Supplier Quality Assurance Manual

SQAM 28.01
April-2023

Mercedes-Benz
U.S. International, Inc.

Table of Contents

Integrated Management System (IMS) Statement

The name Mercedes-Benz is synonymous with high quality around the world. Mercedes-Benz U.S. International, Inc. (MBUSI) is committed to producing world class quality in our Vehicles.

Our IMS Slogan is:

"Nothing but the Best for Our Customers and Environment
Let's do Our Best Together With Continuous Improvement"

In order to accomplish the IMS statement, Mercedes-Benz U.S. International, Inc. (MBUSI) believes in the philosophy of open communication with its "Suppliers" (also referred to as "Partners"). This philosophy allows MBUSI and its "Suppliers" to work together cooperatively and in the spirit of "partnering" on projects. The "Suppliers" of MBUSI are a critical element of MBUSI's success.

In order to meet the expectations of MBUSI and "Our Customers", the Suppliers shall establish and maintain a comprehensive Quality Management System (QM) to assure compliance to the requirements of the contract and this document. The QM System shall be documented and reviewed periodically by MBUSI and the Suppliers shall make objective evidence of quality conformance readily available. Any deviation from this procedure requires specific approval by Mercedes-Benz U.S. International. Inc. / Mercedes-Benz Cars (MBUSI/MBC).

Suppliers are required to comply with the requirements in accordance to the current version of MBST 14: Quality Management System, which shall control Supplier's QM System obligations. Current version of the Mercedes-Benz Special Terms (MBST) can be found via the Mercedes-Benz Supplier Portal.

1. Supplier Quality Assurance Manual (SQAM)

1.1 Distribution

Suppliers of Mercedes-Benz U.S. International, Inc. (MBUSI)
Published centrally on the DocMaster via the Mercedes-Benz Supplier Portal (MBSP)
Link: https://supplier.mercedes-benz.com/portal/en

1.2 Purpose

The purpose of the Supplier Quality Manual (SQAM) is to outline the minimum quality requirements for the Suppliers of Mercedes-Benz U.S. International, Inc. (MBUSI) and applies to all MBUSI Suppliers that supply product for production use in accordance to IATF 16949. These requirements are designed to assure that all products including systems, modules, components, and raw materials supplied to MBUSI meet all known drawings, standards, specifications, regulatory and certification requirements and agreements. Meeting these minimum requirements helps to conform to the customer specific requirements. This manual, however, is not intended to change specific requirements and remedies set forth in the supply agreement and/or any appendix other than this manual. If an inconsistency between this document and the supply agreement—or any other appendix—arises, then the latter documents shall govern the issue.

In addition, Suppliers are also required to adhere to the current version, which can be found via the Mercedes-Benz Supplier Portal, of the standards and requirements according to the following Mercedes-Benz Special Terms (MBST):

- MBST 13: Production Process and Product Approval (PPA)
- MBST 27: Failure Mode and Effects Analysis (FMEA)

1.3 Scope

IATF 16949 certification requires the consistent application of standardized and sustainable methods to ensure the quality of purchased parts. Therefore, it is important to validate the maturity level and process stability along the entire Product life cycle with an integrated Supplier quality strategy.

The SQAM defines these minimum requirements that the Supplier shall meet. It is designed to be flexible for individual Supplier's systems; however, there are specific procedures, forms, and systems that are outlined in the manual that the Supplier shall follow. Unless otherwise specified in the following, the requirements made on this manual are oriented towards the relevant current issue of VDA Volume 2, Quality Assurance for Supplies, Production process and product approval (PPA). It is the responsibility of the Supplier to understand and utilize this manual. Any questions concerning the content of this document should be directed to your Supplier Quality Engineer (SQE).

1.4 Definition/Acronyms

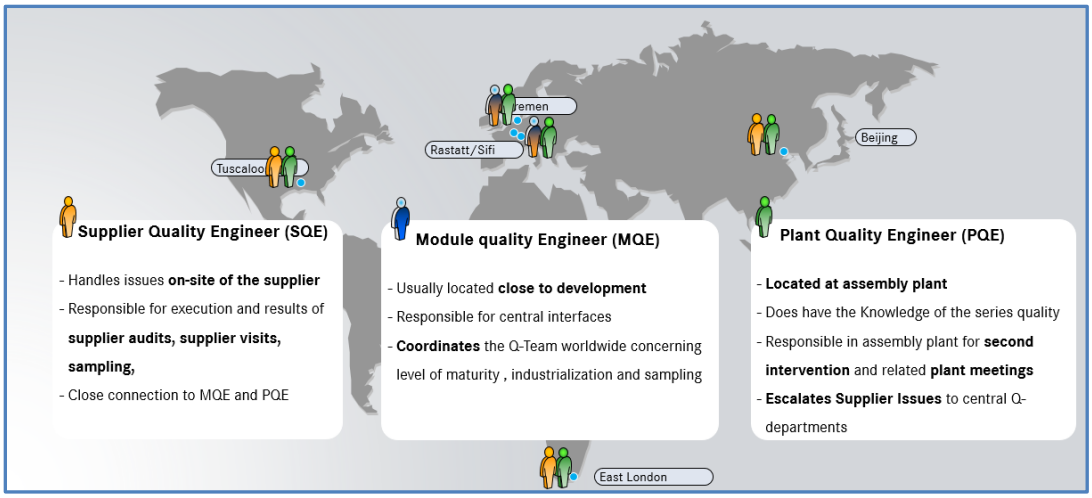
AIAG	Automotive Industry Action Group. A Trade association consisting of U.S. Automobile Manufacturers and Supplier's established to foster improved productivity in the customer-supplier relationship. AIAG distributes manuals and documents.
AWE	Abweicherlaubnis – Deviation Permission
AZF	Factor calculated from the number and severity of CPA issues
BAG	Sampling Coordination Meeting or "**B**emusterungs**A**bstimmungs**G**espraech"
BPF	Sampling Planning Form or **B**emusterungs**P**lanungs**F**ormular
"_" Release	Blank Release, Production release level of a drawing
CAR	Corrective Action Request
CMM	Coordinate Measurement Machine
CPA	Final Vehicle Audit used to gauge overall vehicle quality and customer satisfaction
CpK	Process Capability Index
<DS>	Identification and documentation of "safety-relevance"
<DZ>	Identification and documentation of certification relevance including emission relevance
DBL	Supply Specification (Daimler-Benz Liefervorschrift)
DCI	Design Change Information sheet used by MBUSI ECC section of Production Control Department to gather supplier timing
DIN	German Industrial Standard (Deutsche Industrienorm)
DMT	Defective Material Tag
ECC	Engineering Change Coordination or Control
E-Level	Method to track all changes related to a part and its corresponding production processes before PPAP
EPA	U.S. Environmental Protection Agency

Error Proofing	Mechanical devices/controls that will not allow defective product to proceed to the next step in a manufacturing process
ET	Engineering Trial, the 1st trial in the pre-launch build process
VE-DOK	Vehicle documentation system that maintains a record of as-built data for each vehicle
FMEA	Failure Mode and Effects Analysis (System, Design, or Process)
FMVSS	Federal Motor Vehicle Safety Standards
GR&R	Gage Repeatability and Reproducibility study as defined in the AIAG Measurement Systems Analysis Manual (MSA)
IMDS	International Material Data System
I-Lot	Trial for Initial Release
ISO9000	International Standards Organization quality system
ISO 14001	International Standards Organization environmental management system
ISO/IEC 27001	International Standards Organization and International Electrotechnical Commission Information Security Management System
KEM	Design change notification (Konstruktionseinsatzmeldung)
KQC	Key Quality Characteristic
Logistics	MBUSI Logistics Department
MBAG	Mercedes-Benz Group AG, as the case may be
MBC	Mercedes-Benz Cars
MBSP	Mercedes-Benz Supplier Portal
MBN	Mercedes-Benz Standard (Mercedes-Benz Normen)
MBUSI	Mercedes-Benz U.S. International, Inc. or any MBUSI affiliate(s) which supports MBUSI in any particular area related to this document
MRD	Material Requirement Date
MQI	Modular Quality Engineer
MSA	Measurement Systems Analysis, also referred to as GR&R Gage Repeatability and Reproducibility Study
NEDS	Noise, Emissions, Durability, and Safety
Null Series	Trial Builds Conducted to Evaluate Design
PAF	Numbering system for KEM's
PC	MBUSI Production Control Department
PDR	Product Deviation Request
PDRS	Product Deviation Request System
PE	MBUSI Production Engineering Department
PIA	Parts Inspection Approval
P-Lot	Trial for Prototype release
PM	Preventative Maintenance

PPA	Production Process and Product Approval (VDA)
PPAP	Production Part Approval Process (AIAG)
PPAR	Production Process and Product Approval Provisional Part Approval Report. VDA equivalent to ISIR (complete PPAP documentation)
PPM	Parts per Million Reject Rate
PQE	Part Quality Engineer
P-Release	Pre-Release or Prototype release of a drawing
Product	For the purposes of this manual, used as a generic definition for any commodity, raw material, part, assembly, module, etc. supplied to MBUSI from any outside party
PSW	Part Submission Warrant
PT1, 2, 3, etc.	The production trials in the pre-launch build process
Q-H:ELP	Quality CHallenges: REcognition, SoLution and Prevention
Q Level	Method to track all changes related to a part and its corresponding production processes
QS9000	AIAG Quality System 9000 - Modeled after ISO 9000 with additional sections specific to Automotive Manufacturers requirements
Sampling	
SDA	Series Delivery Approval
SDR	Sampling Deviation Request
SES	Supplier Evaluation System
Shall / Should	In this manual “shall” refers to activities that the Supplier must perform. “Should” refers to activities that are recommended or the Supplier may be asked to perform
SIS	Supplier Inspection Standard
SPC	Statistical Process Control
SPRP	Supplier Parts Readiness Program (DAG Central document, VDA based)
SQAM	MBUSI Supplier Quality Assurance Manual
SQE/LQI	Supplier Quality Engineer
SQO/KTB	Supplier Quality Operations
SQMS	Supplier Quality Management System
TRL	Technical Revision of Supplier
IATF16949	Quality Management System that encompasses QS9000, ISO 9000, and VDA
VDA 6	Verband der Automobilindustrie, quality management system based on DIN EN ISO 9001 and DIN EN ISO 9004
VDA-RGA	Maturity Level Assurance
W-Release	Preliminary design release between “_” and P-Release
YAP	Numbering system for KEM’s
ZGS	Drawing Geometry Status (Zeichnungsgeometriestand)

1.5 Responsibility

1.5.1 Supplier Quality Roles & Responsibilities



1.6 Supplier General Matrix

Minimum Requirements for Suppliers	Reference / Standard / Comment Note: Always refer to the latest documents
Understand MBUSI expectations for all functions and processes	• MBUSI Supplier Quality Assurance Manual (SQAM) • MBUSI Terms Direct Purchasing (MTDP)
Have training program for all new associates, temporary support and personnel changes	• IATF 16949: 7.1.6 Organizational Knowledge • IATF 16949: 7.2 Competence
Have an updated organizational chart / responsibility matrix for plant and project personnel	• MBUSI SQAM, provide current copy to MBUSI
Give MBUSI advance notice of union contract expiration – Including tier n-suppliers	• 6 months prior to expiration, inform MBUSI
Have all norms, specifications and documents related to the production products available and maintain an archive to fulfill records retention	• IATF 16949: 7.5.3.2.1 Record retention • MBST 13/19: Production Process and Product Approval (PPA), section 1, Storage Periods • VDA Volume 1: Documented Information and Retention
Have a Quality Management System IATF 16949 Certification ISO 14001 Certification	• IATF 16949: 7.5.1 Quality management system documentation • MBUSI Supplier Quality Assurance Manual (SQAM) • MBST 14/07: Quality Management System, section 1, Selection and Application of the QM System • Supplier Contract

Minimum Requirements for Suppliers	Reference / Standard / Comment Note: Always refer to the latest documents
Have a continuous improvement program which includes quality, cost, production, and delivery for both value and non-value added processes	• Per industry accepted methods addressing entire business value chain
Have a Quality Management System IATF 16949 Certification ISO 14001 Certification	• IATF 16949: 7.5.1 Quality management system documentation • MBUSI Supplier Quality Assurance Manual (SQAM) • MBST 14/07: Quality Management System, section 1, Selection and Application of the QM System • Supplier Contract
Have all norms, specifications and documents related to the production products available and maintain an archive to fulfill records retention	• IATF 16949: 7.5.3.2.1 Record retention • MBST 13/19: Production Process and Product Approval (PPA), section 1, Storage Periods • VDA Volume 1: Documented Information and Retention
Key Quality Characteristics (KQC) Safety/Regulatory Characteristics	• IATF 16949: 8.2.3.1.2 Customer-designated special characteristics • IATF 16949: 8.4.2.2 Statutory and regulatory requirements • IATF 16949: 8.3.3.3 Special characteristics • MBUSI Supplier Quality Assurance Manual (SQAM) • MBST 13/19: Production Process and Product Approval (PPA), section 5, paragraph 9 • MBST 14/07: Quality Management System, section 5, paragraph 4-7 • Legal and Regulatory Requirements for Certifications
Software release and approval	• IATF 16949: 8.3.2.3 Development of products with embedded software • MBST 13/19: Production Process and Product Approval (PPA), section 2, paragraph 1 • MBST 14/07: Quality Management System, section 3, paragraph 2-9
Production Process and Product approval	• IATF 16949: 8.3.4.4 Product approval process • MBUSI Supplier Quality Assurance Manual (SQAM) • MBST 13/19: Production Process and Product Approval (PPA) • VDA Volume 2: Quality Assurance for Suppliers, Production process and product approval (PPA) • MBST 27: Failure Mode and Effects Analysis (FMEA)
Check annually whether the deliveries meet testing specifications (including material, reliability, legal specifications and the control plan). These documents shall be made available to MBUSI upon request.	• IATF 16949: 8.6.2 Layout inspection and functional testing • MBUSI Supplier Quality Assurance Manual (SQAM) • MBST 13/19: Production Process and Product Approval (PPA)
Maintain all equipment and tools through a preventative maintenance system	• IAT 16949: 8.5.1.5 Total productive maintenance • MBUSI Master Terms Direct Purchasing (MTDP)

Minimum Requirements for Suppliers	Reference / Standard / Comment Note: Always refer to the latest documents
Maintain a system for identification, lot traceability and control for all product produced	• IATF 16949: 8.5.2 Identification and traceability – supplemental • MBUSI Supplier Quality Assurance Manual (SQAM) • MBST 14/07: Quality Management System, section 5, paragraph 8
Maintain all equipment and tools through a preventative maintenance system	• IAT 16949: 8.5.1.5 Total productive maintenance • MBUSI Master Terms Direct Purchasing (MTDP)
Maintain samples and/or standards for inspection of product, including sheet metal, painted and molded components	• Per Quality requirements as established by responsible SQE
JIS Supplier communication	• Per Logistics directive

1.7 Supplier Organization **Previously released under Section 2.2*

The Supplier shall define the individuals responsible for the new program, engineering and production trials support and series production. Personnel performing those functions shall have sufficient, well-defined responsibility, authority, and organizational freedom to identify and evaluate quality problems. In addition, these individuals shall initiate containment process, recommend, and/or provide solutions and countermeasures.

