VDA QMC

German Association of the Automotive Industry
Quality Management Center

2

Quality Management in the Automotive Industry

Quality Assurance of Supplies

Production Process and Product Approval (PPA)

7th revised edition, January 2026
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Non-binding VDA recommendation

The German Association of the Automotive Industry (VDA) recommends that its members apply the following VDA volume when introducing and maintaining quality management systems.

Disclaimer

This VDA volume reflects the technical procedures known at the time of its respective edition. The contents therefore represent the knowledge and views of the authors at the time of publication. Although the information has been prepared with the greatest possible care, no claim is made for factual accuracy, completeness, and/or timeliness; in particular, this publication cannot take into account the specific circumstances of individual cases. Use of the information is therefore at the reader's own responsibility. Applying the VDA recommendations does not relieve anyone of responsibility for their own actions; all act on their own responsibility.

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Translations

The German document is the original. In the event of interpretive questions in other language versions, the German version shall be referred to as the original. This publication will also appear in other languages. The current version can be obtained from VDA QMC.

Foreword

The 7th edition of VDA Volume 2 is guided by the principle of a risk-based approach. This shift in perspective enables a targeted reduction in complexity – without losing sight of quality assurance. Instead of prescribing rigid catalogs of deliverables, the scope of the Production Process and Product Approval (PPA) procedure is determined by the risk level of the products to be released. This allows for more targeted use of deliverables, differentiated evaluation of deviations, and a reduction in documentation effort. As a result, not only is the number of required submissions reduced, but referencing existing deliverables is also made possible. At the same time, the number of forms has been streamlined. The application of the risk-based approach follows a development already emerging in other VDA volumes – in line with automotive industry practice.

The first edition of VDA Volume 2 was published in 1975, over 50 years ago, and for the first time defined framework guidelines for assessing supplier quality capability, inspecting PPA samples, and evaluating the quality of series parts upon goods receipt. The second edition, published in 1995, fundamentally described the procedure for assessing the quality performance of series deliveries and PPA samples. The third edition followed in 1998, aligning the procedure with international quality standards. The fourth edition, published in 2004, comprehensively revised the procedure, particularly with regard to material data sheets and the IMDS. The fifth edition, released in 2012, restructured the PPA procedure to more clearly describe requirements for new or modified delivery scopes. The sixth edition, published in 2020, focused on coordination between the organization and the customer regarding the scope, content, and schedule of the PPA procedure, as well as the elimination of submission levels and conditional approvals.

The present seventh edition continues this path consistently. It was developed, among others, in coordination with the VDA Materials Committee and incorporates current recommendations such as the recommendation “Multiple Source” (VDA 210-300). Digital data exchange in material sampling (VDA 231-300/301) and the link to the Handbook for Material Data Quality Management (HW-DQM) are now integral components.

Another milestone is the development of an online tool for the PPA procedure, replacing the previous Excel templates and paving the way toward a digitalized future. This tool is available via the VDA QMC webshop. Finally, during the development of this edition, a potential harmonization with the AIAG method “PPAP” was also discussed. The German automotive industry is open to aligning both procedures with the aim of establishing a common international standard for production process and product approval in the long term.

Contents

1 Introduction

The increasingly close cooperation in the automotive supply chain, shorter development periods, and increasing product diversity and complexity have given crucial importance to ensuring more intensive coordination between organization and customer in the automotive industry to achieve a common understanding of the quality requirements for the production process and the product.

The fulfillment of the agreed quality requirements is documented by standardized deliverables implemented along the entire supply chain within the framework of the production process and product approval procedure (PPA procedure) in order to ensure interference-free supply

- in the agreed quality,
- at the scheduled time,
- in the required quantity,
- from an approved production process.

1.1 Procedure for Production Process and Product Approval (PPA)

The PPA procedure consists of the approval of the production process as well as the product (see Figure 1-1).

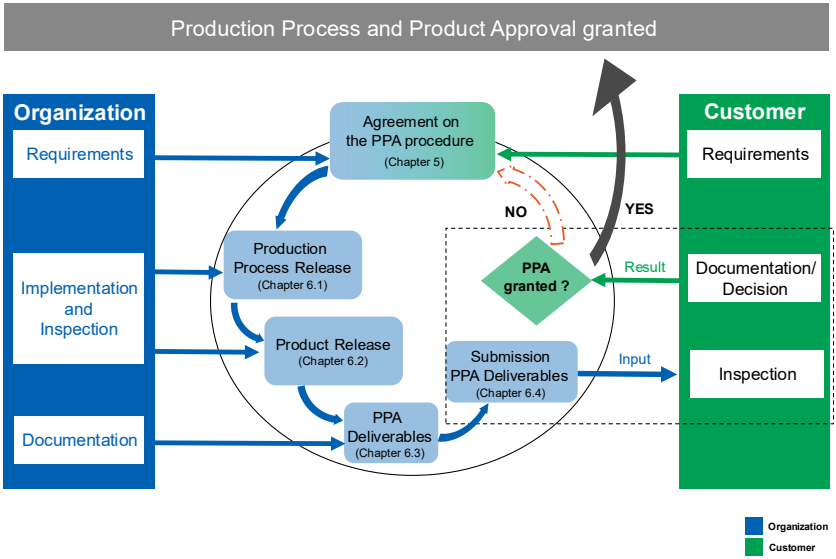


Figure 1-1: Overview of the PPA procedure

The organization is responsible for the execution of production process and product release in order to meet the production process and product requirements. External services and outsourced production processes must be released by the organization.

The organization is also responsible to grant the PPA to its purchased parts (see Figure 1-2). The results of the production process and product approvals of the supply chain are incorporated into the PPA procedure of the organization. The results and the documents of the approval processes of other associations (e.g. AIAG PPAP, etc.) can also be used here.

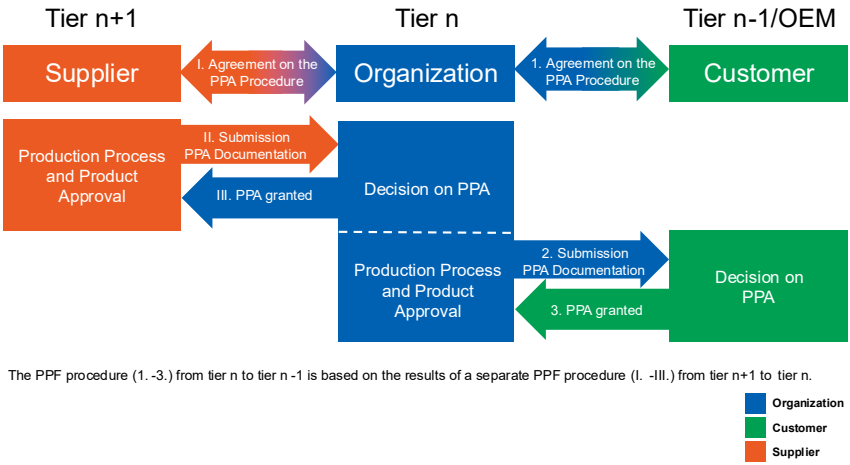


Figure 1-2: PPA in the supply chain

In the PPA agreement, the organization and the customer agree upon the scope of the PPA documentation to be submitted.

Part of the evidence of fulfillment of the requirements for the production process and product are, among others, PPA samples. The software development process does not correspond to a production process in the sense of the PPA procedure.

PPA samples are products that have been manufactured with series equipment under series conditions (see Chapter 6.1) as part of the PPA procedure (PPA samples are a subset of the D samples, see VDA Volume “Maturity Level Assurance for New Parts” (MLA)). Deviating samples must not be used for the PPA procedure unless otherwise agreed upon between the organization and the customer.

1.2 Objective of the PPA Procedure

The PPA procedure provides evidence that the agreed requirements between organization and customer for the production process and the product are met.

The relevant requirements may include:

- legal, regulatory, and homologation-related requirements (e.g., type approval process, EU directives, CE marking)
- requirements from general standards (e.g., ISO, DIN)
- general customer requirements and customer-specific requirements (CSR) in addition to IATF 16949:2016
- technical specifications (e.g., drawings, requirements specifications, customer standards, packaging instructions, reference samples)
- contractual agreements between the organization and the customer on the production process (e.g., capacity)

The PPA procedure encompasses the evaluation of the production process and the product on the basis of documents, records and PPA samples. If the evaluation is positive, the customer grants approval for the production process and the product. The PPA procedure ensures that the organization meets the requirements for delivering products with regard to the specifications.

If the customer waives the submission of the deliverables of a PPA procedure, this does not release the organization from the obligation to document and archive the deliverables for the fulfillment of the requirements for the production process and the product.

2 Scope of Application of the PPA Procedure

Unless otherwise agreed upon between the organization and the customer, the PPA procedure is applicable to:

- finished parts
- component parts (incl. raw parts)
- assemblies across the whole level of vertical integration
- spare parts
- software (SW) as a product and/or as part of a product
- process materials that are supplied to the customer as part of the product
- operating materials
- production materials

Off-The-Shelf products such as standardized products (e.g., DIN parts), standardized materials (e.g., liquids acc. to DIN or SAE), and raw materials (e.g., granulates, steels) are not subject to a dedicated PPA procedure. They are released as part of the PPA procedure of the higher-level product. Standardized products with modified specifications are subject to an own PPA procedure.

For the scope of application of the PPA procedure for Off-the-Shelf Automotive AEC-Q qualified electronic components, see Chapter 7.4.

For multiple sourcing of AEC-Q qualified components, it is recommended to apply in case of multiple source for AEC-Q qualified components that the PPA procedure be carried out in accordance with VDA 210-300 (11/2024)[1].

[1] Verband der Automobilindustrie (VDA) (2024). VDA 210-300 Multiple Source: Recommendations for Contractors. Available at: https://webshop.vda.de/VDA/en/vda-210-300-112024-english-version

For set parts, a PPA procedure must be carried out. The customer is responsible for coordinating with the parties involved in the supply chain to determine whether the production process and product approval is granted by the organization or by the customer. As a result, regulations regarding the coordination process, the transfer of approval documents, and the sequence must be agreed upon, taking into account the organization's schedule. Commercial responsibility can be separated from quality responsibility.

