BMW Group

Supplied Parts Quality Management
Quality is our promise to the customer.

The products of BMW Group shall meet and exceed the expectations of our customers regarding innovations, performance, and quality. This is based on the development process of vehicles and components, where BMW Group engineers and suppliers share responsibility for achieving challenging goals.

Quality management is a task that affects all employees and which can only be executed successfully, if it is fully understood by involved and capable individuals.

BMW Group has reorganised its method for supplied parts quality management in the product development process to meet the demanding challenges of the future.

This booklet explains how you can contribute to the common aim of developing and producing components and vehicles of the highest standards.

We count on you!
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Introduction

The requirement for a continuous quality management system for the purchase and procurement of production material is based on the specifications of the international standards ISO 9000 and ISO/TS 16949 and the BMW Group Quality Management Handbook.

This quality assurance procedure for supplier parts has been developed for a number of reasons:

- to ensure that the quality standards of all components and material used in all BMW Group products continue to please our customers;
- to create a common group-wide operational standard for this very important activity;
- to ensure that all the responsibilities concerning this activity are fully understood throughout BMW Group and throughout our supply chain;
- to help all those involved complete their tasks in a professional manner and in line with the project timetable.

These procedures have to be implemented under the following circumstances:

- new product developments;
- modified or new processes;
- use of new production plants, production facilities, tools, technologies, materials;
- new production location, production re-location.

Suppliers planning to change their product or processes in any way must inform their BMW Group partners from Purchasing, Development, Logistics, and Quality Management (the so-called “Clover Leaf”).

The procedure outlined in this booklet regulates the activities and responsibilities of the supplier and of the BMW Group departments involved in the quality management system for new supplied parts and material.

It applies throughout BMW Group in the business areas Automobiles and Motorcycles and is to be used on all component, systems, and module projects.

The overall responsibility for on-time supply of satisfactory parts and materials lies with the supplier.

The overall responsibility within the BMW Group for the purchase and procurement of production material lies within the Division “Purchasing and Supplier Network”.
Other BMW Group areas involved include:

- Engineering and Development
- Plant Parts Quality
- Logistics
- Purchasing

Please study the content of this booklet, it will help you to prepare to work with the various operational areas of BMW Group on your next new project.

For any questions concerning “Quality Management Parts” please feel free to contact the responsible buyer.

Thank you for your cooperation.
Supplier Selection and Contracting

The relationship with our suppliers is based on partnership and trust. In the supplier selection process, potential suppliers successfully convince our teams that their concepts will meet our requirements in terms of specifications, innovations, quality, and cost. This sets the basis for a successful and mutually beneficial partnership.

Having signed a contract as a supplier to BMW Group, our partners together with our engineers share responsibility for achieving challenging goals.
The engineering and production of quality parts starts with the nomination of world class suppliers. During the selection process, our potential suppliers have to prove that they meet the demanding requirements of BMW Group.

The BMW Group’s Purchasing and Supplier Network Division is responsible for successful supplier selection and contract drafting. Purchasing is supported by Development, Parts Quality Management, and Logistics in what is called a “Clover Leaf” arrangement.

Suppliers are selected across a number of project phases, depending on the scope of service being contracted out and on the type of supplier involved. In most cases the schedule is as follows:

<table>
<thead>
<tr>
<th>Type of supplier</th>
<th>Responsibilities</th>
<th>Nomination date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept suppliers</td>
<td>Develop a technical concept</td>
<td>Up to approx. 38 MbS</td>
</tr>
<tr>
<td>Series development suppliers</td>
<td>Develop a series production process based on a given concept</td>
<td>Up to approx. 30 MbS</td>
</tr>
<tr>
<td>Market suppliers</td>
<td>Supply standard parts</td>
<td>Up to approx. 15 MbS</td>
</tr>
</tbody>
</table>

Mbs-Months before start of series production

In selecting our suppliers, we are looking to find the best in the world for:

- Product innovation and strength of concepts
- Product quality / robust production processes
- Lifetime costs
- Delivery process capability and on-time delivery
- Project management
- Value creation chain / subcontractor management
In most cases, there will be a competition between several potential suppliers. Only if there is a known best practice supplier, a direct nomination will apply. The supplier selection decision will be taken by the BMW Group on the basis of the suppliers’ project proposals and plans in all the areas identified above. If the supplier is already known, the decision will be taken additionally based on the demonstrated capability. Supplier evaluation is carried out by Purchasing, Parts Quality Management, Logistics, and Development.

