VAILLANT GROUP

QUALITY MANAGEMENT

SQG – SUPPLIER QUALITY GUIDELINE

Vaillant Saunier Duval awb Bulex DemirDöküm glow worm Hermann Saunier Duval protherm

Contents

Introduction

1.1. Purpose

Quality and reliability are both essential criteria for the position of the VAILLANT GROUP brands within the context of national and international competition. Since the majority of products within the VAILLANT GROUP are assembled using purchased parts, it is necessary to procure our products and services in collaboration with competent, reliable, and quality-oriented partners. The VAILLANT GROUP has therefore developed a quality strategy, which forms the basis for a comprehensive state-of-the-art purchasing strategy.

Commitment to this strategy is a prerequisite for long-term business relationships between the VAILLANT GROUP and its suppliers, with mutual benefits enabling smooth processes and interfaces between the supplier and the VAILLANT GROUP, as well as look-ahead strategies enabling early error reduction and prevention. When applied consistently, errors are avoided instead of only detected and a “zero-defect strategy” is implemented.

Both the VAILLANT GROUP and the supplier commit to the principle of continuous improvement of quality and productivity, ensuring efficiency, maintenance and improvement of market positions. This is realized by applying the KAIZEN approach and Six Sigma® methods within the entire supply chain.

This supplier Quality Guideline (hereinafter “SQG”) is structured in three main chapters comprising:

- General requirements;
- Detailed requirements before start of production;
- Detailed requirements after start of production.

1.2. Definitions

This SQG describes the essential and all-important requirements and expectations of the VAILLANT GROUP with respect to quality assurance by its suppliers.

The VAILLANT GROUP is an internationally operating heating, ventilation, and air-conditioning technology group with headquarters in Remscheid, Germany. The VAILLANT GROUP comprises the Vaillant GmbH, having its place of business at Berghauser Straße 40, 42859 Remscheid, Germany, and its affiliated companies within the meaning of § 15 AktG [German Stock Companies Act]. The VAILLANT GROUP comprises the following brands:

- Vaillant
- Saunier Duval
- awb
- Bulex
- DemirDökum
- Glow·worm
- Hermann Saunier Duval
- Protherm

1.3. Scope

This SQG is applicable to all contractual relationships between companies of the VAILLANT GROUP and its suppliers. It does not affect individual written agreements with the supplier. In the event that the VAILLANT GROUP or a company of the VAILLANT GROUP has entered into separate agreements (e.g. supply agreements or quality assurance agreements) with the supplier in written form that deviate from the present SQG, the provisions of this SQG shall apply in addition and subordinately to written agreements; the provisions of such written agreements therefore prevail.

The SQG defines the requirements and methods for enabling quality assurance. The basic responsibility for all purchased parts lies with the supplier. This SQG targets the complete range of deliveries, including the existence of Quality Assurance Management Systems, as well as the monitoring of the quality of relevant data from all subcontracted suppliers and service providers. The supplier commits to deliver corresponding proof at any time upon request from the VAILLANT GROUP. Therefore, the SQG is also a requirement for all business relationships of the supplier with their subcontracted partners.

The VAILLANT GROUP expects the supplier to consequently and responsibly implement all methods and procedures required under this SQG. Within the process audits conducted by the VAILLANT GROUP, conformity to the SQG is periodically reviewed and assured.

1.4. Language

In principle, the language to be used for all correspondence between the VAILLANT GROUP and the supplier within the scope of this SQG is English. However, for convenience, translations of the SQG are also available.

2. General Requirements

2.1. Quality Management System

REQUIRED DOCUMENTS

✓ EN/ISO 9001 certification

The supplier agrees to introduce and maintain a quality management system based on the international ISO 9000 ff standards.

The VAILLANT GROUP expects all suppliers to be at least ISO 9001 certified. The supplier must provide evidence of certification at any time, deliver renewal of certifications without special request, and inform the VAILLANT GROUP at least three months in advance if a certification will expire without a planned re-audit. For suppliers that are not certified, a declaration reinforcing the supplier's predilection to become ISO 9001 certified is mandatory.

2.2. Environmental Protection, Health and Safety

In addition to having a quality management system in place, the VAILLANT GROUP requires the supplier to comply with the respective statutory provisions governing the treatment of employees, environmental protection, health and safety at work, and to work on reducing the adverse effects of its activities on human beings and the environment.

In this respect, the supplier must, within the realm of possibilities, set up and further develop a management system in accordance with the DIN ISO 14001 and DIN ISO 45001 standards.

Furthermore, the supplier must comply with the 10 principles of the UN Global Compact Initiative relating to the protection of internal human rights, the right to collective bargaining, the abolition of forced labour and child labour, the elimination of discrimination when personnel is engaged and employed, the responsibility for the environment and the prevention of corruption.

Further information on the UN Global Compact Initiative is available at: www.unglobalcompact.org

In order to verify the supplier's compliance with the 10 principles of the UN Global Compact Initiative, the VAILLANT GROUP carries out social checks. These social checks are composed of a self-assessment and an on-site visit.

2.3. ESD protection

The VAILLANT GROUP supplies heating and cooling applications with electronic parts that are manufactured under ESD (Electro-Static Discharge) protected conditions and takes the necessary ESD protective measures.

All parts and all assemblies containing electronic components, whether in open or closed packaging, are considered as ESD sensitive and must be protected according to the IEC 61340 international ESD standards.

The implementation of the IEC 61340 international ESD standards is an important part of the measures for securing the quality and reliability of Vaillant products.

