Rheinmetall – Division Power Systems

Supplier Guide – for production material supplier

Version 4.2 | 01.08.2025

PASSION FOR TECHNOLOGY.

RHEINMETALL

Table of content

QUALITY ASSURES OUR FUTURE

The Supplier Guide describes the regulations for the organizational unit of Supplier Quality Development within the Purchasing Department of the Rheinmetall Division Power Systems. Given that the individual companies of the Division Power Systems act under the well-established brand name "PIERBURG". This name is in use to specify the PIERBURG companies in their relation to the market.

PIERBURG as part of the Rheinmetall Group develops and manufactures in close partnership with the automotive manufacturers (referred to in the following as customers) components and modules for mobility solutions and beyond automotive applications. As a system partner of the customers in their core technology area of engine engineering, PIERBURG fulfils through its products the high requirements through the utilization of its know-how, specifically suited materials and innovative manufacturing processes.

The success of PIERBURG is directly dependent on the satisfaction of its customers which can exclusively be attained through the complete fulfilment of customer requirements and expectations. This customer satisfaction is not only based on quality aspects but equally on keeping deadlines and price-wise competitiveness.

Through the utilization of modern quality assurance tools, PIERBURG is relying on the avoidance of errors instead of their correction in order to attain the "Zero Defect" quality target. All processes are arranged for the purpose of attaining a specific target and result and are continually improved or renewed.

Regarding the quality of its products, PIERBURG is highly demanding in order to exceed comparison with its competitors. The quality of all supplied parts must also meet these requirements. PIERBURG can only achieve this ambitious targets in close cooperation with its suppliers and partners.

Beyond these activities the consideration of environmental aspects is an important component in the company policy of PIERBURG. Already during the development phase, attention is paid to the aspect that the manufacture of the product will have an impact on the environment, which is as small as possible and that the production process will conserve energy and natural resources.

This Supplier Guide describes the PIERBURG minimum requirements regarding the quality management aspect of the supplier and defines the specific requirements to efficiently design the co-operation with the supplier during the product development process and during series production.

For this reason PIERBURG suppliers should be included in the quality planning aspect of a project at the earliest possible stage. PIERBURG expects from its suppliers to actively contribute experience and potentials for improvement within the respective process steps.

Matthias Horst
Head of Purchasing

Frank Berbuir
Director Supplier Quality Development

1 GENERAL REQUIREMENTS

1.1 Scope (IATF 16949: section 1.1)

The Supplier Guideline is valid for the supply of production materials, external services, extended workbench, software and aftermarket products to Pierburg, Pierburg Pump Technology, Rheinmetall Brandt & Rheinmetall Invent which operate in the Rheinmetall Division Power Systems.

It is also valid for services that affect customer requirements such as sub-assembling, sequencing, sorting, rework, washing and calibration services.

It applies to all suppliers along the supply chain providing products to PIERBURG. It is also applicable for customer directed suppliers (directed buy) or recommended suppliers.

PIERBURG suppliers are expected to extend the requirements of this guideline to their own suppliers and sub-suppliers.

1.2 References

All reference documents mentioned in this directive and listed in section 6. (References) are the latest editions. Only the latest edition of each referenced document shall be used, unless otherwise specified by PIERBURG.

1.3 Business Language (IATF 16949: section 8.2.1.1)

All communications shall be conducted in English unless otherwise requested by PIERBURG representatives.

Unless otherwise specified by PIERBURG representative, documents including PPAP and APQP documents shall be written in English. In addition, they may display the native language of the supplier or of the PIERBURG receiving plant, if common to both.

1.4 Quality Management System (IATF 16949: section 4)

An effective quality management system, set up according to the standards and regulations of IATF 16949, is a prerequisite for supplier relations with PIERBURG.

The effectiveness of the QM system should be reflected by:

- Continuous and verifiable improvement of processes, procedures, and products
- Delivered quality & quantity
- Delivery reliability
- Prompt and effective implementation of corrective actions
- Communication at all levels
- Appropriate / timely processing of new and revised projects

The goal of the quality management system is to achieve the “Zero-Defect” target.

The minimum requirement is certification according to ISO 9001 by an accredited certification body.

Certification according to IATF 16949 is required for automotive and service parts suppliers. If not yet accredited to IATF 16949, the suppliers affected shall have a plan to achieve certification. Pierburg reserves the right to conduct 2nd Party System Audits in accordance to IATF 16949 to identify the gap and develop the quality management system of the suppliers. Certifications are required to be issued by accredited certification bodies.

The supplier is obligated to inform PIERBURG immediately if the certificate:

- has been revoked
- has expired without a successful recertification
- has been temporarily placed on suspension

In these cases PIERBURG representative reserves the right to conduct system audits and assessments on quality management systems, after prior notification.

If no recertification is planned, the supplier shall inform PIERBURG, at least 3 months prior to the expiration date.

After a successful recertification, new certificates shall be sent to supplier-certificates@de.rheinmetall.com electronically as well as uploaded to the Supplier Portal "Ivalua" module business directory.

1.5 ESG, CSR & Sustainability (IATF 16949: section 8.6.5, 8.4.2.2, 5.1.1.1)

PIERBURG expects from its suppliers and sub-suppliers to adopt and adhere to our minimum expectations towards business ethics, working conditions, human rights and environmental leadership. These expectations are outlined in the Rheinmetall Supplier Code of Conduct and are available at the Rheinmetall website. All suppliers are obligated to comply with the LkSG (Lieferkettensorgfaltspflichtengesetz). Upon request or audit by PIERBURG, suppliers shall provide evidence of adherence to these requirements.

1.6 Regulatory and Statutory Compliance (IATF 16949: section 8.4.3.1, 8.4.2.2, 8.6.5)

PIERBURG suppliers shall adhere to and pass down all applicable statutory and regulatory requirements to their suppliers in the entire supply chain. The supplier shall apply the legal requirements of the production location and of the country of use (if named by PIERBURG) during the SURE (Supplier Readiness) phase to all products, processes or services (internal and external). This process shall be completed at the latest by PPAP submission.

PIERBURG jointly with its customers and/or legal authorities [i.e. German KBA] shall be granted access to the supplier premises and the related sub-suppliers premises for the inspection of the compliance to all relevant legal requirements.

1.7 Environment (IATF 16949: section 8.2.2.1)

Effective environmental management, which ensures compliance with the respective applicable environmental regulations and improves continuously and efficiently the environmental conditions of the supplier, is an essential contribution towards supply security. PIERBURG is committed to the protection of the environment.

All PIERBURG plants are ISO 14001 certified. Therefore we expect our suppliers to show voluntary commitment towards environmental protection by implementing an environmental management system.

If the ISO 14001 certificate is not available, then a timeline for certification needs to be presented. Otherwise the completion of the M12 – Checklist Environmental Management form is required. The M12-form needs to be send to supplier-certificates@de.rheinmetall.com after completion.

Product-related environmental and Safety Data Sheet requirements

All suppliers shall meet applicable legal, environmental and import regulations (e.g. EU REACH (EC) No. 1907/2006, EU ELV Directive 2000/53/EC, 2011/65/EU – RoHS, China requirements for prohibited substances on automobiles GB/T 3051 2-2014, ...)

Upon request, suppliers shall provide recycling and disposal concepts appropriate for their products. Additional data (e.g. energy consumption, usage of renewable energy, recycling quotas, emissions) may be requested for life cycle assessment of PIERBURG products.

Suppliers shall submit Safety Data Sheets (SDS) for materials and mixtures, in accordance with the United Nation's Globally Harmonized System (GHS) of Classification and Labelling of Chemicals and the European Classification, Labelling & Packaging (CLP) regulation.

For products classified as a dangerous good (e.g. pressurized shock absorber, pyrotechnic articles, lithium batteries, ...) SDS or similar information shall be provided by the supplier in order for PIERBURG to fulfill handling and transport requirements.

1.8 Occupational Health and Safety Management & Energy Management

Occupational health and safety management

Health and safety of the workforce has the highest priority to PIERBURG. PIERBURG efforts for health and safety concerns are managed via ISO 45001 occupational health and safety management system. PIERBURG therefore strongly encourages the whole supply chain to show voluntary commitments to health and safety by implementing an occupational health and safety management system.

The supplier shall upload the valid certificate for the occupational health and safety management system to Ivalua Portal. The supplier shall always have the latest and valid certificate available.

Energy management

PIERBURG is strongly committed to conserving resources, recycling, continuously improving products & processes and saving energy by the ISO 50001 energy management system. PIERBURG therefore encourages the whole supply chain to participate in the initiative by a voluntary commitment to implement an energy management system.

The supplier shall upload the valid energy management system certificate on Ivalua Portal. The supplier shall always have the latest and valid certificate available.

1.9 Sub-supplier Management (IATF 16949: section 8.4)

Sub-suppliers have a significant impact on the quality of the final product. PIERBURG suppliers shall have a documented supplier management system in place.