Supplier contacts shall be provided upon request to the Supplier Quality group (e.g. SQE, PQE, SQO), Capacity Management and/or Logistics team, along with immediate updates to any changes. Supplier is responsible for updating their contact information in the following systems via the MBSP:

- Supplier Database (SDB)
- Supplier Quality Management System (SQMS)
- Parts Inspection Approval (PIA)

If MBUSI determines, in its sole discretion, that Supplier's employees need training related to MBUSI/MBC systems, information, or processes relevant to Supplier's supply of MBUSI, MBUSI may organize for and provide relevant trainings to Supplier's employees. In any such event, Supplier is required to ensure the participation of its employees and is responsible for the cost of any such trainings.

1.8 Program Management **Previously released under Section 2.3*

It is the responsibility of the Supplier to manage its systems and its suppliers to meet MBUSI's requirements. The Supplier shall notify MBUSI at the earliest possible time of those items which affect critical timing paths (Tier-N supplied parts) or have unusual requirements (i.e., long lead-times for raw materials, tooling, equipment, gauges or test completion). This notification is necessary to assure that appropriate steps are taken to prevent delays in vehicle launch or design change implementation.

Supplier Part History Reports and Gantt Charts shall be provided as required by the responsible SQE. These plans shall consider all fixtures, dies equipment, gauges, testing, PPAP requirements and program reviews for the product. The Supplier shall require the same level of documentation from its Tier-N suppliers to meet quality/delivery targets. Selected Tier-N suppliers will also be required to provide this documentation, based on Supplier Quality requirements.

2. Quality Activities Prior to Part and Process Approval (PPA)

Production and supply capabilities shall be guaranteed for the entire product cycle. To fulfill this requirement, it shall be implemented for all new products, model year changes and changes to current product. The Supplier shall align the requirements with the responsible SQE.

2.1 Potential Analysis

The objective of the Potential Analysis (PA) is to evaluate the Supplier's capabilities, performance, experience and skills of new, unknown Suppliers, new locations, new manufacturing technologies or new sourcing scopes to fulfill the requirements of MBUSI/MBC in the respective products and associated processes in preparation of the contract awarding decision. The basis of the PA are selected questions from VDA 6.3 which includes sustainability questions which will cover all sections of VDA 6.3.

For new product launches or new Suppliers, an initial Potential Analysis (PA) should take place at the Supplier between "P" and "_" release of the product.

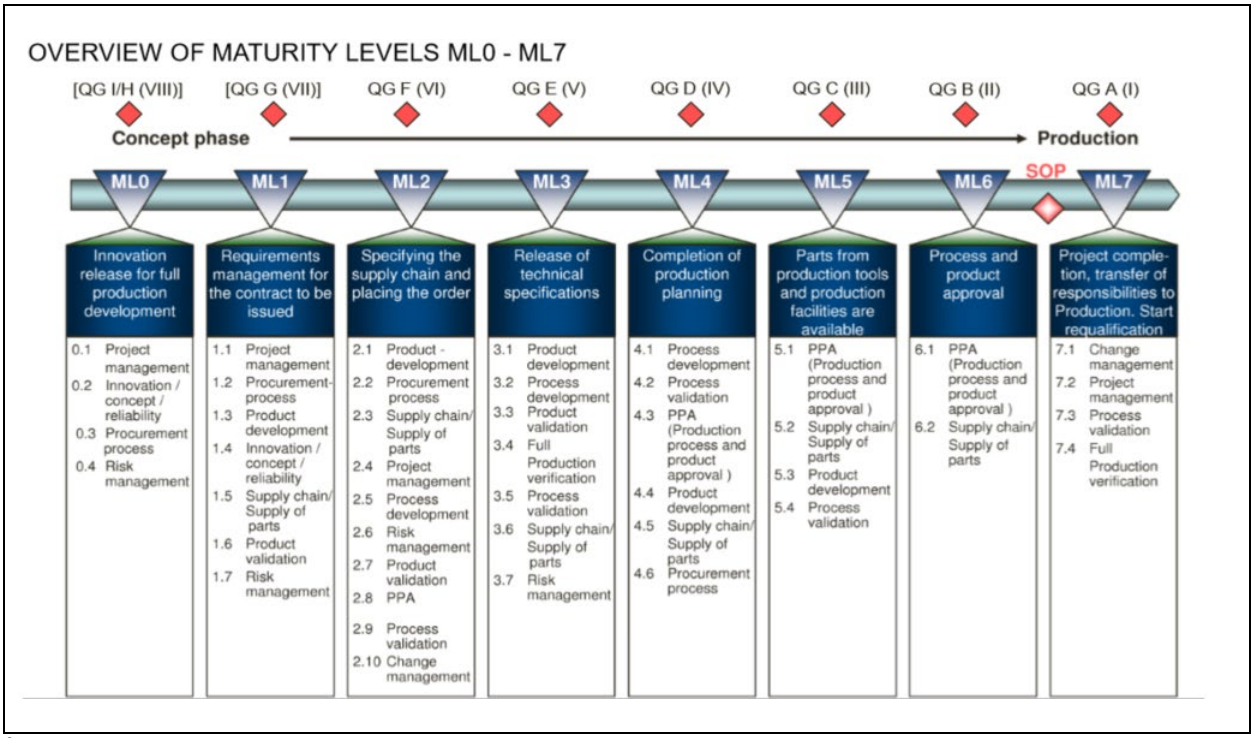
2.2 VDA-RGA Program **Previously released under Section 2.4*

2.2.1 Objective

The target of VDA-RGA (Maturity Level Assurance) is a preventive maturity level assurance according to the VDA standard for new product projects in Supplier management through cross-functional cooperation with development, purchasing, capacity management, logistics, and supplier quality and the Supplier. Method is optional for facelift (MOPF) and change year (ÄJ).

2.2.2 Milestone[2]

Execution is in accordance to the MDS project timeline and project type (MDS vehicle or MDS powertrain) before the contracting (ML2) till the series production ramp-up (ML7).



[2] *Overview of Maturity Levels ML0-ML7*

2.2.3 Scope

The scope of the VDA-RGA application depends on the ABC part-classification. The responsible SQE will decide, in case of A-or B-classified component, whether a round table or a self-assessment will be performed. Planning for the VDA-RGA has to be performed in Husky accordingly.

The first evaluation of a VDA-RGA classified as a round table begins with a self-assessment from Supplier site. The Supplier must present this 2-3 days before conducting the round table. Afterwards the responsible SQE sends out this self-assessment for preparation to development, purchasing, capacity management and logistic.

2.2.4 Evaluation/Tool

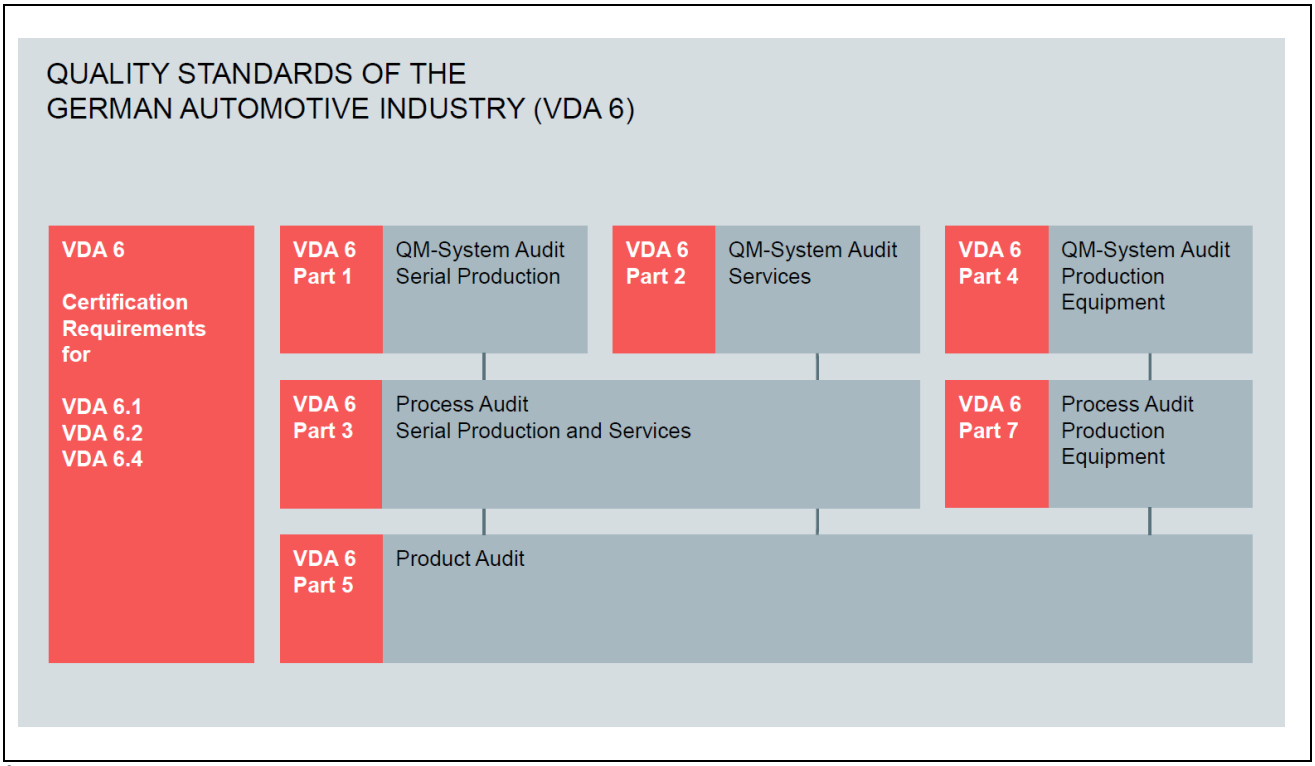
The common evaluation on basis of the Supplier self-assessment takes places in the round table meeting. Based on the standardized measurement criteria and evaluation results, corrective actions, responsible persons and due date will be defined and escalated as needed and documented via the system QUNECT.

QUNECT is an online tool for the VDA-RGA process that replaced the traditional Excel spreadsheet and offers a platform on which MBUSI/MBC cross-functional team and Suppliers can collaborate together in real time.