Outsourced production processes as well as external services and their outputs are subject to the PPA procedure. If they cannot be independently approved via a PPA procedure, they must be approved as part of a higher level PPA procedure.

Capital goods, such as production facilities (incl. supply materials), are not subject to the PPA procedure. Process materials that are not supplied to the customer as part of the product are not subject to the PPA procedure.

3 Trigger of the PPA Procedure and Customer Involvement

The organization always executes an internal PPA procedure.

The process flow for customer involvement must be applied unless otherwise agreed upon between the organization and the customer.

a) Trigger of the PPA procedure and initiation of the agreement on the PPA procedure

Table 3-1: Initiation of the agreement on the PPA procedure (see section 5)

	Initiation of the agreement on the PPA procedure*:	
The PPA procedure towards the customer is triggered for:	**Customer**	**Organization**
New parts	must initiate	can initiate
Changes, initiated by the customer	must initiate	can initiate
Changes, initiated by the organization	can initiate	must initiate, if customer involvement results from Figure 3-1 and the customer requests it
Customer specific agreements	depending on agreements	

***** For Off-the-Shelf Automotive AEC-Q qualified electronic components, see the regulations in section 7.4.

b) Application rules for using the process flow shown below (see Figure 3-1) to decide on involving the customer by the organization in case of changes

- the change is assessed by an interdisciplinary team, following the process flow as illustrated
- if the outcome is ‘customer involvement’, the organization and the customer must align on how the change will be implemented and whether a PPA procedure towards the customer will be initiated. A change notification does not automatically trigger a PPA procedure towards the customer
- the customer involvement takes place in good time before the change is implemented. The customer's decision upon an initiation of a PPA procedure must be awaited before the change is implemented
- the first reaction of the customer takes place within two weeks after the organization's request. In case of no reaction by the customer, the organization requests a reaction for a second time including an adequate due date. After expiry of the second due date, the organization may approve internally and implement the change. The communications channels are to be agreed upon between organization and customer
- as soon as it becomes apparent that, contrary to initial assumptions, the change may impact the customer, the customer will be involved, or the implementation of the change will be stopped

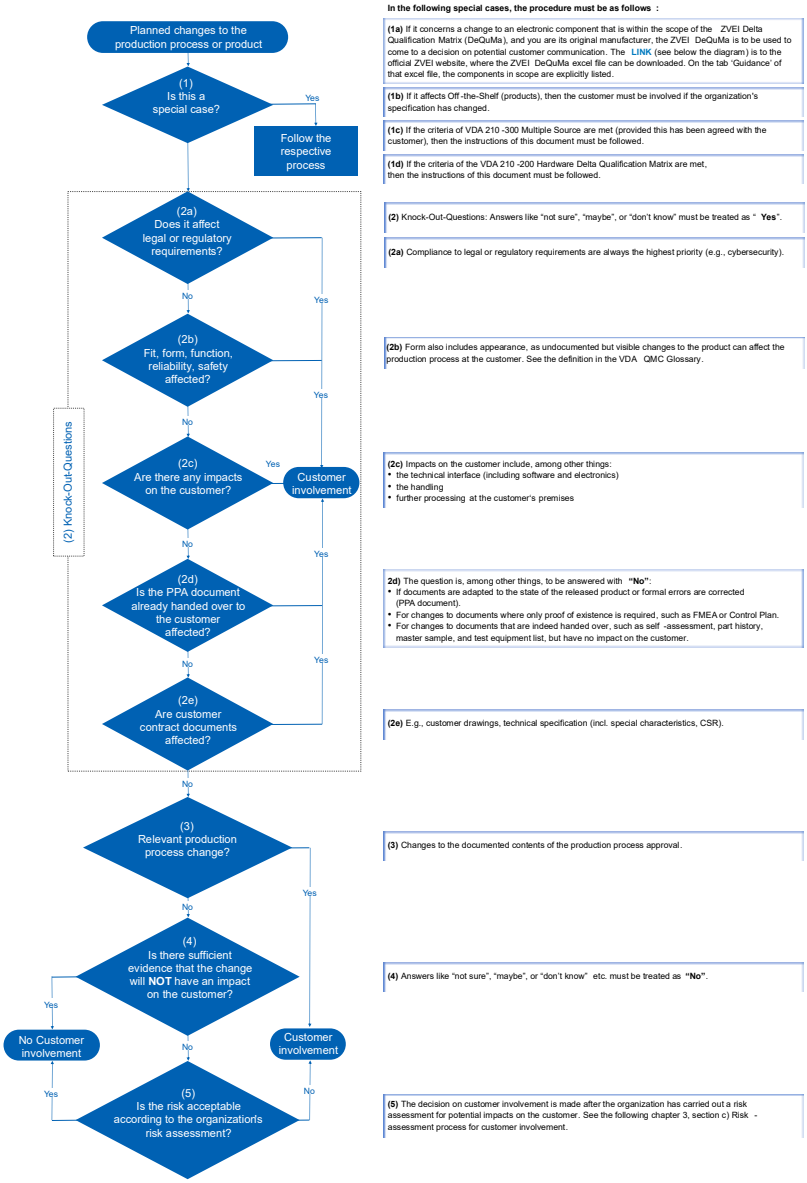


Figure 3-1: Process flow for decision on customer involvement by the Organization

LINK to note 1a): https://www.zvei.org/en/subjects/product-process-change-notification-method-in-automotive-electronics

c) Risk assessment process for customer involvement:

For process-step 5 in Figure 3-1 the organization must define a risk assessment process for customer involvement to be used at this point. This process must comply to the following:

Procedural requirements

- the process for risk assessment must be documented within the organization and communicated to the customer upon request
- the risk assessment must be performed by an interdisciplinary team
- the persons involved in the risk assessment and their roles within the organization are documented
- the results of the risk assessment must be documented, traceable, and accessible
- risk assessments are subject to the control of documented information
- the risk assessment process must be regularly reviewed and, if necessary, improved by the organization, as well as reviewed on an event-driven basis

Examples of tools that can support risk assessment include, among others, the “VDA 210-200 Changes to Electrical / Electronic Components in Mass Production HW DQM – Hardware Deltaqualification Matrix” (11/2023) and “VDA 290-110 Execution Instructions for VDA Volume 2 - Trigger Matrix for Elastomer and TPE Applications” (11/2024).

4 Timeline and Basic Sequence of the PPA Procedure

4.1 Timeline

Figure 4-1 exemplifies the chronological classification of the PPA procedure across the various Tier levels.

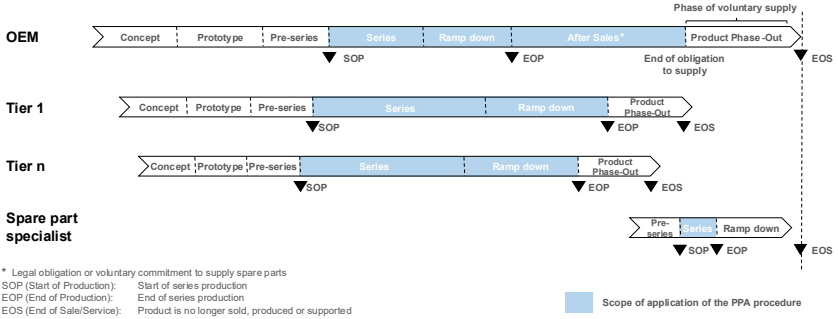


Figure 4-1: Exemplary illustration of the scope of application of the PPA procedure

Figure 4-2 exemplifies the temporal dependencies of the PPA procedures in the transition from one Tier level to the next and organizes the PPA procedure in the sequence of MLA milestones.

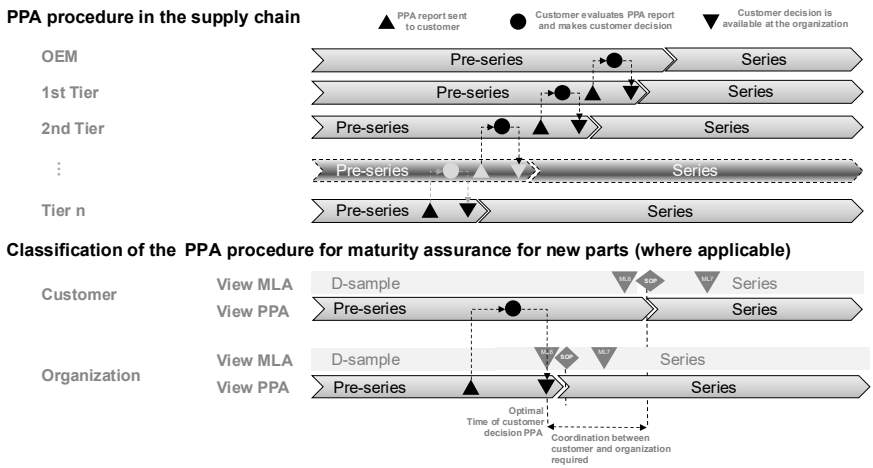


Figure 4-2: Exemplary classification of the PPA procedure in the transition from pre-series to series production

4.2 Basic Sequence

Figure 4-3 exemplifies the principal workflow of the organization's internal PPA procedure and the external PPA procedure for the customer.