PIERBURG suppliers are responsible for the development of their sub-suppliers. They shall have the necessary process, competence and resources to manage their sub-suppliers (including directed-buy suppliers and outsourced processes) and monitor their performance. The supplier ensure the compliance of its sub-supplier with all requirements of this directive.

Any intented changes from a sub-supplier shall be communicated well in advance at least 12 month prior to implementation. The change of a sub-supplier can only be implemented upon prior approval by PIERBURG representative. See section 1 .9 — Changes to Product or Processes. Subsequently, Production Part Approval Process (PPAP) shall be performed.

PIERBURG reserves the right to participate in audits and assessments of the entire supply chain regarding quality management systems, processes, products. Advance notification will be given. PIERBURG participation in a sub-supplier audit does not exempt the PIERBURG supplier from their responsibility to monitor and develop the sub-suppliers.

1.10 Changes to Product or Processes (IATF 16949: section 8.2.4, 8.5.6)

The supplier shall have a documented process to control and implement changes that has an impact on product and manufacturing process.

All cases captured by “AIAG PPAP Manual and/or VDA Volume 2 - Trigger matrix” are to be considered a “Change”.

The effects of any change, including those changes caused by sub-suppliers, shall be assessed, verified and validated to ensure full compliance within the PIERBURG requirements prior to implementation. An evidence as part of the risk mitigation analysis process shall be presented prior to implementation of the proposed change. For proposed changes affecting tolerances statistical methods shall be applied by the supplier and forwarded to Pierburg for review upon request.

Any intended change, deviating from the latest PPAP approval, shall be communicated as soon as possible to PIERBURG representative to allow for a timely review and approval.

Suppliers shall submit a written request by sending the designated form (REA – Request for Engineering Approval) to all affected PIERBURG plants. The request shall be accompanied by a detailed timeline demonstrating proper change control that identifies necessary safety stock/bank requirements and to allow for a timely PIERBURG/Customer approval and validation.

Proposed changes shall not be implemented prior to reception of any written approval from PIERBURG representative.

If the change is related to electronic components (particularly semiconductor devices, passive components and LED components), section 5.4 shall be applied.

1.11 Product Safety (IATF 16949: section 4.4.1.2)

Product safety and product liability are particularly significant for companies in the automotive industry. The supplier has the responsibility (product liability) for their parts and processes, including their sub-suppliers. In order to prevent product liability risks, it is the responsibility of the supplier to do everything in their power, in terms of organization and technical matters to guarantee the product safety.

The supplier shall have a documented process for the management of “product safety” related to products and manufacturing processes.

PIERBURG requires from their suppliers to designate a Product Safety and Conformity Representative (PSR) to be responsible of all related tasks described in IATF 16949 section 4.4.1.2. This PSR has to be named within the Ivalua Portal within the PIERBURG specific module business directory.

Furthermore, the supplier shall apply these requirements to their entire supply chain.

1.12 Business Processes based on Electronic Data Exchange (IATF 16949: section 8.2.1.1)

Business processes based on electronic data exchange between PIERBURG and its suppliers are the main focus of PIERBURG’s strategy. According to this strategy, more and more of the processes, which are described in this directive, are managed by using the electronic communication platforms of PIERBURG such as “Ivalua” modules (“Sourcing”, “SRM”, …) and secured data transfer system “Cryptshare”.

PIERBURG expects from their suppliers to take the necessary measures to support electronic data exchange via the above-mentioned communication platforms and carry out transactions via PIERBURG’s web based applications and communications. Suppliers are responsible for maintaining and updating latest contact information in the Ivalua master data contacts.

All suppliers shall access the PIERBURG communication platform frequently to stay up to date.

1.13 Contingency Plans (IATF 16949: section 6.1.2.3)

Suppliers shall identify and evaluate internal/external risk to all manufacturing processes, machinery and infrastructure, which are essential to maintain production output and ensure that PIERBURG requirements are met.

Suppliers shall develop a contingency plan for each supplier manufacturing/shipping location which may disrupt product flow to PIERBURG.

PIERBURG shall be informed immediately in the event of any disaster (e.g. interruption from externally provided products, services, natural disasters, fires, etc.). In this case, the suppliers shall provide PIERBURG access to their facility and their own tools.

Suppliers are required to regularly review and update each contingency plan, minimum on annual basis. The contingency plan should include comprehensive testing of the recovery actions and should address potential gaps in component/raw materials. The implementation of any changes concerning these contingency plans shall be properly documented and be subjected to the change management process (see section 1.9 — “Changes to Product or Process”).

1.14 Escalation Model “Supplier/Purchased Parts”

Suppliers providing PIERBURG with products and services that does not comply to quality requirements, delivery, planning commitments and expectations are subjected to escalation process in expediting improvement actions and visibility.

In the case of continuous or repetitive quality problems, a Controlled Shipping Level (CSL) or a New Business Hold (NBH) can be executed.

- CSL I = 100% delivered products inspection by the supplier,
- CSL II = 100% delivered products inspection by the supplier and a second 100% inspection by an external service provider at the expense of the supplier,
- NBH = For the period of the New Business Hold there will be no consideration in the case of new orders, respectively new developments.

The external service provider utilized for the 100% inspection is required to be certified in acc. to ISO9001. It is mandatory for the supplier to nominate a service provider and obtain PIERBURG approval.

The Controlled Shipping Level remains applicable for the supplier until permanent corrective actions and measures are implemented and their effectiveness has been verified. Suppliers which are currently engaged in Controlled Shipping Level can exit by written notification from PIERBURG.

The suppliers are liable for the costs of the delivery of faulty products and any sub sequential damages.

The PIERBURG Escalation Model Controlled Shipping Level 1, Control Shipping Level 2 and New Business Hold are available at Annex A and B for review. Questions regarding the interpretation of this policy and the application shall be directed to the PIERBURG receiving plant.

1.15 Lessons Learned (IATF 16949: section 6.1.2.1, 7.1.6, 10.3)

The supplier shall have a process to document and share knowledge, generally gained by experience within their organization.

For realizing an efficient product and process development process, the supplier shall consider a minimum knowledge gained from previous projects, customer claims, recall actions, supplier complaints, change and deviation requests, audits, rework, repair and scrap. The supplier shall review and apply the Lessons Learned as a first step in the project.

This process keeps the focus in the avoidance instead of detecting defects in the entire supply chain. The effectiveness is proven by continuous improvement of the production process reliability, quality and delivery performance.

1.16 Retention Periods (IATF 16949: section 7.5.3.2.1)

The supplier shall define, document and implement a record retention policy. The control of records shall satisfy statutory, regulatory, organizational and customer requirements.

Production part approvals, tooling records (including maintenance and ownership), product and process design records, purchase orders (if applicable), or contracts and amendments shall be retained while the product is active for production and service requirements unless otherwise specified by the customer or regulatory agency.

For the above mentioned documents and any documents as proof of special characteristics the retention period shall never be less than 15 years (after the discontinuation of the product from series and spare parts demand).

For all other documents, the retention period shall never be less than 5 years (after the discontinuation of the product from series and spare parts demand).

NOTE: Production part approval document information may include approved product/sample parts, applicable test equipment records, or approved test data.

Automotive Industry

- IATF (section 7.5.3.2.1) — Record Retention
- VDA 1 — Information Management, Documentation Control and Archiving

These regulations and this summary do not replace legal/legislative requirements.

1.17 Customer Specific Requirements (IATF 16949: section 4.3.2)

Suppliers are expected to comply with specific requirements of PIERBURG customers.

General customer specific requirements are already included in this directive shall be implemented and to be cascaded through the entire supply chain.

Additional customer specific requirements issued by PIERBURG customers will be communicated on a project basis. Their application will be subject to an agreement between PIERBURG and the supplier.

2 APQP ADVANCED PRODUCT QUALITY PLANNING (SUPPLIER READINESS – SURE)

2.1 Feasibility Study (IATF 16949: section 8.2.3)

The supplier shall analyze all technical documents (e.g. drawing, specifications, environment, statement of work, commodity specific and customer specific requirements ...) as well as the Purchasing Terms & Conditions and this Quality Directive as part of a contract review.

The requirements are to determine and confirm:

- The feasibility of the design (for suppliers with design responsibility),
- The ability to manufacture,
- The ability to measure, achieve and sustain process capability for special characteristics.
- The capabilities to the relevant CQI standard for the process

We expect our suppliers to determine improvements in design, process and costs. In this context, PIERBURG also expects that the supplier consider issues such as packaging and shipping for each plant.

For each part, all potential suppliers shall submit a signed Feasibility Study form along with the quote, prior to sourcing and awarding of the contract. This is a prerequisite and does not guarantee award of business. PIERBURG expects its suppliers to assess the feasibility by a cross functional team, consisting minimum of representatives from Sales, Technical/R&D, Quality and Production. The Feasiblity Evaluation is required to be signed from a representative of the supplier with the power of attorney.

In addition, PIERBURG expects its suppliers to sign a Zero Defect Agreement (05 Annex 5a_Form5 ppm-Agreement Zero Defect) with the ultimate goal of “zero PPM”.

