and measurement systems that occur during mass production.

Each part shall have a control plan but, in many cases, family control plans may cover a number of similar parts produced using a common process.

The supplier shall develop a control plan that includes, as a minimum, the following contents.

#### ➤ **General data**

- control plan number,
- issue date, and revision date, if any,
- supplier's name/site designation,
- part number(s),
- part name/description,
- engineering change level,
- phase covered (prototype, pre-launch, production),
- key contact,
- part/process step number,
- process name/operation description.

#### ➤ **Product control**

- product-related special characteristics,
- other characteristics for control (number, product or process),
- specification/tolerance.

#### ➤ **Process control**

- process parameters,
- process-related special characteristics,
- machines, jigs, fixtures, tools for manufacturing.

- **Methods**
  - evaluation measurement technique,
  - error proofing,
  - sample size and frequency,
  - control method.
  
- **Reaction plan and corrective actions**
  - reaction plan (include or reference),
  - corrective action.

### 7.5.1.2. Work Instructions

Operators shall use the most current work instructions or those consistent with the revision level of the product.

### 7.5.1.3. Verification of Job Set-ups

Set-up verification requirements include manual tooling exchanges.

### 7.5.1.4. Preventive and Predictive Maintenance

The supplier shall have a documented system for preventive maintenance. This shall include a timely review of planned maintenance activities and a documented action plan to address any backlog. The Management Review process shall include a review of key metrics such as MTBF, on-time maintenance, and others as appropriate, to determine the effectiveness of the program. The supplier shall use predictive maintenance techniques to continually improve the effectiveness and the efficiency of production equipment.

### 7.5.1.6. Production Scheduling

Suppliers shall electronically receive ship authorizations, schedules and forecasts, and send shipment notification at the time of shipment.

MAHLE Letrika will establish the shipping frequency for each production part. The supplier shall be able to ship daily at a minimum. Supplier shall ship to the exact quantities, dates, and times specified on the release, no over, under, early or late shipments and no freedom of the week delivery. All MAHLE Letrika schedules shall be in standard pack quantities in the smallest approved standard pack container. At the time of pick up, the supplier shall allow the authorized carrier's driver to check the shipping quantities against the scheduled quantities. Over-shipments will not be accepted, if an over-shipment occurs it will be returned at the expense of the supplier. If for any reason the supplier is unable to meet the schedules communicated, it is the responsibility of the supplier to notify proper MAHLE Letrika Logistics personnel immediately and receive authorization for the undershipment.

Suppliers will make up all under-shipments via supplier paid premium transportation on MAHLE Letrika authorized carriers to meet the originally scheduled quantities. If MAHLE Letrika's and/or its customer's production is interrupted by the failure of the supplier to deliver contracted goods within the terms of the contract, all costs that are incurred by MAHLE Letrika and/or its customers will be the sole responsibility of the supplier and corrective action will be taken.

#### **Scheduling Lead Time**

The scheduling lead-time will be quoted in working days and should quantify the time from receipt of order to ship availability. Steady state lead-time (when schedule and/or forecast is routinely available) is 10 calendar days or less. Exceptions to this lead-time requirement must be approved by Logistics and Supply Management, and must be documented it in the purchase agreement.

## 7.5.2.1. Validation of processes for production and service provision

### Special Process Assessments

Special processes for suppliers of heat treated, plated, coated, welded or soldered products, suppliers shall comply with the requirements documented in CQI-9 Special Process: Heat Treat System Assessment (HTSA), CQI-11 Special Process: Plating System Assessment (PSA), CQI-12 Special Process: Coating System Assessment (CSA), CQI-15 Special Process: Welding System Assessment (WSA), CQI-17 Special Process: Soldering System Assessment (SSA), and CQI-23 Special Process: Molding System Assessment, and CQI-27 Special Process: Casting System Assessment published by AIAG. Suppliers are responsible to apply these requirements to applicable sub-suppliers.

### Supporting Documentation, Forms or Reference:

- Published by AIAG (Required to be completed and made available to MAHLE Letrika when part of the supplier's value stream):
  - CQI-9 Special Process: Heat Treat System Assessment
  - CQI-11 Special Process: Plating System Assessment
  - CQI-12 Special Process: Coating System Assessment
  - CQI-15 Special Process: Welding System Assessment
  - CQI-17 Special Process: Soldering System Assessment
  - CQI-23 Special Process: Molding System Assessment
  - CQI-27 Special Process: Casting System Assessment

## 7.5.4. MAHLE Letrika Property

**MAHLE Letrika will control the ownership of all returnable container systems.** The supplier is responsible for tracking and maintaining (including repairs and cleaning) returnable containers in their possession.

### Tools

If tooling is to be paid by MAHLE Letrika, suppliers will be paid for tooling contingent on full PPAP approval. Maintenance and renewal of MAHLE Letrika - owned tooling are the responsibility of the supplier. If the supplier is tool design responsible, then reproducible tooling prints shall be completed by supplier within 6 weeks after PPAP approval on all new program tools, tools undergoing an engineering change, and current tools that are revised. Supplier, upon request from MAHLE Letrika, shall provide reproducible tooling prints for existing tools.