The initial set-up of Supplier access can be requested by emailing the responsible SQE. After the initial set-up, the Supplier can access QUNECT via the Mercedes-Benz Supplier Portal

2.3 Supplier Audits *Previously released under Section 2.5*

2.3.1 Audit Concept[3]



[3] *Based on the VDA 6 audit concept (Association of the Automotive Industry), published on VDA 6.3 Process Audit Part 3, 2016 edition*

2.3.2 VDA 6.3 Process Audit *Previously released under Section 2.5.1*

2.3.2.1 Objective

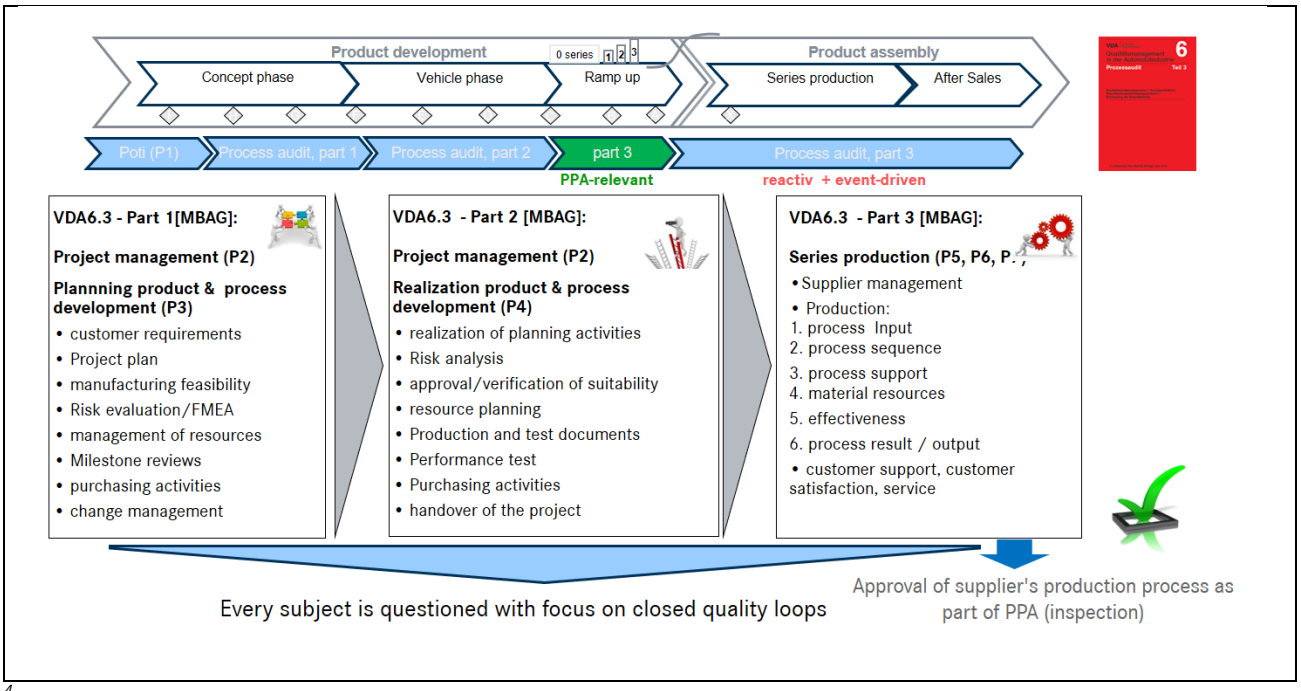
The objective of VDA 6.3 process audit is to validate the processes at the Supplier. VDA 6.3 process audit analyzes and evaluates the performance of processes in the product creation process to identify maturity level and manufacturing process risks for Suppliers along the MDS. It is an evaluation of the Suppliers' planning, development, and realization processes for all product-related activities.

2.3.2.2 Application and Timeline[4]

The terminology of applying the process elements in the case of VDA6.3 Auditing at MBC differs from the VDA definition.

In this context the preventive "VDA 6.3 Part A" is split up into "VDA 6.3 Part 1" (P2&P3) and "VDA 6.3 Part 2" (P2&P4). VDA 6.3 Part B is communicated as "VDA 6.3 Part 3" (P5–P7).

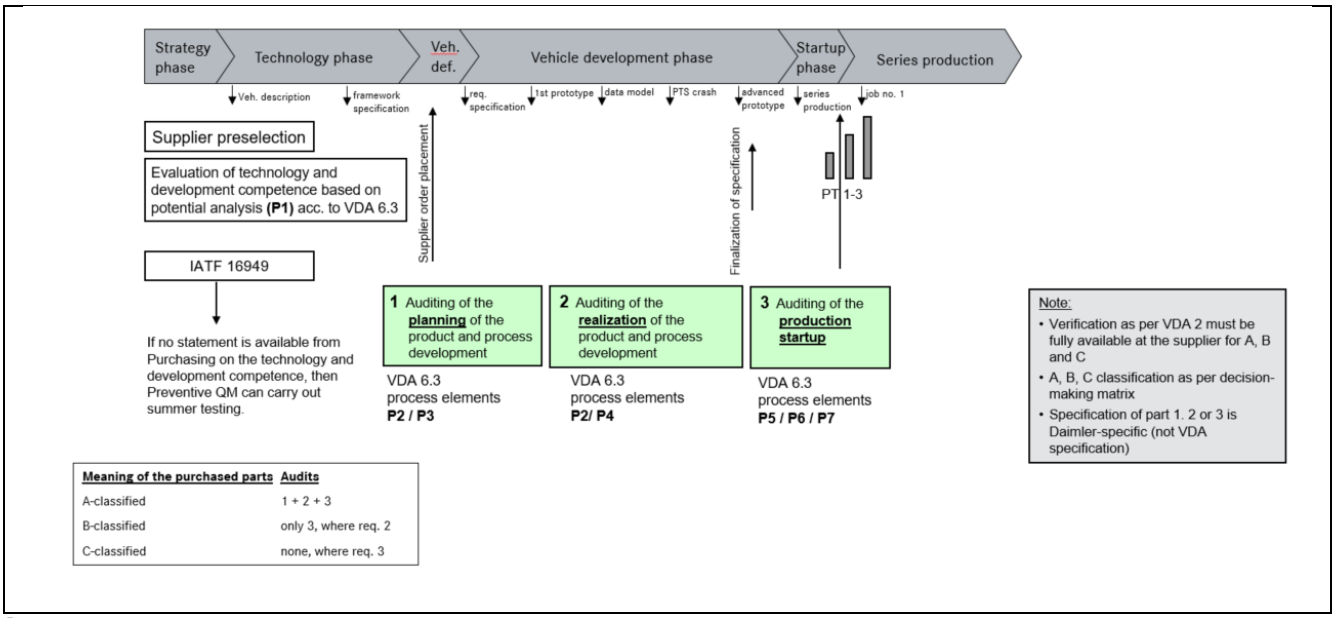
Audits mainly focusing on logistics shall be covered and performed by Logistics.



[4] *Range of application at MBC based on DA 6.3, edition 2016*

2.3.2.3 Time Sequence and Scope of Process Audit[5]

Application of the method internally and externally on-site at the Supplier may take place: after contract has been awarded to start of production (SOP) for early identification of maturity level and process risks, after SOP for failure analysis and failure elimination, and process audit (part 3) serves to release the production process of the Supplier on the context of PPA.



[5] *Sequence and scope of process audit at MBC based on DA 6.3, edition 2016*

2.3.3 TAS/TRL Audit **Previously released under Section 2.5.2*

The TAS/TRL audit (Technical Revision of Supplier) is an on-site visit paid to the Supplier which is announced and performed on very short notices (at least 4 hrs. in advance). The audit announcement should always be made in a timeframe that enables the Supplier to ensure production of the audit scope. The reasons for conducting TAS/TRL audit can include but not limited to:

- Poor quality performance (e.g. sudden run of non-conforming products)
- Jeopardized line supply
- Degrading quality scores or quality concerns
- Spot-check verification of the quality of the Supplier's parts and production processes
- Verification of the execution of product audits and requalification tests

2.3.4 PCA/PFA Audit **Previously released under Section 2.5.3*

The PCA/PFA (Process Capability Analysis) is an additional process audit tool which can be used when a complete VDA 6.3 process audit is not necessary, also known as "small audit". PCA/PFA is an on-site audit at the Supplier's site that is announced at least four weeks in advance. The reasons for conducting PCA/PFA can include but not limited to:

- Approval of production process of the Supplier in the context of PPA
    - Move or replace minor production equipment/tolling
    - Change existing process
    - Adds additional production line(s)
    - Adds additional product(s) to existing production line(s)
- Before SOP for early identification of process risks or after SOP for failure analysis and failure elimination
    - Poor quality performance

  - Jeopardized line supply
  - Corrective action verification for quality spill
- Verification of the execution of requalification tests

2.4 Performance Test

Performance tests shall be performed by the Supplier in the case of new launches and model changes. Supplier shall notify the responsible SQE for PPA procedure in advance for planning purposes.

Performance tests shall be performed by the Partner in the case of new launches and model refinements, and the respective/responsible MBC contact person for PPA procedure shall be notified within good time so that participation by MBC is possible. For selected scopes, a number of parts which at least corresponds to the yield of one shift under full capacity production conditions shall be produced in coordination with responsible MBC contact person in the final performance test. These parts shall be produced under MBUSI full capacity production conditions. The Partner must, if necessary, carry out an analogous performance test with his sub-suppliers, taking into account the risk classification, in cooperation with MBC and provide corresponding evidence.

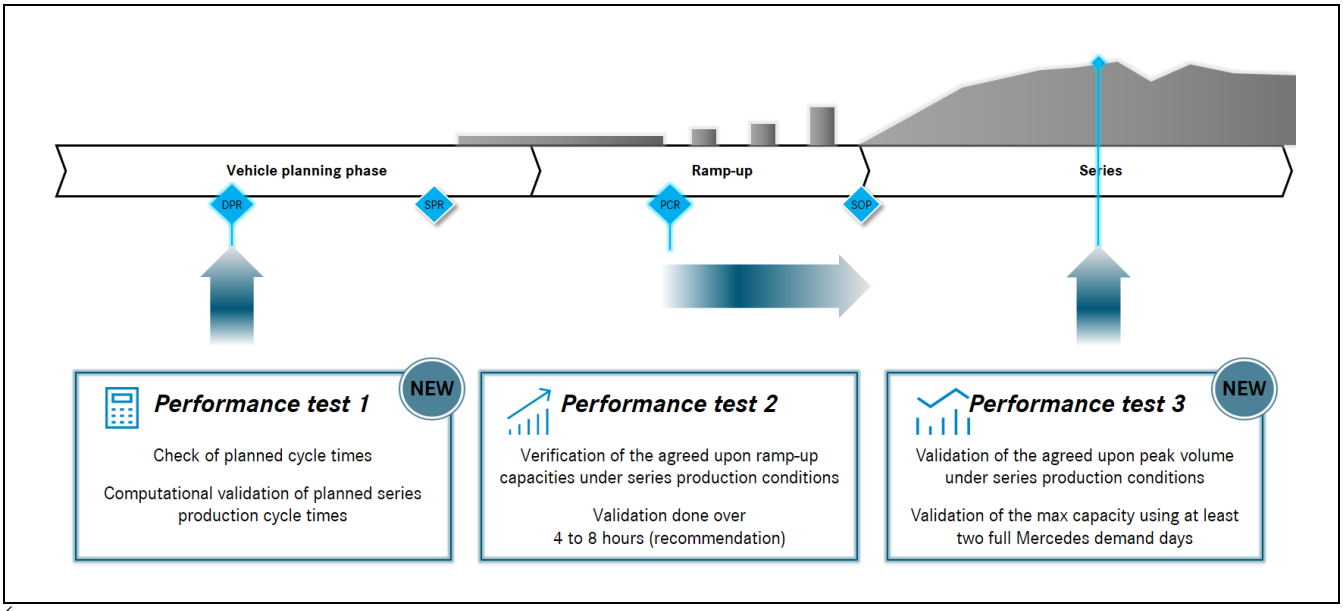
2.4.1 Objective

The Performance Test is a process validation to verify the following:

- **Preventive check of Supplier's performance** under consideration of all conditions and parameters.
- **Verification** of the **process performance** and **quality capability** of the complete production process under **series production conditions** (tools, systems, cycle time, personnel at the production site ...).
- **Verification** of the ability to produce the **agreed maximum capacity** on time for the customer with the resources used.

2.4.2 Stages of Performance Test[6]

There are three stages of the Performance test in the planning phase, for the ramp up and for peak volume quantity



[6] *Stages of Performance Test*

2.4.3 Performance Test 1: Checking Capacity Planning

The Performance Test 1 is a self-declaration by the Supplier with the objective checking he planned cycle times and computational validation of planned series production cycle times. Implementation period is during the Vehicle Planning Phase (DPR/D1) in combination with VDA RGA question 4.1.1.

Based on the calculated capacity evaluation, a result is automatically determined (green/red).
The final evaluation can be "green" or "red ".

- Green: Planned cycle time to ensure the peak volume quantity is achieved
- Red: Planned cycle time to ensure the peak volume quantity not reached

2.4.4 Performance Test 2: Validation of Ramp-Up

The Performance Test 2 is an on-site execution or a self-declaration by the Supplier with the objective of verifying the ramp-up capacities under series production conditions and recommended validation of quantity over 4-8 hours of production depending on part/processes. Ideally, this is implemented during the Ramp-Up phase and in some cases, it is possible after SOP.

Based on the production run, a result is automatically determined (green/red).
The final evaluation can be "green", "yellow" or "red ".

- Green: Demand peak volume quantity covered
- Yellow: Requirements for peak volume quantity not covered. Validation of SOP and ramp-up (partially) available, measures for achieving peak volume production quantity defined. Check of the implemented measures necessary, if necessary validate using an additional performance test. If additional performance tests are planned they cannot cause bottlenecks in series production deliveries
- Red: Requirements for peak volume quantity not covered

2.4.5 Performance Test 3: Validation of Full/Maximum Capacity

The Performance Test 3 is an on-site execution or a self-declaration by the Supplier with the objective of verifying the proof of achieving the peak volume under series production conditions and validation of quantity over at least two full days of MBUSI production requirements.

Based on the production run, a result is automatically determined (green/red).
The final evaluation can be "green" or "red ".