Prior to final sourcing award, PIERBURG reserves the right to conduct a joint detailed technical review/verification with appropriate supplier representatives.

The submission of the feasibility study shall be accompanied by a Capacity Confirmation, if requested by PIERBURG. Whenever there is a product or process change on existing business, the feasibility study shall be reviewed and confirmed. The confirmed feasibility study shall be a part of all part approval reports.

2.2 Quality Planning (APQP/Supplier Readiness) (IATF 16949: section 8.1)

Supplier Readiness (SuRe)

PIERBURG’s objective is to involve suppliers in the quality planning for a new project at the earliest possible stage. PIERBURG always requires systematic planning from their suppliers in the context of project management according to AIAG APQP or VDA Volume Material Level Assurance (Product Creation — Maturity Level Assurance for New Parts).

PIERBURG reserves the right to determine components of increased risk or special priority and initiate a Supplier Readiness program for these components. For the respective part and/or project, the supplier shall, at a minimum, implement the planning steps as specified in Supplier Readiness. Each section describes a necessary planning item (SuRe element). If not otherwise specified by PIERBURG, all of these requirements are mandatory.

Feedback shall be provided by the communication platform “Ivalua APQP” or with exemptions via SuRe document without request at least every two weeks.

For parts produced and purchased by the supplier (raw materials, external processing, sub-suppliers), a status shall be drawn up which represents the individual evaluations in summary and puts emphasis on individual critical items.

Project-specific requirements, which go beyond the contents of this Quality Directive, will be agreed between PIERBURG and the supplier.

2.3 Product- and Process FMEA (IATF 16949: section 8.3.5.2)

The Failure Mode & Effects Analysis (FMEA) shall be carried out based on AIAG & VDA Handbook to examine possible risks and their evaluation regarding severity, probability of occurrence, and the possibility of detection.

These risks shall be minimized by introducing appropriate measures.

The FMEA is thus an important instrument for preventing defects. The FMEA shall be carried out in a timely manner, so that the results and measures to be taken can still be incorporated into planning.

A FMEA shall be used for all phases of the product lifecycle, such as design, production, assembly, packaging, transport, customer usage, as well as recycling and waste disposal.

The FMEA shall be used as a continuous improvement tool.

FMEAs shall be developed and/or revised in the following cases, e.g.:

- Development/production of new parts
- Introduction of new manufacturing methods
- Relocation of plants
- Drawing changes
- Process changes
- If defects occur
- Lessons learned
- Complaints
- Product (Design) FMEA
- Product FMEA shall be completed for all parts which are being designed within the responsibility of the supplier upon request by PIERBURG, Product FMEA shall be presented to PIERBURG

Process FMEA

Process FMEA shall be completed for all process steps of a component. In particular, the results of the process FMEA and the special characteristics shall be taken into consideration as basis for the Control Plan.

The following topics shall be considered with special focus:

Failure simulation along the FMEA (Product and Process)

The identified failure modes within the FMEA shall be simulated on the shop floor after industrialization of the production process in order to verify if the failures are detected. Additional failure modes and other potential causes shall be identified and integrated into the FMEA.

Material mix-up

The complete process chain during production, including the processes of the sub-suppliers, shall be analyzed for risk potential concerning the mix-up of material. All necessary actions shall be taken in order to eliminate the risk of material mix up (e.g. implementation of efficient interlocking systems).

Management of part variants

A system shall be implemented which eliminates the risk of a mix-up of similar looking parts.

Control of scrap parts, rework parts, setup parts and reference parts

This includes, in particular, the prevention of the mixing of suspect parts with good parts in special situations such as machine crashes, machine stoppage and restart.

Technical cleanliness

Technical cleanliness shall be implemented in the FMEA based on the specific requirements. The sub-suppliers, machine manufacturers and service providers have to be considered as well. The product and all processes shall be designed so that all the requirements are fulfilled.

By pass/Skip Process

A system shall be designed and implemented to ensure that each process step can only be started if the previous one has been successfully completed.

Lessons Learned

All lessons learned from similar processes and products shall be taken into account for the new project. Among other things, lessons learned documentation, records of all internal and external complaints, 8D reports, as well as preceding FMEA's shall be considered. Lessons Learned of sub-supplier's issues have to be taken into account as well.

FMEDA (Failure Mode Effect and Diagnostic Analysis)

If requested by PIERBURG, the SFF (Safe Failure Fraction) for electrical/electronic/programmable electronic safety-related systems shall be determined by the FMEDA based on the IEC DIN EN 61508-2. PIERBURG shall be notified in written form about risks in the safety related system.

Reverse FMEA

Reverse PFMEA is an on-station review of all failure modes included in PFMEA conducted by cross-functional team, focused to verify that all failure modes have proper controls (prevention/detection) and they are working properly.

Reverse FMEA (R-FMEA) tool must be applied to review FMEA. Evidence of R-FMEA deployment and use shall be requested by PIERBURG Quality Representative. The supplier is requested to deploy R-FMEA use at its sub-suppliers.

2.4 Process Development and Station Release (IATF 16949: section 8.3.5, 8.3.5.2)

The supplier shall evaluate and document its releases for individual stages of product and process development

The supplier shall release all manufacturing and assembly stations before PPAP. While doing so, the availability and suitability of the items listed in the following points shall be ensured:

- Special characteristics for product and manufacturing process
- Capability studies
- Identification of process input variables that impact characteristics
- Process approval acceptance criteria
- Error simulation completed and documented (e.g. verification of automatic test equipment)
- Complete and valid work documents (e.g. flow charts, operation sheets, control plans, inspection plans. ...)
- operating materials and maintenance plans
- Inspection equipment
- Means of transport
- Provision of material with accompanying documents indicating the revision level of the parts

The inspection shall be performed using a suitable checklist. All production and assembly operations shall be included. The deviations, if any, shall be documented. Responsibilities shall be defined for implementing corrective and improvement measures and target deadlines shall be set.

After completing the defined measures, another inspection shall be performed, taking the deviations that had been previously identified into account. The results shall also be documented. A release for the PPF/PPAP can only take place once the results of the inspection are successful. This release shall be documented.

The supplier shall approve their sub-suppliers according to this guideline.

2.5 Technical Cleanliness (IATF 16949: section 8.2)

Technical Cleanliness is defined in PIERBURG cleanliness specification indicated on the component drawing. All types of contamination and their sources across the entire process chain (sub-suppliers, machine manufacturers and service providers) must be considered and be evaluated within the FMEA.

2.6 Statistical Process Control (IATF 16949: section 8.5.1)

As a basic principle, all product and process characteristics are important and shall be complied with.

Special characteristics require the proof of process capability. For this purpose the supplier shall monitor these characteristics with suitable methods, e.g. with statistical process control (SPC).

If process capability cannot be achieved, 100% inspection shall be carried out.

Special characteristics which are not measurable or only measurable by destroying the product shall be monitored and documented with suitable methods. Test intervals and the size of random samples shall be determined and planned. Planned monitoring of the characteristics in series production shall be agreed with PIERBURG. This information shall be documented in the Control Plan.

2.7 Special Characteristics (IATF 16949: section 8.2.3.1, 8.3.3.3)

Special characteristics are stated on the drawings and defined in respective PIERBURG specification. Special characteristics are to be identified from the risk analysis of the supplier, e.g. from the Product- and/or Process-FMEA, based on the supplier's experience and knowledge.

All characteristics shall be complied with. There are characteristics with higher risks which require special consideration.

The supplier shall identify and mark them in all relevant product and process documents, such as drawings, FMEA, risk analyses, work instructions, control plans and PIERBURG specific documents such as Process Steering (04_Annex 4a_Form4 Process Steering).

These characteristics require particular consideration including capable processes, error proofing, special controls and monitoring in all relevant planning steps.

Concerning the verification management documents for special characteristics, the extent of the retention period to be applied needs to be defined in accordance with the requirements described in section 1 .14 — "Retention Periods".

Deviations in these characteristics can seriously affect product safety, product lifetime, assembly capability, product functionality, quality and can violate official or legal regulations.

2.8 Capability studies (IATF 16949: section 8.3.5.2, 9.11.1)

The supplier shall agree to conduct the machine and process capability study in accordance to one of the automotive standards AIAG SPC book, VDA Volume 2 or VDA Volume 4.

Minimum requirements for capability indices:

- Machine capability/short-term process capability Cm/Cmk ≥ 2.0
- Preliminary process capability Pp/Ppk ≥ 1.67
- Process capability/long-term process capability Cpk according to requirements listed in the respective Pierburg specification indicated on the drawing

Deviating requirements to the supplier will only be permissable after prior approval by Pierburg.

Machine capability study/short-term capability

The verification for machine capability studies shall be planned and available prior to PPAP submission.

Preliminary process capability study

The evaluation of preliminary process capability studies shall be generated from at least 25 sub-groups, each consisting of 5 samples, unless otherwise agreed with PIERBURG.