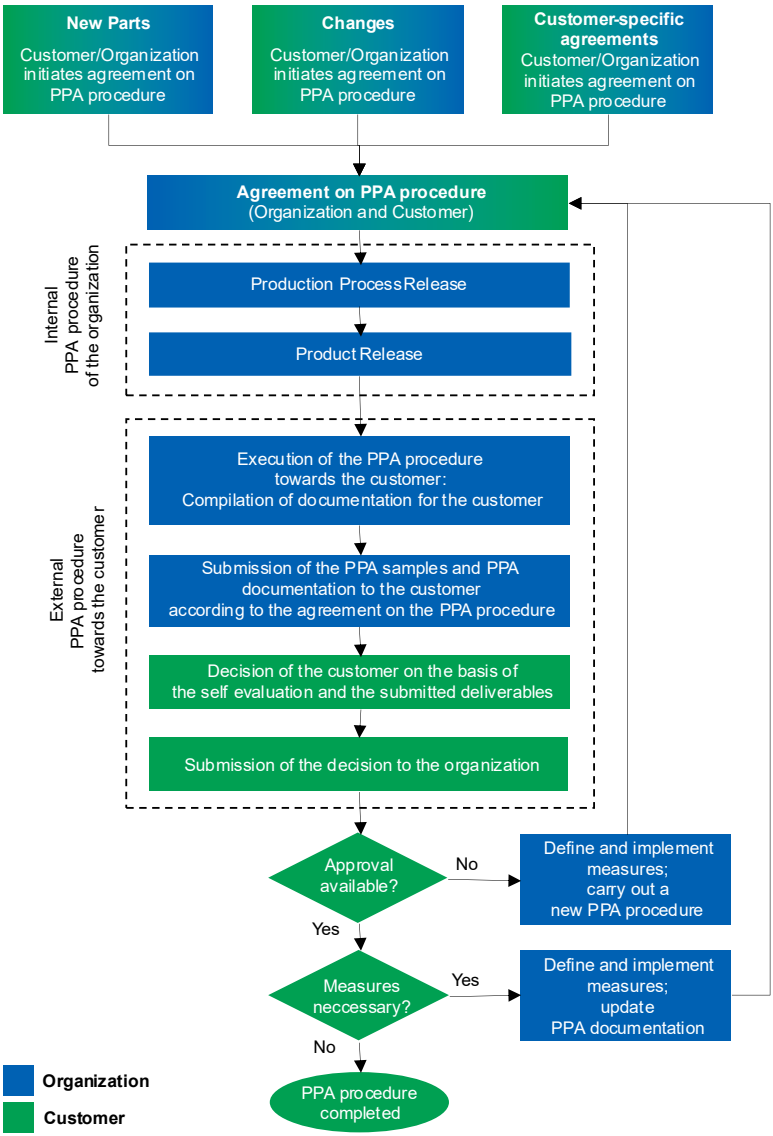


Figure 4-3: Basic Sequence of the PPA Procedure

5 Agreement on the PPA Procedure between Organization and Customer

For each PPA procedure, an agreement between the organization and the customer must be conducted. The objective is to reach an agreement on the scope, content, and timeline of the PPA procedure.

The agreement on the PPA procedure must be carried out for new parts in accordance with the VDA Volume “Maturity level assurance for new parts” at the corresponding maturity levels.

The basis for the agreement of the PPA procedure is the set of requirements mutually agreed upon between the organization and the customer. These requirements may be defined among others in approved specifications (including legal regulations), requirement specifications, drawings, standards, packaging instructions, color sample boards, and interface agreements.

It is recommended that the following topics be agreed upon during the agreement of the PPA procedure:

- Specification of the object (under consideration, e.g., part number, designation, drawing revision, change status, production site)
- Scope of approval (e.g., formation of product families, grouping of production lines)
- Milestones and timelines
- Required deliverables as per Table 5-2 and the way of evidence provision (see Chapter 5.1)
- Formal and contextual requirements for self-assessment (see Chapter 5.4)
- Evidence provision for special characteristics
- Definition of the quantity of products to be inspected and delivered (per tool, cavity, variant, color, etc.) incl. delivery locations
- Scope of customer approval (e.g., delivery locations, plants)
- Handling of directed parts within the PPA procedure (e.g., responsibility for their approval)

- Self-assessment
- Delivery locations for PPA samples
- Measurement / inspection methods, procedure for conducting measurements (e.g., measurement / inspection instructions)
- Product and production process characteristics for capability studies
- Methods and requirements for proof of capability of measurement and inspection processes
- Methods and requirements for capability studies of in-process inspection processes
- Framework conditions for production process approval (e.g., requirements for performance testing incl. batch size) and potentially the customer's participation
- Requirements for documentation (e.g., format and submission)
- Customer involvement in the event of deviations and definition of the risk assessment procedure
- Agreements on layout inspection and functional testing (see also Chapter 10 and VDA Volume „Product Manufacturing and Delivery – Robust Production Process")
- Procedure for documentation of the evaluation and analysis process
    - Complaint management (see also VDA Volume "8D – Problem Solving in 8 Disciplines")
    - Process for field failure analysis (if applicable including software components)
- Handling manufacturing interruptions
    - Longer production process downtimes can lead to risks during the restart. To minimize these risks, the organization and the customer coordinate within the framework of the PPA agreement on when and how the customer should be involved during the restart. This must be defined depending on the process and the duration of the downtime.

The outcome of the agreement upon the PPA procedure must be documented.

If the same product is manufactured at different production sites, using different production equipment and/or different manufacturing processes, if not otherwise agreed upon between the organization and the customer a separate PPA procedure must be executed for each case. Relevant information must be recorded in the PPA documentation.

In order to exploit synergies and avoid redundancies, joint inspections between the organization and the customer may be agreed upon by mutual consent.

In the case of renewed PPA procedures due to changes, restart after production interruption, or extension of the product family, referencing documents from previous PPA procedures is permissible, provided their content remains unchanged.

5.1 Types of Evaluation of Deliverables in the PPA Procedure

Deliverables confirming the fulfillment of the agreed requirements are generated by methods including measurement, testing, and documentation. They can be evaluated in three different ways:

1. Reference

   These deliverables refer to documented information, e.g., by specifying name, version, or other identification features. These deliverables are not submitted to the customer, but the customer may request access for review.

   Example: Design FMEA, Process FMEA, Control Plan.

2. Existence

   These deliverables serve to evaluate the presence of certain documented information. They must be available within the organization but are not subject to further contextual evaluation by the customer. Whether and how they are submitted in the PPA procedure must be agreed upon between the organization and the customer.

   Example: Documentation of agreement upon layout inspection and functional testing.

3. Verification

   These deliverables enable the customer to perform a target/actual comparison, e.g., regarding completeness, correctness, chronological order and consistency.

   Example: Comparison of a measurement report with a technical drawing.

The decision regarding which deliverable is to be evaluated for existence or verification rests with the customer.

5.2 Reference to Requirement Documents

The PPA documentation must include references to documents that define requirements for the product and production process. The documents listed in Table 5-1 are used for this purpose:

Table 5-1: Requirement Documents for Product and Production Process (see Annex 1 for details)

Hardware / Mechanics	
I.	Technical Specifications
II.	Approved Design Changes
III.	Design and Engineering Approval
Software	
IV.	Documentation of Software Quality Requirements
V.	Documentation of Technical Software Requirements

These documents are subject to the documentation and archiving requirements outlined in Chapter 8.

5.3 Definition of Deliverables and the Submission

The objective of the PPA procedure is to confirm the fulfillment of the agreed requirements. Table 5-2 lists potential options for providing evidence within the PPA procedure:

- ‘Self-assessment’: The organization always confirms the fulfillment of the requirements by means of the self-assessment without submitting documents to the customer
- ‘Self-assessment or submission’: The organization and the customer agree upon the type of provision in the ‘Agreement on the PPA Procedure’
- ‘Submission*’: Minimum scope of deliverables that must always be submitted by the organization to the customer

Deliverables may only be requested for agreed requirements. The following questions must be clarified between the organization and the customer:

Question 1 Is the creation of the deliverable required due to the trigger for the PPA procedure?

Question 2 If Question 1 is answered with “yes”:
Should the deliverable be provided through self-assessment or through submission?

All required deliverables (e.g., Question 1 answered with “yes”) must always be created, documented, and archived by the organization (granting the customer access for review if necessary).

Table 5-2: PPA Deliverables (For details, see Annex 1)

VDA No.	Deliverables, if applicable for the product	If deliverable is applicable, then agreement on:
0.1	PPA Report including Self-Assessment	Submission*
0.2	Documentation of the Agreement upon the Layout Inspection and Functional Testing	Self-Assessment or Submission
1.	**Deliverables of the Product Development**	
1.1	Design FMEA	Self-Assessment
2.	**Deliverables of the Production Process Development**	
2.1	Process Flow Diagram	Self-Assessment or Submission
2.2	Process FMEA	Self-Assessment
2.3	Control Plan	Self-Assessment
3.	**Deliverables of the Product Validation and Verification** *Exclusively against the Requirements defined in the Technical Specifications agreed upon with the Customer.*	
3.1	Data on Materials, e.g., via IMDS, CAMDS	Submission*
3.2	Geometry, Dimension	Self-Assessment or Submission
3.3	Material	Self-Assessment or Submission
3.4	Function	Self-Assessment or Submission
3.5	Haptics	Self-Assessment or Submission
3.6	Acoustics	Self-Assessment or Submission

3.7	Appearance	Self-Assessment or Submission
3.8	Surface Requirements	Self-Assessment or Submission
3.9	Technical Cleanliness	Self-Assessment or Submission
3.10	Reliability	Self-Assessment or Submission
3.11	Resistance to Electrostatic Discharge (ESD)	Self-Assessment or Submission
3.12	Electrical/High-Voltage Safety	Self-Assessment or Submission
3.13	Electromagnetic Compatibility (EMC)	Self-Assessment or Submission
3.14	Part Marking	Self-Assessment or Submission
4. Deliverables of Production Process Validation		
4.1	Assurance of Special Characteristics and, if applicable, additionally Agreed Characteristics	Self-Assessment or Submission
4.2	Production Process Capacity	Self-Assessment or Submission
4.3	Series Production Process Release by the Organization	Self-Assessment or Submission
5. General Deliverables		
5.1	Evidence of Compliance with Legal Requirements	Submission*
5.2	PPA Status of the Supply Chain	Self-Assessment or Submission
5.3	PPA Samples	Self-Assessment or Submission
5.4	Master Sample	Self-Assessment

5.5	Inspection Processes for Product and Production Process • List of Inspection Processes • Proof of Capability of Inspection Processes • Laboratory Qualification	Self-Assessment or Submission
5.6	Part History	Submission*
5.7	Evidence of Suitability of the Employed Load Carriers including Storage	Self-Assessment or Submission
5.8	Documentation of Agreements upon the Diagnosis and Analysis Process (Complaint Handling, Field Failure Analysis)	Self-Assessment
5.9	Others	Self-Assessment or Submission
6. Software Deliverables		
6.1	Evidence of Implementation of Quality and Technical Requirements	Self-Assessment or Submission
6.2	Evidence of Performance Indicators for Software Quality	Self-Assessment or Submission
6.3	Documentation of Free-and-Open-Source Software (FOSS)	Submission*
6.4	List of Known Errors	Submission*
6.5	Documentation of Development Tools	Self-Assessment
6.6	Documentation of Software Version	Self-Assessment or Submission

5.4 PPA Report including Self-Assessment

For each PPA procedure a PPA Report is created. The basis for the PPA Report is the Agreement on the PPA procedure.