- Green: Demand for peak volume quantity achieved
- Red: Demand for peak volume quantity not reached

2.5 Key Quality Characteristics *Previously released under Section 2.6*

During the product design stage, the Supplier shall begin the identification of Key Quality Characteristics (KQC). KQC's are those dimensions, features, and requirements that shall be closely controlled or confirmed in the manufacturing process to assure customer satisfaction, engineering specification conformance, regulatory compliance, vehicle safety, and/or manufacturability by MBUSI.

All KQC's shall be controlled/confirmed by one of the following methods: mistake proofing of design; mistake proofing of process with sensors/fixturing; automated 100% inspection; proven process capability through Statistical Process Control; or in a method agreed upon by the Supplier and the responsible SQE. Suppliers may be requested to submit KQC data to MBUSI on a regular basis.

2.5.1.1 Safety/Regulatory Characteristics (DS/DZ)

Safety (DS)/Regulatory (DZ) characteristics are critical product specifications that can affect compliance with government regulations or safe function and/or performance of the vehicle. As commodity experts, the Supplier must inform the responsible SQE of any regulatory requirements pertaining to its product.

Suppliers with regulatory product (e.g. FMVSS, EPA) is required to maintain relevant and applicable data for its product. For parts with safety-relevant (DS) or regulatory/certification-relevant (DZ) features, corresponding identification of the documents created during the sampling procedure (e.g. sampling plan) must be provided.

MBC specifications for the DS/DZ designations are:

DS:	Documentation of relevance to safety	Components or systems whose malfunction or failure may lead to a direct risk to the life and limb of other road traffic users are safety-relevant.
DZ:	Documentation of relevance to certification	Components or systems whose data, verifications, construction permits are used in certificates or country-specific registration documents or which are checked on type approval are certification-relevant.

In deviation from the industrial standard, the following requirements apply to the measurable DS/DZ characteristics specified in the specification documents (e.g. drawings, CAD data records):

- Process performance index/machine performance index Ppk/Pmk ≥ 2.0
- Stable processes- process capability Cpk ≥ 1.67

In addition, parts with regulatory/certification-relevant (DZ) may require certain market specific certification (MSC), testing and/or labeling requirements. The Supplier shall meet the required testing and upload proof of compliance (i.e. certificates and/or labeling requirements) in the Certification Management System (CERTUS) via the Mercedes-Benz Supplier Portal for review and approval by the homologation department.

2.5.1.2 Product Characteristics

Product Characteristics are features on the drawing or specification that are significant for customer satisfaction, reliability, fit, form, or function (i.e., color, diameter, surface).

2.5.1.3 Process Characteristics

Process Characteristics are those Supplier process parameters for which variation shall be controlled and monitored on an ongoing basis to assure conformance to specifications and customer satisfaction (i.e., feed rate, temperature, pressure).

2.6 Inspection Gauge Requirements *Previously released under Section 2.7

The Supplier is responsible to manufacture inspection gauges for all products as needed unless otherwise agreed upon by the responsible SQE. The inspection gauges will be used to monitor the dimensional and functional quality of the product being produced. The inspection gauge shall also assist the supplier in the checking the Key Quality Characteristics (KQC). The responsible SQE and the Supplier shall agree upon the type and number of inspection gauges necessary.

All inspection gauges shall be constructed per the requirements of the Gauge Standard, see Section 8. All inspection gauge designs for final shipped product shall be submitted to and approved by the responsible SQE prior to manufacture. Some possible types of inspection gauges are CMM holding fixtures attribute gauges, form gauges, templates, and SPC gauges capable of line speed. The characteristics to be monitored on the inspection gauge and their nominal dimensions and applicable tolerances will be listed on the Supplier Inspection Standard (SIS).

If datum and locators are not noted on the drawings, an agreement on datum and locators shall be reached and documented on the Functional Gauge Plan and Approval Request (FGAR). Whenever possible, the datum and locators should be representative of the vehicle application of the product and tolerances should also be clarified at this time.

The Supplier shall seek approval for gauge design by submitting the FGAR, along with any additional documentation requested by the responsible SQE (e.g. gauge construction - dimensions, weight, and material type), if applicable. Gauge approval is one of the requirement for PPA test equipment. After receiving approval, the Supplier shall proceed with the gauge build process. Prior to using the gauge for series production, the Supplier shall perform Measurement Systems Analysis (MSA) and submit the results of the MSA along with the completed FGAR to the responsible SQE.

2.7 Testing Requirements and Responsibility *Previously released under Section 2.8

The Supplier and MBC shall define the testing requirements and specifications required to validate the product, both as a stand-alone component and as component of the vehicle system. The development engineer (RD) will have the lead in defining the testing requirements.

The required testing and estimated timing for both component level and in-vehicle testing shall be documented on the suppliers testing plan. This activity is not intended to supersede any contractual obligations of the Supplier, or Supply Agreement, or any regulatory requirements (e.g. Federal Motor Vehicle Safety Standards).

Design validation testing shall be completed prior to PPA process. Changes to part or process may require a re-testing of all or part of validation testing. It is the Supplier's responsibility to discuss testing requirements with the responsible RD and responsible SQE for product changes after initial part approval. The responsible SQE reserves the right to add additional requirements based on past problem history, unique environmental requirements, etc.

Supplier shall be responsible to meet all the required testing requirements including but not limited to: drawing specifications, DBL's, MBN's, initial material sampling (WEB) requirements. Supplier shall follow the WEB 2020, WEB 2020+ requirements. Additional information regarding the material sampling requirements, can be found in the DocMaster via the Mercedes-Benz Supplier Portal.

3. Production Process and Product Approval (PPA)

3.1 Introduction

According to IATF 16949, the Supplier shall carry out a Production Process and Product Approval (PPA) process to achieve the release for series production for new and modified products/processes. Unless otherwise specified in the following, the requirements made on this process are oriented towards the relevant current issue of VDA Volume 2 and the latest version of MBST 13: Production Process and Product Approval.

3.2 Scope of Application[7]

In accordance to MBST 13/19: Production Process and Product Approval:

2. Scope of Application

In addition to the scope specified in VDA Volume 2, the PPA Process shall also be carried out for software and standard parts unless otherwise agreed (the respective applicable version of VDA material specification 235-204 shall be taken into consideration for high-strength fasteners for the automotive industry).

If delivery conditions are described through several item numbers, the corresponding processes and generated/amended product features of the delivery condition shall be described in sampling in addition to the component features.

[7] *Based on the MBST 13/19: Production Process and Product Approval (PPA)*

The PPAP procedure also consist of sampling of Software (SW) as a product and/or as part of a product.

3.3 PPA Objective[8]

The PPA objective is verification of quality and release of product and production process for purchased parts. The PPA Process is used to provide evidence, before the start of production, that the customer requirements agreed in specifications (e.g. the component requirements specification, drawings, standards, packing instructions, document issue levels, color-sample charts, capacities and flexibility) and other requirements (e.g. legislation, standards) are satisfied.

In accordance to VDA 2[8] :

1.2 Objective of the PPA procedure

The PPA procedure furnishes proof that the requirements for the production process and the product are being met. This allows the documentation of the assurance of the quality capability of the production processes and products under series conditions.

The corresponding requirements may include:
- *Legal, official, and approval-related requirements (e.g. type approval process, EU directives, CE marking, etc.)*
- *General standards*
- *Customer-specific requirements*
- *Technical specifications, e.g. drawings, requirements specifications, customer standards, packaging instructions, reference samples in its applicable revision status*
- *Contractual agreements between the organization and the customer, e.g. capacities and flexibility*

The approval encompasses the evaluation of the production process and the product on the basis of documents, records and samples for the PPA. This ensures that the requirements for the delivery of specification-compliant products are fulfilled by the organization.

The customer grants delivery approval depending on his/her evaluation.

If the customer dispenses with the verifications from the PPA procedure, this does not release the organization from the duty of documenting the verifications for meeting the requirements for the production process and the product.

[8] *Based on the VDA 2, 6th revised edition, section 1.2, Securing the Quality of Supplies*

If delivery conditions are described by several item numbers, the corresponding processes and generated/amended product features of the delivery condition must be presented in the submission of samples in addition to the component features.

MBUSI can request a PPA report for the components in a delivery scope with MBC item numbers.

3.4 Overview of the PPA Process[9]

The PPA process is broken down into the approval of the processes used in manufacturing and transporting the products and the approval of the product itself.

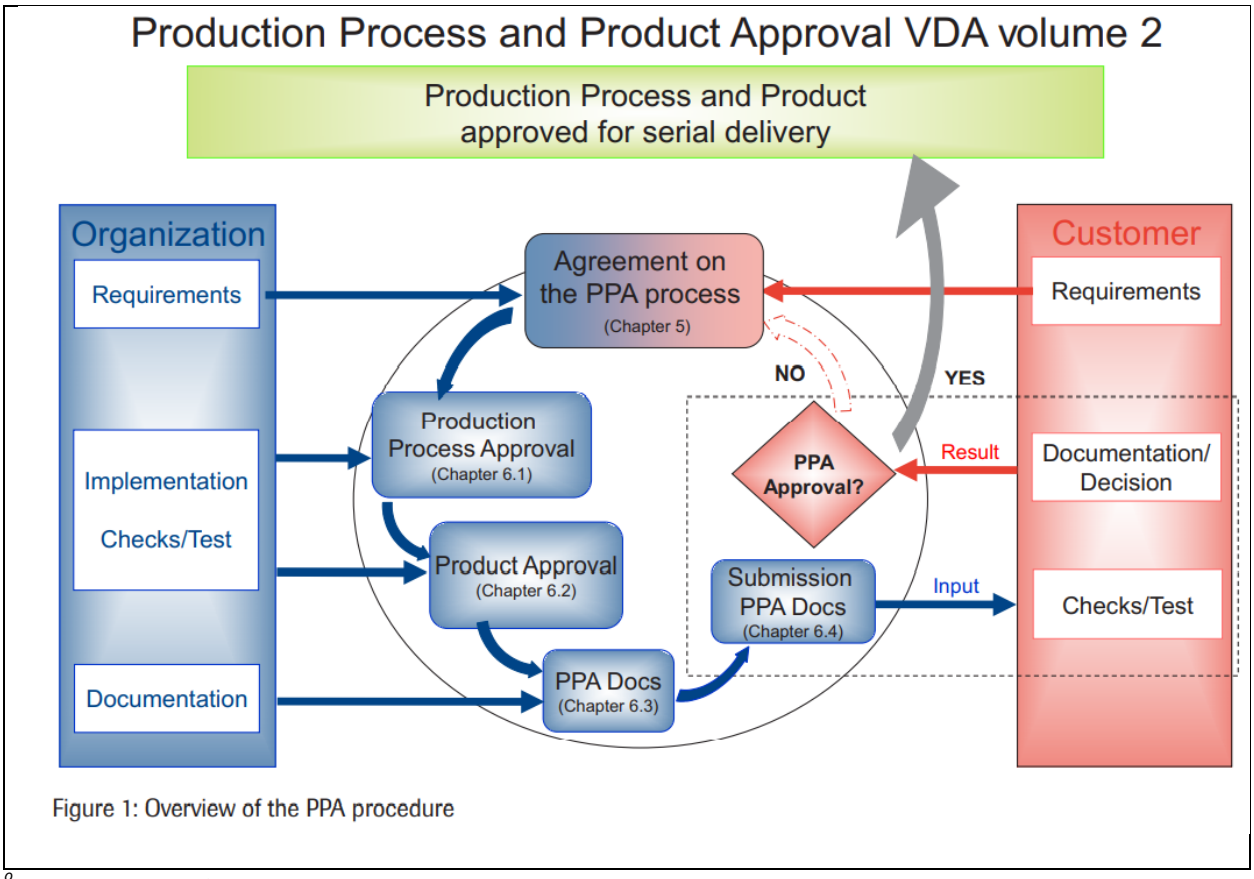


Figure 1: Overview of the PPA procedure

[9] *Based on the VDA 2, 6th revised edition, Section 1.1, Securing the Quality of Suppliersboun*

3.5 Global Sampling of Series Production Approvals

The individual Mercedes-Benz Cars production plants including subsidiaries are combined to approval units (Europe, Africa, DGRC, America, Asia). The series delivery approval for the combination of part number, contractual location and supplier production site (“Magic Sampling Triangle”), is an approval for supplying the plants within a release unit with which the supplier has concluded a supply contract (“Global Sampling”).

3.6 Triggers for the PPA Process[10]

The Supplier shall notify the responsible SQE of all modifications in the production process and product. A material change has the same relevance as a product change and thus triggers a PPA procedure. Unless otherwise agreed, the following triggers shall require the Supplier to initiate a new PPA submission. To the extent any of the below triggers are the result of the Supplier's actions or omissions, Supplier is fully responsible for all cost associated with the new PPA submission. The trigger matrix described in VDA Volume 2 is not applicable to MBUSI/MBC.

According to MBST-13, the following triggers are as follows:

Trigger	MBC specialist department for the PPA process	MBC operative procurement	MBC logistics
New Parts	**D**		
Product modifications* (approved by Development)	**D**	**A**	
Product relocation	**D**	**A**	**A**
Production process modification**	**D**		**A**
Test process modification	**A**		
Production stoppage for more than 12 months	**D**		
Use of new, modified or replacement tools (not applicable to metal removing tools)	**D**	**A**	
Change in 2nd-tier suppliers (MBC 2nd-tier). In the case of parts with special characteristics (DS, DZ), the above obligation exists up to the supplier responsible for the characteristics	**D**	**A**	
Change in 2nd- tier supplier locations (MBC 2nd-tier) for deliveries with DS/DZ features	**D**	**A**	
Change in 2nd-tier supplier locations (MBC 2nd-tier)	**A**	**A**	
Modifications in the supplier's purchased parts/primary material/stock	**D**		
No unconditional series production approval	**D**		
Failed requalification	**D**		

[10] *Based on MBST 13/19: Production Process and Product Approval (PPA), section 4*

*Includes modifications of material as well

** Also includes modifications to the logistical value chain

D = Execution of the PPA Process by the Supplier

A = Obligation of disclosure in written form by the Supplier Partner to the MBC specialist department. Implementation and scope of the PPA Process is decided by the MBC specialist department.