For attributive inspection, sample size is minimum 300 consecutive pieces, unless otherwise agreed by PIERBURG aligned with the supplier.

Containment, generally either 100% sorting or some form of error proofing, shall continue until the process Ppk demonstrates preliminary capability unless otherwise agreed by PIERBURG aligned with the supplier.

Process capability study/Long-term process capability

The long-term process capability study shall be submitted to PIERBURG. In case of non-capable indices results [i.e. Ppk/Cpk] a 100% inspections/sorting must be initiated until the desired indices value can be reached.

2.9 Planning and Procurement of Inspection Equipment (IATF 16949: section 7.1.5.1)

The supplier determines the inspection method with the appropriate IATF inspection equipment for all characteristics, captured on e.g. engineering drawings, standards, specifications, etc. The procurement process shall be planned so that the necessary inspection equipment is readily available by the time of PPAP submission. External inspection and testing by a service provider need to be planned and must be accredited according to ISO/IEC 17025 or comparable national standards.

The verification shall be carried out according to the requirements of AIAG MSA or VDA Volume 5. All MSA shall be processed in accordance to ANOVA methodology.

Inspection Planning

Based on the control plan, the supplier shall create an inspection plan, which captures all characteristics and defined frequency to be inspected with the appropriate inspection equipment.

2.10 Planning and Procurement of Tools, Fixtures and Equipment (IATF 16949: section 7.1.3.1)

All facilities, tools, fixtures and equipment necessary for manufacturing are to be planned and procured to meet the contracted volume and be readily available at PPAP-submission.

Identification of Customer Property (IATF 16949; section 8.5.3)

All tools for manufacturing, testing or inspection equipment belonging to PIERBURG or its customers shall be permanently identified clearly showing ownership. These tools are exclusively use for PIERBURG products.

Proof of ownership [i.e. pictures of the tags and/or the permanent identification] shall be submitted within the PPAP Phase to PIERBURG Purchasing

Failure to comply with tool identification requirements will result in delay of payment or non-payment.

Tools for manufacturing, testing or inspection equipment belongs to PIERBURG cannot be scrapped or sold in any form unless prior written approval by PIERBURG Purchasing.

2.11 Planning of Preventive Maintenance (IATF 16949: section 8.5.1.5)

A system for preventive maintenance on production equipment and tooling shall be developed.

A preventive maintenance plan shall be developed which includes the frequency and the course of actions.

Actions executed shall be documented in writing. A contingency plan shall be established for all processes that can influence the ability to deliver. Special focus shall be on machines with capacity constraints and special tools.

2.12 Status of Sub-suppliers and Purchased Parts

If the supplier assigned orders to a sub-supplier, the sub-supplier shall also fulfill the requirements of this Quality Directive. This includes the implementation of a quality planning and feedback system with the sub-suppliers according to the requirements of section 2 — APQP Advanced Product Quality Planning/ SuRe.

The use of qualified/certified sub-suppliers for the project shall be ensured. If requirements are not met, improvement plans shall be defined prior to PPAP approval of the entire product.

The status of the quality planning process shall be presented regularly. The activities shall be organized to meet the Production Part Approval Process (PPAP) of the purchased parts is completed before the production process and product approval of the entire product.

2.13 Logistics (IATF 16949: section 8.1.1, 8.3.5.1, 8.5.4)

In principle, PIERBURG establishes a logistics agreement with the supplier regardless of whether such an agreement was made or not, the following minimum requirements apply unless a variance has been explicitly agreed:

Planning of packaging including labeling

The supplier is responsible for the packaging of their components and to improve packaging if it is not suitable for its intended purpose/s. The packaging must be designed to ensure that it is robust to withstand shipment by land, air, sea, etc. and arrive on time without damage or contamination. The supplier shall submit the initial packaging concept using the Packaging Data Sheet to PIERBURG Logistics during the feasibility analysis. The final packaging concept is to be forwarded to PIERBRUG Logistics in form of a Supplier Packaging Data sheet prior to the PPAP submission and requires approval from PIERBURG Logistics

The following PIERBURG Standards shall be observed:

- Logistiklastenheft (Logistics Agreement)
- Supplier Packaging Data Sheet

Plant-specific detailed regulations shall be applied [if requested].

Corrosion prevention

All products which could be impaired by interaction with the environment shall be protected appropriately. Approval for use of the planned corrosion inhibitors (if necessary) shall be coordinated in a timely manner with PIERBURG on the supplier's initiative and included with PPAP submission.

Material flow

To avoid mix up and to be able to trace batches, raw materials, parts purchased from sub-suppliers and parts from supplier's own production, "First In — First Out" principle shall be followed across all processes and deliveries.

Supplier shall ensure the traceability of their products from PIERBURG all the way back to their sub-suppliers. For this purpose, the parts or containers shall be labeled in a suitable way with batch identification number and revision status. The revision status shall be stated on the delivery note.

Technical Cleanliness

The supplier is responsible for the technical cleanliness of both the parts and the packaging and shall take technical cleanliness specifications of PIERBURG into consideration. Approved packaging shall prevent and protect the parts against contamination.

All packaging materials shall be recyclable, reusable or returnable — whenever possible.

If required by PIERBURG, the supplier shall ensure that the packaging for electronic parts conforms to the ESD specific requirements (Electro Static Discharge).

2.14 Traceability (IATF 16949: section 8.5.2.1)

The supplier shall set up a defined process which allows the traceability of a each single part, batch production, delivery lot (e.g. FIFO logistic; allocation to production -line, -stream, -shift; production date; inspection documents) to each production step and inspection lot across the entire supply chain all the way down to the raw material/purchased parts.

The traceability plan must be agreed with PIERBURG on the supplier's initiative. PIERBURG specific requirements for traceability must be taken into consideration.

2.15 Personnel (IATF 16949: section 7.1.2, 7.2)

Capacity requirements

Personnel need to be planned in a timely manner for both project and production. Planning shall be performed in such a way that sufficient capacity is readily available at the start of both project management and production.

Qualification

When a process operation is set up or in the case of changes, the personnel shall be trained according to the new conditions. Corresponding verification shall be documented.

When temporary/contracted personnel are deployed, a risk analysis shall be done up front in consideration of the workplace. This personnel shall be trained accordingly.

Auditor Qualification

The supplier shall have certified Auditors in accordance to ISO19011 & VDA 6.3 available.

2.16 Audit Planning (IATF 16949: section 9.2, 7.2.3, 7.2.4)

The supplier shall issue an audit plan, which defines the regular execution and the extent of internal product and process audits. VDA Volume 6 part 5 or VDA Volume 6 part 3 or equivalent procedures are to be applied. Audits at sub-suppliers shall also be taken into consideration.

Suppliers shall have certified auditors to fulfill the automotive standards.

Specific audit requirements related to special processes and products (CQI, Customer Specific Requirements, SPICE assessment, etc.) shall also be considered.

Self Process Auditing

The supplier shall conduct self-process audits for every process on an annual base. Self-audits are to be performed in accordance to VDA 6.3 standard. The documentation of the self-audit is to be retained by the supplier and to be sent to PIERBURG upon request.

In case any deviations are detected by the supplier within the self-audit it is the responsibility to present the deviations to the responsible Plant Quality Representative with a corresponding corrective action plan.

The Auditors used for self-process audit shall be certified in accordance to ISO19011 & VDA6.3.

Manufacturing Process Audit (Layered Process Audit)

The supplier is required to conduct Layered Process Audits, with the target to ensure consistent application and execution of standards. Layered Process Audit are to be performed by Operational Managers.

Layered Process Audit shall be implemented for all operational areas and all shifts shall be audited.

All management level should be involved but at minimum the management from the operational teams shall be involved (shift and team leader).

To conduct Layered Process Audits no formal training is required auditor qualification is required.

For further information see "AIAG CQI-8 Layered Process Audit Guideline."

2.17 Capacity Verification (Run at Rate) (IATF 16949: section 8.3.5.2)

A Run at Rate (R@R) is a performance driven trial run under serial production conditions.

The supplier shall investigate initial capacity analysis during the feasibility assessment- The results of the initial capacity analysis shall be forwarded to PIERBURG if requested. A final capacity verification shall be conducted during PPAP phase. The results are to be forwarded to PIERBURG.

The purpose of R@R is to demonstrate that PIERBURG requirements for supplier capacity are met, to provide evidence that the supplier can produce the required volumes to specification with installed capacity and to identify potential process weaknesses.

Potential reasons for performing R@R:

- PIERBURG requirement
- New product / new supplier / new machinery
- Changes in product, process or equipment
- Capacity increasement
- Relocation of tool and/or equipment
- Supplier performance problems

Unless otherwise agreed, the R@R shall be applied to all production material supplied to PIERBURG. The CAR (Capacity Analysis Report) R@R Tool specified by PIERBURG shall be used.

Catalogue parts are excluded from this R@R requirements. In case of any exception from performing a R@R, supplier capacity, the respective parts shall then be assured and documented with a separate capacity commitment signed by the supplier.