By completing the contract draft only when the supplier is nominated, the best possible conditions can be achieved with regard to:

- Clearly stated requirements,
- Agreed targets,
- Achievable objectives,
- Compatible terms and conditions.

“Supplier Contracting” covers the following types of agreement:

- Confidentiality agreement,
- Development contract,
- Warranty agreement,
- Supply contract,
- Combined development / supply contract,
- Requirements specification
- Service Level Agreement (SLA) / QMT Requirements
- Scope of service and logistics (LLQs).

A nominated BMW Group supplier takes a great responsibility for the overall quality management, as described in this booklet. With the nomination usually a long-term relationship starts, that needs to be based on mutual trust, acting as true partners.
• BMW Group Division “Purchasing and Supplier Network” is responsible for the performance of supplier selection activities.

• The timing for the supplier selection process depends on scope of service being contracted out.

• The supplier selection decision is taken based on the suppliers project proposals and plans for new suppliers and additionally on the demonstrated capability for known suppliers.

• Contracts are drafted as part of the supplier nomination process.
Project Assessment

Production and supply capabilities, together with outstanding quality performance, must be guaranteed from the very first day of production until the end of a part’s life cycle.

To ensure this, all possible risks have to be identified and minimised as early as possible. To help with work in this area, the BMW Group has put a project assessment process in place.
The Project Assessment is conducted immediately before the supplier is selected, to make the risks of the whole supply chain transparent at the start of the project. The objectives of this procedure are:

- to achieve transparency throughout concerning potential risks of suppliers and subcontractors;
- to clarify responsibilities for resolving any risks identified as collaborations begin;
- to help to decide the level of project supervision by BMW Group staff during Product and Process Development;
- to form the basis for realistic resource and project planning.

Project risks are generally located not only within the different companies involved, but also at the interfaces between them. Risks are assessed in the following areas:

BMW Group summarises these risks into three responsibility areas, to allocate the responsibility for risk resolution unambiguously:
Inside BMW Group, interface BMW Group – Supplier, Supplier – Sub-Supplier.
<table>
<thead>
<tr>
<th><strong>The Procedure of Project Assessment</strong></th>
<th>Project assessment is carried out by the BMW Group’s “Clover leaf” group, which evaluates potential risks and defines responsibilities and measures to minimise them.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summary</strong></td>
<td>• Project assessment is designed to achieve transparency concerning the risks of potential suppliers and subcontractors.</td>
</tr>
<tr>
<td></td>
<td>• Project Assessment is conducted by a BMW Group team (“Clover Leaf”).</td>
</tr>
<tr>
<td></td>
<td>• The results of a project assessment affect supplier selection and determine the intensity of project monitoring by the BMW Group.</td>
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Product and Process Development at the Supplier

More than fifty percent of all components within our vehicles are being developed at our suppliers, including the respective production processes.

This shows the great impact that our development partners in Europe and around the globe have in the process of creating products of the BMW Group.

The process described here shows how we expect our suppliers to contribute to securing a fault-free, customer focussed, production start up.

The final quality assessment is carried out with the help of a process series and initial sample analyses from it. This confirms the supplier’s ability to produce and deliver sufficient series parts that meet all requirements from stable production and delivery processes, with series tools and at calculated costs.

The responsibility for the completion of all necessary tasks clearly lies with the suppliers. Our experts from various divisions will provide all the necessary support.
Introduction

The Product and Process Development is part of the Product Development Process of BMW Group. This process is structured in different phases, as you can see in the chart below.

The development of the product and process should be finished 9 months before start of series production.

Suppliers must demonstrate adequately that they have achieved final process competence (i.e. they must provide evidence of their long-term process capability). This must happen latest until three months after series launch.