In order to avoid ESD damage to parts, assemblies and systems at risk from electrostatic charge, necessary protective measures must be taken by suppliers wherever such ESD sensitive parts are to be manufactured, transported, processed, tested or stored.

2.4. Cybersecurity

Cyberattacks on companies are increasing year by year. The targets of the attackers are different and range from stealing/manipulating systems/data though compromising IT/OT systems to completely disabling production. The supplier should take care of cybersecurity to guarantee continuous B2B, thereby ensuring supplies are not compromised/manipulated and that confidential data is kept secure.

Cybersecurity or information technology security encompasses those techniques for protecting computers, networks, programmes and data from unauthorised access or attacks focused on the exploitation thereof.

It is strongly recommended that suppliers set up an ISMS (Information Security Management System) to tackle the above issues. There are several standards that apply to IT security. One widely known standard is ISO 27001. This sets out the security requirements for securing IT/OT systems against cyber breaches (e.g. implementation of cybersecurity plan & policies; BCM covering CS risks; performance of regular CS audits and cyberattack simulations on IT/OT systems; deployment & maintenance of CS tools; allocation of IT CS resources; regular training of employees about cybersecurity risks; etc.).

Any form of ISMS certification is recommended (e.g. ISO 27001)

In order to verify the supplier’s compliance with the VAILANT GROUP supplier cybersecurity requirements, the VAILLANT GROUP may carry out cybersecurity checks consisting of a self-assessment questionnaire and audit form (online and/or on site).

In case of development activity (hardware or software) at supplier the IEC62443-4-1 certification is highly recommended - this part of the IEC62443 Standard framework gives detailed advice on establishing a secure development process

2.5. Zero-Defect Strategy

REQUIRED DOCUMENTS

✓ Zero-defect strategy

The supplier must implement a strategy leading to a “zero defect” ratio for all parts, assemblies and modules along the complete supply chain.

In order to monitor, measure and evaluate the achieved quality, the supplier must also define internal and external quality targets in cooperation with the VAILLANT GROUP. With respect to these quality targets, the minimum requirements placed by the VAILLANT GROUP are the monitoring of both the internal and external return rate, preferably based on parts per million (ppm), and the monitoring of the internal and external defect cost.

2.6. Process Audit (Supplier)

Upon request, the supplier must allow the VAILLANT GROUP and/or their representative(s) to check the supplier’s compliance with the quality assurance measures described in this SQG (see Section 4.2). The supplier must therefore, after being given prior notice of the date of such an inspection, grant the VAILLANT GROUP and/or their representative(s) reasonable access to their business premises and must, within reason, provide assistance during such an audit. Furthermore, the supplier must grant reasonable access to all quality related documents, records, data, or other information on the production of the products.

The VAILLANT GROUP has the right to oblige suppliers to fill in a self-assessment questionnaire to prove their compliance with the VAILLANT GROUP requirements concerning the supplier´s quality management system and manufacturing capabilities. The filled in questionnaire, with provided evidence, is subsequently checked, clarified and evaluated by the VAILLANT GROUP in cooperation with the supplier`s representative(s) during an online conference call. This represents the first step before a site visit and helps suppliers to pass further audit stages.

2.7. Evaluation of Supplier Capability

Based on the results of the certification audit, process & product audit and online audit, the VAILLANT GROUP subsequently evaluates the supplier according to the following ratings table. These ratings are key criteria for new supplier approval. When a supplier has not delivered for more than one year, a requalification audit is required.

Score	Category	Name	Action
80-100%	A	Qualified	Supplier is qualified and released; action list to be followed.
65-79%	B	Temporarily qualified	Supplier is temporarily qualified; requalification audit required.
0-64%	C	Unqualified	Supplier is unqualified.

The VAILLANT GROUP supplier quality department reserves the right to decide which supplier is qualified/unqualified according to the table above.

2.8. Treatment of Non-Conforming Products

All non-conforming products, which may be detected at:

- Incoming inspection (goods receiving);
- Line reject or end test (production);
- Shipping audit (goods shipping) or other product audits; or
- Field reject (customer service);

are managed according to the "treatment of non-conforming products" process, which is presented here in a simplified form.

1. Label and transfer the product to quarantine area.
2. Check if further parts–including raw materials and semi-finished products–are affected by this failure.
3. Inform responsible persons and determine severity:

Failure Category	Frequency → / Short description ↓	Individual case / affects less than 1%)	Affects almost all/ whole lot	Affects whole production / other types as well / repetitive failure
C	Minor customer effects	No 8D necessary	No 8D necessary	8D required
B2	Product still functional; possible customer service	No 8D necessary	8D required	8D required
B1	Product non-functional; insurance case	8D required	8D required	8D required
A1 A2	(In)direct danger to customer; Norm non-conformity	8D required	8D required	8D required

4. If required according to the table above, or if internally defined as necessary, initiate 8D process.
5. Initiate claim management and start material and non-material reimbursement processes.
6. Decide whether product should be recycled, scrapped, reworked or returned.

8D Reporting
The supplier and the VAILLANT GROUP both work within the 8D tool, as provided by the VAILLANT GROUP. The supplier assures the following response times:

- Initial response to 8D report within one working day;
- Finalisation of immediate actions within 3 working days;
- Finalisation of long-term actions within 21 days.

The supplier is obliged to use the VAILLANT GROUP 8D Template.