The R@R shall be conducted either on all process steps or on individual bottleneck/critical process steps. When limited to individual process steps, the reason(s) shall be documented.

R@R result shall be provided using the PIERBURG CAR (Capacity Analysis Report). This report is part of the PIERBURG R@R Tool.

2.18 CQI/Qualification of Special Processes (IATF 16949: section 9.2.2.3)

The AIAG (Automotive Industry Action Group) is publisher of the CQI guidelines (Continuous Quality Improvement). CQI formats are available at www.aiag.org.

The supplier is required to indicate capabilities with relevance to CQI to PIERBURG during feasibility analysis phase.

For suppliers and sub-suppliers dealing with special processes according to AIAG, relevant CQI-guidelines shall be considered. If the related results indicates the type “Need for Immediate Action” or “Fail Findings”, the supplier shall inform PIERBURG immediately and provide an action plan.

The CQI assessments are self-assessments and shall be performed according to the CQI requirements at least annually.

CQI assessments and related action plans shall be retained at the supplier and submitted electronically to PIERBURG upon request

3 PPAP PRODUCTION PART APPROVAL PROCESS

3.1 Initial Samples (IATF 16949: section 8.3.4.4)

Production Part Approval Process (PPAP) is based on the production part release process of the AIAG PPAP.

Prior to start of Production Part Approval Process (PPAP), it shall be ensured that all activities of process and quality planning have been completed.

Initial Samples (IATF 16949: section 8.3.4.4) are products made and tested under serial production conditions (plants, machinery, operating materials and test equipment, machining conditions). The minimum quantity of the production batch is 300 components, unless otherwise specified by PIERBURG Quality representative.

Handling of the initial samples is defined in line with the requirements described below:

- The 5 initial samples per cavity / respectively each production stream must be taken from a production batch which ran at the serial production tooling at the right production rate. A lower number of components for the initial samples per cavity / production batch is permissible only in agreement with the responsible PIERBURG Quality representative.
- The minimum volume of the production batch is 300 components. For determination of process capability analysis minimum 125 pieces (25 x 5 pieces) per cavity are required. A lower number of components for this batch is permissible only in agreement with the responsible PIERBURG Quality representative.
- The assignment and marking of the initial samples to the measurement results must be unambiguous. The minimum number of the initial samples to be measured is 5 pieces per cavity. A lower number of components for this batch is permissible only in agreement with the responsible PIERBURG Quality representative.
- The initial samples and their packaging must be marked unambiguously and durably.
- The initial samples must be supplied to the appropriate PIERBURG address given within the purchase order together with the completed and signed documentation.
- PIERBURG shall be allowed to review this documentation as required. PIERBURG reserves the right to issue a complaint at a later date about deviations from the PIERBURG specifications which have not been detected during the PPAP procedure.

3.2 Reasons for Initial Samples (IATF 16949: section 8.3.4.4.1, 8.5.6.1)

In alignment with above mentioned standards and regulations, the PPAP procedure is required if any of the following changes applies at the supplier or sub-supplier:

- If a product is ordered for the first time (marked on order)
- Name change of the supplier with or without change of ownership status
- After the supplier has changed a subcontractor
- For all affected characteristics after any product modification
- For all affected characteristics following a drawing index modification
- Following a delivery stop
- Following an interruption in delivery after a stop shipment (business on hold)
- Following an interruption in delivery of more than one year
- Following an interruption in production of more than one year
- If production procedures / processes have been changed
- Following the introduction of new / modified mold

- Change in equipment / tools (e.g. stamping, rolling, pressing, forging, molding equipment, in the case of several dies/molds and/or multiple dies/molds, for each cavity/cluster)
- Following any type of relocation of PPAP approved production or the use of new or relocated machinery and/or operating materials
- After use of alternative materials and design changes in product appearance attributes applied to material such as paint, leather, wood, where there is no appearance specification. (e.g. color, smell ...)
- Change in test / inspection method or new technique (no effect on acceptance criteria). For a change in the test method, supplier should have evidence that the new method provides results equivalent to or better than the old (previous) method
- Change to test- / inspection frequency
- Production following upgrade, refurbishment, rearrangement of existing tooling or equipment, if requested by PIERBURG
- Follow up tool

Exceptions to the scope are only permissible in agreement with PIERBURG, for example in the following cases:

- Interruption in delivery or production of more than one year
- Small production batches, after-sales service parts
- Standard and catalogue parts
- Directed buy

3.3 Submission Levels (IATF 16949: section 8.3.4.4)

In general, unless otherwise specified by PIERBURG, Submission Level 3 applies.

The PIERBURG PPAP Requirement list describes the Submission Levels and deliverables.

Approved PSW of sub-components and precursor processes, if applicable, are to be included in the submitted PPAP documentation by the supplier.

3.4 Initial Sample Documentation (IATF 16949: section 8.3.4.4)

The initial sample documentation according to the requested submission level (see section 3.3 for reference) shall be submitted at the same time as the initial samples.

Missing, incorrect, incomplete or delayed submission of initial sample documentation will be recorded as a supplier performance failure and will affect the supplier's performance rating.

3.5 Process Flow Chart (IATF 16949: section 8.3.5.2)

The supplier shall provide a Process Flow Chart for the entire process chain from receiving inspection to packaging, shipping and rework. This process flow chart shall be presented to PIERBURG for common review. FMEA and Control Plan shall align with Process Flow Chart.

3.6 Control Plan (IATF 16949: section 8.5.1.1)

The control plan presents a steering document for a production control strategy. It is implemented by a team through systematic analysis of production, assembly and test processes. Team members must be a cross-functional team (i.e. Planning, Manufacturing and Quality Assurance as well as other related departments).

The results of product and process FMEAs, experiences with similar processes and products, as well as the application of improvement methods shall be taken into consideration in the creation of the control plan.

In the product development process, the control plan shall be created for the phases of prototype production, safe launch and series production.

For special characteristics, the sample plan frequency shall be based on quantity. The layout Inspection and Functional Testing/Annual Revalidation are to be captured in the Control Plan.

3.7 Deviation in initial sample (IATF 16949: section 8.3.4.4, 8.7.1.1)

Documents, records, and initial sample parts may only be submitted if all specifications are fulfilled. In case of deviations, the supplier shall first obtain written permission from PIERBURG using the requested form REA and attach it to the submitted documentation. Initial samples with deviations that have no deviation approval will not be processed by PIERBURG.

The following shall be submitted along with the deviation request:

- 8D-Report / REA
- Ballooned drawing
- Measurement report
- An action plan to return to planned serial conditions
- A detailed timing plan when normal production can be resumed

3.8 Material Data Reporting [IMDS] (IATF 16949: section 8.3.4.4)

For all suppliers to PIERBURG, material data needs to be provided where legal reporting obligations apply.

Where PPAP requirements apply, suppliers shall report material and substance information for all types of purchased materials, components or items supplied by using the International Material Data System (IMDS) (www.mdsystem.com)

Suppliers for COEMS programs (Chinese Original Equipment Manufacturers) and their joint ventures with global OEMs (Original Equipment Manufacturer) for the chinese market shall also report material and substance information in the CAMDS system (China Automotive Material Data System) (www.camds.org).

Suppliers shall submit IMDS and, if required by PIERBURG, CAMDS to PIERBURG as part of awarding new business, but in any case as part of the PPAP process. The supplier IMDS/CAMDS information shall be subject to PIERBURG review and approval. Missing material data will lead to rejection. Additional information is available in the PIERBURG Norm and Supplement 1 on the Rheinmetall Internet website.

For parts delivered to assemble in the vehicles for the Chinese Automotive market, suppliers shall provide an ‘End-of-Life/ELV test report’ from an authorized lab to ensure compliance with National Standard of the People’s Republic of China, GB/T 3051 2-2014 - Requirements for prohibited substances on Automobiles.

Changes of legal or other requirements shall promptly be reviewed and subsequently updated data provided to PIERBURG (IMDS submission, CAMDS submission, SDS, etc.). Material alternatives shall be proposed by the supplier to PIERBURG.

Different reporting requirements may be applicable for supplies to Non-Automotive products or PIERBURG Aftermarket.

3.9 PPAP Submission Process (IATF 16949: section 8.3.4.4)

The PPAP documents shall be submitted via the process requested by PIERBURG. They shall be submitted along with the list of PPAP Elements in the order of the element numbers stipulated in the “02_Annex_2a_PPAP Requirement list for Sampling of Purchasing Parts” or the 02_Annex_2c_Requirementlist for Sampling of E-Components” Submission Levels form.

Incomplete or incorrect PPAP documentations will be rejected.

4 SERIAL PRODUCTION REQUIREMENT

4.1 Introduction

Once the manufacturing process is successfully validated (PPAP is approved), the serial production phase begins.

During this stage, there are a number of requirements each supplier and sub-supplier shall be fully aware of and follow. Key areas for this phase are detailed in the following sections.

