
**Assuring the Quality of the Manufacturing Processes
(Characteristics Important / Critical for Quality)**

AA 6.3.6-1

1 Purpose

Determination of the quality requirements for purchased and in-house parts with regard to verification of the process capability for securing the quality of the series.

2 Scope

These instructions are valid for all purchased and in-house for MAHLE Behr Industry GmbH & Co. KG (group), which are labeled with a diamond marker \diamond , on the drawing and for all parts subject to the scope of ISO TS 16949 (customer requirement).

3 Terms and Definitions

MBI	MAHLE Behr Industry
MS	Management System
Cmk	Short-term process capability
Cpk	Long-term process capability
ISI	Initial sample inspection
ISIR	Initial sample inspection report
Manufacturer	Supplier, MBI in-house production
IP	Inspection plan
P FMEA	Product/Process Failure Mode and Effects Analysis
Diamond Marker (\diamond) /	Customer-relevant / process-critical product characteristics
Oval Symbol (\ominus)	(= characteristic important for quality (significant characteristic))
Triangle Symbol (∇)	Safety characteristics (= critical characteristics)
PPAP:	Production Part Approval Process according to QS 9000
TS-Products:	Products that are industrialized or produced by MBI and subject to the scope of ISO TS 16949 (customer requirement)

4 Responsibilities

See 5 Procedures

5 Procedures

5.1 Differentiation of the Symbols ($\diamond, \ominus, \nabla$)

Quality-Relevant Symbols (= Oval symbols \ominus):

Customer-relevant or process-critical characteristics that are significant for the function. For further definitions see Behr standard KNAR.00302 (Section "Significant characteristics"). The

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For a lot size of less than 20, each piece must be measured and the results must be documented.

Random sampling perimeters when determining the Cpk-value must include at least 10 pieces from 5 production lots (= 50 pieces).

If production is uninterrupted for several days / weeks (which means no refitting of machinery / equipment and no production standstills of more than one day), so that production batches can not be isolated, then a timeframe of no more than 2 weeks of produced parts can be considered as one production lot.

The Cmk-values must be available for initial sampling inspection (requirement: minimum of 20 pieces, see above); Cpk-values should be conveyed to the MBI quality department (Designation of: all individual values, max. / min.-values, standard deviations, drawing-no. with revision status).

If the agreed-upon capability value is not achieved by the supplier, the supplier must either demonstrate suitable optimization of their own systems or carry out suitable inspections of the manufactured products to demonstrate that there is no possibility of faulty deliveries.

In addition to the quality-relevant (significant) product characteristics specified by MBI, the supplier is also responsible for the proper establishment and monitoring of their own significant characteristics.

5.2.2 Inspection Plan from the Manufacturer / Production/Inspection Planning

The supplier must plan, implement, and document the appropriate production and inspection steps in each phase (prototype phase, pre-production and production phase) of the product.

The characteristics (\diamond) or (∇) or (\ominus) must be included in the manufacturer's inspection plan / control plan, incl. specification of inspection frequency, inspection scope, inspection equipment, and tolerance. The inspection plan / control plan must contain all production steps used to generate the abovementioned characteristics.

The manufacturer's production documents (e.g. production order or work schedule) must clearly refer to the inspection plan or contain the corresponding specifications.

5.2.3 Series Production for Markers (\diamond) or (∇) or (\ominus) / Inspection Frequency

The determination of the inspection frequency of the up-to-date series for the markers (\diamond) or (∇) or (\ominus) is the responsibility of the manufacturer and should be stored with the inspection plan (see above 5.2.2). If inspection plans are made available by MBI (comes from the parts list) then the corresponding requirements in the MBI inspection plans are valid. All results should be documented and available for viewing at all times.

For all suppliers the following is also valid:

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The minimum inspection perimeter for markers (◇) or (▽) is basically an inspection of the first and last pieces of a production batch with documentation of the results.

5.2.4 Process FMEA (P-FMEA)

The risks of manufacturing parts of markers (◇) or (▽) must be evaluated on the basis of a P-FMEA by the manufacturer and, if applicable, the risks must be minimized by the implementation of appropriate measures. If necessary, MBI Quality can provide support in these matters.