Claim Management including Reimbursements
Regardless of whether an 8D has been raised, the claim management process is initiated if the poor quality of supplied parts causes a failure, incurs costs, or requires rework by the supplier. All claims must be constructively answered within 14 calendar days from the date on which the claim was lodged.

The re-charges for the material (RDO) and non-material reimbursement (RSO) processes are regulated by the conditions of purchase and individual contracts between the supplier and the VAILLANT GROUP.

Claim-to-Cash (C2C)
After acceptance of the affected quantity of defective parts, the VAILLANT GROUP will send a corresponding return delivery order (RDO) to the supplier.

The supplier is obliged to send a corresponding credit note to the VAILLANT GROUP.

This credit note must provide reference to both the goods complaint message and the return delivery order (RDO).

2.9. Evaluation of Suppliers

Every month, the VAILLANT GROUP performs a supplier evaluation called “Supplier Indicator”. This indicator includes monitoring and evaluation of both failures during production (i.e. line rejects) as well as failures during end-customer product use (i.e. field rejects), and the corresponding supplier response times. Line rejects are measured in parts per million (ppm), calculated as the ratio of the defective quantity to the delivered quantity. The response ratio for claim reports is measured as the percentage of open reports out of the total reports, with the duration measured in days. Based on the analysis of the monitored data, the VAILLANT GROUP decides on further cooperation, projects, necessary supplier audits and supplier development programmes.

2.10. **Quality Assurance of Sub-Suppliers**

REQUIRED DOCUMENTS

- ✓ Quality assurance systems of all sub-suppliers

It is expected that the supplier ensures that all their sub-suppliers diligently comply with the same regulations under which they themselves operate for the VAILLANT GROUP. The supplier must ensure that:

- Communication is enabled for all information regarding significant characteristics of the installation situation, including drawings and specifications, to sub-suppliers;
- All product-related sub-suppliers maintain quality assurance systems that conform with the quality assurance systems described in this SQG;
- All product-related sub-suppliers comply with the quality norms defined by the VAILLANT GROUP;
- All product-related sub-suppliers continuously improve their manufactured products and their quality management systems;
- Corresponding reviews of conformity, including, where applicable, the required developments concerning the four points above, are managed by the sub-supplier.

Any change regarding product-related sub-suppliers must be reported to the VAILLANT GROUP purchasing department in advance. In all cases, the supplier remains solely responsible for the delivered product, irrespective of the extent to which parts or services are subcontracted to sub-suppliers.

3. Requirements before Start of Production

3.1. Quality Targets, Strategy and Policy

REQUIRED DOCUMENTS

✓ Quality targets

A zero-defect strategy must be implemented by the supplier. For this purpose, the VAILLANT GROUP and the supplier will develop a zero-defect strategy along the entire value chain and take all the necessary actions to enable the quality target of zero defects.

For measuring the achieved quality, the supplier must define internal and external quality targets. All the targets must be aligned with the VAILLANT GROUP. In this context, the following minimum requirements must be fulfilled by the supplier:

- Determination and documentation of the internal and external quota of non-conformities, measured in parts per million (ppm);
- Determination and documentation of the internal and external cost of non-conformities;
- Continuous measurement of the process capability;
- Established quality management system based on the philosophy of continuous improvement.

3.2. Definition of Responsibilities and Contact Persons

REQUIRED DOCUMENTS

✓ Responsibilities

The VAILLANT GROUP requires a dedicated contact person to represent the supplier for each project. In the same way, the VAILLANT GROUP provides a dedicated contact person.

The purpose of having a dedicated contact person with defined responsibilities is to ensure projects are processed efficiently and effectively. As a minimum requirement, the corresponding information for both sides must include the person´s name, function and deputization arrangement.

3.3. Advanced Product and Quality Planning

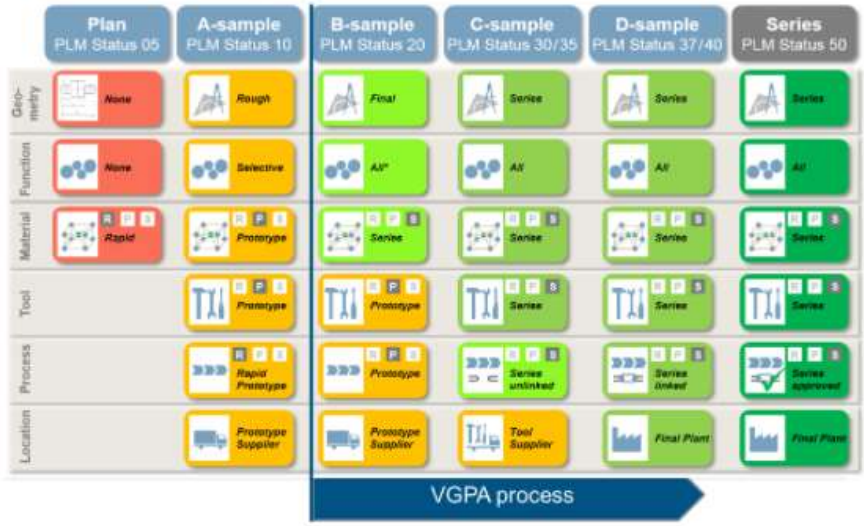
Advanced Product & Process Quality Planning (APQP) is one of the key processes for ensuring the products of the VAILLANT GROUP are reliable and competitive.

This requires deviations and risks to be identified as early as possible in order to meet all project targets (quality, cost, scheduling).

The overall objective is to ensure that product criteria are already capable at the start of production. Suppliers therefore play a major role in safeguarding the quality and reliability of the VAILLANT GROUP products in the field.