3.7 Execution of the PPA Process

If a PPA process trigger caused by the Supplier arises, the Supplier shall provide notification of this trigger at least six months prior to planned implementation. In justified, exceptional cases, deviating regulations may be agreed with the responsible SQE for series production approval. Relocation is not permitted in the start-up phase. Notification of relocation must be issued six months in advance and requires approval from MBUSI.

MBUSI specifies a sampling date to the Supplier. Even without a separate purchase order, the Supplier shall deliver sample parts by the above mentioned date, unless MBUSI expressly dispenses with delivery.

Prior to the PPA process, the documents specific to the sampling scope and the number of samples required are specified in sampling planning, the submission stage. In addition to the technical sample (Q status), a variant sample (A status) must be provided for parts distinguished by supplementary code 2 (color, language, etc.).

In the case of tools for parts where the surface structure is integrated in a separate production step, the PPA process is carried out on the basis of “other samples” with a development status within the meaning of Chapter 4.5.2 of VDA Volume 2. Approval for integrating the surface structure is issued by the department responsible for series production approval.

In the event of deviations, the Supplier must obtain written deviation in advance (e.g. SDR) from the responsible SQE prior to sampling. The corrected status must be presented within the scope of subsequent sampling prior to the expiry of the deviation.

The relevant product and process characteristics for which capability studies are to be carried out are to be coordinated with the responsible SQE. Until the process capability parameters have been verified, the characteristics are checked 100% by the Supplier.

3.8 Sampling Planning/Evidence Planning **Previously released under Section 2.1*

In advance of the PPA procedure, a sampling planning can be done as part of the “Sampling Coordination Meeting” or “BemusterungsAbstimmungsGespraech” (BAG) between the Supplier and the responsible SQE and/or other specialist department carrying out the verification inspection types and shall be held after the parts are “W” or “_” released.

The objective of planning is the definition of the necessary verifications to be submitted based on the specification of the production process and product and to identify the sampling scope (i.e. testing requirements, verification type) and sample requirements. The result of this meeting can be documented in Parts Inspection Approval (PIA) system as part of the evidence planning.

The approval tree, which can be found on PIA, is generally used for the sampling and detailed planning of the required verifications, implementation and decision of the sampling. It ensures the transparency of the individual statuses of the approval modules and individual decisions as well as the documentation of the approval history.

3.8.1 Verification for the PPA Process[11]

As part of the sampling/evidence planning, the required verifications are agreed upon as per the table below, unless otherwise agreed between the department responsible for the series production approval and the Supplier. Verification requirements will vary depending on product, product change complexity

and/or Supplier performance. Specifics of timing, quantity of sample parts, and verification criteria shall be defined during the sampling/evidence planning between the Supplier and the responsible SQE.

No.	Verification if applicable for process and product	Sampling Planning
1	Cover sheet for the PPA report*	V
2	Self-assessment of product, process and, if applicable, software	V
3	Technical Specifications	A
4	Approved design modifications	A
5	Design and development approvals	A
6	The ID no. of the accepted IMDS material data sheet on the current design engineering status shall be specified in the PPA report	V
7	Design FMEA	A
8	Process flow chart	A
9	Process FMEA	A
10	Production control plan (PCP)	A
11	Geometry, dimension	A
12	Material	A
13	Function	A
14	Haptics	A
15	acoustics	A
16	Odor	A
17	Appearance	A
18	Surface requirement	A
19	Technical cleanliness	A
20	Reliability	A
21	Resistance to Electrostatic Discharge (ESD)	A
22	Electrical safety / high voltage safety	A
23	Electromagnetic compatibility (EMC)	A
24	Protection of special features as per technical specifications and agreed features (e.g. Poka Yoke, 100 % testing, process capabilities...)	A
25	Laboratory qualification	A
26	Number of samples and reference samples	A

No.	Verification if applicable for process and product	Sampling Planning
27	Achievement of serial cycle time	A
28	Tools list (with unit nos./number of nests and statement on tool quality)	A
29	Compliance with legal requirements	V
30	Overview of the Partner's supplier and in-house parts with part and process release status	A
31	Inspection and Test Equipment List	A
32	Verification of test equipment capability	A
33	Parts history**	V
34	Suitability of the used charge carriers incl. their storage	A
35	Requalification agreement	A
36	SW Application release ("Software Test Report" annex)	V
37	SW Application release ("Software Test Report" annex)	V
38	Reference to contractually determined quality requirements (e.g. Coding guidelines, code metrics, test coverage)	V
39	Documentation of technical SW specifications (functional and non-functional)	A
40	Verification of the implementation of the requirements from 38 and 39, especially the A special features (e.g. safety)	A
41	Documentation about FOSS (Free-and-open-source-software)	V
42	List of known errors	V
43	Documentation of the development tools applied during the entire project duration	A
44	Documentation of the testing tools applied during the entire project duration	A
45	Documentation of the version management (baseline, configurations, change history)	A
46	Verification of a process assessment (e.g. VDA Automotive Spice)	A

[11] *Refer to the current release of the MBST-13 for detailed information of the Production Process and Product Approval (PPA)*

*Submission of the document in case of samplings, which do not take place via an IT system (i.e. documentation only in paper form).

**No submission of the associated document by the Partner if the relevant documentation is covered by the MBC-internal IT system unless otherwise required by specific MBC location (i.e. MBUS)

V = Submission to MBC

D = Where applicable: Execution, documentation and archiving of the organization (if necessary, for inspection by MBC)

A = All the submissions points going beyond the minimum scope must be agreed upon during the sampling planning between the Partner and MBC.

3.8.2 Process Flow Chart, Control Plan and FMEA[12]

The Supplier shall have the Process Flowchart, Process Failure Mode and Effects Analysis (PFMEA) and/or Control Plan readily available for review by the responsible SQE. These documents shall depict the manufacturing process and inspection points from beginning to end (incoming material through final shipping) and shall include all KQC's (e.g. <DS>, <DZ>).

[12]In reference to MBST 27 Failure mode and effects analysis (FMEA)

The Partner shall create and maintain a Design and Process FMEA for the system and/or component (component part) which is to be developed/supplied in a timely manner using a suitable system. The procedure thereby must comply with the AIAG/VDA FMEA manual for Design FMEA, Process FMEA, FMEA amendment to the Monitoring & System Response of engine friction torque control. The Partner is solely responsible for his FMEA scope.

The interfaces of the FMEA shall be coordinated with the responsible Daimler department prior to the creation of the FMEA. If necessary, the assessment of the error severity level of the error consequences ("B") must be agreed upon between the Partner and the Daimler department.

If the product (system) to be developed/to be supplied includes software scope, the system architecture/structure should preferably be presented in a function-oriented manner. The structure can be derived from a function analysis that describes the interactions between a system's functions and sub-functions. The key software functions shall be analyzed analogous to hardware functions and must be taken into account the system architecture/structure.

Further requirements can be defined by Daimler in the requirement specifications or other specifications and guidelines.

The documentation of the method and the evidence of the execution of the FMEA incl. documents shall be provided to Daimler for inspection upon request.

All documents associated with this procedure must be stored by the Partner in accordance with VDA Volume 1.

[12]Based on MBST 27/09 Failure mode and effects analysis (FMEA)

The control plan is the main document that defines the manufacturing process. MBUSI requires the Supplier to annually re-validate the aspects of the product that affect safety and durability. These requirements shall be listed on the Control Plan.

3.9 Identification/Labeling *Previously released under Section 3.3

3.9.1 Identification of the Part

Location of the sticker with the E/Q/F level shall be easily found on the part and easily readable. MBUSI reserves the right to request separate labeling of sample parts and parts for production tests.

3.9.1.1 Before Sampling

For parts that have not been sampled, these parts shall be identified specifying the state of development (Exx) according to the development part life record.

Parts for advanced tests (split sampling), which have not yet been produced completely under series conditions, shall be submitted as "Other samples" in consultation with the responsible SQE. No series production approval shall be issued for "Other samples".

Unless otherwise agreed, a red sticker (Ø approx. 20 mm) specifying Exx (whereby xx is the sequential index) must be used.

3.9.1.2 Initial Sampling

The sample parts for the initial sampling as part of the PPA process shall be identified with a white sticker (Ø approx. 20 mm) specifying the quality status in accordance with the quality status in accordance with the part life record (Qxx) and stating the color status in accordance with the color part life record (Fxx) for parts with supplementary code 2 (ES2).

Coordination with the responsible SQE is required for body-in-white parts. In justified exceptional cases, deviating regulations may additionally be agreed with the responsible SQE for series production approval.

In addition, the container and the initial samples themselves shall be identified with a tag. This tag shall be affixed in a manner appropriate for volume shipments and shall be clearly marked "initial sample" and shall state details of the Q-Level and the drawing geometry level (ZGS). In addition, a written record of any special agreements (e.g., deviation approval) shall be included with the initial sample unless otherwise agreed with the responsible SQE.

3.9.2 Shipping Label **Previously released under Section 3.3.2*

All MBUSI production part Suppliers shall have a process in place at their production facility and any other location in which parts are shipped to ensure that the shipping labels on the product container complies with MBUSI "Parts Identification Label – Barcode Standards." This system should include at a minimum one-verification loop before the final product is shipped to MBUSI or any MBUSI part consolidation/sequencing center.

MBUSI reserves the right to make the part ZGS/Q/E level labeling mandatory in certain cases (i.e. Production Trials).

3.9.3 Part Specific Labels and/or Bar Code **Previously released under Section 3.3.3*

Any product that requires a part specific label or bar code shall meet the label requirements defined on the production part print or part data. Supplier shall meet specific/special part labeling requirements for some market/countries (i.e. China CCC).

3.9.4 IMDS Requirements **Previously released under Section 3.3.4*

The IMDS (International Material Data System) is the automobile industry's material data system. IMDS data is strictly needed as a certification document about compliance to legal substance bans. IMDS number is needed for purchased parts during the submission of sampling. Within the scope of sampling of new and of modified parts, the Supplier is obliged to configure the material data sheets in IMDS. The ID-number for the IMDS data record shall be specified in the initial sample cover sheet and the corresponding "Materials data sheet/IMDS" annex.

The plant code for Plant 1380/ Mercedes-Benz Tuscaloosa is ID 8302

The Supplier receives the IMDS data sheet evaluation approval via MDS system.

For more information: https://public.mdsystem.com/en/web/imds-public-pages/imds-system

3.9.5 VeDoc Requirements **Previously released under Section 3.3.5 as FDOK*

Any product that has VeDoc identifier in the Product Data Management (PDM) system shall meet the requirements in accordance to MBN 10385 which can be found in the DocMaster.

3.10 Part E-Level and Q-Level History Tracking

For each part, the Supplier shall establish a Part E-Level and/or Q-Level History Report. The Part E-Level and Q-Level History Report shall list the change status of the production process by means of the E-Level or Q-Level.

The E-Level and Q-Level of a product describes the exact drawing and geometry level (e.g., KEM) and, in addition, all manufacturing engineering conditions and/or process modifications not associated with an engineering change, such as: changes to raw material sources, manufacturing locations, PPAP sample iterations, tracking of additional tooling capacity being brought into production, etc.

E-Level, also known as development level is used to identify parts prior to PPA approval (i.e. Null Series parts). Q-Level is used to identify the quality level of production parts during the PPAP approval.

Changes to part geometry or design will be tracked on the ZGS level. The parts submitted for initial PPAP approval shall be marked as Q1. Each time a PPAP is submitted for a product the Q-Level will increase.

3.11 Sample Parts

The sample parts requirements will be determined by the responsible SQE and documented in the evidence planning. For new products and/or model year changes the parts shall come from the same manufacturing lot as the parts for PV testing and/or shipments for the PT1 build.

PPA sample parts, including shipping, are “Plannable Start Up Costs” and are therefore NOT subject to separate reimbursement, cost recovery, or any other compensation (including Running Changes). Supplier is responsible for ensuring it has included PPA sample parts and their associated costs in its “Plannable Start-Up Costs”. After initial approval, subsequent PPA samples can be requested by the responsible SQE upon request.

3.11.1 Sampling Parts Submission: GPEC

Sampling is controlled via the Global Parts Evaluation Center (GPEC/LPEC). The Supplier shall ship the sample parts, as requested to GPEC in Germany. Sample parts shall be shipped in separate containers from production shipment and addressed to:

Mercedes-Benz WerkSindelfingen
Abladestelle 564 GPEC
Dornierstraße - Gebäude 512 – Tor 76
71034 Böblingen, Germany

3.11.2 Sampling Parts Submission: Interior Color Parts

Supplier shall provide the interior color parts that requires color PPAP approval to the local evaluation team at MBUSI. Requirements of the samples will be aligned by the responsible SQE and documented in the evidence planning. Sample parts for the interior color samples shall be shipped or hand carry to the MBUSI Color Evaluation Room.

