VOITH

Voith Turbo

Version 002/10.2010
Author: MSm / WSß / Schleth / Jup / Lwg / Werz

VOITH TURBO Supplier Quality Standard

Contents:

1 General requirements

Preamble

Quality to us means meeting or exceeding all customer requirements and expectations without any rework to ensure long-term customer satisfaction.
The quality of supplier products has a direct impact on the quality of Voith Turbo products and services. Our suppliers act as our partners and are fully responsible for the quality of their products. Our reputation and position in the world market are decisively determined by the quality of our products.
This Supplier Quality Standard, along with our Quality Assurance Agreement (QAA), is intended to help us establish a joint quality and risk management solution in co-operation with our suppliers. Smooth processes between Voith Turbo and its suppliers are essential to achieve joint objectives.
We expect our suppliers to fully implement and embrace a philosophy of continuous improvement (CIP).
Our long-term relationships with our suppliers are based on partnership and co-operation in order to constantly achieve zero defects.

Scope of validity

This Supplier Quality Standard, along with the Quality Assurance Agreement (QAA), applies to all supply contracts entered into by the contracting parties. It describes the minimum requirements to be fulfilled by our suppliers. In addition to these minimum requirements, suppliers may have to comply with specific customer requirements or requirements applicable at the place of destination of the products.

This Supplier Quality Standard shall not be construed to supersede the requirements of DIN EN ISO 9001, QS 9000, VDA, EAQF, AVSQ, ISO/TS 16949, IRIS (International Railway Industry Standard) as amended, or any other specific customer standards. It merely defines the minimum requirements established by the purchaser.

The supplier undertakes to perform its activities in accordance with the requirements of this Standard and of any other standards and regulations referenced herein in order to assure the quality of its business processes and the absence of risks in its products and services in accordance with the needs and expectations of all Voith Turbo Divisions and with the requirements specified in this Supplier Quality Standard.

Should any part or section of this Standard be held or declared invalid, the validity of the remaining provisions or terms shall not in any way whatsoever be affected or impaired thereby. Such invalid provision shall be replaced by a provision that comes closest to what the contracting parties had intended to conceive in accordance with the meaning and effect of this Standard.

In the event of any inconsistency between the German version and any translated version of this Standard, the current German version shall prevail.

Deviations from the requirements defined in this Supplier Quality Standard shall be subject to the written approval of the respective Voith Turbo Purchasing Department.

2 General requirements

Suppliers are expected to meet the fundamental requirements defined below to ensure effective and target-oriented co-operation with Voith Turbo.

General requirements for the quality management system

The supplier shall establish and maintain a quality management system to DIN EN IS0 9001 and specific Voith Turbo requirements.

The top management of the supplier's organization shall pursue a zero defects strategy and address the following challenges:

- prevention of defects,
- analysis and elimination of causes of defects,
- quality-oriented personnel with a positive attitude,
- use of preventive and analytical quality assurance methods,
- philosophy of continuous improvement of products and processes in conjunction with the possibility of price reduction.

As a minimum requirement, suppliers shall provide evidence of a certified quality management system to DIN EN ISO 9001. Uncertified quality management systems may be approved by the Quality Officer in charge from case to case for specific products.

Supplementary requirements for suppliers to the Rail Division

At the request of Voith Turbo, the supplier shall provide evidence of a certified quality management system to IRIS requirements and of customer or country specific certifications, such as DB Q-1, DB HPQ, GM/RT 2450 etc.

Supplementary requirements for suppliers to the Road Division

An effective quality management system to ISO/TS 16949 is an essential requirement to be met by all suppliers to the Voith Turbo Road Division. Alternatively, quality management systems to international VDA 6.1, EAQF, AVSQ standards etc. will also be accepted.

When the supplier's QM system certificate is due to expire and no requalification of the QM system is planned, the supplier shall inform Voith Turbo thereof at least three months prior to the date of expiry. New certificates shall be sent to the Voith Turbo Supplier Quality Departments without request. Voith Turbo shall be informed immediately of any withdrawal of a supplier's QM system certificate.

For retrace ability the supplier has to create and file manufacturer's certificates and/or documentation regarding the material composition. On request of Voith the supplier has to allow inspection to this documentation.

General requirements for suppliers

Quality responsibility

The responsibility for the planning and execution of work to be performed at manufacturing, assembly and inspection workplaces shall be entirely that of the supplier. The supplier shall be fully responsible for the quality of its products and services, including products and services provided by its subcontractors, and shall ensure that such products and services comply with drawing requirements, technical delivery conditions, standards and statutory and regulatory requirements. It shall be the supplier's responsibility to obtain a copy of the Voith and customer standards referred to in the product specifications and to make sure to use only the latest version of such standards for reference. Suppliers working on purchase orders in progress are required to contact the Purchasing Department of the respective Voith Turbo Division once a year for information on the latest version of such standards. In case of new purchase orders or after a prolonged suspension of orders, suppliers shall request such information before the purchase order is confirmed.

Agreements

Voith Turbo Quality Officers shall be entitled to agree with the supplier the required actions to be taken by the supplier to achieve quality capability and to continuously verify that the agreed actions are implemented.