A sample maturity model is in place to ensure critical parts are checked already at the prototype stage (B-sample). Depending on tool usage, a C-sample check may also be requested.

Series approval is based on the D-sample check.



3.4. Management of Customer Requirements

All customer requirements must be identified and implemented.

3.4.1. Feasibility Study

REQUIRED DOCUMENTS

✓ Feasibility study

In the context of contract review, technical documents (e.g. drawings, specifications, VAILLANT plant norms) created by the VAILLANT GROUP must be analysed and confirmed by the supplier.

The analysis, which is seen as a tool for Simultaneous Engineering, contains both a feasibility study of the planned product development project (only applicable to product development suppliers) and an investigation of the economic and actionable producibility (processes, materials, tolerances, components, and characteristics with special procedure for furnishing proof, etc.). The goal of the analysis is to give the supplier the opportunity to share their experiences and suggestions for the sake of generating mutual benefits.

The tools for the feasibility study include simulation, FEM, case studies, Design of Experiments, etc.

This analysis should include a matching FMEA and MSA.

3.4.2. Product and Process Failure Modes and Effects Analysis (FMEA)

REQUIRED DOCUMENTS

✓ Design-FMEA
✓ Process-FMEA

The Failure Modes and Effects Analysis (FMEA) is used for the investigation and rating of possible risks regarding severity, occurrence and detection.

Potential risks must be minimised through urgent measures. In this regard, the FMEA is an important error prevention tool and it shall take into consideration all phases of the product lifecycle, such as construction, production, assembly, packaging, transportation, as well as recycling/disposal.

The FMEA needs to be conducted or revised on the following occasions:

- Development/production of new parts;
- Introduction of new manufacturing processes;
- Location changes;
- Changes to drawings;
- Changes to processes;
- Occurrence of flaws.

For the implementation of any measures to be taken, a schedule must be provided, a responsible person named, and a guarantee given that all the measures will be implemented before the beginning of series production. For evaluation purposes, the VAILLANT GROUP must be informed in advance about any necessary construction changes. This includes maintenance of production-relevant equipment.

Design-FMEA
A Design-FMEA must be conducted for all parts which are being constructed under the responsibility of the supplier.

Process-FMEA
A Process-FMEA must be conducted for all production stages of a part. During the course of this, the results of the Design-FMEA and the "significant characteristics" named by the VAILLANT GROUP need to be specifically taken into consideration.

Implementation of Measures
Potential risks which are identified by the FMEA need to be minimised through appropriate measures/actions.

3.4.3. Process Flowcharts

REQUIRED DOCUMENTS
✓ Process flowcharts

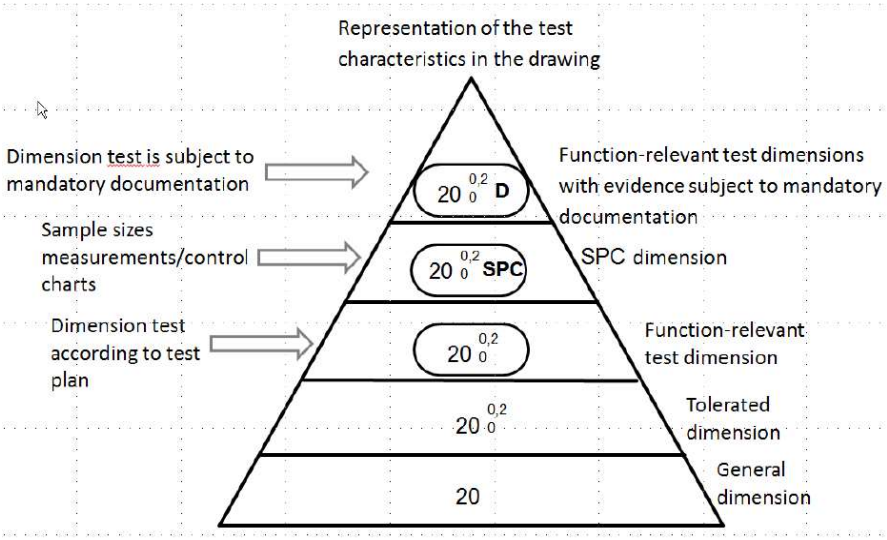
Process flowcharts describe the production flow along the entire value chain, including the arrival of goods (together with transport), all manufacturing steps, warehousing and shipment. Alternatively, comparable steering elements, like production orders, that fulfil all requirements on process flowcharts can be used.

Process flowcharts reveal influencing variables and are therefore important facilitators for quality planning. Furthermore, they are the basis for the FMEAs and test plans.

Elements of the process flowchart are:

- Short description of each process step;
- Definition of production/machinery type and/or equipment;
- Short description of controls;
- Specific methods (including statistical ones) which are used for process control.

3.4.4. Definition of Significant Characteristics



Any significant characteristics will be defined by the VAILLANT GROUP drawings, which are informed by the results of quality planning and/or risk analysis conducted by the supplier (e.g. the production and/or process FMEA). These are highlighted in the VAILLANT GROUP specifications or drawings, accordingly.

The supplier commits to implementing a dedicated system for products and characteristics, including a special procedure for furnishing proof. This also holds true for internal significant characteristics, i.e. defined by the supplier, in relation to the implementation of the specification requirements of the VAILLANT GROUP.

The special procedure for furnishing proof needs to be set up in such a way that, in the event of damage, due diligence can be proven (proof of discharge).