4.2 Safe Launch Plan

Introduction

Safe Launch planning is designed to protect both PIERBURG and the supplier during the initial phases of product supply. This early Production Containment Procedure (GP-12) may be requested by PIERBURG and shall be implemented to detect symptoms of potential issues in new processes and to ensure that new launches are defect free. To accomplish this, a Safe Launch Plan shall be agreed during the planning phase with an increased frequency or quantity of inspection and monitoring on designated and other agreed characteristics.

Safe Launch Duration

In general, the Safe Launch phase starts with the PPAP submission and extends until start of production (SOP of the PIERBURG customer) + 90 days, unless otherwise specified by PIERBURG. The program duration may also be specified by a quantity of products.

Exit and Restart Criteria

Zero defect supplies during the entire Safe Launch phase and fulfillment of all agreed criteria qualify the supplier for an exit of the Safe Launch phase.

Any defect discovered during the Safe Launch Phase resets the event to “0” and the Safe Launch Phase is restarted.

Documentation

The supplier shall use the GP-12 – Early Production Containment Procedure form (Annex 10a).

Filled in Safe Launch form, inspection raw data and capability charts shall be submitted on agreed frequency to PIERBURG.

4.3 Measurement of Supplier Performance (IATF 16949: section 8.4.2.4)

PIERBURG continuously monitors the performance of their supplier base having following two tools in use.

SAP ACS-ABC Classification

The following characteristics are taken as assessment criteria for the ABC-Classification:

Quality Performance	Logistic Performance
PPM Level	Adherence to delivery dates
Incoming Inspection Results	Adherence to quantities
Soft Facts: Quality & Punctuality of PPAP submission / Certification Status / particularly weighted Complaints	Adherence to consignment stock (VMI) agreements
	Special Freight Deliveries

Supplier Rating:

The ABC Rating is based on the total ABC points achieved.

Rating	Points
A	90 - 100
B	80 – 89
C	1 - 79

The supplier rating is send to the supplier on a monthly basis by email. In case of B- & C- rating the supplier must generate the respective statement on improvement by sending an Action Plan to the affected PIERBURG plant(s).

The ABC-rating will be taken into consideration for the nomination of suppliers for new projects.

4.4 Quality Target (IATF 16949: section 6.2.2.1)

It is the defined quality target by PIERBURG that all suppliers within the supply chain will achieve and maintain “A-rating”.

The supplier shall ensure that quality targets to meet customer requirements are defined, established, maintained and reviewed for relevant functions, processes, and levels throughout the organization.

In the context of quality planning, the supplier is expected to develop a respective strategy and take all necessary actions in order to achieve the quality target set by PIERBURG.

If the quality performance has an impact in relation to safety, quality and delivery of products, the supplier shall inform immediately all possibly affected PIERBURG receiving plants and other involved parties in the supply chain to PIERBURG.

Furthermore, for measurement and evaluation of the achieved quality, internal project / product related quality objectives shall be defined by the supplier. The supplier shall monitor the KPIs (Key Performance Indicators) at all times to meet the quality target set by PIERBURG.

4.5 Improvement of Supplier Quality Performance (IATF 16949: section 8.4.2.5)

The continuously increasing quality standards for our products within the automotive industry requires the continuous improvement of our purchased parts and our suppliers.

In case of B- & C- rating the supplier must generate a statement on improvement by sending an Action Plan to the respective PIERBURG Plant Quality / Logistic Manager within 28 days after dispatch of the letter. In addition, PIERBURG reserves the right for further actions, ranging from an incoming inspection to the suppliers account over the Top Focus Supplier Improvement Program up to a New Business Hold for all PIERBURG Plants.

In future PIERBURG will maintain a durable business relation only with suppliers, whose total evaluation result indicates a classification as A-supplier.

4.6 Top Focus Supplier Improvement Program (IATF 16949: section 8.4.2.5)

The target of this program is to improve the suppliers with low performance rating in series deliveries.

TOP FOCUS SUPPLIERS shall be identified on a global view / plant view based on the supplier evaluation and detailed analysis of quality data and claims.

TOP FOCUS SUPPLIERS identified shall be visited by PIERBURG Purchasing Organization & Plant Quality Organization to conduct common process reviews / audits or quality meetings. Actions to improve the quality performance shall be taken by the supplier. Periodical follow- up meetings at the supplier shall be conducted to achieve the program exit.

PIERBURG reserves the right to invoice for the additional costs incurred by not meeting the quality targets.

4.7 Processing Complaints (IATF 16949 section: 10.2.6)

Should the supplier determine during the production process any deviations with respect to the product specifications, a delivery to PIERBURG must be excluded. Suppliers are expected to immediately notify all possibly affected PIERBURG plants and other involved parties in the supply chain to PIERBURG, when made aware of a potential safety, quality or delivery issue.

Complaint Management

After a complaint is issued by PIERBURG, containment actions shall be implemented immediately.

Within 24 hours, the supplier shall submit initial written feedback with a preliminary 8D report to the relevant PIERBURG plant. If not separately agreed with the PIERBURG plant quality, 8D reports shall be completely processed (including appropriate quality tools used [e.g. Ishikawa diagram, 5-Why, FMEA- Review]) and completed by the supplier within 14 calendar days. The supplier shall be responsible for reporting of the error ratio of returned parts (e.g. OK vs. NOK parts; ratio to be determined analyzing a certain quantity of rejected parts) with the complaint raised included in the 8-D report.

Complaint-specific due dates may be addressed to the Supplier via the complaint notification (i.a. in case Pierburg customers require deviant due dates).

If above targeted feedback times to PIERBURG cannot be achieved by the supplier, the supplier is obligated to contact PIERBURG plant quality in timely manner to communicate the delays. In this case the supplier is obligated to present a detailed plan for improvement of investigation times and obtain PIERBURG plant quality approval for the presented plan.

The 8D process can only be closed by the acceptance of PIERBURG.

The supplier performance in the context of the complaint processing (punctuality of feedback and submissions, effectiveness of corrective actions/repetition failures,…) may impact the Pierburg Supplier Rating.

Identification of certified parts or packaging after a complaint

The clean point information shall be determined and communicated at once to the person in charge at PIERBURG. In addition, it shall be documented in the 8D-report.

Subsequent deliveries from warehouse and work in progress, which have been subjected to 100% inspection or testing due to a complaint, shall be marked or labelled. This shall be done via the appropriate label or REA. Every packaging unit shall be clearly labelled with the requested label or form until permanent corrective actions have been implemented successfully.

4.8 Field Failure Analysis/ No Trouble Found

For complaints from the field, the supplier has to plan a methodic analysis according to VDA Volume Joint Quality Management in the Supply Chain — Marketing and Service — Field Failure Analysis. The No Trouble Found process is part of this volume.

PIERBURG retains ownership rights of all material returned for analysis. If destructive testing is required to determine root causes, PIERBURG shall be notified prior to the testing process. The destruction of any part returned

for analysis without written permission from PIERBURG is strictly forbidden. Material associated with a complaint, wherein responsibility of failure is indeterminate or disputed, shall be returned to PIERBURG for retention unless otherwise agreed in writing.

4.9 Layout Inspection and Functional Testing/Annual requalification (IATF 16949: section 8.6.2)

All products shall be subject to an annual full layout inspection and functional testing (revalidation), unless agreed otherwise with PIERBURG. After previous agreement with PIERBURG, the requalification can be carried out per product group (family) or results for the current series production tests can be included, for example:

- Cyclical series production releases
- Product audits (aggregates, modules, components, parts, etc.)
- Records for initial item and final item tests
- SPC evaluations
- Initial sampling
- Incoming goods inspection

The valid PIERBURG specifications are the basis for requalification/revalidation. A full layout inspection and functional testing usually covers:

- Dimension
- Material
- Function
- Reliability
- Legal requirements
- Environmental requirements

Other test items are to be agreed with the PIERBURG receiving plant. The full layout inspection and functional testing/annual revalidation shall be planned and presented with the PIERBURG initial sample inspection and shall be captured in the Control Plan.

The results shall be documented and made available for evaluation by PIERBURG. For this purpose, the initial sample inspection report forms from PPAP AIAG (PSW) shall be used. If the test results are negative, the supplier shall immediately contact PIERBURG with a corresponding detailed corrective action plan.

The risk for PIERBURG, the root cause of the fault, and corrective actions shall be specified. The results of the full layout inspection shall be submitted to PIERBURG upon request.

4.10 Deviation Approval

In case of deviations from the specification, the following forms shall be used and submitted to PIERBURG in order to obtain approval prior to delivery:

• Deviation Request Form – Request for Engineering Approval - “REA”

The submitted information shall indicate when the supplier plans to return to production of conforming products. For proposed changes affecting tolerances statistical methods shall be applied by the supplier and forwarded to Pierburg upon request.

All deliveries based on a deviation approval shall have additional identification labels. For this purpose, the requested REA number shall be used.

4.11 Control of Reworked and Repaired Products

For rework and repair of products, the supplier shall have a documented process and conduct a risk analysis (e.g. FMEA).