The PPA Report contains the object under consideration (e.g., part number, designation, drawing revision, change status, production location), the ‘Self-Assessment by the Organization’, and the ‘Decision by the Customer’. The organization processes the information on the object under consideration and the ‘self-assessment by the organization’, while the customer processes the ‘decision by the customer’.

The ‘Self-Assessment by the Organization’ is conducted at the level of the single deliverables. It includes the organization’s evaluation of all deliverables that, based on the Agreement on the PPA procedure, are marked as either ‘Submission’ or ‘Self-Assessment’, along with a recommendation for the customer’s decision.

The ‘Decision by the Customer’ includes the evaluation of those deliverables that, according to the Agreement on the PPA procedure, are marked as ‘Submission’. The customer’s evaluation of deliverables marked as ‘self-assessment’ is not based on individual deliverables, but under VDA No. 0.1 Self-assessment. Finally, the overall customer decision is documented (see Chapter 6.4) as well as the handling of deviations according to the risk assessment (see Chapter 6.5).

6 Execution of the PPA Procedure

Independently of the PPA procedure towards the customer, the organization performs an internal PPA procedure and documents the results. In this activity, the deliverables according to Table 5-2 are worked out for the fulfilment of the agreed requirements for the production process and the product.

In case of software as a product (SWaaP), exclusively the deliverables according to Table 5-2, VDA No. 0 and 6, must be worked out.

In order to prove the fulfillment of the agreed requirements to the customer, the defined deliverables must be provided in accordance with the Agreement on the PPA procedure, either through self-assessment or through submission to the customer.

The fulfillment of the requirements of the specification is furthermore proven on the basis of samples that are produced under series conditions (D-samples according to VDA Volume "Maturity level assurance for new parts"). The assignment of measured values to the specific sample parts must be ensured.

6.1 Production Process Approval

The production process approval includes the following aspects:

Series production	The production process is implemented in such a way that products are continuously or batch produced as planned.
Reproducibility	The production process is able to produce products reproducibly with consistent properties and in consistent quality.
Defined production process related requirements	Defined legal/regulatory requirements, requirements agreed upon between the organization and the customer, as well as requirements for the production process defined internally by the organization are met.

For approval of the production process, the deliverables on the production process quality and on the production process capacity must be provided by the organization.

The following requirements (see also VDA Volume “Product Manufacturing and Delivery – Robust Production Process”) must be fulfilled:

- Product specifications are aligned and approved
- Requirements for the production process are agreed
- Production process and product approvals in the supply chain have been granted (see also Chapter 6.4 "Customer decision")
- Production takes place under series conditions. This includes:
  - Production at the series production location
  - Use of series production facilities
  - Use of series tools
  - Fulfilment of the requirements of the logistics processes required for the production process
  - Deployment of qualified personnel
  - Achieving the required capacity
  - Implementation of the planned series process flow

The organization and the customer agree upon the timeline and scope of providing proofs of production process quality and production process capacity. The organization carries out the approval of the production process considering the conditions agreed upon and provides the agreed deliverables.

In addition, the customer decides whether to participate in the production process inspection carried out by the organization and subject it to a joint evaluation. In this case, it is recommended to the organization to carry out an internal inspection prior to the production process inspection carried out jointly with the customer.

The production process inspection can be combined with the execution

of the PPA procedure by the customer on site (e.g., preparation and verification of deliverables, accompaniment of the production of PPA samples).

In case of changes to the product or the production process or relocations of production processes, the organization evaluates the impact on the production process and its performance and, if necessary, carries out a production process inspection.

6.1.1 Production Process Quality

Within the scope of the production process approval, the process quality of the entire production process must be verified under series conditions. Process quality refers to the effectiveness of the production process. Aspects such as fulfilment of agreed requirements and defect-free production of the product are taken into account.

Assurance of production process quality can be carried out, for example, by:

- Poka-yoke
- 100% inspection (e.g. end-of-line test)
- Process capabilities
- First / last part approval

The evidence to secure the Special Characteristics and further agreed characteristics must be assured in the PPA procedure. For characteristics for which the proof of process capabilities has been agreed upon between the organization and the customer, the agreed examination methods are used to determine defined capability parameters. If not otherwise specified, the requirements of ISO 22514 and successor standards apply.

Note: Proof of long-term capabilities is the responsibility of the organization and is not part of the PPA procedure towards the customer.

6.1.2 Production Process Capacity

Production process capacity is a parameter used to describe the efficiency of a production process and is proven by means of the performance test.

The aim of the performance test is to prove that

- the agreed number of units can be produced for the customer
- in the specified time
- according to specification
- with the resources used.

When defining the framework conditions for the performance test, among others the following aspects must be considered:

- Duration and/or quantity of production
- Variants (if existing and relevant)
- Production concept (shift models, break times, shift change)
- Logistics concept (e.g., JIT, JIS)
- Set-up and maintenance times / shifts
- Tool concept (e.g., single / multiple cavity molds)
- Number of production lines
- Planned scrape rate
- Rework concepts
- Planned alternative processes (e.g., Flash Programming Station)

In case of changes to the product or the production process or relocations, the organization evaluates the impact on the production process capacity and, if necessary, carries out a new performance test.

6.2 Product Release by the Organization

The product release by the organization confirms that the product-related requirements agreed upon between the organization and the customer as well as internal requirements of the organization are met. The agreed product-related requirements are defined in the technical specifications. Their fulfillment must be verified by the organization.

Product release is based on the Deliverables of the Product Validation and Verification (see Table 5-2). Evidence is provided with the help of D-samples.

6.3 PPA Documentation and Procedure for Deviations

The organization works out the deliverables for the PPA documentation based on the agreed requirements for the production process and the product. The PPA documentation must be created in such a way that it is comprehensible to the organization and the customer.

The result of the risk assessment is agreed upon between the organization and the customer before the deliverables are submitted. The result of the risk assessment is documented and submitted to the customer as part of the PPA documentation.

Deviations from requirements between the organization and the supplier that concern interface-relevant specifications between the organization and the customer require the customer's approval.

If no agreement can be achieved on the procedure in the case of deviations, this must be documented in the risk assessment and considered in the organization’s self-assessment.

The submission of the deliverables to the customer is done for all contents agreed upon between the organization and the customer in the scope of the Agreement on the PPA procedure in the agreed form. The minimum scope are the deliverables marked with (*****) in Table 5-2. The method of submission is carried out in the form agreed upon between the organization and the customer.

6.4 Customer Decision on the PPA Procedure

According to the Agreement on the PPA procedure the organization submits to the customer the agreed deliverables and PPA samples, if applicable. The customer evaluates these deliverables and carries out cross-checks, if necessary. This evaluation is documented by the customer and forms the basis for the customer's decision.

6.4.1 Sequence

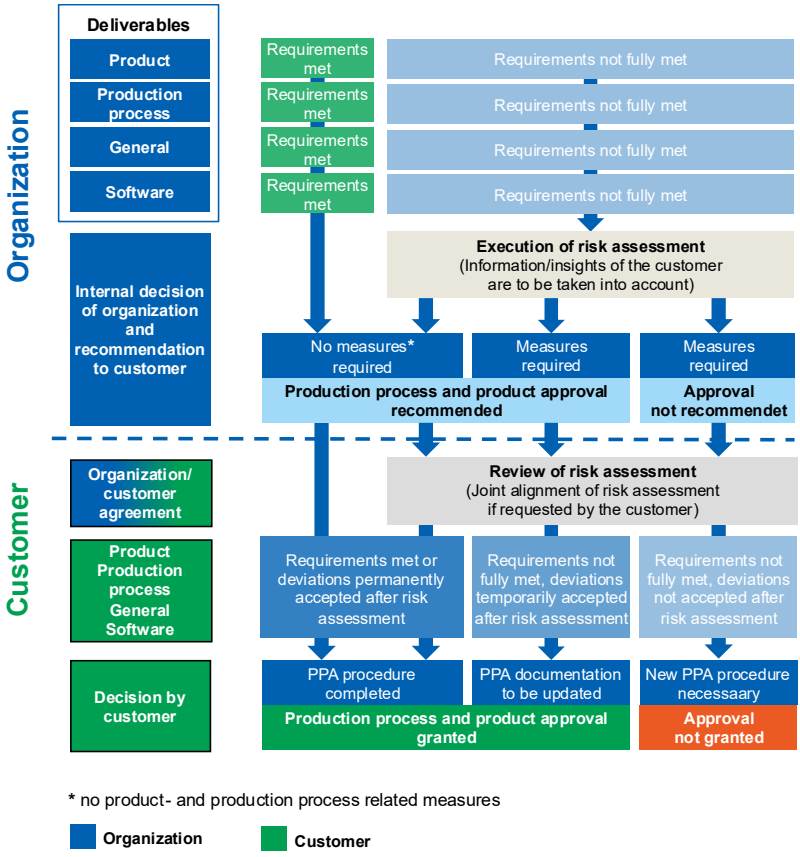


Figure 6-1: Customer decision on the PPA procedure

Organization

- The organization checks and evaluates the fulfillment of the requirements by the deliverables from Table 5-2 with the possible outcomes:
  - Requirements fully met.
    (The evaluated individual deliverable meets the respective requirement.)
  - Requirements not fully met.
    (The evaluated individual deliverable does not meet or only partially meets the respective requirement.)
    If requirements are not fully met, a risk assessment is carried out and measures are reviewed and, if necessary, initiated.
- The organization prepares a recommendation for the customer decision based on the individual evaluations of the deliverables and, if applicable, the risk assessment:
  - PPA recommended:
    - PPA procedure to the customer to be completed or
    - updated PPA documentation to be submitted to the customer
  - PPA not recommended:
    - a new PPA procedure to the customer to be carried out

Organization and customer

- The organization submits the deliverables and, if applicable, the risk assessment according to the Agreement on the PPA procedure and, if necessary, aligns any deviations and corrective measures with the customer.
- The customer reviews the risk assessment (joint alignment of risk assessment by the organization and the customer, if requested by the customer) and aligns further measures with the organization, if necessary.