Right of access

Voith Turbo personnel and Voith Turbo customers shall be granted access to the supplier's manufacturing and inspection areas after prior appointment.

Documentation

The supplier undertakes to collect, evaluate and make available with the shipment or upon request any data and information requested by the Voith Turbo Quality Officer for quality documentation purposes. Such data and information shall be readily available for inspection during the specified or agreed retention period.

The supplier shall ensure that quality documents can be traced to the individual component (component traceability), if this requirement has been agreed between the parties.

Non-conformity costs

Any non-conformity costs incurred by Voith Turbo for unscheduled tests or rework caused by defects, incomplete information on shipping documents, wrong shipments or missing / incomplete quality documents or records shall be charged to the supplier. These costs shall also include the so-called lost value addition costs caused by hidden defects which are identified in the Voith Turbo value addition process.

Warranty

The supplier agrees to grant Voith Turbo its rights under the warranty even in the event that Voith Turbo identifies defects, which would have been detectable during technical incoming goods inspections, only at the time of or after processing of the products. Voith Turbo shall report defects to the supplier immediately upon detection and will request the supplier to take actions for damage containment. The supplier expressly undertakes to inform its insurance liability company of this provision to ensure that it will be able to take out the required product liability insurance, including the envisaged product recall insurance.

Consequential damage caused by defects

Voith Turbo reserves the right of recourse against the supplier in the event that the supplier fails to perform the quality management measures agreed in this Supplier Quality Standard or the quality assurance and inspection measures agreed for specific components and in the event that such failure results in the delivery and processing of defective products and causes extra manufacturing costs, costs of production loss or extra logistics costs.

Product development

Suppliers with responsibility for product development and design undertake to perform the services listed below and to coordinate such services with the Development Department and/or Product Group Section of the respective Voith Turbo Division, and/or to request the required specifications in writing from said Development Department and/or Product Group Section and ask for confirmation that the latest issues of such specifications have been obtained.

- computer-aided design (CAD) in accordance with Voith Turbo requirements and customer-specific CAD specifications;
- provision of CAD data in the data format requested by Voith Turbo. If data conversion is necessary, e.g. because the supplier's data format is different from that used by Voith Turbo, the supplier undertakes to check the converted data, correct conversion errors, if any, and make available to Voith Turbo the converted data in the requested data format;
- computer-aided preparation of the required drawings (CAD drawings) in accordance with Voith Turbo standards and customer-specific drawing requirements;
- computer-aided analyses and simulation;
- risk analyses;
- implementation of the development project in accordance with the QM methods described in VN 3206, where appropriate and necessary.

If tests are necessary during the product development process for design verification and validation, then such tests shall be documented in test reports.

Product inspections and tests

Before the supplier performs extensive product inspections (measurements and tests), the following details shall be agreed between the supplier and the Quality Officer of the Voith Turbo facilities: inspection and test methods to be adopted, extent of the measurements and tests, measuring and test equipment to be used and scope and nature of the inspection/test documentation (see also section 7).

Contingency planning

Contingency plans shall include a description of potential risks and hazards and of the preventive actions and precautions taken for all business and production areas within the supplier's organization. The supplier shall, at its own responsibility, develop a contingency plan designed to prevent any risk of interruption or impairment of its delivery capability.

Liability insurance

The supplier shall take out liability insurance to provide protection against any liability risk. Such liability insurance shall include product recall insurance covering a maximum of two incidents per year.

The minimum coverage per occurrence shall be EUR 7.5 million. This shall not be deemed to constitute any limitation of the supplier's liability.

The insurance policies taken out by the supplier shall not constitute any limitation of liability. They are merely intended to minimize the liability risk of our partners.