3.4.5. Control Plan

REQUIRED DOCUMENTS

✓ Control plan

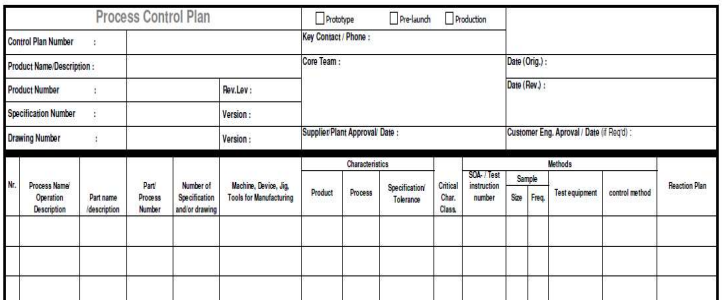
The control plan is a planning tool for preventive process control. It is created on the basis of teamwork through the systematic analysis of manufacturing, assembly and control processes. This team should consist of staff members from planning, manufacturing, quality, as well as other affected departments. Alternatively, comparable steering elements fulfilling all requirements on control plans can be used.

For the creation of control plans, the results from Design-FMEA, Process-FMEA, experiences from similar processes and products, as well as the application of improvement methods should be considered.

Coordinated as well as important product or process control characteristics must be documented in the control plans.

This especially applies to documented parts (“D”-parts), where all obligatory documentation characteristics must be codified within the control plans.

A further detailed description of the procedure for the creation of a control plan is outlined within the QS 9000-document “Advanced Product Quality Planning and Control Plan (APQP)” and in VDA Volume 3, as defined by the German Association of the Automotive Industry.



Process Control Plan

☐ Prototype ☐ Pre-launch ☐ Production

Control Plan Number :					Key Contact / Phone :														
Product Name/Description :					Core Team :												Date (Orig.) :		
Product Number :		Rev.Lev :															Date (Rev.) :		
Specification Number :		Version :																	
Drawing Number :		Version :			Supplier/Plant Approval/ Date :												Customer Eng. Aproval / Date (if Reqd) :		
Nr.	Process Name/ Operation Description	Part name /description	Part/ Process Number	Number of Specification and/or drawing	Machine, Device, Jig, Tools for Manufacturing	Characteristics			Critical Char. Class.	SOA- / Test instruction number	Methods				Reaction Plan				
						Product	Process	Specification/ Tolerance			Sample		Test equipment	control method					
											Size	Freq.							

3.4.6. Test Measurement Equipment Planning

REQUIRED DOCUMENTS

✓ Measurement equipment planning

For all measurement equipment, a measurement system analysis (MSA) must be performed. Hereby, resolution, tolerance, and the entire measuring process of the to-be-measured characteristic must be taken into account. This is also valid for laboratory measurement equipment if the supplier conducts validating tests for the VAILLANT GROUP.

The measurement system analysis is outlined within the DIN EN 9001, DIN EN ISO 10012 and QS9000 standards, as well as in VDA Volume 5, as defined by the German Association of the Automotive Industry.

The set-up of the measurement system analysis (MSA) must include the application of several methods:

MSA Type-1 Study (Method 1) – with influence of worker(s)

This type of study is usually, as a first step, carried out at the supplier of the measurement device or system in order to evaluate new or modified

measurement systems prior to their first use. A capability index is then calculated to determine the suitability of the system. After the Type-1 Study is passed successfully, it must be repeated at the customers' site after delivery.

The performance indicator is the cg and cgk value, where the target is cg/cgk ≥ 1.

MSA Type-2 Study (Method 2) – without influence of worker(s)

After Method 1 has been completed successful, the Type-2 study is carried out at the customer's plant at the system's intended point of use in order to evaluate new and existing measurement systems prior to final acceptance. The evaluation is based on a statistic called %R&R.

The performance indicator is the %R&R value, where the target is ≤ 20%.

MSA Type-3 Study (Method 3)

The Type-3 study is a special form of the Type-2 study. After Method 1 has been completed successfully, it is used for measurement systems without appraiser influence. The evaluation of this measurement procedure is based on the %R&R statistic.

The performance indicator is the %R&R value, where the target is ≤ 20%.

Control Equipment

The procurement or creation of control equipment must be completed prior to the start of the pilot series.

3.4.7. Operating Material Planning

REQUIRED DOCUMENTS

- ✓ Process layout
- ✓ Production plan

Planning of facility and operating supplies includes the planning, procurement or creation of all the required operating supplies that are needed to manufacture the designated part. The suitability or ability of operating supplies must be proven. For this, suitable documentation such as process layout and production plan or supplier specific planning tools fulfilling the process layout and production plan requirements, must be provided. In case of several differential operating equipment applications, individual proof must be supplied for each use.

The supplier is required to make sure that sufficient operating supplies in terms of capacity and quality are available before the start of production of the pilot series.

When required by the customer, the availability of those operating supplies (C_{mk}) must be proven within 24 hours by the supplier in cooperation with the VAILLANT GROUP. The proof must be according to the corresponding specification or part approval (VGPA).

3.4.8. Planning of Preventive Maintenance

REQUIRED DOCUMENTS

✓ Maintenance plan

Suppliers are obligated to develop a system of preventive maintenance for operating supplies. This means a) that preventive maintenance schedules must be dated and b) that a contingency plan must be created for all processes that may result in an inability to supply in the case of a disruption.

Proof of systematic and consequent conduct regarding all preventive maintenance actions must be provided.