## 7.5.5. Preservation of product

### Transportation

Routing instructions will be provided by MAHLE Letrika for all suppliers who ship under MAHLE Letrika paid freight terms. All shipments shall be made by normal mode at the prescribed ship time on the MAHLE Letrika authorized carrier, unless otherwise specified by MAHLE Letrika. The supplier will pay supplier caused premium transportation. Suppliers will use authorized carriers for all modes of transportation, including supplier fault premium transportation. Excess transportation costs incurred, as a result of using incorrect carriers, will be debited from the supplier's account and corrective action will be taken. MAHLE Letrika will assume liability for insurance on the in-transit material when MAHLE Letrika specifies the carrier. In the event the carrier is supplier owned, the insurance liability is the responsibility of the supplier.

### 7.5.5.1. Storage and Inventory

The supplier shall use the first in first out inventory method (FIFO) for inventory control for all MAHLE Letrika products.

## 7.6. Control of Monitoring and Measuring Devices

### 7.6.1. Measuring System Analysis

Unless otherwise agreed upon with the MAHLE Letrika SQE, Gage R&R's:

- Shall be completed on all measurement systems identified on the control plan. This includes hand tools such as micrometers or calipers, as well as those features checked by a CMM, Optical Comparator, Smart Scope, attribute gages, etc.
- Shall be included in PPAP submission for special characteristics and those features that will have capability studies submitted at the time of PPAP.
- Minitab is preferred statistical software package for preparation of Measurement System Analysis. If any concerns arise Minitab software solution shall be applied.

**Variable Gage Studies** – Shall be completed with all operators who will be using the gage as part of normal production process. The study shall consist of a minimum of 3 trials, using a minimum of 10 parts. All variable gage R&R studies should have a minimum of 5 distinct categories. The required method for calculating the gage R&R is by using the ANOVA method. Recent gage R&R's may be used if completed within one year at the time of submission.

For process control situations (where measurement determines stability, direction, and compliance with natural process variation) percentage R&R should be calculated based on study variation with a maximum target of 10%.

For product control situations (conformance or non-conformance) the percentage R&R should be calculated based on tolerance.

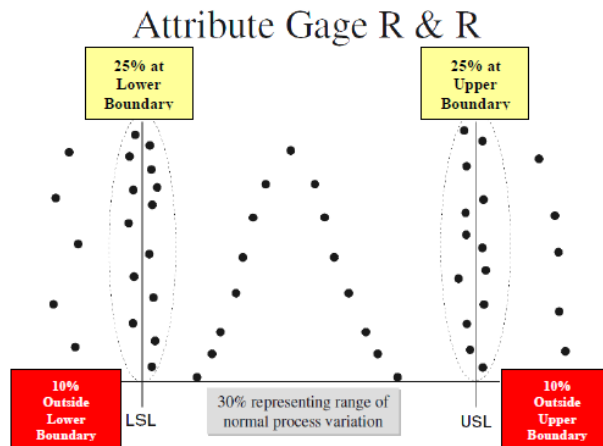
In special cases where the manufacturing process is very capable, stable and in control, the percentage R&R should be calculated based on tolerance, with concurrence of the MAHLE Letrika SQE. The minimum number of 5 distinct categories may not be applicable in this situation.

Upon request from the MAHLE Letrika SQE, the Supplier is required to provide linearity and bias studies.

**Attribute Gage Studies** – Shall be completed with 3 operators, 3 trials, using 50 parts and evaluated with KAPPA calculations as outlined in the AIAG Manual. NOTE: 25 parts should be discrepant parts. 50% of the discrepant parts should be outside each boundary limit, and 50% should be near each boundary limit (on both sides of the limit). The remaining 25 parts should represent the full range of the process variation.

All attribute gages for special characteristics used for process control must be built to 75% of the specified tolerance, centered around the target, unless otherwise agreed upon with the MAHLE Letrika SQE. Gages to the full tolerance may be used for product control (e.g. EPC, final inspection, or sorting operations). Separate gage studies are required for any attribute gage using appropriate discrepant parts for each study.

Gages not meeting the acceptance criteria per the AIAG MSA manual shall have an alternate inspection method and a gage improvement plan. This shall be submitted in writing to the MAHLE Letrika SQE for approval.



Gage studies should be re-verified at a frequency that is appropriate for gage use and wear. Recommendation – Gage re-verification studies should be completed at the time of calibration

### 7.6.3.1. Internal laboratory

An organization's internal laboratory facility shall have a defined scope that includes its capability to perform the required inspection, test or calibration services. This laboratory scope shall be included in the quality management system documentation. The laboratory shall specify and implement, as a minimum, technical requirements for:

- adequacy of the laboratory procedures,
- competency of the laboratory personnel,
- testing of the product,
- capability to perform these services correctly, traceable to the relevant process standard (such as
- ASTM, EN, etc.), and
- review of the related records.