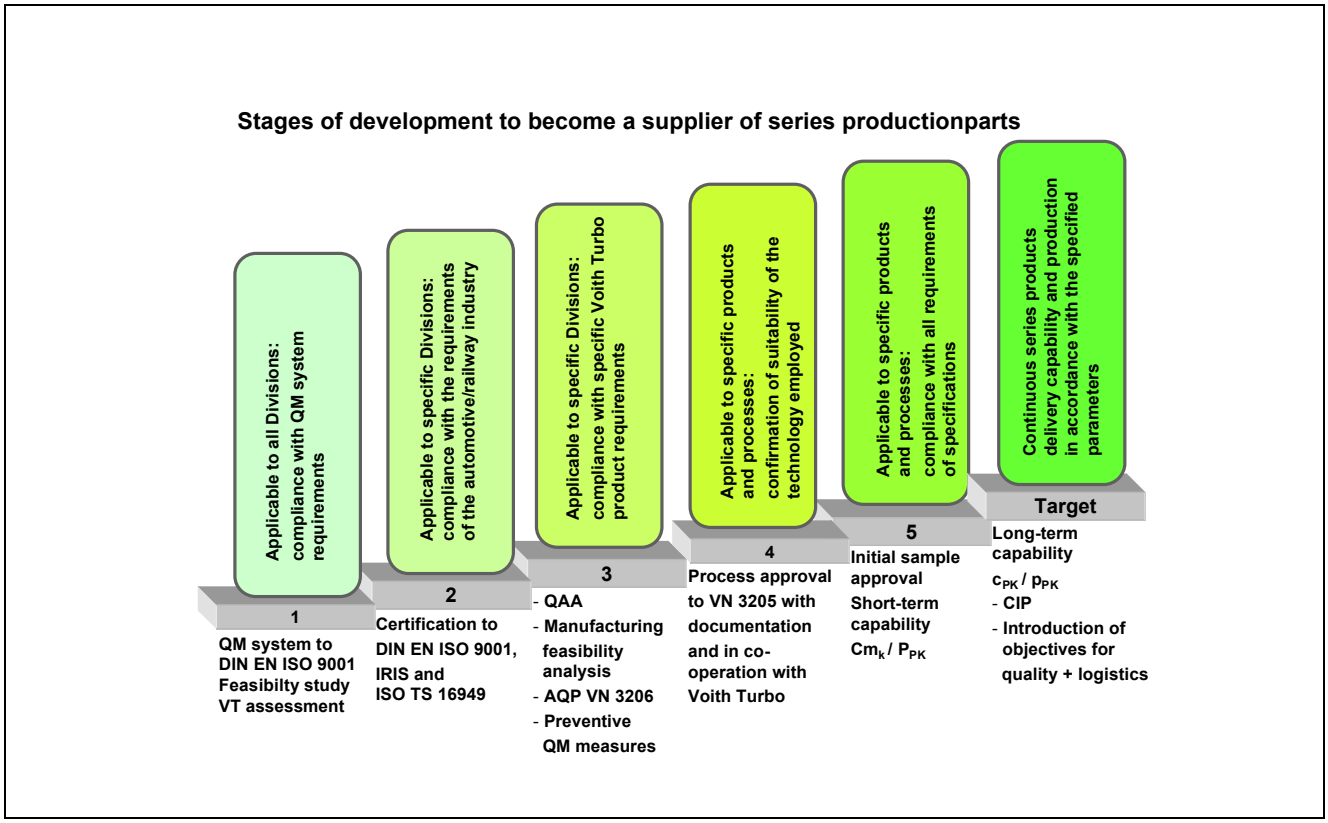
Subcontracting

In the event that the supplier subcontracts to third parties (subcontractors) any of its obligations hereunder, it shall make available to its subcontractors a copy of this Supplier Quality Standard and make sure that all requirements specified herein are met by such subcontractors. The requirements of VN 3205 and VN 3206 shall also apply.

Supplier selection and approval

Before signing a supply contract with a new supplier and before authorizing such supplier to provide products and/or services to Voith Turbo, Voith Turbo will conduct a supplier assessment to verify that

- the supplier has implemented a QM system that meets the requirements of the Voith Turbo Divisions;
- the supplier has the necessary development potential;
- the supplier is able to meet Voith Turbo's logistic and IT requirements;
- the supplier is able to meet Voith Turbo quality requirements in accordance with this Supplier Quality Standard QRL01 and to achieve the development stages shown below:



The supplier assessment required for supplier approval can be performed in one of the following ways, for example:

- by conducting a Potential Supplier Assessment or a QM system audit for non-certified suppliers;

- by recognizing a QM system audit previously conducted by an accredited certification body in accordance with Voith Turbo requirements

- by recognizing an industry-specific QM system assessment conducted by a Voith Turbo customer in accordance with the requirements specified by the respective Voith Turbo Division.

Approved suppliers are required to sign the Quality Assurance Agreement (QAA).

Process approval (process audit)

Before delivery of series products is started, a process audit can be conducted for process approval.

The process audit is performed to assess the effectiveness of the QM measures in a specific process. It also includes an assessment of the supplier's compliance with all relevant documents, such as operating procedures, specifications and customer requirements.

Unscheduled process audits may be necessary if specific reasons exist. Such reasons include, but are not limited to, the following:

- **current complaints, decreasing product quality**

- **product/process changes, including production transfer to other locations**

- **delivery problems, wrong shipments**

- **process qualification as part of an initial sample approval**

- **supplier approval**

Voith Turbo will grant process approval on condition that the supplier has provided sufficient evidence of its continuous series products delivery capability to fulfil the existing Voith Turbo call-off orders while at the same time maintaining the required process capability. Such evidence shall be provided in the form of a control plan and additional documents such as:

- **machine/process parameter specifications**

- **process capability evidence, control charts for defects**

- **measurement system capability evidence**

- **maintenance plans**

- **cycle time calculations / start-up curves for component requirements etc.**

3 Project management

The supplier shall establish and maintain an appropriate project management solution.

A project manager shall be designated for each project who shall coordinate all planning activities. Voith Turbo shall be informed of the names of the individual project team members with specific assignments, who shall act as contact persons for Voith Turbo for the entire duration of the project.

Risks and critical project issues shall be identified in the overall project plan at an early stage in order to allow corrective actions to be taken, where necessary.

The overall project planning scope (project management) depends on the complexity of the product and shall be agreed with Voith Turbo.

Project plan

An overall cross-functional project plan identifying all planned objectives shall be prepared in order to ensure that the envisaged objectives of Voith Turbo specific projects can be achieved in terms of the specified technical, financial and quality requirements and agreed deadlines.

For specific projects, the supplier will be requested to establish a work package agreement under the Voith project plan or, alternatively, an independent supplier project plan which shall be coordinated with the Voith project plan in accordance with the requirements of the Voith Turbo Project Management Guideline.