Customer

Based on the risk assessment, the customer decides and informs the organization.

- **PPA granted:**
  - PPA procedure towards the customer is completed or
  - updated PPA documentation has to be submitted to the customer.

  In the event of permanent acceptance of deviations:

  If no adjustments are made to the specifications in the customer's requirements documents (e.g., drawings, specifications), the customer must confirm the deviations and the new limit values in the also PPA report.
- **PPA not granted:**
  - a new PPA procedure towards the customer must be carried out

6.4.2 Results

PPA granted:

- The prerequisites for the organization to deliver products that fulfill the specifications and are manufactured under series conditions are met
- The agreed customer requirements are fulfilled met

  ➔ The PPA procedure towards the customer is completed
- The agreed customer requirements are not fully met

  Case a)
  After a risk assessment by the organization and the customer deviations are accepted by the customer on a permanent basis.
  A separate special approval is not necessary

  ➔ The PPA procedure towards the customer is completed

Case b)
After a risk assessment by the organization and the customer deviations are accepted by the customer for a limited time or quantity. Measures are agreed upon between the organization and the customer.
A separate special approval is not necessary

➔ After implementation of the agreed measures, the updated PPA documentation must be submitted

PPA not granted:

- The prerequisites for the organization to deliver products that fulfill the specifications and are manufactured under series conditions are not met:
  - legal and regulatory requirements are not fully met

  or
  - the agreed customer requirements have not been fully met. Deviations are not accepted by the customer after a risk assessment by the organization and the customer.

    The further procedure must be agreed upon between the organization and the customer
- Due to the unacceptable risk to the customer and the organization, products in this state must not be placed on the market
- If the customer requires additional products in this condition (e.g., for testing purposes, to temporarily prevent production interruptions, etc.), this can be agreed upon separately in writing between the organization and the customer.
  In this case, the delivered parts must be clearly marked and documented with a reference to the specifically agreed application (including the number of items delivered). The customer is responsible for ensuring that measures are in place to enable or prevent the product from being placed on the market. The customer's decision "PPA not granted" remains unaffected by this

  ➔ A new PPA procedure is necessary

6.5 Risk Assessment

If, when evaluating the fulfilment of requirements, the organization finds that the requirements are not fully met, the organization conducts a risk assessment.

The risk assessment is submitted to the customer as part of the PPA documentation. It is recommended that the risk assessment is aligned with the customer prior to submission.

When carrying out the risk assessment, requirements must be taken into account, which are described below.

Requirements for the procedure

- A process for risk assessment in the PPA procedure must be in place and described within the organization
- The risk assessment is carried out by an interdisciplinary team
- The people involved in the assessment and their roles within the organization are documented
- The results of the risk assessment must be documented and comprehensible
- Risk assessments are subject to the control of documented information
- It is recommended that the procedure for risk assessment be aligned in advance between the organization and the customer
- Risk assessments from the supply chain must be reviewed by the organization with regard to the fulfillment of customer requirements and technical specifications and taken into account where relevant

Content-related requirements

- Description of the detected deviation in comparison to the specification
- Cause(s) of the detected deviation
- Potential error sequence(s) of the detected deviation

- Result of the evaluation of the risk
- Measures to reduce risk and/or eliminate errors
  These can be measures that are currently being implemented or planned
- If no effective measures can be determined, this must also be documented
- Information/findings of the customer on the detected deviations must be taken into account in the risk assessment
- Internal decision of the organization and proposal to the customer as to whether the PPA can be granted despite the deviations and the resulting risk

7 Special Procedures

7.1 Stepped PPA Procedure

The PPA procedure can be carried out in multiple steps. Each step is approved separately. The single approvals only include the deliverables of the related step. Details on approach, timeline, and usage of the approvals of the steps are to be agreed upon between the organization and the customer. For example, the approval of the material including the deliverables to fulfill environmental requirements can be done separately from the approval of the dimensional inspection.

Reference may be made to the results of prior steps if the production process conditions, and/or the product characteristics did not change. The PPA for the overall scope will only be granted if the fulfillment of all requirements agreed upon between organization and customer has been proven across the different steps.

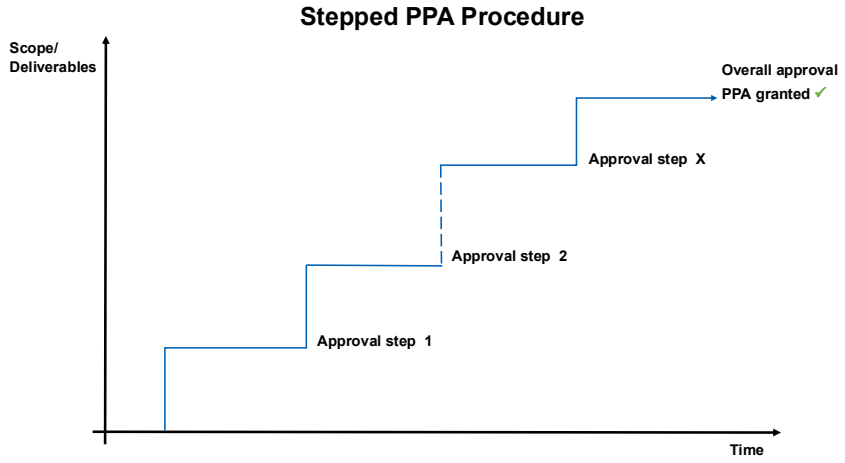


Figure 7-1: Exemplary Illustration of a Stepped PPA Procedure

7.2 PPA Procedure for the Approval of Variants

Multiple variants of a product may be approved within a single PPA procedure. The details are to be agreed upon in consultation between the organization and the customer regarding the PPA procedure.

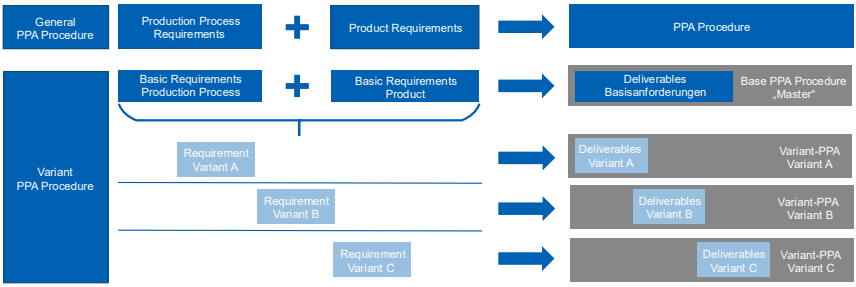


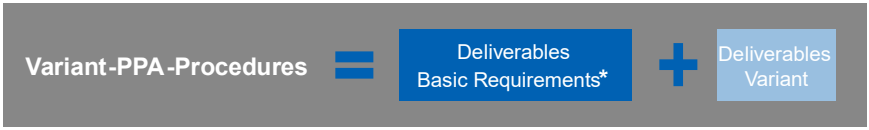
Figure 7-2: General PPA Procedure and Variant PPA Procedure

Characteristics of a variant may include:

- same basic component with different supplementary specifications (e.g., colors, surface coatings, electrical or mechanical values)
- components with comparable basic functions in different equipment configurations (e.g., seats, door panels)

The fulfillment of requirements for variant-independent production process and product characteristics can be demonstrated using a single variant. The deliverables are provided on the basis of a selected ‘master’, is assigned to the basic PPA procedure, and applies across the board to all variants.

Deliverables for variant-dependent production process and product characteristics must be provided separately for each variant and attached to the PPA documentation.



* The verification of the basic requirements in a variant PPA procedure is carried out by reference. A copy of the original process is not required.

Figure 7-3: PPA Procedure for Approval of Variants

The approval of variants can be applied when there is a common basis in the production process and/or product (e.g., similar product characteristics but different production processes; comparable production process but different product requirements).

Approvals of variants can also be carried out in a stepped PPA procedure (see Figure 7-1: Exemplary illustration of a stepped PPA Procedure).

Furthermore, there is the possibility to add further variants to an already approved PPA procedure (see Chapter 5 Agreement on the PPA Procedure). In this case, a PPA procedure is carried out in which all variant-independent production process and product characteristics refer to an already existing and approved PPA procedure (Base PPA Procedure). For all characteristics that are specific to the newly added variant, fulfillment of the requirements must be proven separately.

7.3 Small Series

Small series are characterized by the fact that production and quality assurance processes are adapted to smaller production volumes as agreed upon between organization and customer and that they cannot be evaluated statistically.

The requirements for the PPA procedure for small series are to be agreed between the organization and the customer on a case-by-case basis and may deviate from the standard specifications. The scope of

the approval has to be defined in consideration of qualitative, quantitative, and risk-oriented aspects.