NOTE: Accreditation to ISO/IEC 17025 may be used to demonstrate supplier in-house laboratory conformity to this requirement but is not mandatory.

### 7.6.3.2. External Laboratory

Commercial/independent laboratory facilities registered to ISO/IEC 17025 shall have a scope and capability for the laboratory consistent with the test(s) to be performed.

## 8. Measurement, Analysis and Improvement

### 8.1.1. Identification of Statistical Tools

The supplier should use the latest edition of AIAG SPC for manufacturing process controls and AIAG MSA for measurement system equipment management.

For preparation of Measurement System Analysis and Process Capability Studies statistical software package (Minitab version 15 or newer or equivalent software) shall be used.

### 8.2.4.1. Layout Inspection and Functional Testing

A layout inspection and functional verification (to all engineering material and performance requirements) shall be performed annually. If discrepancies are found at this point, supplier shall contact MAHLE Letrika to evaluate corrective action impact. After correction action and communication of the updated documents to MAHLE Letrika, acceptance is subject to approval by MAHLE Letrika Supplier Quality.

A raw material certification with updated laboratory scope of accreditation shall be performed annually.

### 8.2.4.2. Appearance Items

Appearance items will be designated on the engineering drawing. For specific direction on appearance item requirements, contact the respective MAHLE Letrika product development group.

## 8.3. Control of Nonconforming Product

The supplier shall have an internal containment procedure that integrates the requirements of the MAHLE Letrika. When a Supplier is placed in Controlled Shipping Level 2, the Supplier shall contact their ISO/TS 16949 Registrar and submit irreversible corrective action plans.

Supplier shall present the irreversible corrective action plans to MAHLE Letrika SQE. If the Registrar completes an on-site assessment at the Supplier location, the Supplier must present the assessment results to MAHLE Letrika SQE.

### 8.5.1. Continual Improvement

Supplier shall implement a program of manufacturing process audits to monitor the ability of manufacturing processes to achieve planned results. The improvement process shall be based on appropriate alarms and defined reaction plans. Improvement process should be implemented during APQP and PPM calculation verified at PPAP and Run@Rate and needs to be continued during production.

The supplier shall promote and manage continual improvement in quality, productivity, service, and value.

Improvement projects shall include, as appropriate, external customer, corporate, supplier, safety, and regulatory requirements. Continual improvement shall be measured against goals and objectives. One or more of the following techniques may assist with achieving the goals and objectives:

- Application of statistical sciences such as the use of the engineering for quality tools, including statistical process control (SPC), design of experiments (DOE), regression analysis, and analysis of variance (ANOVA).
- LEAN: A series of tools and techniques that focus on process optimization through cycle time reduction and the elimination of waste.
- Management Methods: Self-assessment and gap analysis (SAGA), ISO/TS 16949, benchmarking, suggestion systems, taskforce teams, cross functional teams, organization and leadership review (OLR), performance reviews, training, apprentice programs, bonus programs and business planning.
- Manufacturing Resource Planning (MRP): A process or integrating and controlling all business planning processes for the purpose of balancing supply and demand in the most effective and efficient way.
- QOS Review: A regular management review to demonstrate that processes are meeting customer requirements and internal continual improvement goals; utilizing trend chart(s), goal(s), Pareto analysis, problem summary chart(s), and verification chart(s).
- Six Sigma Lean: A process improvement methodology that uses a series of tools and techniques to identify, optimize, and control the key process variables that affect the key output variables.



- KPI review: During production rump-up or minimum during the early production period of 6 months after SOP a Key Process Indicator (KPI) review should be performed and presented to the customer on monthly basis. The KPI shall include Production volumes and demands, OEE, FPY, Rework rate and Scrap rate.

Continual improvement shall focus upon control and reduction of variation in product characteristics and manufacturing process parameters.

For any process changes associated with continual improvement activities supplier shall use Supplier Suggestion/Change Request Forms that is available upon request from MAHLE contact commodity buyer or related SQE. See Section 7.1.4.

## 8.5.2. Corrective Action

When a problem does occur, we expect our suppliers to immediately put their operations in containment and to protect MAHLE Letrika or MAHLE Letrika's customers from receiving any non-conforming material. The initial response to a problem is due within 24 hours. Final response, (with verified root cause analysis), is due within 15 calendar days, unless additional time has been requested and approved by problem owner. Suppliers shall complete a **5-Why Analysis or FTA** as a means of ascertaining root cause analysis and verification.

Suppliers have financial responsibilities for non-conforming materials and their effects, which may include warranty issues and cost recoveries for sorting, re-work, scrap, premium transportation and other related types of charges incurred at MAHLE Letrika or by MAHLE Letrika's customer. Cost recovery will be communicated to a MAHLE Letrika SQE. Suppliers shall respond to the cost recovery notices within 15 days.