KION GROUP	PPAP - Production Part Approval Process Requirements and delivery conditions	WN 50 020

ICS 03

1 AREA OF APPLICATION AND PURPOSE

This company standard contains the general, basic requirements for the approval of vendor parts for production. It is based on the requirements for sampling outlined in IATF 16949. The company standard specifies the prerequisites that are necessary to produce and supply products that meet the quality requirements.

The company standard describes the processes and documents assigned to the PPAP levels.

This standard applies to all business units of the KION Group.

2 TERMS AND DEFINITIONS

Cpk	Process Capability Index
FMEA	Failure Mode and Effects Analysis
PPAP	Production part approval process
PPAP Level 1,2,3	Risk classification of a component
Ppk	Process Performance Index
PSW	Part Submission Warrant
Representative of KION Quality	KION Quality contact for supplier's
Supplier	Supplier to KION

3 GENERAL

The supplier shall submit a new/amended PPAP before the first series delivery in the following situations (provided that the representative of KION Quality may not waive the requirement):

- A new individual part, a new component or a new product
- Correction of a fault on an individual part, component or product that has previously been submitted
- An engineering change (new individual part number)
- Any situation in which a new/amended PPAP shall be submitted in accordance with Section 5.

4 REQUIREMENTS FOR THE PPAP PROCESS

4.1 Representative production run

In the case of production parts, the products for the PPAP (initial samples) shall be taken from a representative production run.

This representative production run is carried out using a specific production quantity of consecutive individual parts, which shall be agreed between the supplier and the representative of KION Quality.

This representative production run shall be carried out at the production site using the appropriate production tools, gauges, processes and materials, and shall involve the future production personnel under series conditions.

Individual parts from each individual production process (e.g. from every other assembly line or production cell, from each position in the case of multiple moulds, tools or models) shall be measured and/or tested.

4.2 PPAP requirements

The supplier shall fulfil all the PPAP requirements specified and listed below (see 4.2.1 to 4.2.15).

Components and individual parts shall fulfil all the requirements contained in the technical development documents and the specifications from KION (including safety and regulatory requirements).

4.2.1 Development documents (Level 1, Level 2, Level 3)

The supplier shall hold the development documents (drawings, specifications and/or documents) for the saleable product/individual part, components or units. This shall be submitted with the quotation.
Note 1: For each saleable product, each individual part or each component, only one development document is released by/valid for KION (i.e. only one uniform set of development documents), regardless of who is responsible for development. The development documents may refer to other documents, which will become an integral part of the development documents.

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Note 2: Individual development documents can relate to several individual parts or units (collective drawing), e.g. a sub-assembly with several combinations of bores for different applications.

Note 3: For individual parts that can be identified as black box, the development documents specify the interfaces and the performance standards.

Note 4: For individual parts that are identified as catalogue parts, the development documents may consist at least of a functional specification or a reference to an accepted industrial standard.

4.2.2 Approved Engineering change documents (Level 3)

The supplier shall have authorized engineering change documents for those changes not yet recorded in the design record but incorporated in the product, part or tooling.

4.2.3 Design FMEA (Level 3)

If the supplier is responsible for the product development the supplier shall develop a Design FMEA.

Note: An individual Design-FMEA may *be applied to a family of similar individual parts or materials.*

4.2.4 Process flow diagrams (Level 1, Level 2, Level 3)

The supplier shall have a process flow diagram that clearly describes the production process steps and sequences, if applicable (e.g. Product Quality Forward Planning and Control Plan Reference Manual). The diagram should include all process steps, including receiving, inspection, material handling, rework, and shipping. It clearly indicates the flow of materials. This process flow diagram shall be submitted with the quotation.

Note: Process flow diagrams for families of similar individual parts are acceptable if the similarity of the new individual parts has been assessed by the supplier.

4.2.5 Process FMEA (Level 2, Level 3)

The supplier shall develop a Process FMEA in accordance with and in agreement with the KION development documents and requirements.

Note: An individual Process FMEA may be applied to a process used to manufacture a family of similar parts or materials if the supplier has assessed their similarity.

4.2.6 Control plan (Level 1, Level 2, Level 3)

The supplier shall have a production control plan that defines all the methods used for production control and fulfils the KION requirements: test steps, testing equipment, test frequencies and documentation. This production control plan shows all the requirements for testing goods from their arrival to their departure, including all the testing procedures carried out during the production process.