Objectives of Product and Process Development at the Supplier

- Provide a standard procedure for preventive quality work in component projects;
- general illustration of the activities in the product creation process;
- provide a framework for regular assessment of project status;
- definition of interfaces to other departments or divisions;
- assurance of a fault-free, customer focussed production start up.

Responsibilities

The supplier carries overall responsibility for proper, on-time execution of all tasks relating to product and process development at his facility. The different expert departments of BMW Group help if required and have to provide the necessary information at the appropriate time.
Overview of the timing of activities:

The Procedure for Product and Process Development at the Supplier

The Fundamentals of Project Collaboration

Before supplier nomination, contract negotiations commence with first "Clover Leaf" discussions. At this stage, initial agreements regarding project collaborations may be reached. These are then recorded in the Service Level Agreement approximately 45 months before series production launch (MbS), depending on the type of supplier concerned (core supplier, concept developer, series developer or market suppliers).

The level of project supervision by BMW Group employees is determined based on the identified risks of the project assessment. Projects are monitored using the maturity level assurance method specified in VDA. They are developed using RMT software (see section on Project Management Tool for Parts Quality Management.) Depending on the risks identified, several evaluations may be carried out to assess the different project phases. This is done either by BMW Group associates or by the supplier himself on his own responsibility.

Quality requirements and quality planning are verified for all suppliers. Both have to comply with international and industrial standards, as well as BMW Group requirements.

Verification of quality requirements ensures the supplier's ability to complete the project:

- in the allowed time,
- with sufficient resources and
- at high quality.
For existing supplier performance weaknesses a plan of activities has to be developed.

Based on his own QM system, the supplier must draw up a quality plan for all the trial and series parts to be delivered. The plan must identify and define quality standards for the project, and fix times and procedures for quality inspections and quality assurance (e.g. audits). Where necessary, the quality plan must be adjusted for the series production phase. Quality plans must be verified with regard to whether:

- the supplier’s quality system is being properly applied,
- the supplier is implementing the measures agreed and
- these measures are successful.

For development suppliers, quality requirements, and quality planning will be verified around the time the supplier is nominated.

Determination of relevant Product and Process Characteristics

When the fundamentals of project collaboration are agreed, the relevant characteristics of the product and process can be established and fixed. These characteristics have to be agreed with BMW Group. They are developed from the customer requirements (BMW Group and market) and are documented on the data sheet for process series.

Product and process characteristics should be approved and fixed by 20 MbS.

Product and Process Development

As a supplier devises the concept for an offer, he is already working on product and process development. Responsibility for continuous development and improvement of the product and the production process remains with the supplier for the duration of the project.

Process development must result in an optimal production and delivery process that is suited to series production. By the end of process development:

- Sufficient trials must have identified influential process parameters and stated secure tolerances.
- The production process (i.e. machinery and tools) and the delivery process (i.e. the flow of goods and information) must be up to series standard.
- Production steering plans, specifications and drawings must be made and updated.
• The supplier’s employees and subcontractors must be trained and familiar with the new product and process. They must also be available in sufficient numbers to enable series production. Specialist support from the BMW Group will be on hand wherever necessary.

• Instructions (such as process specifications and work and test instructions) must be made available at the workplace and adhered to.

• Workplaces must meet all requirements for series production.

• The supplied parts correspond to series standard and are produced under series conditions.

• The confirmation of the successful process development by the suppliers is available. If necessary, BMW Group associates and suppliers must be able to verify the details on-site.

Process development should be complete by 9 MbS.

Start-up Capability Evaluation

After the completion of the process development and optimisation phases we assess the start-up capability. Tested here will be whether the supplier is able to supply high quality parts on time in sufficient quantities from the start of series production.

The results will be distributed to Purchasing and the project team and will be documented in a computer system.

Start-up Capability is a provisional approval covering the period between the first delivery and the positive PPAP initial sample inspection (Production and Process Approval). It is based on an assessment of possible risks relating to the supplier’s ability to meet the launch schedule.

As a rule, the Start-up Capability is assessed for all parts. The Start-up Capability Evaluation does not replace the PPAP initial sample inspection.

The evaluation of Start-up Capability is assessed around 5 MbS.

For a positive Start-up Capability, all the following criteria have to be satisfactory:

• Components are from series tools.