If the proof of process capabilities for agreed characteristics is not possible due to the agreed quantity, the assurance of the production process is carried out in the form of a 100% inspection of these characteristics.

Note: The term 'small series' is not solely based on the production volume. Small series can also mean, for example:

- *small series in the sense of special equipment*
- *special vehicles / special products of any kind*
- *limited quantity*
- *limited life cycle*
- *one-off production*
- *spare parts not originating from the series production process*

7.4 Approval Process for Off-the-Shelf Automotive AEC-Q qualified Electronic Components

a) Scope

The scope of Chapter 7.4 covers exclusively:

- "Products" defined by the following three criteria:
  1. **Off-the-Shelf** and
  2. **electronic component** and
  3. **Automotive AEC-Q qualified**
- PPA process between the organization (the electronic component manufacturer) and the customer (the electronic module manufacturer). PPA procedures at the next higher Tier level between the organization and the customer remain unaffected

Chapters 4 to 6 of this VDA Volume 2 are not fully applicable to the scope described here, as explained below.

An approval procedure must be agreed upon for the following electronic components:

- Off-the-Shelf, not AEC-Q qualified electronic components
- Off-the-Shelf, AEC-Q qualified electronic components that have not been approved by the organization for use in the automotive industry

For these product types, it is recommended to refer to VDA Volume „Guidelines on analyzing possible scenarios and risks when using consumer electronics components in vehicles“.

b) Release of production processes and products

The organization defines and develops production processes, grants the release, and sustains production processes. Subsequently, the organization defines and develops products that utilize these production processes. The products are then released to the open market, after which a customer can decide whether to use such product or not.

The organization’s product release for the automotive industry is based on AEC-Q (reliability) qualification and the associated evidence. The customer decides how to approve the product for his intended use.

In the event of differences in product specifications, the organization's product documentation takes precedence over customer documentation, unless otherwise agreed upon between the organization and the customer.

Typically, a standardized package of deliverables is available upon customer request, containing, among others, the following:

- Product datasheet
- AEC-Q reliability qualification report
- AEC-Q Certificate of Design, Construction and Qualification

(CDCQ)

- IATF 16949 certifications of the manufacturing site
- Evidence of the existence of appropriate FMEAs, control plans, and proof of inspection process capability
- Data on materials, e.g., via IMDS, CAMDS
- Standard form used by the organization, which includes, among other things, the customer part number and the required scope of verification

The same production process of the organization is used for many products and for many different customers. Only basic information about the production process is shared with customers, e.g., the AEC-Q Certificate for Design, Construction, and Qualification (CDCQ).

- It is therefore not possible for a customer to approve the organization's production process
- Based on the standardized package of deliverables provided by the organization, the customer can approve the product for his intended use

c) Change management

In the event of a change to the production process or product initiated by the organization, it is recommended to use ZVEI DeQuMa to evaluate the change and decide whether to notify the customer (see Figure 3-1).

In addition to the customer notification described in Chapter 3, there is the option of informing the customer only about a change. After a reasonable period of time (see JEDEC J-STD-046) delivery of the modified product will commence.

If the standardized package of deliverables is updated as a result of the change, it will be available upon request after the organization has released the modified product.

8 Retention Periods

In general, the retention periods for the documents and for the master sample are based on legal and regulatory requirements as well as contractually agreed requirements.

For information on retention periods for documents, please see VDA Volume 1 "Documented Information and Retention" as well as IATF 16949.

9 Declaration of Constituent Materials

Within the framework of the PPA procedure, documentation is required to prove compliance with statutory substance bans. Data on materials are collected and transferred along the supply chain.

International material data systems (e.g., IMDS, CAMDS) represent an electronic documentation and reporting tool for this verification process. The declaration of data on materials is carried out as part of the PPA procedure by specifying the MDB ID number. If it is not possible to create an IMDS record in justified exceptional cases (e.g. spare parts, stockpiled components), a substitute process must be agreed upon between the organization and the customer.

The approval criteria for an IMDS record meet the criteria at the time of the last customer approval in the scope of the PPA procedure, unless constituent materials are no longer allowed by the current legislation. Formal deviations (e.g., changes to records of the IMDS Steering Committee) must be agreed upon between the organization and the customer where necessary.

For any PPA procedure that involves a change in the part number or has a relevant effect on the material composition, it is also necessary to send the currently valid material data record.

Any additional country-specific rules and requirements for providing information about constituent materials must be complied with.

Note: Prohibited pure substances and those subject to specific declaration requirements with their associated declaration limits are set out in the VDA 232-101 "Global Automotive Declarable Substance List (GADSL)" (Version 02/2015).

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10 Layout Inspection and Functional Testing

In the course of the PPA procedure, the organization has proven that all product and production process requirements have been met before the start of the series production.

In order to continue to assure the fulfillment of these requirements during the period of series production, regular repeated layout inspections and functional testing are required (see also IATF 16949 Chapter 8.6.2 ‘layout inspection and functional testing’, VDA Volume "Product Manufacturing and Delivery – Robust Production Process”, and if applicable customer-specific requirements). The formation of product families for this purpose is allowed.

The frequency, form, and scope must be contractually agreed upon between the organization and the customer and documented in the PPA procedure.

Deviations detected during layout inspection and functional testing must be pointed out to the customer.

11 Appendices and Downloads

11.1 Terms and Definitions

With publication of the Red Volume the following terms and definitions will only be published in the VDA QMC Online Glossary:

https://vda-qmc-learning.de/module/glossary/index.php?lang=en

Term	Definition
Agreement on the PPA procedure	The agreement on the PPA procedure is an individual agreement between an organization and a customer, which must be reached anew for each PPA procedure for new parts and in case of changes. The agreement on the PPA procedure does not have general validity; its validity is limited to the respective PPA procedure. The result is documented and traceable. Part of the agreement on the PPA procedure includes, among other things, the definition of the object under consideration, the scope of approval, deadlines and timelines, as well as the required deliverables (see Chapter 5).
Assembly	Functional system (e.g., steering or gearbox) or its intermediate product, which is manufactured from production materials and for which further requirements are defined or agreed with the customer (external/internal).
Automotive AEC-Q qualified	AEC-Q10x/Q20x qualification of electronic components that are released for automotive by the manufacturer/supplier.
Capital goods	Machines, general tools and project-specific tools used for the production of the product.

Term	Definition
Customer	Organization or person that receives a product. (from ISO 9000:2005) The customer is the recipient of the products to be supplied, no matter at what level of the supply chain. The last customer in the supply chain is the OEM and not the vehicle's end user (end customer).
Cyber security	According to ISO/IEC 27032, cyber security is the "preservation of confidentiality, integrity and availability of information in the cyberspace".
Directed parts	Parts (products, components, individual parts or software) to be used by an organization in its products whose procurement source (supplier) is defined by the customer.
DUNS® number	The DUNS® number (Data Universal Numbering System) is a 9-digit numerical code used internationally as a standard for the unique identification of companies/production locations. DUNS® numbers are issued and managed centrally by Dun & Bradstreet.
Electronic component	Basic component used in electronic circuits to control, process or store electrical signals. Examples: • **passive electronic component**: Resistors, capacitors, diodes, PCBs (typically not made by semiconductor manufacturer)

Term	Definition
	• **active electronic component**: Integrated Circuits (ICs), Micro-Electro-Mechanical system (MEMs), opto-electronic components. Multi-Chip-Modules (MCMs) (typically made by a semiconductor manufacturer)
Electronic module manufacturer	Manufacturer of a module (PCB, [sub]-assembly, system, electronic circuit etc) using at least one electronic component. The electronic module manufacturer is typically Tier 1, the direct/end-customer of the electronic component manufacturer, and supplier to the OEM.
EMC (ElectroMagnetic Compatibility)	ElectroMagnetic Compatibility refers to the capability of a technical device not to impair unexpectedly the functioning of other devices in its vicinity, unintentionally through electric or electromagnetic effects or not to be disturbed itself by other devices. Based on Directive 2014/30/EU.
ESD (Electro Static Discharge)	Undesirable rapid charge transfer. (See also: DIN EN 61340-5-1).
Finished part	Part in operational or ready-to-install condition (see DIN 199-1).
Fit, Form, Function (FFF)	• **Fit**: The ability of an item to physically interface or interconnect with or become an integral part of another item • **Form**: The shape, size, dimensions, mass, weight, or visual parameters which

Term	Definition
	uniquely characterize an item. For software, form denotes the language and media • **Function**: The action or interaction for which an item is designed to perform
Function	Within the technical context of a product/system, this term refers to a task to be performed or an activity/action to be executed or a result to be delivered (within a system) by an object (e.g. device, software) or the mode of action of the object (relationship between input and output).
IMDS	International Material Data System of the automotive industry. The IMDS is used for the collection, management, analysis, and archiving of data on all materials used in a vehicle. By using the *IMDS*, it is possible to meet the obligations that arise for automobile manufacturers and their suppliers through national and international standards, laws and regulations.
Manufacturer of Software	The production process of software is the transfer of executables and data into the target operating environment.
Master sample	Master sample (retained sample) from the organization for later quality comparison. This is assigned to a PPA procedure and a production lot. Not identical to “reference part” (limit sample, master part), which is used for checking measurement and test processes.

Term	Definition
Model (prototype)	Material item which is subjected to quality inspection for a particular reason or which is needed for quality inspection (from 55350-15:1986-02).
Off-the-Shelf	Off-the-Shelf products are not designed or manufactured to any customer specification. Only if the design or manufacturing of a product is modified for a specific customer, and this is agreed between organization and customer, the product is no longer off-the-shelf. Organization and customer can agree to deviate from this.
Operating materials	Materials or substances that are necessary for the operation of the product (e.g., gear oil).
Organization	The organization is the company supplying the customer in accordance with the PPA procedure; the supplier is one Tier lower in the supply chain.
Outsourced process	A process that an organization requires but arranges to be executed by an external party. The organization is responsible for quality assurance. (See also IATF 16949.)
Part number	Classification number for a product, such as an assembly, scope of delivery, individual part, raw part, material, etc.
Performance test	The performance test provides evidence that the quality capability of the entire manufacturing process is given under agreed series conditions.