Mercedes-Benz Plant 138 – Color Evaluation
1 Mercedes Drive
Vance, AL 35490
Unloading Point C44.2

3.12 Approval Status

The Series Delivery Approval (SDA) report is delivered to the Supplier via the sampling system). For specific plants, the results of the material test may be transferred with a separate test report.

In case of any rejections or conditional release, the Supplier shall coordinate measures to fulfill the green Series Delivery criteria and the sampling plan for follow-up sampling including resubmission/forecast date is accomplished at the same time as the test report is compiled.

Exception: Part to be discontinued soon (less than 3 months) or part is issued a new part number. In this case, the responsible SQE is bound to monitor the situation and, where applicable, has to introduce appropriate measures.

The rating system used for approval of the PPAP/PPA corresponds to the traffic light-system:

Series Delivery Status	Criteria
Green	Fulfills customer expectations completely Fulfills criteria of evaluating department completely Meets all design and development requirements / specifications
Yellow	Fulfills customer expectations Can remain in the vehicle Only non-critical specifications are not fulfilled New submission for approval necessary
Red	Does not fulfill customer expectations Cannot remain in vehicle Immediate re-submission for approval necessary

3.12.1 Product Approval Matrix

Product Approval	GREEN	YELLOW	RED
Material	Production material DBL requirements met	Production material, differently processed / DBL not complied with, deviation approval	Not production material DBL Requirements not met/not tested
Function	Function fulfilled, complies with specification	Slight deviations from specification, but with deviation approval	Function n.o.k. or not proven, specification not fulfilled
Dimensions	Dimensionally o.k. No rework	Dimensionally o.k. with rework or deviation approval, non-critical values n.o.k.	Dimensionally n.o.k., no measurement report, no gauge

Product Approval	GREEN	YELLOW	RED
Workability	Can be used without additional expenditure of time or money	Can be used with additional expenditure of time or money	Cannot be used
Appearance (Surface, Structure, Color/ Grain) Part Approval	o.k., no depressions, no undulations, meets design intent	Just acceptable, borderline, specimens available	Significant deviations, non-conformities, or cannot be assessed
Main Tools (Shaping or Reshaping Tool)	Production tool	Production tool, Fulfills customer requirements, Slight deviations from specification, but with deviation approval	Experimental tool
Machines Plant Equipment	Production version at the production location, accepted by supplier and capability demonstrated	Of same design as that to be used in production, or no quality issues expected in production	Not similar to production version, quality issues expected
Sub-supplier Parts	Approved	Conditionally approved	Rejected or no samples provided yet
MDB/IMDS	Approved	Conditionally approved	Missing IMDS number Incorrect IMDS number
Special Characteristics DS/DZ	Approved	Conditionally approved	Missing or incorrect or expired MSC certificates Missing proof of conformity of DS/DZ characteristics

3.12.2 Process Approval Matrix

Process Approval	GREEN	YELLOW	RED
Secondary Tools (Cutting/Deburring/ etc.)	Production tool	Production tool, fulfills customer requirements, Slight Deviations from specification, but with deviations but with deviation approval	Experimental tool, cut by hand

Process Approval	GREEN	YELLOW	RED
Logistics Chain	As for production with relevant sequencing effective dates determined	Not as for production, but no quality issues expected in production	Quality issues expected
Cycle Time Volume (Run at Rate)	Production cycle time without special measures	Production cycle time can be achieved on an on-going basis with special measures	Production cycle time cannot be achieved even with special measures
Workforce	All production staff trained, work/test instructions available	Selected production staff trained, work/test instructions available	No production staff, or work/test instructions incomplete
Process Capability	Agreed capability index requirements fulfilled	Agreed capability indices not reached, 100% inspection introduced	Capability indices not proven or established, no 100% inspection
Inspection and Test Equipment	All present and accepted, capability demonstrated	Equipment only partly available / accepted, substitute devices available	Not available or not accepted
Production Process for Sub Supplier Parts	Approved	Conditionally approved	Rejected or not yet accepted

3.12.3 Deviations

If the Supplier identifies any deviations to the production process, the Supplier shall contact the responsible SQE immediately and discuss the deviation and determine the appropriate countermeasure. A deviation (i.e. SDR, PDR) is a request for a temporary deviation or waiver from a product requirement. It is defined as a known or planned departure from the product requirements, approved process, or documentation. A deviation or a waiver is an unplanned departure from the product requirements, approved process, or documentation due to an error or problem and is not intended to be used for early implementation of design changes, or any failure of a Supplier to plan effectively.

MBUSI/MBC uses “Product Deviation Request System” (PDRS), and IT system that allows users to request, approve, document, and control the deviation permissions. One of the deviation type under the PDRS is the SDR.

Sampling Deviation Request (SDR) refers to the deviation management for components within the scope of initial and change sampling.

3.13 PPAP after initial release

3.13.1 Changes Requiring Re-Submission of PPAP

The Supplier shall discuss the proposed changes to the previously approved part and/or manufacturing process with the responsible SQE to determine if the change will invalidate the current approval status and discuss re-submission timing and/or requirements. Re-submission of previously approved part and/or manufacturing is necessary based on the triggers for PPAP submission. These changes include

but are not limited to: alternate processes, changes to the process control plans, inspection sample size/frequency changes, process flow alterations, sub-supplier changes, introduction of new acceptance standards, changes in manufacturing locations, relocation of equipment inside a facility, and changes to sub-supplier processes.

Any change of a sub-supplier must be pre-approved by the responsible SQE. A change of sub-suppliers may void previous testing releases, thus requiring additional vehicle validation testing by MBC. The Supplier shall gain written approval from MBUSI before relocation of any MBUSI assets. The responsible SQE may, at their discretion, also require re-validation of any PPAP in part or whole.

3.13.2 Requalification

The Supplier shall perform a requalification of part according to IATF 16949 by checking annually from start of production (SOP) to end of production (EOP) whether its deliveries meet the original specifications (including dimensions, material, reliability, legal specifications, environmental and production control plan).

Supplier shall meet the requalification requirements in accordance to IATF 16949.

> „A layout inspection and a functional verification to applicable customer engineering material and performance standards shall be performed for each product as specified in the control plans. Results shall be available for customer review.“

[12] *Based on IATF 16949: 8.6.2 Layout inspection and functional testing*

The Supplier evaluates, documents and archives the results and shall be made available to the responsible SQE upon request or during the supplier visit or audit by the responsible SQE. The requalification is carried out in PIA via sampling and requalification module. Any deviation must be agreed and aligned with the Supplier and the responsible SQE.

3.14 Tier Supplier Responsibilities

The Tier I Supplier of product to MBUSI shall be fully responsible for all tier Suppliers, including directed Tier-N suppliers. The Tier I Suppliers shall be responsible for verifying the quality of all pass through products from all Tier-N suppliers.

The Tier I Suppliers shall have a system in place that follows the same guidelines for the development of new product and processes with their Tier-N Suppliers.

The Tier 1 Supplier shall be responsible for the annual requalification of the parts.

3.15 Submission of Documents

The Supplier shall submit the PPA documents: sampling/evidence planning and/or required sampling documents, via IT sampling system: PIA (Parts Inspection Approval).

3.16 Storage Periods

Storage periods are based on VDA Volume 1. Following the discontinuation of series production, the PPA documents must be archived for 30 years by the Supplier and submitted on request to MBUSI.

4. Trial Series Support

4.1 Pre-Launch Control Plan and Launch Containment Plans

The Supplier shall prepare a Pre-Launch Control Plan for all products supplied for pre-launch trial builds and the production ramp-up phase. This document shall be prepared in accordance with VDA Volume 2. The Pre-Launch Control Plan shall be submitted to and approved by the responsible SQE prior to the Supplier commencing the Null Series, PT1, PT2 and Series Production.

The Pre-Launch Control Plan shall outline the process controls for all features and shall be controlled during early builds when supplied product is not from the final production process or the final production location. It must also detail the extraordinary process controls and product checks that will occur during the launch containment phase for the build of the first trial vehicles, as aligned with the responsible SQE.

4.1.1 Plan Requirements

Depending on the production process and set-up, additional process controls may consist of but not limited to:

- inspection audits/testing to identify any non-conformances during the production process
- increased frequency/sample size of receiving process and/or shipping inspections
- mandated sub-supplier containment and/or sub-supplier support/audits
- addition of inspection/control items
- increased verification of label accuracy
- enhancement of process controls such as error proofing validation through introduction of known quality sample parts (i.e. good vs bad master samples)
- increased involvement and visibility of top management
- identification of the measurement equipment and data collection devices to be used where applicable
- reaction plan for any non-conformances that are discovered
- Documented evidence for parts review (e.g. parts buy-off)

4.1.2 Pre-Launch Control Plan

The Supplier shall document the pre-launch control plan, including functional testing and error proofing. The development and documentation of the pre-launch control plan are required during the early phase of the project and does not substitute the production control plan.

4.1.3 The Launch Containment Process

The Launch Containment Process should be used for all pre-production requirements (e.g., Null Series, PT trials and selected running changes that require PPAP) and for the production ship quantity or duration specified by the responsible SQE or until the Production Control Plan is validated, whichever occurs later. The specified quantity or the specified duration is intended to reflect the MBUSI plan to full production rate.
The Supplier and the responsible SQE should align the MBUSI launch containment process.

4.2 KTMA and Measurement Requirements

4.2.1 KTMA

The KTMA (Purchased Parts Measurement Audit) checks the geometric shape against the corresponding nominal values and tolerances and compares with the actual values. The Supplier is responsible for producing dimensionally accurate components. The Supplier shall measure and test the components on a defined test equipment according to the required measurement specification and shall submit the measurement reports to the KTMA (Purchased Parts Measurement Audit) team according to the Project milestones and shall have an improvement plans in place and show progress from each build phase.

4.2.2 Measurement Reports

Measurement information and functional test results are required for parts shipped for Null Series, ET, PT1, PT2, PT3 and/or any other sample parts supplied to MBUSI. This information will allow for dimensional evaluation of the product as well as support in problem resolution during the trials.

The following are the minimum dimensional measurement requirements: all KQC points, attachment holes, attachment surfaces, and/or mating area to other parts. Other dimensions should be available upon request from the responsible SQE, MQI, Development or Null Series Engineering.

This measurement information should be acquired by means of CMM-Measurement or other equivalent device approved by the responsible SQE. “Go”/”No-Go” evaluation information on a checking gauge does not qualify as dimensional measurement, unless specifically agreed to by the responsible SQE.

Following are the minimum sample sizes for dimensional measurements per trial:

Null Series: The first 5 parts of each lot plus every 10th part after the initial five-part measurement (i.e., part number 15, 25, 35)
ET and PT1: The first 5 parts plus every 10th part after the initial five-part measurement (i.e., part number 15, 25, 35)
PT2: The first part plus every 10th part (i.e., part number 1, 10, 20, 30)
PT3: The first part plus every 20th part (i.e., part number 1, 20, 40, 60)

The Supplier is required to perform functional checks on 100% of the trial product, unless otherwise agreed to in writing by the responsible SQE. The results of those checks shall be recorded on the Sample Data Sheet. One copy of the Sample Data Sheet shall be supplied with the product in or attached to the shipping container. One copy of the Sample Data Sheet shall be supplied to the responsible SQE as a paper copy or in an electronic format. The measured parts shall be identified or labeled so they can be easily matched to the measurement and test results in the Sample Data Sheet.

Trial product not measured per these requirements shall be checked on a go/no-go gauge. These parts shall be identified with a small green sticker on the product in an area not visible in the vehicle (does not apply to body in white product).

4.3 Supplier Maturity Vehicle

During Null Series, one or more vehicles will be designated a Supplier Maturity Vehicle (SMV). During this build, MBUSI may invite critical Suppliers to attend and support the trial to identify issues and provide an immediate countermeasures. Selected Suppliers will be notified by MBUSI with the planned build schedule. Any changes to the schedule will be communicated as soon as known. Designated Suppliers are expected to provide a list of attendees to the responsible SQE one month prior to the event. Attendees shall comply with all Mercedes-Benz plant and Null Series guidelines while attending the Null Series build.

5. Production Launch Support

5.1 Launch Containment Plan

The Supplier shall implement a launch containment plan to support new model start up as outlined in the Trial Series Support. Implementation of this plan shall be in place for all pre-production requirements (e.g. Baulos, PT trials and selected running changes).

5.2 On-Site Supplier Resident Engineers/Supplier Representatives

Supplier Representatives are welcome on-site at MBUSI during our Launch and Ramp-up phase to assist with coordination activities of their respective supplied parts.

Supplier Representative may sort, rework, or repair supplied material upon review and approval from the responsible Supplier Quality (e.g. SQE. PQE, SQO, QRD). Supplier Representatives will need to observe all safety and mutilation guidelines while on-site at MBUSI.

Desk space will not be provided by MBUSI for Supplier Representatives. In addition phone service and data services are the responsibility of the individual supplier. On-site supplier representation at MBUSI shall be pre-approved by responsible SQE and/or PQE. Supplier Representatives who do not adhere to MBUSI guidelines will be asked to leave the facility.