Note: Production control plans for families of individual parts are acceptable if the similarity of the new individual parts has been assessed by the supplier.

4.2.7 Measurement System Analysis (Level 3)

The supplier shall have applicable Measurement System Analysis studies, e.g., gage R&R, bias, linearity, stability, for all new or modified gages, measurement, and test equipment.

Table 1:

CAPABILITY CRITERION %GRR	Interpretation
< 10%	Measurement process is generally acceptable.
10-30%	Measurement process may be acceptable depending on the application.
>30%	Measurement process is generally unacceptable.

NOTE: For bulk materials, Measurement System Analysis may not apply. KION agreement should be obtained on actual requirements.

4.2.8 Dimension test results (Level 1, Level 2, Level 3)

The supplier shall provide proof that the dimension tests required in the development documents and production control plan have been carried out and that the results show that the dimensions fulfil the specified requirements. The supplier shall record the results of dimension tests for each individual production process, e.g. for production cells or lines and for all impressions, moulds, models or stamps (see Section 4.2.15). The supplier shall record all dimensions (with the exception of reference dimensions), characteristics and requirements, as noted in the development documents and production control plan, with the actual values.

The supplier shall identify one of the measured individual parts as the product sample (see Section 4.2.13).

4.2.9 Results of testing and performance tests (Level 1, Level 2, Level 3)

The supplier shall hold records of the results of the material tests and performance tests that are specified in the development documents or production control plan.

4.2.10 Appearance approval report (Level 2, Level 3)

Approval for appearance is normally only applied in the case of products with requirements for colour, granulation or surface.

If the development documents contain requirements relating to the appearance of the product/individual part, a separate appearance approval report (AAR) shall be issued for each individual part or for each series of individual parts.

After fulfilling all the required criteria, the supplier shall record the required information using the AAR form. The completed AAR form and representative production parts shall be submitted to the location specified by KION in order to obtain a decision.

Appearance approval for families of individual parts is acceptable if the similarity of the new individual parts has been assessed by the supplier and the materials and processes used are identical.

4.2.11 Process capability studies (Level 2, Level 3)

4.2.11.1 General

The purpose of this requirement is to determine whether the production process can manufacture products that fulfil the requirements of KION.

For all special characteristics or dimensions specified by KION the initial process capability or process performance shall be determined prior to submission, and the acceptance criteria shall be fulfilled. The number of produced parts and the number of measurements depends on the supply quantity over one year and shall be taken from Table 2.

Table 2:

Supply quantity/year	Number of/quantity produced parts for process investigation	Number of/quantity measurement for process investigation
0 - 99	0	0
100 - 499	25	25
500 - 999	50	25
1000 - 4999	100	50
≥5000	200	50

The supplier shall carry out measuring system analyses to understand how measurement deviations affect the measurement results of the investigation.

Note 1: These initial process investigations are based on short-term observations and are not suitable for predicting the influences of time and changes to employees, materials, methods, equipment, measuring systems and the environment. Even for these short-term investigations, it is important to collect and analyse data using control charts in the sequence in which the data was observed.

Note 2: With the agreement of KION, the data requirements for the initial process investigation may be replaced by long-term results from identical or similar processes. For certain processes, alternative analysis tools, such as original value and moving range charts, can be permitted following prior approval by a representative of KION Quality.

4.2.11.2 Quality indices

If applicable, the results of initial process investigations shall be summarized using capability indices (Cpk) and performance indices (Ppk).

4.2.11.3 Acceptance criteria for the initial investigation

The supplier shall apply the following acceptance criteria for the assessment of the results of the initial process investigation for processes that can be considered stable.

Table 3:

Results of Cpk/Ppk	Interpretation
Index value ≥ 1.67	Process fulfills the requirements.
1.33 < index value < 1.67	Process is acceptable. Consult the representative of KION Quality to assess the results.
Index value ≤ 1.33	Process does not currently fulfil the requirement. Consult the representative of KION Quality to assess the results.

The supplier shall make contact with the representative of KION Quality if the acceptance criteria cannot be achieved by the agreed PPAP submission date. The supplier shall submit a corrective action plan and an amended production control plan, which will normally prescribe a 100% testing procedure, to the representative of KION Quality for approval. Efforts to continuously reduce the spread shall be pursued until the acceptance criteria are met or approval is received from KION.