It is the responsibility of the manufacturer to prepare the P-FMEA in a timely manner before the manufacture of the initial sampling parts, in order to present the results / measures within the framework of initial sampling / process release (see below 5.2.7). The procedure is described in VDA Volume 4, among others.

5.2.5 Inspection Equipment Capability

All inspection equipment used must be subject to regular inspection equipment monitoring. Verification of the capability of the equipment must be present. The inspection by MBI Quality occurs within the framework of a process audit (see below 5.2.6) or the ISI / Process Release (see below 5.2.7). Capability tests must be conducted on the measurement equipment for TS products according to BDS 2.7.

5.2.6 Process Audit / Process Approval

Process acceptances demonstrate that the production process is proceeding under controlled conditions at the supplier's premises.

Within the framework of a process audit at the supplier's premises, all production and inspection procedures for part production are controlled (with special attention to characteristics (◇) and (▽)).

- Associated manufacturing documents (e.g. work schedule, parts list, drawing, inspection plan, specifications) must be available.
- The process has already been conducted under series production conditions and approved in-house by the supplier. Drawing and specification requirements have been verified. Deviations must be incorporated into the drawing or specification by the responsible product development department.
- Production and inspection equipment must correspond to the series production status and must be documented. The measuring capability was proven for inspection and measuring equipment.
- The agreed-upon quality measures have been completed and the results are available (e.g. FMEA, capability studies, inspection plans).
- The number of the pieces to be produced has been specified.
- All quality measures and sampling activities (incl. process acceptance and capacity rating) have been conducted and completed at the sub-contractors' premises.
- The employees are trained and training certificates are present.

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- The available packaging corresponds to the defined series packaging.
- The number of parts necessary for initial sampling is defined and the planning of the initial sampling has been coordinated with MBI.

All deviations and necessary improvements resulting from the process audit will be recorded and must be remedied or implemented without delay.

The manufacturer is responsible for setting an audit date with MBI Quality. The latest possible acceptance date is the inspection of the initial sampling at the manufacturer's premises.

5.2.7 Initial sample Inspection (ISI) / PPAP / Process Release for Parts with Diamond Markers (◇)

For characteristics (◇) or (▽), the ISI with the process audit (or PPAP) at the manufacturer by MBI Quality is the release for series production; all documents mentioned below must be present. The ISI / PPAP takes place according to the specifications in VA 4.2.

The date for the ISI / PPAP / process audit should be scheduled upon receipt of request / order from the manufacturer and should be scheduled in a timely manner with MBI Quality (at least 1 week in advance). Should MBI Quality choose to forego the ISI / PPAP / Process Release at the manufacturer, then the manufacturer is required to forward all of the documents mentioned below to MBI Quality before delivery of the initial sampling.

For (⊖) characteristics MBI-Quality is no longer obligated to conduct a process audit or PPAP at the manufacturer's location.

When delivering the initial sample parts to MBI, the following documents must be included with the shipping documents:

- Initial sample inspection report (per VDA or request from MBI) with all attachments / results (initial sampling content per VA 4.2). Cover sheet must be filled out completely and signed.
- For all TS-Products: Report Product Process and Product Release (PPAP) with attachments / content per VA 4.2. For forms see MS 4.2.4.5.
- Cmk / Cpk-Values (see above 5.2.1)
- Inspection plan (see above 5.2.2. and 5.2.3.)
- Process-FMEA

Initial sample deliveries must be marked according to MBI guidelines. Deviations in the initial sample inspection report must be coordinated with the responsible product development department and approval requested in writing via a design deviation.

A separate initial sample approval must be present for each MBI location receiving a delivery.

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The release of the first delivery from MBI Quality takes place only after all of the documents mentioned above have been submitted or after the completion of the ISI / PPAP / process audit at the manufacturer with an OK result.

6 Further Applicable Documents

VA 4.2: Quality requirements for Purchased and In-House Parts

EN 10204: Types of Inspection Certificates

KNAR.00302: Labeling of Characteristics

MS / BDS: Management System / Behr Development System

VDA Volume 4