5.3 Rework and Sort of Non-Conforming Product

5.3.1 Reworking of Non-Conforming Product

Supplier Representative may sort, rework, or repair supplied material upon review and approval from the responsible Supplier Quality (e.g. SQE. PQE, SQO, QRD). Removal of supplied material from the MBUSI premises shall be coordinated with MBUSI Logistics and/or MBUSI PQE/SQO. All Foreign Trade Zone (FTZ) requirements shall be adhered to when moving material into and out of the MBUSI facility.

It is the Supplier's responsibility to take all necessary steps to ensure that disruptions to the flow of material into MBUSI are avoided with regards to rework. Suppliers will be financially liable for any disruptions to the MBUSI operations caused by non-conforming product.

6. Series Production Support

6.1 Containment of Non-Conforming Product

If the Supplier suspects or knows that non-conforming material has been shipped to MBUSI, the Supplier shall inform MBUSI without delay. Suppliers will be financially liable for any disruptions to the MBUSI operations caused by non-conforming material including but not limited to parts replacement, expedited shipment.

MBUSI expects that all supplied material meets the agreed upon quality standards and is free from non-conformances before being shipped to MBUSI. In the event non-conformances are suspected in supplied material, a specific short term sort may be required to ensure non-conforming material is contained before reaching the MBUSI assembly lines. An on-site sort may be initiated by MBUSI Supplier Quality (SQO, PQE or SQE). Only MBUSI personnel or MBUSI approved third party sorting companies may sort material on-site at MBUSI. Sorting of suspect material by Supplier representatives on-site at MBUSI is not allowed.

In some cases, MBUSI Supplier Quality (SQO, PQE or SQE) may require that an on-site sort be continued even after a clean point is established until the verification is completed that the material is non-

conformance free. In the event that a clean point is broken, the containment will be restarted to obtain a new clean point.

MBUSI expects that clean stock be expedited as needed at the Supplier's expense to avoid a disruption of material flow to MBUSI operations. This action should be coordinated with MBUSI Logistics and MBUSI Supplier Quality (SQO, PQE or SQE), as needed.

6.1.1 On Vehicle Containment

Upon discovery of nonconforming parts, MBUSI reserves the right to conduct an inspection of completed and partially completed vehicles with the appropriate charge back of time to the Supplier's account. Whenever possible, MBUSI will contact the Supplier prior to this inspection and allow the opportunity for an approved 3rd party inspection company to support the vehicle inspection. MBUSI will provide a vehicle listing to the inspectors and the inspectors will provide the results to MBUSI at the end of each shift. On vehicle containment will remain in place until all suspect vehicles are inspected.

6.1.2 In Route Containment

Within 2 hours of notification, the Supplier Representative at MBUSI facility (or an approved third-party inspection company contracted by MBUSI or the Supplier) will initiate containment of all parts in the MBUSI plant or inventory location and conduct the receiving inspection until a good shipment is received. The Supplier Representative or the third-party inspection company will report the results of the inspection to the MBUSI PQE immediately upon establishing a clean point for the contained material.

6.1.3 Shipping Containment

If an on-site sort is initiated, in parallel, all efforts shall be taken to contain suspect non-conforming material prior to its arrival at MBUSI. Any necessary steps need to be taken so that a clean point can be established from the Supplier and the on-site sort discontinued. Suppliers shall take all necessary steps to improve their process as needed to avoid having to sort material in the first place.

6.2 Part Disposition

Non-conforming material provided by Supplier to MBUSI will be contained and marked with a Defective Material Tag (DMT) to remove the product(s) from MBUSI inventory and charge back the material cost to Supplier. Unless otherwise arranged, material will be returned through the normal logistics process. The Supplier shall arrange and bear the cost for any expedited shipments or additional delivery other than the normal logistics system required due to the provision of non-confirming material and issuance of a DMT. Expedited shipments shall be made within 24 hours of notification or parts will be returned to logistics for shipment.

MBUSI reserves the right to scrap nonconforming product if return shipping is not arranged. The Supplier is responsible for all costs associated with shipping/scrapping of nonconforming parts. These include, but are not limited to, material cost, overhead cost, rework cost and shipping cost.

6.3 Rework

Non-conforming product may not be reworked at MBUSI facility **unless** approved by MBUSI Supplier Quality (e.g SQE, PQE, SQO) Immediate rework due to part shortage may require a deviation to bring the part to conformity and must be reviewed by MBUSI Supplier Quality for applicability.

If the cause of the part rework is the Supplier responsibility, the Supplier shall be responsible for and the Supplier shall bear all costs associated with part rework, including but not limited to all support activities, all support services (including third party services), and any costs associated with processing quality or nonconformity issues.

7. Corrective Action/Q-H:ELP

7.1 Corrective Actions

When nonconformities or quality issues are reported by MBUSI, Supplier shall provide information to the responsible SQE/PQE identifying root causes and countermeasures to ensure no repeat occurrences determined by a problem solving methodology. Repeat occurrences due to ineffective countermeasures are not acceptable and require corrective action as decided by MBUSI in its sole discretion.

7.1.1 Reporting Tool

The method and format of corrective action must be submitted and coordinated with the responsible SQE/PQE (e.g. MBUSI 8D Problem Solving, 5-Why, SQMS Complaint Management, 8D-Report, 4Q).

Preferred problem solving documentation by the responsible PQE: MBUSI 8D Problem Solving and/or SQMS Complaint Management module.

For further details, refer to “MBUSI Supplier Problem Solving – expectations and requirements” that can be found in the DocMaster.

7.2 Q-H:ELP Process

Q-H:ELP stands for **Q**uality C**H**allenges: R**E**cognition, So**L**ution and **P**revention.

7.2.1 Objective

The high quality standards at Mercedes-Benz Cars & Vans require efficient detection, solution and prevention of quality and logistics issues. The three-stage supplier cooperation model Q-H:ELP is a method that supports the achievement of these requirements for Suppliers.

With regard to the treatment of quality and logistics issues, this interdisciplinary procedure not only enables rapid action, but in particular binding and effective process optimization for all parties involved. Q-H:ELP ensures that the various Mercedes-Benz Cars (MBC) plant apply a uniform procedure and that the Suppliers from all production plants are integrated into the issue solving process via the same procedure in order to improve cooperation and delivery performance.

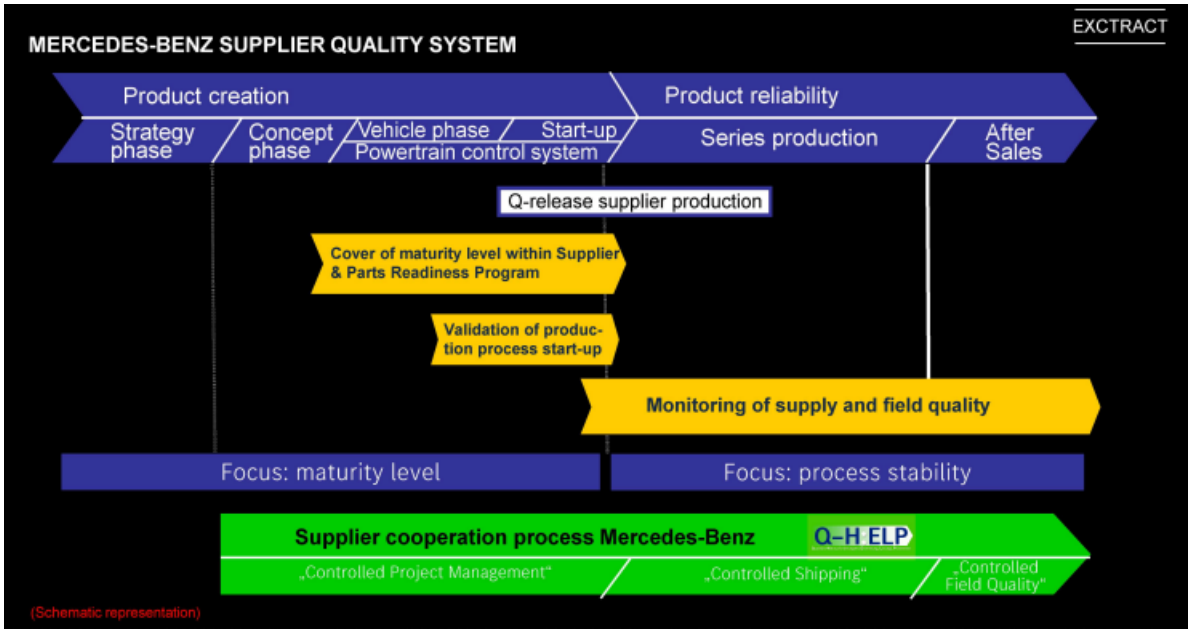
In this way, Q-H:ELP sets a binding standards in troubleshooting – standards that are just as important for Suppliers as they are for the entire MBC organization. Consistently positive and quality and logistics services of a Supplier are taken into account accordingly with regard to new product projects.

Suppliers who practice the zero defect target and practice an exemplary issue solving and prevention do not come in Q-H:ELP. Q-H:ELP follows an objective of highest priority in every respect: ensure high-quality cooperation between MBC and its Suppliers.

Q-H:ELP is the standard process for Mercedes-Benz Cars & Vans on how to solve critical quality and logistics issues with Suppliers. It is a three level process with standard activities in each level.

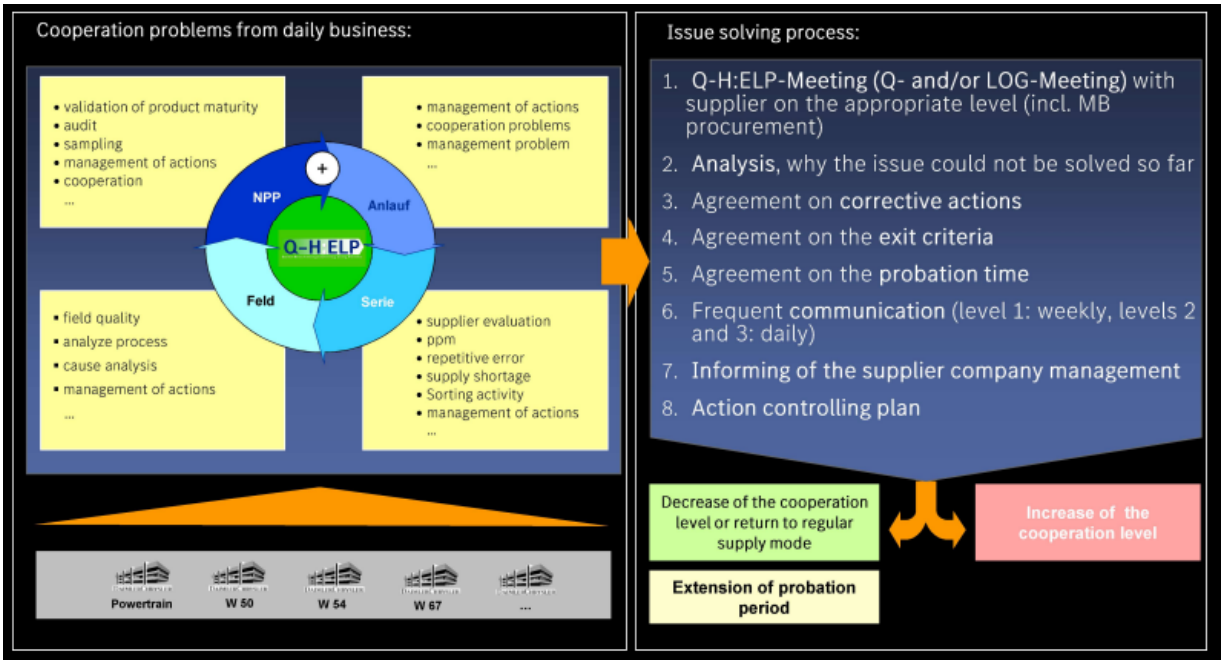
7.2.2 Overview cooperation process Q-H:ELP

Q-H:ELP is the standard process for Mercedes-Benz Cars & Vans on how to solve critical quality and logistics issues with Suppliers. It is a three level process with standard activities in each level.



7.2.3 Basic process in each cooperation level

The basic process in every cooperation level is the same. There are only two possibilities at the end of the probation time: increase or decrease of the classification level.



7.2.4 Q-H:ELP Level and Criteria

Depending on the issue, individual criteria and requirements as aligned with MBUSI/MBC contact, can lead to a Q-H:ELP classification in the New Product Project (NPP), Series (Delivery, Quality, Logistics), and Field Quality.

The three level of Q-H:ELP are:

- Q-H:ELP Level 1 – Controlled Project Management/Controlled Shipping
- Q-H:ELP Level 2 – Controlled Project Management/Controlled Shipping
- Q-H:ELP Level 3 – New Business Hold

Suppliers on Q-H:ELP has to address its ongoing issues, requirements and countermeasures within a certain timeframe, as aligned with MBUSI/MBC contact, in order to get back to the regular cooperation. Otherwise, the process leads to the next Q-H:ELP level.

To exit a Q-H:ELP classification the agreed **countermeasures** have to be fulfilled. The **effectiveness** of the countermeasures have to be confirmed by MBUSI/MBC and the issue has to be solved in the defined **probation time**. In case of re-audit the audit must be rated with min. B or yellow.

7.2.5 Initiation and Cost Responsibilities

MBUSI may put Supplier on Q-H:ELP if Supplier, in MBUSI's sole discretion, does not meet the program management, quality, and/or logistics measures as set forth in MBUSI's specifications or customer requirements, or any other performance requirements provided to or otherwise expected of Supplier by MBUSI.