Status report

For specific projects, the supplier will be requested to submit a status report on supplier work package agreements under the Voith project plan or, alternatively, an independent supplier project status report in accordance with the requirements of the Voith Turbo Project Management Guideline.

Apart from the project management requirements outlined above, the supplier will also be requested to submit a production status report for specific projects.

Project planning – advance quality planning (AQP)

The following advance quality planning requirements shall be considered during project planning:

- **identification of Voith Turbo quality requirements**
- **manufacturing feasibility review process**
- **product and manufacturing process quality planning activities**
- **procurement and approval of measurement systems and inspection/test equipment**
- **approval for series production**
- **risks of individual work packages**

For specific projects, the supplier shall continuously review the project progress and project risks by using the Advance Quality Planning checklist included in VN 3206 (see section 3) and submit such evidence if so requested by the Voith Turbo Quality Officers.

Project planning – product development

Suppliers with responsibility for product development are fully responsible for performing all development activities involved (see section 2).

During the product development stage, the supplier shall closely co-operate with the Voith Turbo Development and Design Departments to ensure continuous coordination of the product development, in particular with regard to product interfaces with Voith Turbo design components.

The supplier shall prepare a "Product/design development" project plan which shall specify the development project schedule. This project plan shall be coordinated with the Voith Turbo Development and Design Departments.

Advance quality planning meetings

Objectives of AQP meetings

In the course of the process / product development stage, advance quality planning meetings (AQP meetings) shall be held between the Voith Turbo Quality Officer and the supplier's project manager.

Such AQP meetings shall be for the purpose of coordinating quality assurance measures with the supplier on the basis of a risk assessment and shall ensure, by using the appropriate checklists (AQP checklist to VN 3206), correct implementation and documentation of all planned quality activities before series production is started.

In the event that non-conformities are identified, appropriate corrective actions shall be taken. Voith Turbo shall be informed in writing of the successful elimination of such non-conformities.

Special characteristics

Voith Turbo and the supplier shall jointly determine the special product characteristics that need to be verified and documented during initial sample inspection and, if necessary, during series production (see sections 5 and 7).

The selection of the special characteristics that are subject to verification and documentation is determined by the agreed drawing specifications, by the planned manufacturing conditions and by Voith Turbo production and product requirements.

Component-specific quality assurance agreement

Along with the initial sample inspection report, the documentation of the planning results (e.g. checklists, inspection/test plans, etc.) constitutes the component-specific quality assurance agreement.

Manufacturing feasibility analysis and review

The supplier shall conduct manufacturing feasibility analyses as part of its advance quality planning activities to VN 3206. Based on its know-how and expertise acquired over the years, the supplier shall assess, together with the manufacturing and assembly departments, its subcontractors and, where necessary, with the Voith Turbo Development and Design Departments, whether the manufacture of the desired product is feasible and the applicable specifications can be complied with.

By confirming the manufacturing feasibility of a product, the supplier assures that the product can be manufactured, assembled, packed and delivered with the existing means of production and capacity and in accordance with Voith Turbo specifications and quality requirements.

A manufacturing feasibility analysis is required for all new products. Previously conducted feasibility analyses shall be reviewed and reconfirmed in the event of product or process changes.

The results of the manufacturing feasibility review shall be documented in the Feasibility Analysis form included in the VN 3206 standard.

4 Documentation requirements

4.1 Special characteristics

Strict compliance with the defined special characteristics is of crucial importance. Any non-conformity in such special characteristics may adversely affect the safety, life, assembly capability and function of the product or have an impact on the quality of downstream manufacturing operations or even constitute a violation of statutory requirements.
Special characteristics, along with the applicable statutory and safety requirements, shall be defined by the final customer and/or by Voith Turbo or shall be determined as a result of the risk analysis, e.g. product and/or process FMEA, conducted by the supplier.

Special characteristics include:

- critical characteristics:
  product characteristics that have a major impact on product safety, health, personal safety and compliance with statutory requirements.

- significant characteristics:
  product characteristics that have a major impact on customer satisfaction with the quality, suitability, functionality, assembly capability and appearance of the product.

Special characteristics shall be identified as such in the drawings and shall be given special attention in the supplier's process planning activities and FMEA. Special characteristics shall be included in the inspection/test plan according to the results of the risk analysis and shall be addressed in the production control plan.
The scope of the inspections/tests to be conducted for special characteristics and the documentation required shall be determined during the AQP meeting with the Voith Turbo Quality Officers.

4.2 Products with critical characteristics (safety-critical components)

Safety-critical products are products whose characteristics have a major impact on product safety and on the compliance with statutory requirements. Such products entail particular product liability risks. If design responsibility is with Voith Turbo, safety-critical products and their characteristics are identified in the technical documentation. If, on the other hand, design responsibility is with the supplier, the supplier shall determine the critical characteristics in the course of its design activities, taking account of the requirements specified by Voith Turbo.

The supplier shall establish an appropriate documentation system for safety-critical products and characteristics that are subject to special documentation requirements.

The supplier shall ensure that products with critical characteristics (safety-critical components) are clearly identified in all stages of the material flow to avoid that products get mixed up.