The basis of this preventive maintenance plan may, for example, comprise recommendations outlined by the equipment manufacturer, experience, or SPC analyses.

The scope of the maintenance must also be defined (maintenance manual).

Maintenance staff must be prepared in a timely manner to handle new equipment and systems.

The application of the TPM method ("Total Productive Maintenance") is recommended.

3.4.9. Packaging Planning

REQUIRED DOCUMENTS

✓ Packaging planning including description

Based on the initiative of the supplier, the requirements regarding packaging, transportation mode and warehousing must be defined and jointly agreed upon between the VAILLANT GROUP and the supplier. These requirements are subsequently laid down in the specification of the product. Essential criteria according to standard ISO 14001:2015 are in particular, but not limited to:

- Protection of parts against dirt, contamination and damage;
- Simple and ergonomic beneficial handling (transportation, discharge);
- Content protection and machine-readable labelling on the outside;
- Reusability (multi-way containers are preferred);
- Avoidance of packaging waste;
- Availability, replenishment;
- Stability and stackability;
- Warehousing requirements.

The supplier is responsible for damage-free delivery. Any deviations must be clarified with the VAILLANT GROUP in writing.

The determination of the packaging must be completed before the start of production of the pilot series.

The documentation is completed within the scope of part approval (VGPA) on the basis of the document “Packaging data sheet”.

This notwithstanding, the supplier must at all times also adhere to all local legal provisions regarding packaging matters.

3.4.10. Staff

REQUIRED DOCUMENTS
- ✓ Skills matrix
- ✓ Training plan

Capacity

The capacity of qualified staff needs to be planned and implemented in such a way that sufficient human resources are available before the start of production of the pilot series.

Qualification

When members of staff are assigned to new workstations or are translocated to different workstations, they must be (re)trained according to the new conditions. Proof of this must be recorded.

For the creation of quantitative and qualitative staff training requirements planning, pre-existing staff qualifications (experience, proven skills, etc.) need to be recorded beforehand.

3.4.11. Process Capability

REQUIRED DOCUMENTS
- ✓ Process capability study

Suppliers must prove capabilities for all the significant characteristics defined by the VAILLANT GROUP. This also holds true for internal significant characteristics as defined by specification requirements.

Minimum requirements for capability indexes:

- Machinery capability $C_{mk} \geq 1.67$
- Short-term process capability $C_{pk} \geq 1.67$
- Long-term, process performance index $P_{pk} \geq 1.33$

Short-term Process Capability

A first analysis of the short-term process capability must be presented as soon as at least 50 samples are available. Depending on the project, a smaller sample size can be agreed upon in writing with the VAILLANT GROUP. A regular analysis of the SPC-recordings (preferably automated) must be conducted at the start of production of the pilot series at the latest.

Long-term Process Capability

Proof of long-term process capability must be provided as soon as it can be determined according to the aforementioned regulations.

The short-term process capability must be planned in such a way that all the proof is available before the initial samples are taken.

Central Manufacturing

REQUIRED DOCUMENTS
- ✓ Process capability analysis

For all controllable characteristics, central manufacturing is the goal. For significant characteristics, the requirement is that a controlled and capable process is documented through continuous and systematic analysis of process control results according to set policy and statistical process control.

Significant characteristics that are non-controllable or non-capable require an adjustment of the specification limits, as well as tolerances of work

pieces, thereby respecting all boundary conditions of statistical process control.

For non-capable process characteristics, 100% sampling must be performed. The measurement values must be documented and evaluated before initiation of any shipping or further processing.

3.4.12. Initial Sample Testing

REQUIRED DOCUMENTS

- ✓ Initial sample evaluation
- ✓ Approval

Before the first delivery, the initial sample testing (VGPA) must prove that all the agreed quality requirements, as defined in the drawings and specifications, are fulfilled according to the conditions for serial production.

All quality characteristics, as defined in the applicable drawings and specifications, must be sampled with regards to measure, material, function, reliability, optic, haptic and hallmark (e.g. manufacturer´s code). This also holds true for the internal characteristics as defined in the specification requirements.

Definition of Initial Sample

Initial samples are products which have been manufactured and inspected under series production conditions (with regard to machinery, facilities, operating supplies, measuring devices, and staff).

Storage of Reference Samples

Reference samples from the initial sampling must be stored by the supplier in an appropriate manner for at least 10 years.

Reason for initial sampling:

- First-time order of a product;
- Product change;
- Supply disruption for a period of more than one year;
- Supplier switch and, respectively, sub-supplier switch by the supplier;
- Change of production process;
- Deployment of new or changed forming tools (e.g. casting tools, moulding tools, punching tools);
- Change of production site or deployment of new or translocated machinery;
- Re-qualification in case of significant non-conforming products (see Section 2.8.).

Initial samples will be requested by the VAILLANT GROUP with an order and requested delivery date.

The supplier is obliged to inform the VAILLANT GROUP in advance and to supply initial samples after consultation with the VAILLANT GROUP in the following cases:

- Changes to materials or parts incorporated in the products;
- Supply disruption for a period of more than one year;

- Supplier switch and, respectively, sub-supplier switch by the supplier;
- Changes to manufacturing processes;
- modifications made to the methods or facilities for the testing of the products or to other quality assurance measures;
- Deployment of new or changed forming tools (e.g. casting tools, moulding tools, punching tools);
- Change of production site or deployment of new or translocated machinery.

Initial samples must be provided together with a completed initial sample test report. During manufacturing with similar tools, for each tool and mould cavity, an individual test report must be compiled.