4.2.12 Documentation of qualified laboratory (Level 3)

Inspection and testing for PPAP shall be performed by a qualified laboratory as defined by KION requirements (e.g., an accredited laboratory).

The qualified laboratory (internal or external to the supplier) shall have a laboratory scope and documentation showing that the laboratory is qualified for the type of measurements or tests conducted.

When an external/commercial laboratory is used, the supplier shall submit the complete report.

The name of the laboratory that performed the tests, the date (s) of the tests, and the standards used to run the tests shall be identified.

4.2.13 Product samples (Level 1, Level 2, Level 3)

The supplier shall provide product samples, as specified by KION.

4.2.14 Testing equipment (Level 2, Level 3)

If required by KION, the supplier shall submit the part-specific testing equipment for assemblies or components as part of the PPAP submission.

The supplier shall certify that all the characteristics of the testing equipment correspond to the dimension and functional related requirements of the individual part. The supplier shall document all the approved engineering changes that have been included in the testing equipment up to the time of submission. During the entire duration of production for the product, the supplier shall plan preventative maintenance for all testing equipment.

4.2.15 Part submission warrant (Level 1, Level 2, Level 3)

After fulfilling all the PPAP requirements, the supplier shall fill out the individual part submission warrant [PSW]/initial sample cover sheet).

A separate PSW shall be filled out for each KION individual part number, unless otherwise agreed with the representative of KION Quality.

If production parts are manufactured using several impressions, moulds, tools, stamps, models or production process, e.g. production lines or cells, the supplier shall carry out a dimensional test (see 4.2.6) on one individual part from each of the abovementioned components. The individual impressions, moulds, lines etc. shall then be specified.

The supplier shall verify that all the measurement and test results fulfil the KION requirements and that all the required documentation is available.

5 NOTIFICATION TO KION AND SUBMISSION REQUIREMENTS

5.1 Notification to KION Quality

The supplier shall notify the representative of KION Quality about any planned significant change to the design, process or production site. Examples are given in the table below (see table 4).

Following notification and approval of the proposed change by the representative of KION Quality, and following the introduction of the change, a PPAP shall be submitted unless otherwise agreed.

Table 4:

Examples of changes that require notification	Explanations
1. Use of a different design or material to the previously approved individual part or product.	For example, a different design to that documented in a deviation approval or a different design to that included as a comment in the development documents and not covered by an engineering change in accordance with item 3 in table 5
2. Production with new or modified tools, stamps, moulds, models etc., including additional or replacement tools.	This requirement only relates to tools that can be expected to influence the integrity of the end product due to their unique design or function. This requirement does not relate to (new or repaired) standard tools such as standard measuring equipment, manual or electrical screwdrivers etc.
3. Production following an improvement to or changeover from existing tools or equipment.	"Improvement" refers to modifications or changes to a tool or machine in order to increase the capacity or performance, or to change its existing function. This term should not be confused with normal maintenance, repair or the replacement of individual parts etc. if no changes to the performance are expected as a result of these activities and verification methods have been introduced following a repair. "Changeover" is defined as an activity that changes the sequence in the product/process flow in comparison with the process flow diagram (including the addition of a new process). Slight adaptions to the production equipment can be required to fulfil the requirements relating to safety, such as affixing protective covers, excluding risks due to electrostatic discharge (ESD) etc.
4. Production using tools and equipment that are moved to a different plant or come from a different plant.	Tools and equipment for production processes moved between buildings or facilities at one or more sites.

Examples of changes that require notification	Explanations
5. Change of suppliers, individual parts, materials or services (e.g. heat treatment or coating).	The supplier is responsible for the approval of purchased materials and services.
6. Manufactured products after the tools for series production have not been used for twelve months or more.	For products that have been manufactured after tools have not been used for twelve months or more: Notification to KION is required if there is no change to the active order for the individual part and the existing tools for series production have not been used for twelve months or more. An exception to this may only be made for individual parts with small quantities, e.g. for spare parts or individual parts for special-purpose vehicles. However, KION may specify certain PPAP requirements for spare parts.
7. Changes to products or processes that relate to components of the production part and that are manufactured internally or by external suppliers.	Any changes, including changes at the supplier internal or at its suppliers, that have an effect on KION requirements, e.g. fit, design, function, performance or durability.
8. Change to the test method, new method (no influence on the approval criteria)	In the case of changes to the test method, the supplier should provide proof that the capability of the new method is equivalent to the capability of the old method.