All quality-relevant documents of such products shall bear a clear identification stating that "special documentation requirements" apply.

For products with critical characteristics (safety-critical components), the supplier shall, where applicable to a specific product, conduct all tests and inspections that may be necessary to verify conformity of the critical characteristics agreed in the AQP meetings to the applicable requirements. The supplier shall also ensure that inspection/test results and the relevant process parameters of its manufacturing process and that of its subcontractors are documented and retained.

The nature and extent of the documentation required shall be such that evidence of due care (exculpatory evidence) can be provided in the event of damage.

This form of documentation is referred to as documentary evidence subject to special archiving requirements. Please refer to section 17 for further details.

The traceability system adopted shall be such that the shipping data of the products can be traced to the production and test batches. The product traceability system shall also extend to the supplier's subcontractors.

Unless otherwise agreed between the parties, the retention period for documents with special archiving requirements shall be 15 years. The type of retention and the measures adopted to ensure easy access to the documents shall be defined in the supplier's QM system.

Screw connections:

Owing to the high level of safety criticality, screw connections used on railway vehicles shall meet special requirements.

The potential hazards that may be caused in case of failure of such screw connections are defined in three different risk categories. The risk categories that apply to the size, installation and documentation of the screw connections and to the installation tools employed can be determined on the basis of the risk analysis.

Fire protection:

Special vehicle and country specific fire protection requirements shall be met for railway vehicles. The tests and certificates that are necessary to verify compliance with these requirements are defined in the applicable specifications.

5 Approval for series production

Before the supplier is authorized to start the delivery of series products, approval for series production to VN 3205 – production process and product approval (initial sample approval) – shall be granted for each individual material number.

For this purpose, the supplier shall conduct an initial sample inspection (production part approval process) to verify and confirm conformity of the product to all requirements specified in drawings, specifications, standards, inspection/test instructions and statutory regulations. Initial sample approval shall preferably take place at the supplier's premises.

The initial sample inspection shall be conducted using products manufactured under defined inspection and logistics conditions. Such conditions shall be identical with the conditions envisaged for series production (see DIN 55 350, VDA volume 2).

In the following cases, initial samples shall be submitted to Voith Turbo before series production is started (extract from VN 3205):

- new product and/or component or product ordered for the first time
- product change, identified by a changed drawing index; all affected product characteristics to be checked and reported in the initial sample inspection report
- changed drawing index; all affected product characteristics to be checked and reported in the initial sample inspection report

- after the supplier has changed its subcontractor
- after a stop ship order has been placed on the supplier's product
- after suspension of delivery for over a year
- after production equipment has been out of use for 12 months or longer (this may not apply to aftermarket products)
- after production methods / processes have been changed
- when new/modified moulds are used (e.g. casting moulds, punching dies, rolling tools, compression moulding dies; submission of initial samples required for each cavity in case of multiple moulds/tools)
- after production has been transferred to different locations or when new or relocated machines and/or equipment are used
- when alternative materials or designs are used.

In the following cases, the supplier shall inform Voith Turbo about changed series production conditions. The Voith Turbo Quality Officer shall decide whether an initial sample inspection report is required.

- small-series products, aftermarket products
- standardized and catalogue products
- approval for series production granted by another Voith Turbo Division

The supplier shall continuously update its initial sample documentation to ensure consistency with the process and product status at all times.

6 Process control

The supplier shall implement a procedure designed to ensure that the product development process is performed as planned an in a controlled manner.

Process control involves the planning of production, assembly, inspection/test and maintenance processes and thus embraces the entire production organization.

For this purpose, appropriate project plans shall be used which shall include the planning steps required to implement a reliable series production process (see section 3).

The supplier shall define and agree with Voith Turbo the product and process characteristics that have a major impact on the product quality.

The product and process development planning shall be performed, coordinated and documented on the basis of the requirements specified by the Voith Turbo Divisions.

Workflow planning

The planned workflow shall be illustrated in a process flow chart. Based on this schematic diagram of the process sequence / workflow, the quality assurance measures required in each step in the sequence shall be described in detail. The requirements of VN 3206 (supplier advance quality planning) shall apply.

Product and Process FMEA

The supplier shall establish a cross-functional team to conduct a failure mode and effects analysis (FMEA). The purpose of the FMEA is to identify and prevent potential risks of new or changed products and processes at an early stage.

The necessary actions for improvement shall be reviewed, and the implementation of such actions shall be coordinated and monitored.

All special characteristics specified in Voith Turbo drawings shall also be reviewed in a risk assessment. When doing so, it may be useful to review a group of special characteristics in terms of the effects of potential failures.

The process FMEA shall be submitted to the Voith Turbo Quality Officer at the advance quality planning meeting.

Suppliers with responsibility for product development shall perform a product FMEA.

For further details on how to conduct the FMEA, please refer to VDA volume 4,

Voith Turbo would prefer that suppliers use the IQ-FMEA software developed by APIS for the preparation and documentation of the FMEA.

Control plan, production control plan

The preparation of a control plan is a major milestone in the quality planning process. The control plan is a written summary of all quality assurance measures.

It describes the actions to be taken at each stage of the workflow (e.g. on receipt of goods, during the process, before shipment) and all regular inspections and/or tests required to monitor products and processes.