Submission Stages

Depending on the submission stage (1-4), different documents will be requested during the quality planning phase.

Documentation

Control results and records must be incorporated in the initial sample test report and provided to the VAILLANT GROUP together with the initial samples by the set deadline.

Insofar as the documents specified in a Part Approval (VGPA) document are protected by copyright, the companies of the VAILLANT GROUP must be granted a non-exclusive right to use these documents by signing the VGPA document.

These initial samples must be clearly marked as such.

For supplied documents the supplier shall grant to the VAILLANT GROUP a non-exclusive, cost-free, indefinite, transferable, sub-licensable, irrevocable right to use the technical documentation delivered with the Part Approval (e.g., drawings, specifications, data sheets etc.) of the product as well as the corresponding intellectual property rights and copyrights for the purpose of manufacture (including quality assurance, data-management etc.), use and distribution of the VAILLANT GROUP products.

The supplier is obliged to provide, upon request or by audit, all relevant certificates and declarations relating to the delivered product (CE, ISO 10204, etc.). In the event the documentation has been produced on behalf of the VAILLANT GROUP and has been paid for, as the case may be, through the costs of the supplied product or on the basis of a development contract, the supplier shall grant the VAILLANT GROUP exclusive and unrestricted rights of use and exploitation. This shall not affect other written agreements between the parties.

For the identification of characteristics, identical numbers must be used within the test report and accompanying the VAILLANT GROUP approved reference drawings.

Assemblies which are manufactured according to the VAILLANT GROUP construction, including all individual parts, have to go through an initial sample test with the results to be presented to the VAILLANT GROUP.

The supplier has to sample assemblies for products that are constructed by the supplier himself and present the results to the VAILLANT GROUP. Initial samples also have to be taken for to individual parts and, if applicable, to sub-assemblies as well. The VAILLANT GROUP is got to be granted access to these documentations on request.

Sampling inspection activities are the responsibility of the supplier. However, the VAILLANT GROUP reserves the right to verify the supplier's sampling inspection results.

Further agreements between the supplier and the VAILLANT GROUP that either extend or restrict the aforementioned rules regarding initial sample testing can be drawn up.

Product and Process Approval

Approval of the initial samples is given after assessment of the sample test results or, where applicable, after assessment of the supplier process audit results.

The approval decision by the VAILLANT GROUP will be made electronically and the supplier will be informed thereof in text form (e.g. by e-mail).

One of the following decisions will apply:

- Approved: after an order has been issued by the VAILLANT GROUP Purchasing, series production can start.
- Approved under concession: after an order has been issued by VAILLANT GROUP Purchasing, series production can start. Deviations must be remedied as soon as possible and new samples and inspection results presented to the VAILLANT GROUP.
- Rejected: deviations must be remedied and new samples and inspection results presented to the VAILLANT GROUP before series production can start.

Sample approval by the VAILLANT GROUP does not release the supplier from their sole responsibility for the quality of their product. Furthermore, sample approval shall not be construed as an order. Therefore, the VAILLANT GROUP's rights and remedies are reserved regarding deviations from specifications which have not been detected before start of the production process and/or product approval.

-

4. Requirements after Start of Production

After the start of production, fulfilment of all the agreed requirements will be checked on a monthly and quarterly basis and monitored by the VAILLANT GROUP, as described in Section 2.9. If deviations are found in a supplied part, the VAILLANT GROUP's non-conforming products process must be applied and, if necessary, a process audit conducted.

4.1. Determination of Serial Process Capability

REQUIRED DOCUMENTS
- ✓ Process capability report

According to Section 3.4.11., a process capability report must be provided upon request from the VAILLANT GROUP, especially within a process audit. Furthermore, the requirements regarding a centred production approach must be fulfilled.

For the determination of process capability, it is necessary that the process operates under statistical control, i.e. all systematic influences are known and under control. In general, process capability is determined based on control charts.

4.2. Process Audits

REQUIRED DOCUMENTS
- ✓ Audit result
- ✓ Action list

The supplier must conduct and document internal process audits as determined by DIN EN ISO 9001. In case of deviations, this documentation must be provided to the VAILLANT GROUP upon request. Process audits support continuous collaborative product development and optimization.

The VAILLANT GROUP conducts process audits if one or more of the following events occur:

- Product change;
- Material change;
- Process change;
- Production capacity change;
- Significant characteristics must be ensured;
- Change of quality level based on documented deficiency;
- Results of sub-supplier audits.

The extent of the audit is based on the Quality Management Standard VDA 6.3, as defined by the German Association of the Automotive Industry.

Having conducted the audit, all detected deviations must be processed in an effective containment action programme with a corresponding time schedule. The implementation of these containment actions must be tracked, the effectiveness of the changes checked, and the realization thereof documented.

The VAILLANT GROUP evaluates each supplier based on the following ratings table.

Score	Category	Name	Action
80-100%	A	Capable	Improvement actions
65-79%	B	Conditionally capable	Corrective actions and re-audit required
0-64%	C	Incapable	Block supplier for further business; transfer current products

4.3. Serial Production Audit

A Serial Production Audit is part of the control plan (refer to Section 3.4.5.). In case of deviations, containment actions must be implemented, tracked, and documented.

4.4. Measurement System for Significant Characteristics & Calibration

REQUIRED DOCUMENTS
- ✓ Capability indicators

As stipulated in Section 3.4.6., an efficient measurement system must be implemented in order to control the significant characteristics (refer to Section 3.4.4.). Both the monitoring of the measurement system and the calibration are integrated in the Total Productive Maintenance (TPM) system. This means that capability performance indicators must be archived and, if requested, provided to the VAILLANT GROUP.