• Short-term process capability is proven through statistical spread at the product ($C_{mk} \geq 1.67$).

• All required specifications (drawing, quality regulations, technical data package, etc.) are marked with production approvals.

• Characteristics influencing safety, function and fitting position are known (the coordination with the development department has taken place).
- Components fulfil safety, functional and fitting position requirements. If there are deviations, corrective actions are agreed and scheduled, and their implementation before start of series production is ensured.

- Terms of delivery must be agreed with the supplier.

- The measuring report, details of the active life of the part, and series packaging must all be available.

When all of the above requirements have been met, launch viability is confirmed and the supplier can move into process series.

Process Series Approval

In principle the supplier has to prove the provisional product and process quality according to the agreed details in principle in a process series 3 MbS.

The results will be recorded in the data sheet for process series.

The target behind a process series at the supplier's facility is to obtain early confirmation of his ability to deliver on time the required volume and quality of parts with the (technological and human) resources at his disposal under series production conditions. For some suppliers a process series carried out at their facility may concern only specific production characteristics. In general the supplier is required to conduct a process series. This holds especially true when the following conditions exist:

- new product developments;
- modified or new processes;
- use of new production plants, production facilities, tools, technologies, materials;
- new production location, production re-location.

The process series is a test to see how production machinery, tools and logistics processes perform under series production conditions.

The supplier is responsible for planning and preparing the process series (including parts volume), which must include all the agreed process characteristics and take place as according to the project schedule.
A process series (including performance test) is successfully completed when process capability is rated at \( P_{pk} \geq 1.67 \). Results must be presented to the relevant technical department at the BMW Group and open issues resolved.

If process capability for the agreed characteristics is not satisfactory, appropriate measures must be taken. In case of critical defects, any remedial measures have to be confirmed in a repeated performance test.

**Initial Sample Inspection Report (ISIR)**

The Initial Sample Inspection Report is the responsibility of the supplier or subcontractor and requires an appropriate process to be planned and carried out on-site at the supplier’s.

The Initial Sample Inspection must take place only when drawings and applicable specifications (e.g. quality requirements) have been approved. Which production characteristics will be examined must be agreed in advance and Initial Samples must be taken from the production batch being used to certify provisional process capability (normally the process series).

The supplier is responsible for preparing the Initial Sample Inspection Report (ISIR). He will generally produce a report in accordance with VDA Vol. 2, Submittal Level 3. BMW Group associates can add to the report if necessary (e.g. by detailing any defects found and the measures devised to correct them, or by scheduling and general comments).

As the customer, the BMW Group is responsible for deciding whether the Initial Sample Inspection Report will be approved or not. If necessary, the BMW Group also decides whether Initial Sample Inspection Report will be general or specific to certain areas (dimensions, function, material, reliability). When all tests are complete (generally around 2 MbS) the Parts Quality Specialist concerned must summarise the test results, record them in a data processing system and inform the supplier and the purchaser of the final decision.

Some production characteristics needing approval can only be considered within the broader context of further processing steps or other components. For production characteristics of this kind, the BMW Group must carry out fitting and function tests before making a final decision as to the result of the Initial Sample Inspection. Where the supplier fails to meet requirements, he must define and coordinate appropriate measures.
Validation of the Ramp-up Curve

Final confirmation of the supplier’s long-term process capability concerning specified production characteristics must be submitted within the first three months after series launch (MaS). At least 125 samples must be spot-checked and long-term process capability must be evaluated at $C_{pk} \geq 1.33$.

Issues can be evaluated on-site either by the supplier alone or jointly by the supplier and the BMW Group. In order to secure process capability between SOP and full capacity production the supplier must define and seek approval for measures relating to quality and capacity. The Ramp-up Curve must be monitored and all deviations reported to the BMW Group.
Production Phase

Product and Process Monitoring

For the entire supply period, product and process monitoring in series production is determined by process series results and product and production process approvals. The supplier must ensure that any changes arising in the manufacturing process are recognised quickly and appropriate action is taken to minimise the number of defective parts.

Any findings from the monitoring process must be forwarded to the agreed specialist department at the BMW Group.