If Supplier is placed on Q-H:ELP, the Supplier shall be responsible for and the Supplier shall bear all costs associated with Q-H:ELP, including but not limited to all support activities, all support services (including third party services), and any costs associated with processing quality or nonconformity issues.

8. Gauge Standard

The purpose of the Supplier Gauge Standard is to outline the minimum quality requirements for the Suppliers of Mercedes-Benz U.S. International, Inc. (MBUSI). These requirements are designed to assure that all products (parts, systems, modules, components, raw materials, etc.) supplied to MBUSI meet all known drawings, standards, specifications and agreements. Meeting these minimum requirements helps to assure customer satisfaction. This manual, however, is not intended to change specific requirements and remedies, if set forth in the body of the supply agreement and/or any appendix other than this manual, which specific requirements and remedies in case of inconsistencies shall prevail.

8.1 Scope

This standard gives the supplier guidance in the requirements for design, build, inspection and certification of all dimensional control gages built for MBUSI production parts. This standard applies to all body-in-white, trim and chassis components. These standards shall be adhered to for all gages and aligned with the responsible SQE.

8.2 Responsibilities

The Design approval shall not constitute a waiver or guarantee of responsibility for any gauge produced for MBUSI. An approved gage design does not constitute a certified or functional gage.

It is the responsibility of the Supplier to meet the requirements called out in this standard. If there are any questions or concerns, contact the responsible SQE. Any deviations from this standard must be approved in writing by the responsible SQE.

8.3 Requirements

8.3.1 Kick-off Meeting

A kick-off meeting will be held between the Supplier and the responsible SQE to review the Suppliers' proposed gauging concept for the production part. In this meeting the Supplier will provide a pre-launch Process Control Plan along with a process Flow Chart and a copy of the latest released production part print or CATIA data file. This Control Plan shall include all process control points with the points where process gauging will be used, highlighted. These points should also be highlighted on the process flow chart.

The supplier will submit a Functional Gauge and Approval Request (FGAR) and a Supplier Part Inspection Standard (SIS) for the final shipping unit. These should be provided at the kick off meeting. A FGAR will also be provided for the other process gauges called out in the control plan. If there is no datum scheme called out on the production part print or in the CATIA data file, the Supplier shall propose a datum scheme, significant characteristics (SC) or KQC points called out on the production part print, the Supplier shall propose an SC/KQC plan by listing the points on the SIS form and checking the KQC box and provide that information to the responsible SQE prior to the meeting.

The following criteria will be used to determine if the supplier can begin the gauge design process:

- Review of the production part print and the CATIA data file
- Review of the Process Flow Chart and pre-launch Process Control Plan
- Review the FGAR sub-processes
- Review the FGAR and SIS for the final shipping unit
- Determine if the process control system and proposed gauging will insure that the production parts will meet the design intent and dimensional requirements

8.3.2 Design Approval

Once the gauge design is complete, the supplier shall submit a copy of the final gauge design along with the FGAR and SIS to the responsible SQE for approval, before the hard tooling build can begin.

8.3.3 Final Approval

The supplier is responsible to perform the final buy-off of the gauge at the gauge manufacturer per the gauge buy-off requirements listed in section 8.3.7. The supplier will maintain a copy of the buy-off data at the manufacturing facility where the gauge is being used.

8.3.4 Production Implementation

The responsible SQE will perform final production approval of the gauge during the PPA approval.

8.3.5 Engineering Changes and Modification to the Gauge

All engineering changes that have an effect on the gauge and all modifications to the gauge will follow the same process and be reviewed with the responsible SQE.

8.3.6 Build Requirements

8.3.6.1 General Requirements

The purpose of this build requirement section is to insure that there is a uniform build standard for all MBUSI production part gauges. If the supplier has gauge build standards that meet or exceeds these

general requirements, the supplier standards can replace sections 8.3.2 through 8.3.6.10, with written approval from the responsible SQE.

8.3.6.2 General Design

- All gauges shall be designed in metric and built with metric components
- The gauge shall address all tolerances as shown on the production part print/or in CATIA data file
- The fixture base will be parallel to the X, Y, or Z plane of vehicle unless otherwise agreed by the responsible SQE
- Design Considerations:
- Operator and maintenance personnel safety.
- Simplicity in operator part loading without restrictions or interference's
- Free accessibility to all components for ease of maintenance and replacement.

8.3.6.3 Bases

- All gauges will have a steel or aluminum base unless otherwise agreed by the responsible SQE
- The base shall be sized so that all clamps and movable components do not overhang the edges of the base when in the open position. Also, there shall be sufficient surface provided on the base for mounting interchangeable tooling, inspection equipment
- All gauge bases shall have jig feet in the four corners at a minimum
- All CMM alignment features shall be clearly identified on the base
- Color of base per MBC/MBUSI specification

8.3.6.4 Body

- The gauge body shall be constructed of steel, aluminum, or composite material upon agreement with the responsible SQE
- All features will be NC machined to the math data
- No shims or adjustability shall be allowed in any gauge
- All units mounted to the base or body of the gauge will be doweled and labeled

8.3.6.5 Datum

- The datum, as indicated on the production part print, CATIA data file, SIS or FGAR, will be used as locators on the gauge. Any datum that is used other than primary, secondary, and tertiary (datum 1 – 6) shall be removable.
- All datum points shall be clearly identified on the gauge
- All 2-way and 4-way location pins shall be tapered with an angle of 5° - 10°. Diamond shaped 2-way location pins must be keyed to prevent rotation
- All datum surfaces shall be the same size called out on the production part print, CATIA data file, SIS, or FGAR
- All datum surfaces shall be hardened steel and inserted onto the fixture body.

8.3.6.6 Clamps

- The responsible SQE must approve all clamp points.
- Clamps on "A" surface of trim parts should be avoided.
- Clamps shall be mounted to the gauge base not to the body of the gauge.
- All clamps shall be 90° to the part surface.
- Corner clamps shall clamp along the bisecting line of the two corner surfaces
- All clamp contact points on datum surfaces shall be centered on the datum.

8.3.6.7 Pins

- All holes requiring pins checks (position and/or size) will be determined by agreement between the responsible SQE and the Supplier on the FGAR.
- A hole location pin shall use the nominal hole size minus the hole size tolerance and location tolerance to determine the gage pin diameter
- A threaded hole location pin shall use the minor diameter of thread minus the locational tolerance for the pin size.
- All gage pins shall slip fit into standard size bushings. The bushings shall be press fit in nominal position in the gage.
- A slotted hole size shall be checked by two independent pins – one for each dimension.
- All gauge pins are to be hardened steel.
- All pins must be attached to the gauge and labeled appropriately.

8.3.6.8 Flush and Feeler Checks

- Feeler clearance gaps to be either a 3mm or 6mm nominal gap, as agreed upon by the responsible SQE and the Supplier on the FGAR.
- All flush and feeler checks are to be normal to the nominal part surface.
- All stamping and assembly gauges for closure panels shall have complete periphery gauge bars with all feeler checks being 3.0mm gaps and flush checks to be zero (nominal).
- Feeler and Flush check requirements for all other parts are to be agreed upon by the responsible SQE and the Supplier on the FGAR.

8.3.6.9 SPC Checks

- All SPC bushings to be made from hardened steel
- Calibration for SPC indicators to be fixed to the gauge base
- Sections 8.3.2 through 8.3.6.10, with written approval from the responsible SQE

8.3.6.10 Identification

- All gauges for MBUSI supplied parts shall be clearly identified with the following information:
- MBUSI Part Name
- MBUSI Part Number (or part number series)
- KEM Level and ZGS level
- Last certification date and date due for next certification
- This information must be permanently attached to the gauge.

8.3.6.11 Build Tolerances

Feature	Location	Size
Location Pins	± 0.05 mm	± 0.01 mm
Datum Surface	± 0.05 mm	
Flush Surface	± 0.15 mm	
Feeler Surface	± 0.15 mm	
Stab Pins	± 0.10 mm	± 0.01 mm
SPC Position on Gauge	± 0.50 mm	
SPC Location to Check	± 0.05 mm	

8.3.7 Buy-Off Requirements

The supplier shall have a documented procedure showing how the gauge verification process is accomplished. This plan should include a verification plan at the gauge manufacturer and at the user facility.

8.3.7.1 CMM Certifications

- The gauge shall be verified by CMM inspection to the latest production part data, not to the gauge data.
- Gauge verification points should, at a minimum, include:
  a) Maximum distance between inspection point is not to exceed 100.0mm.
  b) Minimum distance from a tangent is 3mm.
  c) For curved surfaces reduce point spacing to 15-25mm.
  d) For radius up to 20mm generate 3 points - both ends of tangent and at center for radius.
  e) For radius 20 to 40 mm generate 5 points – both ends of tangent and 3 equally spaced on radius.
  f) For radius 40 40mm and larger generate 10 points - both ends of tangent and 8 equally spaced
- When generating CMM inspection data, at a minimum, the following points should be used:
  a) Datum blocks - generate (5) points (1) at each corner and center.
  b) Flush and feeler check rails - make rows of points at 5mm and 13mm from hard corner edge.
  c) Template (knife-edge) - make (1) row of data at .75mm from hard corner edge.
  d) Template (contour edge) - make (2) rows of data 1mm from each side of blade.
  e) Sight checks (irregular shaped hole) - make a row of data 3mm from top surface.
  f) Sight checks (round or slot holes) - make a row of data 3mm from top surface to check size and location, if it's a slot check the angle. Project nominal to part surface.
  g) Plug checks (round or slotted holes) - make 2 depths of cylinder check points to determine size and location.
- The supplier shall maintain this information on site at the user facility

8.3.7.2 Gauge R&R Requirements

- All gages shall pass an approved Gauge Repeatability and Reproducibility procedure as outlined in the AIAG Measurement System Analysis manual
- Guidelines for acceptance are as follows:
  a) Under 10% error is required for critical product characteristics
  b) 10% to 30% may be acceptable based upon the importance of the application. I.e. non-critical product characteristics, cost of gage, cost of repair, etc. Acceptability shall be determined by the responsible SQE
  c) Over 30% error, the measurement system needs improvement. The supplier shall identify the problems and submit proposed corrections to the responsible SQE

8.3.8 Maintenance Requirements

8.3.8.1 Storage

- The supplier is responsible to provide proper storage for the gauge.
- Proper storage is considered protection from dirt and damage so that the environment in which the gauge is stored has on effect on its performance.

8.3.8.2 Repair and Maintenance

- The supplier shall have a gauge repair and maintenance system at the user facility.
- The repair and maintenance system shall, at a minimum, consist of the following:
  a) An individual assigned to be responsible for the system

b) A frequency of inspection assigned to each gauge maintained on a master list
c) A system for repairing or replacing missing or damaged gauge components

8.3.8.3 Re-Certification

- The supplier shall adhere to the requirements for certification and calibration in accordance to the IATF 16949 manual.
- A gauge re-certification program with a frequency of no less than once per year must be in place. This re-certification program shall include verification of the GR&R, if required by the responsible SQE

9. Supplier Scorecard

The Supplier Scorecard (e.g. Supplier Quality Performance Card) is calculated and sent on a monthly basis based on key performance indicators (KPI's) and targets set by the Supplier Quality. The KPI's and targets are reviewed periodically and is subject to change.

10. Supplier Portal Applications

Supplier is responsible for registering for user access to the Mercedes-Benz Supplier Portal
Suppliers shall request access to the following frequently used applications by Supplier Quality, but not limited to:

- **Parts Inspection Approval (PIA)** – an IT system that supports the planning, sampling and requalification process for purchased parts
- **start** - system for ramp-up management and parts readiness
- **ARGUS** - supports planning, execution and action management of Supplier audit
- **QUNECT** – online tool for VDA-RGA process
- **CERTUS** – Certification Management for component and supplier certificates
- **DocMaster** – stores standards and technical specifications in a digital format
- **Supplier Quality Management System (SQMS)** – an IT system that supports the complaint process

11. Change Documentation – Description of Changes

28-Apr-2023: Released SQAM 28.01 for spelling correction and removed comments
17-Apr-2023: This version of the MBUSI Supplier Quality Assurance Manual, SQAM 28.00 supersedes the existing version of SQAM PSQ 27.0. Replaced the following terminologies and see the table below for changes in each section.

- Daimler has been replaced to either MBC or MBUSI
- ISO/TS16949 to IATF 16949

Section	Description of Change
1	Updated QMS requirements based on: • MBST 14: Quality Management System • IATF 16949 Requirements
2	Updated the following process: • Supplier Audits • Performance Test • VDA-RGA process • DS/DZ • Inspection Gauge Requirements FGAR form to include the construction requirements
3	Adopted requirements from the new FMEA/AIAG process and MBST 27: Failure Mode and Effects Analysis (FMEA) Additional PPAP requirements based on MBST 13: Production Process and Product Approval (PPA) Updated the following process: • PPA process based on PIA (Global Sampling) • Performance Test • VDA-RGA process
4	Added the following requirement for KTMA process
5	Updated supplier representative responsibility
6	Updated MBUSI expectation of containment of non-conforming product
7	Updated the problem solving tool Added additional information about Q-H:ELP and cost responsibility
8	No Change
9	Replaced the Supplier Evaluation System to Supplier Scorecard
10	Updated required applications (e.g PIA, QUNECT)