All inspections/tests specified in the FMEA shall be included in the control plan.

The control plan shall be submitted to Voith Turbo during the advance quality planning stage and shall be divided into three sections: prototype stage, pre-series stage and series production stage.

The control plan shall be updated as necessary in the event of product and process changes to ensure consistency with the production sequence at all times.

In addition to the above requirements, the project-/component-specific QA checklist and the project-/ component-specific inspection and test plan (I+T plan) shall apply to products intended for railway vehicles.

Process capability evidence

The supplier shall provide process capability evidence for all agreed product and process characteristics specified in the control plan.
Such evidence shall be furnished by adopting statistical process control (SPC) methods and considering the production sequence and requested quantities.

Evidence of the cm/cmk short-term capability shall be provided at the time of initial sample inspection.
Evidence of the cp/cpk long-term capability shall be provided continuously and shall be assessed at regular intervals.

7 Inspections and tests

The supplier shall ensure that all planned inspections and tests along the entire process chain are coordinated with the Voith Turbo Quality Officer and performed as specified in the control plan.

Inspection and test results shall be documented.

Evidence of product conformity shall be documented by the supplier. Product approval and service provision shall be subject to satisfactory inspection and test results.

Process capability, 100% inspection

If requested by the Voith Turbo Quality Officers, the results of SPC inspection characteristics shall be evaluated at regular intervals to assess the process capability. If the required process capability is not achieved with respect to these characteristics, 100% inspections shall be performed until the manufacturing process has been optimized and the requested cpk values are reached.

Final inspection

Before the products are shipped, a final inspection shall be conducted to verify that all planned operations have been performed and that no deviation from the specification has been identified in the quality inspections/tests.

The provision of inspection/test certificates or reference to inspections or tests conducted by third parties shall not relieve the supplier of its direct quality responsibility towards Voith Turbo.

The type and content of the required inspection and test certificates to DIN EN 10204 shall be specified in the purchase order documents for specific projects and products.

Products subject to acceptance testing

Certain products specified in the purchase order are subject to specific acceptance tests (e.g. DB quality tests) and require specific quality evidence issued by national or international acceptance test organizations or in accordance with the requirements of maritime classification societies.

Periodical inspections

Periodical inspections and tests shall be conducted to verify that all quality requirements beyond those controlled during ongoing process monitoring, are reliably met. Periodical inspections and tests include, but are not limited to, the following:

- **environmental resistance tests (e.g. thermal cycling tests, salt spray tests, etc.)**
- **long-term tests**
- **strength tests**
- **product audits**
- **validity of fire protection certificates**

Periodical inspections/tests are generally more extensive than those performed during series production. The type and extent of such periodical inspections/tests shall be specified in detail in the control plan.

Layout inspection and functional testing

Suppliers to Voith Turbo's Road Division shall conduct layout inspection and functional tests in the form of interim tests at least once a year.

Interim test

Interim tests shall be documented as specified in section 5. The test report shall be submitted to Voith Turbo upon request.

8 Non-conformity

If any non-conformity to specifications is identified during process monitoring, the necessary actions established in the supplier's QM system shall be taken to ensure that all defective products are reliably separated from on-spec products and that the problem-solving process is initiated.
In the event that the supplier intends to deliver non-conforming products to Voith Turbo (i.e. products with characteristics outside the tolerance limits), the supplier shall request and obtain approval from Voith Turbo to supply under concession before delivery.
Any events or incidents that may result in the failure of safety-critical components and cause hazards of personal injury or fatal accidents to persons directly or indirectly involved in the use of such products (e.g. passengers etc.) shall be reported immediately to the respective Voith Turbo department.

9 Complaints

Notices of defects

If non-conformities are identified as a result of assembly problems, laboratory tests, customer complaints or other inspections or tests, the supplier shall receive a written notice of defects.

However, the supplier shall take the required corrective actions immediately upon notification of the defects by telephone to ensure rapid identification of the root cause and instant correction.

Complaints may refer to initial samples, series products or other samples.

Correction of defects

In the event that a stop ship order has been placed on the supplier's product, the supplier shall take all necessary measures to reduce the work-in-process (WIP) inventory.
The supplier shall immediately take containment actions such as delivery of replacement products or rework.

In the event that the above procedure is not possible due to time constraints, short-term special actions shall be agreed between the supplier and the operative QA teams of the Voith Turbo facilities in order to continue production.

A notice of defects with documentation of the defects identified shall also be issued if products are conditionally accepted.

Containment actions

8D report

Along with every inspection or test report, the supplier shall submit an 8D report using the form provided by Voith Turbo. The 8D report shall be submitted within the specified submission date.

Containment actions

The 8D report shall comprise, as a minimum, steps 1 to 3 and include a description of the problem, root cause and corrective containment actions.

In the event of serious quality problems or possible production shutdown, the 8D report shall be returned to Voith Turbo within 24 hours.

Submission date for final 8-D report

In the event that the root causes of the problem have not yet been identified and permanent corrective actions have not yet been defined (steps 4 to 7 in the 8D report), the supplier shall, when providing information on the containment actions, notify Voith Turbo of the date of completion of the final 8-D report (see section 12).