4.5. Reliability Checks

REQUIRED DOCUMENTS
- ✓ Evidence

Conducting reliability checks is a mandatory requirement as specified in the control plan (refer to Section 3.4.5.). Documented evidence of the reliability checks must be archived so that it can be provided to the VAILLANT GROUP upon request.

4.6. Documentation and Archiving of Quality Data

REQUIRED DOCUMENTS

- ✓ Document management system

The supplier must archive all resulting quality data, in particular but not limited to data from control cards, inspections, audits as well as regulations on dimensional checks, calibration and failure containment for a period of at least 10 years.

4.7. Change Management

The supplier must give the VAILLANT GROUP advance written notice of any changes to their manufacturing process, materials or parts incorporated in their products, any changes in the design of the products, of the relocation of production plants, of their sub-suppliers, of any modifications made to the methods or facilities for the testing of the products, or to any other quality assurance measures. The supplier must give the VAILLANT GROUP sufficient time to check whether such changes may have a detrimental effect. The supplier must report all changes to the VAILLANT GROUP, including all corresponding performed measurements. In all cases, the VAILLANT GROUP will evaluate the changes. Any modifications of the products with regards to agreed quality requirements (as defined in the drawings and specifications) require the prior written confirmation of the VAILLANT GROUP on the VGPA.

4.8. Traceability

The supplier must ensure, whether by identification of the products, or, if such is impossible or impractical, by other suitable means, that, in case defects are detected in a product, they can immediately establish which other products might be affected. The VAILLANT GROUP shall not be obliged to accept products that are not adequately marked, or products without an adequate substitute form of identification, and is entitled to return them to the supplier at the supplier's expense.

Tracing needs to be designed in such a way that a clear and gapless tracking from delivery data back to the designated workstation is ensured, also down to the sub-supplier level.

The correct position for the means of identification of the product will be laid down in the specifications for the product.

For the tracing of important components, the VAILLANT GROUP´s VN 208 standard (on trading goods) outlines the requirements for machine-readable optical labels, with corresponding information on the subject. The label creation software is provided as freeware by the VAILLANT GROUP.

For the traceability of parts within the production process, the supplier must refer to the VAILLANT GROUP´s VN 209 standard, which will be provided by the VAILLANT GROUP upon request.

All non-conforming products, parts, semi-finished and finished parts or products must be marked and stored clearly without ambiguity so that no confusion is generated and mixing with conforming products is eliminated.

To this end, colour coding, bar coding, and the use of marker tags or stamps are considered appropriate tools.

For parts where a possible mix-up can only be detected using measuring techniques, suitable procedural actions must be established. If such actions are not available, additional eye-catching labelling must be used.

Within mixed production systems, D-parts and essential parts must be identified within the production process. The corresponding containers and accompanying documents must be marked clearly with the capital letter “D”.

All steps must be arranged so that defective parts can be localized within the smallest possible area, even after a longer period of time.

Supply chain and corresponding quality data for all parts containing characteristics with a mandatory documentation requirement must be traceable. This applies to the value chain at all levels of sub-contracted partners. The traceability must be manifest across all relevant levels in an appropriate system, so that all the necessary corresponding information can be provided within 24 hours to the VAILLANT GROUP, if requested.

As a minimum requirement, all parts must contain information on batch number, date of production, and other identification numbers. Machine-readable and electronic solutions are preferred and strongly recommended. The different types of batches are given below:

- Raw material batches;
- Delivery batches;
- Production batches.

The supplier must define and operate their own disturbance management system.

Overview of Revisions

Version	Date of Modification	Revised by	Released by	Change	Affected Sections
2012	2012-07-27	Bernhard Pollul	Karsten Wetekam	First release of the document	-
2013	2013-08-28	Karsten Wetekam, Bernhard Pollul	Karsten Wetekam	General corrections and updates	1.1.-1.3., 2.1., 2.4., 2.6., 3.4., 4.3.-4.5., 4.7., 4.8.
2015	2015-11-20	Armin Michnik, Bernhard Pollul	Karsten Wetekam	Updates of VAILLANT GROUP standards	2.2., 2.6., 2.8., 3.4., 4.2., 4.8.
2016	2016-09-22	Armin Michnik, Tomas Urminsky, Bernhard Pollul	Karsten Wetekam	Update of DIN EN ISO9001 standard	2.1., 2.3, 2.4., 2.6., 3.4., 4.2., 4.3., 4.5.-4.8.
2018	2018-07-12	Lenka Faturova	Anton Dobias	Updates of VAILLANT GROUP standards	2.4.-2.6., 3.4.4, 3.4.9., 4.2., 4.8.
2018	2019-06-05	Stano Michal Dobias Anton	Anton Dobias	Update according to VAILLANT Group Standards	2.2, 3.4.12
2022	2021-08-12	Vanessa Baumes Miloslav Prekop Christophe Termeau Tomas Tichy Michal Stano Ralf Stamm	Anton Dobias	General corrections and updates. Adding of new chapters ESD, CS	2.2; 2.3; 2.4; 2.6; 2.7; 3.3; 3.4.12

VAILLANT GROUP

TAKING CARE
OF A BETTER CLIMATE

INSIDE EACH HOME
AND THE WORLD AROUND IT

Vaillant GmbH
Berghauser Straße 40
42859 Remscheid
Germany