Any repair or rework not included in the agreed Control Plan and Process Flow Chart during the PPAP phase is considered as a process change according to section 1 .8 — Changes to Product or Process.

PIERBURG shall be notified via the requested form “REA”. See section 4.9.

Written PIERBURG approval is required prior to implementation.

4.12 Disposition of Non-Conforming Products (IATF 16949: section 6.1.2.3)

The supplier shall have a documented process for disposition of non-conforming products not subject to rework or repair.

For products not meeting requirements, the supplier shall verify that the product to be scrapped is rendered unusable prior to disposal, unless otherwise agreed with PIERBURG.

Any component produced for supply to PIERBURG, not sent directly to PIERBURG or an authorized third party shall be destroyed in-house prior to recycling in order to make sure that the component may never be used in the intended application — unless otherwise agreed with PIERBURG. This includes scrap, parts produced during production trials, engineering sampling, and all setup and inspection pieces.

The supplier shall not divert non-conforming products to service or other use without prior PIERBURG approval.

Suppliers shall guarantee conformance to this practice and shall guarantee that any and all sub-suppliers will conform to this practice. Evidence of communication of this policy to sub-suppliers shall be retained and presented to PIERBURG when requested.

5 SPECIFIC REQUIREMENTS FOR ELECTRONIC COMPONENTS

For suppliers which develop and/or produce, assemble or test electronic components (e.g. semiconductor devices, passive components and LED components,…) the specific requirements described in section 5 shall be applied.

5.1 AEC-Q (IATF 16949: section 8.3.4.2, 8.5.6.1)

Suppliers, who develop and/or produce, assemble or test electronic components shall at minimum fulfill the respective qualification standard from the Automotive Electronics Council (AEC; e.g. AEC-Q 100; AEC-Q 101; AEC-Q 200). Exceptions or deviations to above shall be properly communicated to and agreed with PIERBURG.

5.2 Robustness Validation (IATF 16949: section 8.3.4.2, 8.5.6.1)

The supplier shall provide their approach to robustness validation in the development phase. In addition, the procedure of robustness validation shall be made available to PIERBURG for assessment.

For further information, refer to ZVEI Handbook of Robustness Validation.

5.3 Product Change Notification (PCN) and Product Termination Notification (PTN) for Electronic Components

Suppliers who develop and/or produce, assemble or the test electronic components shall inform PIERBURG about changes that affects product and/or process. Details of changes shall be submitted to PIERBURG via the ZVEI PCN Form and conform with the requirements of ZVEI- Guideline for Customer Notification (PCN/PTN).

The supplier remains responsible for all changes, irrespective of ZVEI notification requirements. For change classification, PIERBURG requires a formal delta notification FMEA/risk assessment associated with the change.

The supplier shall include a completed ZVEI Delta Qualification Matrix (DeQuMa) with all requests for change. This document is available on the ZVEI website. Additionally, PIERBURG may deem further testing necessary prior to accepting the change.

PIERBURG may request a data review of the critical parameters for the process or processes affected by the change. This should be in the form of a comparison of new process versus the existing process.

For initial release and changes related to software during the full product lifecycle (development, launch, production, aftermarket) the supplier shall conform to the specific software release process of PIERBURG. This shall include management and verification of software revisions and requires approval by PIERBURG.

PCN/PTN for electronic components which fall under the material number range “2.XXXXX.XX.X” shall be submitted by the supplier to the following eMail address “electronic_pcn@de.rheinmetall.com” for processing and review. The supplier is required to list all affected Pierburg material numbers which fall under the scope of the respective PCN/PTN. All other requirements remain unchanged.

5.4 Functional Safety of Software and Components with Integrated Software (IATF 16949: section 8.3.2.3)

The supplier bears the responsibility for the integrity of supplied software. Suppliers who develop or supply software or electronic components with integrated software shall meet the requirements from Automotive SPICE or an equivalent standard. Unless otherwise agreed, the technological maturity level 2 or higher needs to be fulfilled according to the VDA Volume Automotive SPICE Process Assessment Model for processes, which are part of the “VDA process scope”. If required by PIERBURG the supplier is obligated to assign a third-party to conduct the Automotive-Spice assessment and present the related results to PIERBURG.

If maturity level 2 cannot be fulfilled the supplier shall provide an action plan including an adequate time schedule to achieve maturity level 2. The supplier supports PIERBURG in achieving the relevant SPICE Level for the project required by the final customer.

When safety-relevant electronics and software are included in the scope of supply, then the development process shall be “state-of-the-art” and comply with IEC DIN EN 61508, ISO 26262.

Safety-relevant parts, the documentation and drawings shall be marked in a way that they can be clearly identified throughout the development phase and series production process.

The requirements of the necessary safety level (e.g. SIL, ASIL ...) are specified in the respective specification. The safety concept with design and implementation specifications shall be agreed with PIERBURG.

5.5 Cybersecurity

If safety relevant electronics and software are included in the scope of the supply, it shall be ensured, according to the requirement of PIERBURG, that an unsecure access is impossible. The necessary access protection can be based on software and/or physical devices in the production and during transport. In addition, all relevant production equipment and IT Infrastructure shall be, at minimum, secured to the level of PIERBURG requirements.

The hedge-concept shall be discussed between PIERBURG and the supplier in the SuRe phase and shall be provided to PIERBURG upon request.

PIERBURG reserves the right, after pre-announcement, to audit the hedge-concept, possibly jointly with the PIERBURG customers. During the audit, it shall be ensured that PIERBURG and the customers are allowed to obtain access to the safety relevant production, the logistic area and the IT sector.

6 REFERENCES

International Standards

ISO 9001 - Quality management systems, requirements

ISO 14001 - Environmental management systems

IATF 16949 - International Automotive Task Force Automotive Quality Management System Standart

AEC-Q - Automotive Electronics Council

Automotive SPICE® — Process Assessment Model

ISO 26262 (Road vehicles — Functional safety)

ISO / SAE 21434 (Road vehicles engineering – cybersecurity engineering)

IEC 61508 - (Functional safety of electrical/electronic Programmable electronic safety-related systems)

SAE-Ji 879 (Handbook for Robustness Validation of Automotive Electrical/Electronic Modules)

ZVEI documents (Verband der Elektro- und Digitalindustrie - Handbook for Robustness Validation of Semiconductor Devices in Automotive Applications, Handbook for Robustness Validation of Automotive Electricals/Electronic Modules) & (Guideline for Customer Notification) & (PCN Form)

Rules and Standards — VDA Volumes

VDA — German Association of the Automotive Industry www.vda-qmc.de

AIAG Standards and Rules (md. CQI) www.aiaq.org

PIERBURG internal Group Standards and Rules

Source: Respective PIERBURG receiving plant

Pierburg PN 02.035 Technical Cleanliness

Pierburg PN 02.040 Special Characteristics [defined on individual component drawing]

Pierburg PN 02.041 Special Characteristics [defined on individual component drawing]

Material Data Sheets in the International Material Data System (IMDS)

ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories

VDA Band Produktintegrität

7 FORMS

Forms

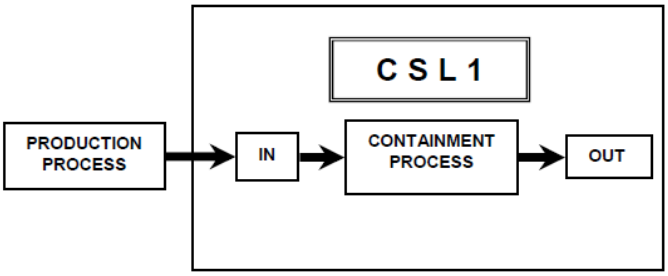
All necessary communication, work forms and relevant documents represent the PIERBURG standard and cover the minimum requirements. Other forms may be used on the condition that they fulfill the minimum PIERBURG requirements and the PIERBURG receiving plant has approved the use of these forms. The supplier is in the obligation to ensure that only the latest version of all documents and forms is used.

8 ANNEX

A. Course of CSL-1 action

Supplier Responsibilities *during **Controlled Shipping Level 1**:*

- Provide a list of similar part numbers affected by the Controlled Shipping action to the PIERBURG Plant Supplier Quality Representative.
- Contain all non-conforming parts at the supplier, warehouses, in transit and at any PIERBURG locations immediately upon notification of Controlled Shipping status.
- Provide an additional inspection for the defect(s) noted in an inspection area which is separated from the normal production area.
- Provide inspection by using the attached chart Containment workplace layout and the Parts Sorting Results sheet at a frequency of twice a month which should be sent to PIERBURG Plant Quality Department.
- Implement irreversible, permanent corrective action in a timely manner, i.e. implement failure proofing.



- Revise all PPAP paperwork as required.
- Pay for all additional costs due to Controlled Shipping.
- Establish and communicate the status of improvement plans with PIERBURG Plant Quality Representative.

The procedures the supplier has created to date have been insufficient in stopping the flow of non-conforming material to PIERBRUG plants.