100% control level

All products shall be subjected to 100% inspections to establish the absence of the identified defects until the effectiveness of the permanent corrective actions has been verified. Product identification shall be performed as specified in the inspection report.

10 Problem-solving methods

Suitable problem-solving methods shall be used to ensure systematic identification of the causes of a problem. The specific method employed shall be suited to the particular problem. Examples of problem-solving tools are:

- **cause and effect diagrams (Ishikawa diagrams)**
- **Pareto analyses (ABC analyses)**
- **histograms**
- **team-oriented problem-solving methods (8-D method)**

The establishment of cross-functional teams in the problem-solving process ensures a systematic approach to a particular problem and allows the interdependence of causes to be identified.

The effectiveness of the implemented actions shall be verified.

Verification

The process can be terminated after documentation and verification of the implemented actions.

The documentation shall be inspected during visits to the supplier's premises or during process audits.

11 Handling, storage, packaging and shipment

The supplier shall ensure correct handling and easy identification of its products and production batches at all times. For this purpose, the following measures shall be taken:

- **creation of the necessary technical requirements**
- **packaging planning**
- **use of suitable packaging to avoid quality defects**
- **control of non-conforming products**
- **training of employees**
- **visualization aids**
- **move tickets & accompanying documents, route cards, tags & labels**

Delivery units shall be identified by labels to VDA Recommendation 4902 as amended.

Storage

The following requirements shall be met for the storage of the supplier's products and storage area planning:

- **adequate storage of incoming goods**
- **avoidance of possible environmental influences**
- **inventory control according to the FIFO principle**
- **special product and material specific storage conditions**
- **protected, marked, structured and clean storage and interim storage areas**
- **identification of materials and products**
- **definition of responsibilities for inventory management and withdrawal**
- **limitation of storage period**

Packaging

The supplier shall use suitable packaging to protect its products.
For this purpose, packaging planning shall be conducted as specified below.
The supplier shall develop a packaging solution based on product and process specific requirements and taking account of the applicable packaging manual and packaging requirements of the respective Voith Turbo plant.
The supplier shall produce a packaging sample as agreed in the AQP meeting and present such sample to Voith Turbo. Voith Turbo and the supplier shall jointly assess the suggested packaging solution and check its suitability for the intended purpose.
Approval of the packaging shall be granted by issuing the agreed packaging data sheet. The packaging manual and packaging data sheet shall be made available to Voith Turbo suppliers in electronic format for information and completion.

12 Ongoing assessment of delivery capability during series production

Each shipment is entered into Voith Turbo's central materials management system, adopting the
"zero defects principle as the rule".
The products are made available to the production department after they have been inspected in the incoming goods inspection department according to the established sampling plans or skip lot sampling plans. The parties may also agree that no technical inspections shall be performed on incoming shipments.
Any deviation from the "zero defects principle" shall be entered into Voith Turbo's central IT system as notice of defects and will have a negative impact on the supplier's performance statistics.
The assessment of the supplier's capability and performance in the on-schedule delivery of conforming products to Voith Turbo facilities shall be based on the following pillars:

- **assessment of the quality of the delivered products and of the defect rate of the delivered quantity**
- **assessment of the logistics quality and compliance with the delivery schedule and ordered quantity**
- **assessment of customer satisfaction (soft facts)**
- **assessment of supplier's certification status**

Depending on the results of the supplier assessment, Voith Turbo Quality Officers will launch an escalation process to VN 3207.

13 Continuous improvement

The supplier undertakes to establish a systematic management system throughout its entire organization, designed to maximize and continuously improve customer satisfaction.

An all-embracing philosophy of continuous improvement of standards, i.e. quality, services, products, processes right up to business transactions and supporting services, shall be evident throughout the entire supplier organization.

If agreed in the AQP meetings, regular statistical evaluations shall be conducted for selected key characteristics to ensure continuous monitoring of the effects of actions for improvement.

These evaluations should provide information on the effectiveness of the entire improvement process. This can be accomplished by using an indicator system, for example.

Evaluations should be conducted at monthly or shorter intervals.

14 Forms and documents

All forms and documents referred to in this Standard are available in electronic format for consultation and use by the supplier.
The supplier shall exclusively use the latest updates of the on-line forms made available by Voith Turbo (supplier's responsibility). Suppliers are requested to contact Voith Turbo for access authorization.

Requests for release under concession shall not be considered unless submitted by using the appropriate form made available by Voith Turbo.
The project plan, control plan and system FMEA forms are mere examples which may prove useful in the preparation of these plans. However, use of these forms is not mandatory.

For further details, please visit http://www.voithturbo.de/vt_en_vt_purlog.htm

15 Occupational health & safety and environmental protection

The supplier undertakes to comply with all statutory requirements regarding occupational health & safety and environmental protection. The supplier shall establish an adequate occupational health & safety and environmental protection organization and ensure adequate occupational health & safety and environmental protection to minimize any possible impact on persons and on the environment.

In order to meet these requirements, the supplier is expected to establish and further improve a certified management system to ISO 14001 and OHSAS 18001 or equivalent standards.

In the event that the supplier is required to perform work or services on the premises of Voith Turbo, the supplier shall strictly adhere to all applicable occupational health & safety and environmental protection regulations and follow all instructions given by Voith Turbo as to the proper behaviour on such premises.