Requalification

After SOP, product and process Requalification must be carried out at least annually in compliance with GS 90018-1 and GS 90018-2 guidelines. Requalifications in the intervening period must be coordinated with the BMW Group.

The supplier is responsible for the performance of Requalifications at his suppliers and sub-suppliers.

- The supplier is responsible for successful product and process development.
- Process development must result in an optimum manufacture and delivery processes which is well-suited to series production.
- A successful evaluation of Start-up Capability does not replace the Initial Sample inspection.
- The process series is a provisional confirmation of product and process quality.
- The Initial Sample Inspection is a pre-requisite for the supplier part to receive final approval.
- For standard parts a simpler Initial Sample Inspection method can be used.
Parts Quality Management: Tools

Comprehensive project management and effective supervision are the keys to efficient production processes.

This task is supported by the computer based tool: RMT-Software (Risk Management Parts).
As agreed in the product and process schedule, regular updates must be given, concerning project progress and on activities and results. This information, obtained from cloverleaf discussions, SE teamwork and the supplier’s agreed reporting system, must be used to control and verify the plausibility of project goals and the degree of goal fulfilment. This includes aspects such as subcontractor management, reliability indicators, audit results, technical assessment of the concept, development and integration, releases (for development), quality reports, product/process Maturity Levels, the active life of the part, status of QV inspections, ppm prognosis, lessons learned, 0km failure statistics, field failure statistics, 100% test results.

Maturity Level Assurance is the process by which the BMW Group develops product and production processes at the supplier's facility. It forms the basis of project cooperations, and by providing a common view of relevant data in risk management, it supports successful communications between the BMW Group and its suppliers. Findings are documented in RMT (the Risk Management for Parts application), which is available online the Partner Portal of the BMW Group. RMT supports holistic and effective project management and is consequently the key to successful realisation of robust production processes. It helps increase efficiency and represents a major contribution to quality improvement. One essential aim of maturity level assurance is to ensure the availability of sufficient numbers of high-quality parts ready for SOP.

Maturity Level Assurance applies to vehicle, chassis and engine projects from concept to series and provides continuous support for the core processes of parts management. Maturity Level Assurance not only provides transparency regarding the current status of the scope of components, it also offers guidance on the systematic achievement of individual milestones en route to successful industrial-scale component production. Before SOP, Maturity level assurance's measurement criteria cover not only process approval but also the final confirmation of process capability by the supplier. After SOP, RMT can be used to record product and process monitoring. Its different process blocks contain component-specific and individually configurable question catalogues. The system also enables a range of reporting forms and evaluations concerning the maturity levels (including measures and effectiveness checks). Consequently, up-to-date assessments of project statuses can be obtained at any time.

As a rule RMT is used to verify product and process development, but also on-site production by BMW Group associates (for example by Parts Quality Management associates in the plants or the different technologies). For selected, non-critical services the supplier can take responsibility for project monitoring and documentation using RMT.
In order to facilitate collaborations between the BMW Group and its suppliers, additional IT applications have been made available in the Partner Portal of the BMW Group: LPKM (Supplier Performance and Competence Management) gives the supplier access to his assessments by a range of BMW Group specialist divisions. TQP (Parts Quality in Production and Logistics) and SWS (Supplier Warranty Status) provide overviews of current 0km and field quality assessments in the series phase.

The different applications are available worldwide 24/7 via the Partner Portal of the BMW Group.

Summary

- A range of applications in the Partner Portal of the BMW Group support cooperations between the BMW Group and its suppliers. RMT is used for presenting evaluations and project status reports.

- Maturity level assurance is the method used for developing products and production processes. It is based largely on a catalogue of measurement criteria in RMT, which offers a step-by-step process to reveal the current project status.

- In most cases product and process development will be conducted by BMW Group associates using this tool.

- For selected volumes the responsibility of monitoring and reporting project status with the RMT software may also be given to the suppliers.
Target Deviation, Escalation and Resolution
(Escalation Procedures)

The Parts Quality Management process is designed to satisfy all needs with minimum risks. Where they occur, Target Deviations must be clearly identified, analysed and effectively resolved.