Therefore, the supplier must immediately:

1. Develop, define, and implement an agreed-upon containment activity over and above the current process controls and containment activity.

2. Clearly identification of the qualified shipments.

3. Meeting the defined exit criteria.

Note: Failure to comply with this process, or the inability to implement a successful action plan or containment activity, will result in the implementation of ***Control Shipping Level 2*** or ***New Business Hold.***

Exit Criteria CSL 1:

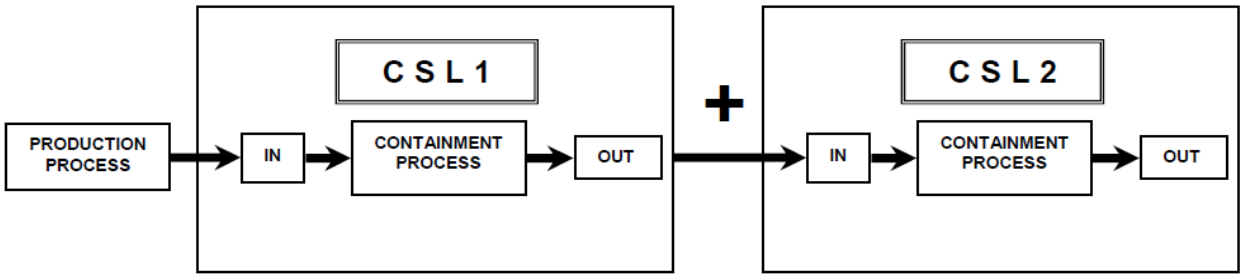
- Inspection data shows no rejects into the inspection area for a minimum of 100 working days after implementation of irreversible corrective action. If deemed appropriate by PIERBRUG Plant Quality Representative, the duration of the controlled shipping activity may be adjusted.
- Implement error proofing as appropriate within the supplier process for the defect(s) noted above.
- Evidence that a thorough problem-solving process was used, the true root cause of the problem was discovered and those irreversible corrective actions were implemented and validated.
- Statistical process control used when appropriate to confirm a stable and capable process during the 100 working days after implementation of irreversible corrective action.

- All paperwork (Potential Failure Mode and Effects Analysis [PFMEA], Process Control Plan, Process Flow Diagram, Operator Work Instructions, etc.) must be modified / updated accordingly.
- The supplier will remain in Controlled Shipping-Level 1 status until written authorization to exit Controlled Shipping-Level 1 is received from the PIERBURG Supplier Quality Manager or from the corresponding Purchasing Manager.

B. Course of CSL-2 action

Supplier Responsibilities during Controlled Shipping Level 2:

- The Controlled Shipping Level 2 shall be conducted by an external certified inspection source.
- Follow all supplier responsibilities outlined in the Controlled Shipping Level 1 above.
- Maintain Controlled Shipping Level 1 inspections and communications.
- Contain all non-conforming parts at the supplier, warehouses, in transit and at any PIERBURG locations immediately upon notification Controlled Shipping status.
- Participate in the Controlled Shipping Level 2 implementation meeting.
- Establish an inspection area that is separated from the normal production and Controlled Shipping Level 1 areas. (The inspection area may be located within the normal production area if the PIERBURG representatives approve the location based on material flow, possible damage due to excessive handling or product design considerations).
- Provide inspection by using the attached chart Containment workplace layout and the PARTS SORTING RESULT SHEET at a weekly frequency which should be sent to PIERBURG Plant Quality Representative.



- Provide tooling, if required, for product inspection.
- Pay for all additional costs due to Controlled Shipping Level 2 and issue a purchase order to the Controlled Shipping Level 2 inspection source. The inspection source must have at minimum valid ISO 9001 certification.
- Establish and communicate the status of improvement plans with PIERBURG Plant Quality Representative and ISO 9001 / IATF 16949 registrar (if applicable).

The procedures the supplier has created to date have been insufficient in stopping the flow of non-conforming material to our plants.

Therefore, the supplier must immediately:

1. Implement and pay the costs for the PIERBURG defined containment activity over and above your current process controls and containment activity. The containment activity defined by PIERBURG is in addition to the current controls and containment activity.

2. Develop, define, and implement the agreed-upon containment activity over and above the suppliers current process controls and containment activity. This requires that the Controlled Shipping Level 1 containment remains in place.

3. Clearly identify the qualified shipments, with a green tag that reads “Containment Process Complete”. Each tag must be initiated and dated by the appropriate person whose name appears on the confirmation reply.

4. Pierburg requires (if applicable) that irreversible corrective action plans for CSL 2 also be submitted to your ISO 9001 / IATF 16949 registrar for review and assessment. Please authorize your registrar to submit the assessment to PIERBURG.

5. Meet the defined exit criteria.

Note: Failure to comply with this process or the inability to implement a successful Level 2 action plan or containment activity will result in the implementation of New Business Hold.

Exit Criteria CSL 2:

- Inspection data shows no rejects in the inspection area for a minimum of 100 working days after implementation of irreversible corrective action. If deemed appropriate by PIERBURG Supplier Quality, the duration of the controlled shipping activity Level 2 may be adjusted.
- The actions taken have been applied and are successful based on the ISO 9001 / IATF 16949 registrar assessment.
- Written authorization, by the PIERBURG Supplier Quality Manager to exit Controlled Shipping Level 2.

9 LIST OF ABBREVIATIONS

Abbreviation	Definition
AECQ	Automotive Qualification Requirements for Discrete Products
AIAG	Automotive Industry Action Group
APQP	Advanced Planning Quality Process
ASIL	Automotive Safety Integrity Level
CAMDS	China Automotive Material Data System
CAR	Capacity Analysis Report
COEMS	Chinese Original Equipment Manufactures
CQI	Continuous Quality Improvement
CSL	Controlled Shipping Level
CSR	Corporate Social Responsibility
DeQuMa	Delta Qualification Matrix
ESD	Electro Static Discharge
ESG	Enviromental Social Governance
FIFO	First in first out
FMEA	Failure Mode and Effects Analysis
FMEDA	Failure Mode Effect and Diagnostic Analysis
IATF	International Automotive Task Fore
IEC	International Electrotechnical Commision
ISO	International Organization for Standardization
LkSG	Lieferkettensorgfaltspflichtengesetz / Supply Chain Due Dilligence Law
MSA	Measurement System Analysis
NBH	New Business Hold
NOK	Non Conforming
PCN	Product Change Notification
PPAP	Production Part Approval Process
PPF	Produktionsprozess- und Produktfreigabe
PPM	Parts per million
PSR	Product Safety and Conformity Representative
PSW	Part Submission Warrant
PTC	Pass Through Characteristic
PTN	Product Termination Notification
QMS	Quality Management System
R&D	Research and Development
R@R	Run at Rate
REA	Request for Engineering Approval
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals

Abbreviation	Definition
R-FMEA	Reverse Failure Mode and Effects Analysis
SDS	Safety Data Sheet
SFF	Safe Failure Fraction
SIL	Safety Integrity Level
SOP	Start of production
SPC	Statistical Process Control
SPICE	Software Process Improvement and Capability Determination
SURE	Supplier Readiness
VDA	Verband der Automobilindustrie
ZVEI	Verband der Elektro- und Digitalindustrie

Publicator / Process Owner / Autor

Publicator	Position	Department	Signature
Eric Zillikens	Manager Supplier Quality Development	Pierburg GmbH | P-CP-Q3	
Process Owner			
Frank Berbuir	Director Supplier Quality Development	Pierburg GmbH | P-CP-Q	

Document Approval

Approved by	Position	Organization	Signature
Frank Berbuir	Director Supplier Quality Development	Pierburg GmbH | P-CP-Q	
Matthias Horst	Head of Purchasing Division Power Systems	Pierburg GmbH | P-CP	

Document Change Management

Version	Date	Publicator	Change description
1.0	03.02.2016	R. Erren, M-CPQ	Initial approval
2.0	23.11.2018	R. Erren, M-CPQ	General update
3.0	19.02.2019	R. Erren, M-CPQ	General update
3.1	06.12.2022	M. Kothenz, M-CPQ	Minor updates & adaption of new corporate design aspects
4.0	07.12.2023	M. Kothenz, M-CPQ	Set up new chapters according IATF16949, specific requirements for electronic products added, general update & adaption of new corporate design aspects
4.1	10.06.2024	M. Kothenz, P-CP-Q3	Change to Chapter 1.6, Changes to comply with updated Rheinmetall divisional structure "Power Systems", extended scope of the document for Rheinmetall Brandt and Rheinmetall Invent
4.2	01.08.2025	E. Zillikens P-CP-Q3	Change from electronic supplier communication platform "SupplyON" to "iValua", handling of special characteristic alignt with the respective updated Pierburg specification and additional minor updates

Document Distribution

Division	Affected entities	Distribution	Accessibility
Division Power Systems	see chapter "1.1 Scope" for reference	Internal – purchasing organization, external – global supplier base of Division Power Systems	Internal – IMS Premium External – iValua