If so requested by Voith Turbo, the supplier shall provide evidence of adequate recycling and disposal programs for its products.

16 Quality requirements for specific commodity groups

16.1 Supplier-developed products (black-box products)

Suppliers who are charged with the development of products or software (so-called black-box products) shall autonomously take all necessary measures to ensure that the agreed product and software quality is achieved and shall be able to submit, upon request, a complete product and software documentation.

16.2 Catalogue products

Suppliers of catalogue products shall inform the Voith Turbo Purchase Management in good time of any change to or further development of such products which is not evident from the order number. This is crucial to ensure close coordination with the responsible Voith Turbo Development Department at an early stage.

16.3 Purchased products subject to acceptance testing

Certain products specified in the purchase order are subject to specific acceptance tests (e.g. DB quality tests) and require specific quality evidence issued by national or international acceptance test organizations or in accordance with the requirements of maritime classification societies.

16.4 Suppliers of welded products

The welding procedures used shall meet the requirements of DIN EN ISO 3834-2 in connection with the requirements of DIN EN ISO 9001.
The welding procedures shall be qualified in accordance with ISO 15614.
Voith Turbo suppliers of welded products shall have suitably qualified welders in accordance with EN 287 and welding supervisors to DIN EN ISO 14731.

To furnish evidence of their qualification, suppliers shall submit a valid certificate issued by an authorized body.

Additional welding qualification certificates to DIN 18800 (steel structures) or DVS 2718 (military equipment) may be required for specific projects.

Compliance with Voith Turbo operating procedures regarding the approval of welded products suppliers and the interim and initial sample inspection of welded products is absolutely mandatory.

Suppliers who develop, design, manufacture or purchase welded products for railway vehicles shall satisfy the requirements of DIN EN 15085-2 (Railway applications - Welding of railway vehicles and components) for qualification as certified welding company for the specific component class and scope of validity and shall be able to submit a qualification certificate issued by an authorized body.

16.5 Suppliers of castings and forgings

Specific non-destructive tests are required for particular castings and forgings specified in the purchase order. The supplier shall have qualified personnel for the performance and assessment of such tests, e.g. NDT personnel to EN 473 Level 1, NDT supervisors to EN 473 Level 2 or Level 3. To furnish evidence of their

qualification, suppliers shall submit a valid certificate issued by an authorized body.

Compliance with Voith Turbo operating procedures regarding tests to be performed on castings and forgings is absolutely mandatory.

Special manufacturer qualifications are required for products for railway vehicles, e.g. DB HPQ (manufacturer and product qualification).

16.6 Suppliers of glass products

Specific requirements shall be defined in the purchase order.

Special tests, e.g. to UIC specifications, are required for products for railway vehicles.

16.7 Software suppliers

Specific requirements shall be defined in the purchase order.

Software development processes may have to be conducted to SPICE requirements (ISO/IEC IS 15504), for example.

Software suppliers or suppliers of products containing software shall meet the requirements of DIN EN 61508. In addition to this, suppliers of software and products for railway vehicles shall comply with the DIN EN 50128 standard.
The applicable software safety requirement level ("SSAS") or "SIL" (Safety Integrity Level) shall be coordinated with the Software Development Department in charge. Conformity with the above standards shall be certified by an authorized expert from case to case.

16.8 Surface treatment suppliers

Specific requirements shall be defined in the purchase order.

Paint systems for railway applications are exposed to severe conditions. As a result, all paint systems used for Voith Turbo products shall meet the requirements of the DB AG technical delivery conditions TL 918 300, part 1.
Specific requirements are defined in the Voith Turbo standard VGN 3025 or customer specifications.

17 Appendix

Important terms and abbreviations

DB AG	Deutsche Bahn AG (German Rail)
EBA	Eisenbahnbundesamt (Federal Railway Agency)
IRIS	International Railway Industry Standard
CMM	Coordinate measuring machine
VGN	Voith standard
VN	Voith standard
TL	Technical delivery conditions
TSI	Technical specification for interoperability
CG	Commodity group
S.Q.	Supplier Quality departments of Voith Turbo Divisions

Retention periods

The supplier shall define and adhere to specific retention periods for documents, records and reference samples.

The following minimum retention periods shall apply:

	Type of document / record	Start of retention period	Documents	Retention period
Specification documents	Documents prepared during the product and process development stage and during the production stage of the delivered product, e.g. process descriptions, production control plans, specifications, drawings or inspection/test procedures	after product phase-out of series and spare parts production at Voith Turbo or after the document has been changed	Documents referring to special characteristics	15 years
			all others	10 years
Records	Records prepared during the product and process development stage and during the production stage of the delivered product, e.g. measuring reports, control charts, audit reports, reviews, assessments	upon shipment of the product to which the product or process records relate	Documents referring to special characteristics	15 years
			all others	10 years
	Records and documents relating to process and product approval (PPF, PPAP), including reference samples	after product phase-out of series and spare parts production at Voith Turbo	all	15 years

The specifications above shall not be deemed to supersede statutory requirements.
Longer retention periods (up to 30 years or for the entire product lifecycle) are recommended in view of the limitation periods of product liability claims and shall be agreed for specific products.