Term	Definition
Process material	Materials or substances necessary for the production of the product (e.g., detergent, flux, cutting oil).
Product	Intended output of a production process, which may be hardware and/or software/processed product (e.g., oils, lubricants).
Product family (part family)	Products that are manufactured using the same production processes and production equipments, and have the same product characteristics.
Production	The fabrication of products in manufacturing and/or assembly stages (from VDA Volume 6). In the case of software, the term "**manufacture of software**" is used instead of "**production**".
Production materials	Individual parts, materials or substances that become a component of the product during production (e.g., raw parts, solder, heat-conducting paste).
Production process release	Release of the production process by the organization and/or customer.
Production transfer	See **Relocation (of production)**.
Pure substance	Chemical elements or mixtures as integral parts of materials or preparations.
Raw materials	Materials that are not related to use in a specific project and serve as a starting point for raw parts or finished parts.

Term	Definition
Raw part	Part produced by forming, reshaping, or machining that is still not in operational or ready-to-install condition.
Relocation (of production)	Complete or partial change of location of production.
Re-start	The use of lines, facilities, machines, tools, cavities, and molds after a longer time of still-stand for the specific product.
Risk assessment	Contains a risk analysis along the lines of IATF 16949 plus an assessment of the effects on the part of the organization and the customer.
Series production (series condition)	Production process in which products are manufactured continuously or in batches (of identical products). (See also DIN EN 55014-2.)
Service, external	A service that an organization requires but arranges to be executed by an external party. The service provider is responsible for quality assurance. (See also DIN EN ISO 9000.)
Single part	Part that cannot be non-destructively disassembled. *Note:* *Inseparable assemblies are not single parts.*
SOP	Start of series production/serial application.
Spare part	Replacement part (product, assembly or individual part) that is produced according to the specification of the customer in the scope of series or after-series production and approved by the customer.

Term	Definition
	Replacement parts and materials: Parts and materials, including service, aftermarket and remanufactured parts and materials, used for repair and maintenance services on automotive vehicles (from **IATF-Rules**).
Special Characteristics (SC)	Characteristics requiring increased care, fulfillment of requirements which require separate verification. (See also IATF 16949 and VDA Volume "A process description covering Special Characteristics (SC)".) The term SC encompasses the characteristic properties from the functional level to the feature level of the product and the production process. Note: Special Characteristics may have an effect, for example, on safety, relevance for approval, installation, and/or functionality.
Specification	A document in which requirements are defined. (See also ISO 9000.)
Standardized products (standard parts)	Technical components that are described in detail in generally accepted norms (e.g., for electrical/mechanical engineering) and that are interchangeable.
Supply material	Materials or substances required to operate the production facility (e.g., compressed air, electricity, hydraulic oil).
Tier	"Tier" describes the level/rank of suppliers in the supply chain.
Updated PPA documentation	PPA documentation containing deliverables of requirements whose fulfillment was not yet

Term	Definition
	fully demonstrated in the original version of the PPA documentation.
Variants	Products with similar form and/or function with a large proportion of identical components and/or characteristics.
Verification measure	Verification measure can be: • Test cases • Measurements • Calculations • Simulations • Reviews • Analyses Note that in particular domains certain verification measures may not be applicable, e.g., software units generally cannot be verified by means of calculations or analyses.

11.2 Evidence of Performance Indicators of Software Quality

Explanations on evidence of performance indicators of software quality are available on the VDA QMC website in the section FAQ and SI on VDA regulations:

https://vda-qmc.de/en/publikationen-und-apps/faq-und-si-zu-vda-regelwerken/

11.3 Annex 1 – Notes on PPA Deliverables (Tables 5-1 and 5-2)

Requirement documents for the product and the production process (Table 5-1)

Hardware / Mechanics	
I.	Technical Specifications Technical specifications include, e.g., customer drawings, CAD data, requirements for short-circuit resistance, voltage protection, functional safety (FuSa).
II.	Approved Design Changes Additional documents relating to design changes not covered by I.).
III.	Design and Engineering Approvals In the case of development responsibility of the organization according to agreement. Additional documents on design and development approvals not covered by I.).
Software	
IV.	Documentation of Software Quality Requirements • List of contractually agreed quality requirements, e.g., in quality assurance agreements, which must be verified after being specified in the “Agreement on the PPA Procedure”. • List of software components not developed within the project (e.g., reused, off-the-shelf, third-party, Free-and-Open-Source Software (FOSS)) that, after consultation, do not fully meet the contractually agreed quality requirements. *Note: Quality requirements within the meaning of the PPA procedure can include, e.g., process assessment procedures (Automotive SPICE®, CMMI, etc.), coding guidelines (MISRA, etc.), code metrics (cyclomatic complexity, number of lines of code, etc.), and test coverage (definition of test levels and coverage rates, etc.).*

V.	Documentation of Technical Software Requirements List of agreed technical software requirements (software specifications, etc.) that must be verified after being defined in the “Agreement on the PPA Procedure”. Taking into account software components <u>not</u> developed in the project. *Note: Technical software requirements within the meaning of the PPA procedure can include, for example, test specifications, architecture, requirements catalog (functional/non-functional, FuSa, security, legal and regulatory requirements, Special Characteristics, etc.).*	

PPA Deliverables (Table 5-2)

VDA No.	Deliverables, if applicable to the product	If deliverables are applicable, then agreement on:
0.1	PPA Report including Self-Assessment The PPA report defines the object under consideration of the PPA procedure based on information from the product documentation (e.g., part number, designation, drawing status, change status, production location), contains the “Self-assessment by the Organization,” and documents the “Decision by the Customer” (see Chapter 5.4).	Submission*
0.2	Documentation of the Agreement upon the Layout Inspection and Functional Testing The frequency, type, and scope of the “layout inspection and functional testing” (see Chapter 10) must be agreed upon contractually between the organization and the customer and documented in the Agreement on the PPA procedure.	Self-assessment or submission
1.	**Deliverables of the product development**	
1.1	Design FMEA (DFMEA)	Self-assessment

	If the organization is responsible for product development, it is also responsible for performing the DFMEA. Evidence of fulfilment of requirements is provided by means of self-assessment. The organization confirms that the DFMEA has been carried out in accordance with customer requirements and reflects the status of the PPA samples. Clear reference is made by means of document number, revision status, and date. The DFMEA is not submitted to the customer. The customer has the right to request access to review the DFMEA.	

2. Deliverables of the production process development

2.1	Process Flow Diagram Graphical visualization of the production process steps (including logistics processes) within the organization.	Self-assessment or submission
2.2	Process FMEA (PFMEA) The organization performs the PFMEA. Evidence of fulfilment of requirements is provided by means of self-assessment. The organization confirms that the PFMEA has been carried out in accordance with customer requirements and reflects the production process of the PPA samples. Clear reference is made by means of document number, revision status, and date. The PFMEA is not submitted to the customer. The customer has the right to request access to review the PFMEA.	Self-assessment
2.3	Control Plan The organization creates a Control Plan that describes the control of the processes for production and inspection of the product. Evidence of fulfilment of requirements is carried out by means of self-assessment. The organization confirms that the Control Plan has been created in accordance with customer requirements, reflects the production process of the PPA samples, and that the findings from the FMEAs have been taken into account during its creation.	Self-assessment

	Clear reference is made by means of document number, revision status, and date. The Control Plan is not submitted to the customer. The customer has the right to request access to review the Control Plan.	
3.	**Deliverables of the product validation and verification** *Exclusively against the requirements defined in the technical specifications agreed upon with the customer.*	
3.1	Data on Materials, e.g., via IMDS, CAMDS Evidence of fulfilment of national and international laws, regulatory requirements, and standards for the declaration of ingredients and the non-use of prohibited substances (see Chapter 9). The material data identification number must be entered in the PPA report.	Submission*
3.2	Geometry, Dimension Evidence of fulfilment of agreed geometric and dimensional requirements, e.g., through standard measurement reports (in accordance with customer drawings), standard gauge reports, individual/raw part/assembly measurements, cross-sections, 3D data set measurements.	Self-assessment or submission
3.3	Material Evidence of fulfilment of agreed material-specific requirements, such as strength, physical properties, mechanical characteristics, odor, and interior emissions, using suitable methods.	Self-assessment or submission
3.4	Function Functional testing in accordance with technical specifications and functional requirements.	Self-assessment or submission
3.5	Haptics Evidence of fulfilment of agreed haptic requirements by means of physical measurements or sensory tests. Examples of haptic requirements include operating forces, surface texture, and material perception.	Self-assessment or submission

3.6	Acoustics Evidence of fulfilment of agreed acoustic requirements by means of physical measurements or sensory tests. Acoustic requirements may relate to operating noises, signal and warning tones or interference noises, and can be described by characteristics such as sound pressure, frequency range, or sound characteristics.	Self-assessment or submission
3.7	Appearance Evidence of fulfilment of agreed visual requirements by means of physical measurements or sensory tests. Examples of visual requirements include color, gloss level, and grain. For further examples and possible assessment conditions, see VDA Volume 16 “Decorative surfaces of accessories and functional parts in the exterior and interior areas of automobiles”.	Self-assessment or submission
3.8	Surface Requirements Evidence of fulfilment of agreed requirements for technically treated surfaces, such as coated, laser-treated, or galvanized components. Examples of surface requirements include adhesion, resistance, roughness, and freedom from grease.	Self-assessment or submission
3.9	Technical Cleanliness See VDA Volume 19 part 1 “Inspection of Technical Cleanliness”.	Self-assessment or submission
3.10	Reliability Evidence of fulfilment of agreed reliability requirements, such as service life, overload, etc. See VDA Volume 3 Part 2 “Reliability Assurance for Car Manufacturers and Suppliers”.	Self-assessment or submission
3.11	Resistance to Electrostatic Discharge (ESD)	Self-assessment or submission
3.12	Electrical/High-Voltage Safety	Self-assessment or submission