Target Deviations must be resolved jointly by the supplier and by the appropriate specialist departments at the BMW Group. A three-stage escalation process ensures that resources are used efficiently.

In resolving Target Deviations, open communications, trust and a working partnership are essential to success. So, once again, the responsibility of the suppliers, as well as that of our own functions, shall clearly be understood.
Introduction/Objectives

Escalation is necessary when a Target Deviation in a core process cannot be resolved solely by those involved.

Escalation aims to:

- use a multi-stage process for the quick and effective resolution of Target Deviations identified in the core process.
- achieve a strategic balance between the interests of the BMW Group and the responsibilities of the supplier.
- ensure goals for purchased parts are met by using the minimum of BMW Group resources to solve supplier problems.
- create a BMW Group-wide framework for structured risk management for purchased parts.

The relevant purchaser at the BMW Group is responsible for implementing the escalation process. He may delegate responsibility for partial solutions. The supplier is responsible for resolving deviations arising from problems in his own organisation or that of a subcontractor.

The Procedure

The BMW Group’s escalation process consists of three stages and is designed to resolve problems by investing only as much time and resources as necessary:

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Problem Discussion</td>
</tr>
<tr>
<td>Level 2</td>
<td>Problem Situation at the supplier location</td>
</tr>
<tr>
<td>Level 3</td>
<td>Supplier Support</td>
</tr>
</tbody>
</table>
In principle each escalation level operates as follows:

- analyse the cause of the escalation;
- analyse the problem;
- agree an action plan to remove the cause of the escalation;
- agree an action plan to bring the project back on target;
- implementation and monitoring of the action plans;
- escalation to the next level, or end the escalation procedure, as necessary.

Each level requires the application of appropriate problem resolution methods and resources to the required breadth and depth.

The work within the project will continue independent of the escalation process.

### Escalation Level 1 – Problem discussion

In Problem Discussion, the supplier is presented with the BMW Group view of the problem. The Problem Discussion is convened and chaired by the responsible buyer. The supplier is represented by the project leader and the managing director or account manager. The supplier is expected to initiate and complete effective problem resolution activities to bring the project back on target. The buyer is responsible for monitoring progress of the resolution actions against the plan and requirements.

The escalation level 1 procedure will be closed by either a de-escalation or escalation discussion.

### Escalation Level 2 – Problem situation at the Supplier Location

In the escalation level 2 an analysis is conducted by BMW Group supplier development into why the desired result was not achieved within the project itself or at escalation level 1. An effective and efficient problem solution will be developed from this analysis and consideration of the essential project requirements. Part of the problem resolution concept could be changes to the BMW Group project prerequisites or the on-site investigation of the problem using the appropriate tools of the BMW Group. The results of the On-Site Problem Investigation will be collated and consolidated into an action plan which will be implemented under the supervision of the buyer. The buyer will monitor the progress of the resolution against the plan.

The escalation level 2 procedure will be closed by either a de-escalation or escalation discussion.
Escalation Level 3 – Supplier Support

The purpose and objectives of the escalation level 3, Supplier Support, is to identify and resolve any supplier business-system causes of a project problem. The Supplier Support activity will be planned by BMW Group supplier development from the results of the level 1 and 2 activities. The relevant BMW Group purchasing director and the supplier managing director have to agree the planned Supplier Support approach. Project progress will be regularly reported.

The level 3 activity will be closed with a de-escalation discussion.

In the event that the Supplier Support project fails and the cause is determined to lie within the supplier, that supplier will be re-positioned within the BMW Group supplier portfolio.

Summary

- Escalation is to be used when Target Deviations in the core process cannot be resolved solely by those concerned.
- The purchaser has overall responsibility and must manage the escalation process.
- The supplier is responsible for resolving Target Deviations caused by his own organisation or by that of his subcontractors or by interfaces between the two.
- The escalation process consists of three stages: Problem Discussion, Problem Situation at the supplier location and Supplier Support.
- In stages 2 and 3 of the process the BMW Group's supplier development section supports the supplier.
- If stage 3 is unsuccessful and the cause of the problem lies with the supplier, the supplier will be re-classified in the BMW Group's supplier portfolio.