3.13	Electromagnetic Compatibility (EMC)	Self-assessment or submission
3.14	Part Marking Evidence of fulfilment of agreed requirements for component labeling, e.g., in the form of image documentation, samples of series labels.	Self-assessment or submission
4. Deliverables of the production process validation		
4.1	Verification of Special Characteristics and, if applicable, additionally Agreed Characteristics Evidence of fulfilment of agreed requirements for safeguarding, e.g., through poka-yoke, 100% inspection, process capabilities (see also section 6.1.1).	Self-assessment or submission
4.2	Production Process Capacity As part of a performance test, proof is provided under series conditions that the required quality and quantity can be guaranteed in accordance with the contractually agreed capacity (see also section 6.1.2).	Self-assessment or submission
4.3	Series Production Process Release by the Organization Evidence (e.g., acceptance reports, checklists) of the implementation of the production process release in accordance with the series conditions described in Chapter 6.1 (including, e.g., a list of the lines, systems, machines, tools, cavities, and nests to which the release relates).	Self-assessment or submission
5. General Deliverables		
5.1	Evidence of Compliance with Legal Requirements Evidence such as country-specific certificates, test numbers, approvals for safety, environment, recycling, etc. in accordance with the specifications agreed upon between the organization and the customer.	Submission*
5.2	PPA Status of the Supply Chain List of component numbers (including index), the components names, and the corresponding PPA status.	Self-assessment or submission

5.3	PPA Samples Number or delivery quantity as agreed. The PPA samples are handed over to the customer. The type of evidence is to be agreed upon between the organization and the customer.	Self-assessment or submission
5.4	Master Sample Evidence of fulfilment of requirements is carried out by means of self-assessment. The organization confirms that a master sample is available in accordance with the agreed requirements. The master sample remains with the organization and is not handed over to the customer. Any deviating procedures must be agreed upon between the organization and the customer.	Self-assessment
5.5	Inspection Processes for Product and Production Process • List of Inspection Processes Listing of inspection processes and assignment to characteristics in accordance with agreed specifications • Proof of Inspection Processes Capabilities Product: Suitability of the inspection processes for the characteristics in accordance with agreed specifications (see VDA Volume 5 “Measurement and Inspection Processes” or comparable) Production process: Calibration certificates or adequate evidence in cases where proof of suitability of the inspection processes cannot be provided • Laboratory Qualification Requirements for testing laboratories according to IATF 16949. External, commercial, or independent testing laboratories must be accredited according to ISO/IEC 17025 or a comparable national standard	Self-assessment or submission

5.6	Part History The organization documents all changes (see also Chapter 3 “Triggers of the PPA Procedure and Customer Involvement”, ISO 9001, and IATF 16949) to the product and production process in the part history.	Submission*
5.7	Evidence of Suitability of the Employed Load Carriers including Storage The organization proves that the intended type of storage and the load carriers used do not impair the specified characteristics of the product in any way. Evidence is provided for the load carriers and the type of storage for which the organization is responsible.	Self-assessment or submission
5.8	Documentation of Agreements upon Diagnosis and Analysis Process • Complaint handling, see, e.g., VDA Volume “8D – Problem Solving in 8 Disciplines” • Field failure analysis, see, e.g., VDA Volume “Field Failure Analysis & Audit Standard” Evidence of fulfilment of requirements is carried out by means of self-assessment. The organization confirms that the applicable diagnosis and analysis process is documented. The documentation is <u>not</u> submitted to the customer. The customer has the right to request access to review it.	Self-assessment
5.9	Others	Self-assessment or submission
6. Software Deliverables		
6.1	Evidence of Implementation of Quality and Technical Requirements The evidence must be compiled in accordance with the agreement in the “Agreement on the PPA Procedure” with regard to Table 5-1, Requirements IV and V.	Self-assessment or submission

6.2	Evidence of Performance Indicators for Software Quality Performance indicators on software quality that must be provided in accordance with the agreement in the "Agreement on the PPA Procedure." Possible performance indicators include, e.g., "agreed customer requirements," "implemented software requirements," "verified software requirements," and "code quality implementation." For additional information, see Chapter 11, "Annexes and Downloads".	Self-assessment or submission
6.3	Documentation of Free-and-Open-Source Software Documentation of the Free-and-Open-Source Software (FOSS) used, including license terms and customer approvals.	Submission*
6.4	List of Known Errors Contents of the error list in accordance with the agreement in the "Agreement on the PPA Procedure," e.g., description of the failure mode and classification of errors.	Submission*
6.5	Documentation of Development Tools This includes: • Documentation of the development environment • Status/configuration of the development tools used to create the product (software) that is the subject of the PPA procedure Examples of development tools: • Compilers / linkers / code generators (including hardware configuration, if necessary) • Application tools The documentation is not submitted to the customer. The customer has the right to request access to review it. Documentation of version management tools (e.g., CVS, GIT, SVN) is not required here.	Self-assessment

6.6	Documentation of Software Version • Documentation of the baseline, configurations, and change history of the product (software). • Documentation of the baseline, the software elements agreed upon in the PPA procedure, such as software modules and components. • Documentation of compatibility with hardware variants.	Self-assessment or submission

‘Self-assessment’: The organization always confirms the fulfillment of requirements by means of self-assessment without submitting documents to the customer.

‘Self-assessment or submission’: The organization and customer agree upon the type of provision in the ‘Agreement on the PPA Procedure’.

‘Submission*****’: Minimum scope of deliverables that must always be submitted by the organization to the customer.

11.4 Annex 2 – Comparison PPA – PPAP

VDA No.	Requirement documents	AIAG No.	Requirement documents
Hardware / Mechanics			
I.	Technical Specifications	1	Design Records
II.	Approved Design Changes	2	Engineering Change Documents
III.	Design and Engineering Approvals	3	Customer Engineering Approval
Software			
IV.	Documentation of Software Quality Requirements	–	CQI-34: Software Assurance Approval Process (SWaaP)
V.	Documentation of Technical Software Requirements	–	CQI-34: Software Assurance Approval Process (SWaaP)

VDA No.	Deliverables	AIAG No.	Deliverables
0.1	PPA Report incl. Self-Assessment	18	Part Submission Warrant (PSW)
0.2	Documentation of the Agreement upon the Layout Inspection and Functional Testing	–	No direct equivalent
1.	**Deliverables of the Product Development**		
1.1	Design FMEA	4	Design FMEA
2.	**Deliverables of the Production Process Development**		

2.1	Process Flow Chart	5	Process Flow Chart
2.2	Process FMEA	6	Process FMEA
2.3	Control Plan	7	Control Plan
3.	**Deliverables of the Product Validation and Verification**		
3.1	Material Data, e.g., via IMDS, CAMDS	1.1	Reporting of Part Material Composition
3.2	Geometry, Dimensions	9	Dimensional Results
3.3	Material (Strength, Physical Properties, Odor …)	10	Material / Performance Test Results
3.4	Function	10	Material / Performance Test Results
3.5	Haptics	10	Material / Performance Test Results
3.6	Acoustics	10	Material / Performance Test Results
3.7	Appearance	13	Appearance Approval Report (AAR)
3.8	Surface Requirement	10	Material / Performance Test Results
3.9	Technical Cleanliness	10	Material / Performance Test Results
3.10	Reliability	10	Material / Performance Test Results
3.11	Resistance to electrostatic discharge (ESD)	10	Material / Performance Test Results
3.12	Electrical Safety/High-voltage Safety	10	Material / Performance Test Results
3.13	Electromagnetic Compatibility (EMC)	10	Material / Performance Test Results

3.14	Part Marking	1 and/or 17	Design Records and/or Customer-Specific Requirements
4.	**Deliverables of the Production Process Validation**		
4.1	Assurance of Special Characteristics; and – if applicable – additionally agreed characteristics (e.g., Poka-Yoke, 100% Inspection, Process Capabilities)	11	Initial Process Studies
4.2	Production Process Capacity	–	No direct equivalent
4.3	Series Production Process Release by the Organization (including a list of approved lines, equipment, machines, tools, etc.)	–	No direct equivalent
5.	**General Deliverables**		
5.1	Evidence of Compliance with Legal Requirements	–	No direct equivalent
5.2	PPA Status of the Supply Chain	–	No direct equivalent
5.3	PPA Samples	14	Sample Product
5.4	Master Sample	15	Master Sample
5.5	Inspection Processes for Product and Production Process • List of Inspection Processes • Proof of inspection process capabilities for the product and the production process • Laboratory Qualification	 16 8 12	 Checking Aids Measurement System Analysis Qualified Laboratory Documentation
5.6	Part History	–	No direct equivalent

5.7	Evidence of Suitability of the Employed Load Carriers including Storage	–	No direct equivalent
5.8	Documentation of Agreements upon the Diagnosis and Analysis Process (Complaint Handling, Field Failure Analysis)	–	No direct equivalent
5.9	Others	17	Records of compliance with customer specific requirements
6.	**Deliverables for Software**		
6.1	Evidence of Implementation of the Quality Requirements and the Technical Requirements	–	CQI-34: Software Assurance Approval Process (SWaaP)
6.2	Evidence of Performance Indicators on Software Quality	–	CQI-34: Software Assurance Approval Process (SWaaP)
6.3	Documentation of Free-and-Open-Source Software (FOSS)	–	CQI-34: Software Assurance Approval Process (SWaaP)
6.4	List of Known Errors	–	CQI-34: Software Assurance Approval Process (SWaaP)
6.5	Documentation of Development Tools	–	CQI-34: Software Assurance Approval Process (SWaaP)
6.6	Documentation of the Software Versions	–	CQI-34: Software Assurance Approval Process (SWaaP)

Quality Management in the Automotive Industry

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