5.2 Submission to KION

The supplier shall submit a PPAP before the first series delivery in the following situations, unless the representative of KION Quality has stated that this is not required (see table 5):

Note: In the situations described below, it is assumed that a prior agreement has been reached with the representative of KION Quality.

The supplier shall, if necessary, assess and update all the relevant items in the PPAP documentation to reflect the production process, regardless of whether KION requires a formal submission or not. The PPAP documentation shall contain the name of the representative of KION Quality who stated that a submission is not required, and the date that this occurred.

Table 5:

Requirement	Explanations
1. A new individual part or product (i.e. a specific individual part or material or a specific colour that has not previously been supplied to KION).	In the case of new products (initial approval) or previously approved products that have been allocated a new or amended individual part number (e.g. an individual part number extension), a PPAP shall be submitted. For a new individual part, product or material that is allocated to an existing individual part family, it is possible to use elements of the PPAP documentation from the previously approved individual parts of the same individual part family.
2. The correction of a fault on a previously submitted individual part.	A PPAP shall be submitted to correct any faults on previously submitted individual parts. A fault can relate to: - The performance of the product compared with the KION requirements - Issues relating to dimensions or capabilities - Issues relating to the supplier - The approval of an individual part to replace a temporary approval - Issues relating to testing, including material testing, performance tests or technical validation
3. Engineering change to the development documents, specifications or materials for production parts or material.	A PPAP shall be submitted for any engineering change to development documents, specifications or materials for production parts or material.

6 SUBMISSION TO KION — SUBMISSION LEVELS

The supplier shall submit the components or records specified for the level in Table 6 and 7:

Table 6:

Level 1	Individual part submission warrant with sample parts and limited supporting data are submitted to KION Quality at the relevant business unit.
Level 2	Individual part submission warrant with sample parts and extensive supporting data are submitted to KION Quality in the relevant business unit.
Level 3	Individual part submission warrant with sample parts and complete supporting data is submitted to KION Quality in the relevant business unit.

The submission of the development documents and the process flow diagram is required for the quotation.

At the time of tendering, the timing of the other elements shall be provided and submitted shortly afterwards to the representative of KION Quality.

At the latest, all other elements shall be submitted together with the product samples/initial samples.

Table 7: Submission level

	Requirement	Level 1	Level 2 [1)]	Level 3 [1)]	To-Do
1.	Development documents	S	S	S	together with Offer
2.	Engineering change documents			R	until finalized Design
3.	Design-FMEA			S	before finalized Design
4.	Process flow diagrams	S	S	S	together with Offer
5.	Process FMEA		R	S	before Control Plan
6.	Control plan	R	S	S	before SOP [2)] Supplier
7.	Measurement System Analysis			R	before supply of Parts
8.	Dimension results	S	S	S	before supply of Parts
9.	Results of material testing and performance tests	S	S	S	before supply of Parts
10.	Appearance approval report, if applicable		S	S	before supply of Parts
11.	Process capability studies		R	S	before supply of Parts
12.	Documentation of qualified laboratory			R	before supply of Parts
13.	Product samples	S	S	S	before supply of Parts
14.	Testing equipment		R	S	before supply of Parts
15.	Part submission warrant (PSW)	S	S	S	before supply of Parts

S = The supplier shall **submit** the items to KION and retain a copy of the records or documentation in suitable locations.
R = The supplier shall **retain** the items in suitable locations and make them available to KION upon request.

1) Optional acceptance at supplier by KION-quality department
2) SOP=Start of production

All forms mentioned in this company standard may be replaced by comparable forms in terms of design and content. The use of these replacements shall be confirmed by the representative of KION Quality before the first submission.

7 PART SUBMISSION STATUS

7.1 General

Following the approval of the submitted samples and documents, the supplier shall ensure that future production continues to fulfil all KION requirements.

7.2 PPAP status

7.2.1 Approved

"Approved" means that the individual part or material, including all components, fulfils all KION requirements. For this reason, the supplier is entitled to supply production quantities of the product, the component or the individual part in accordance with the schedules from the KION planning department.

7.2.2 Approved with Conditions— "conditionally usable"

A temporary approval permits the supply of products, components or individual parts, as required for production, for a restricted time or quantity. A temporary approval is only issued if the supplier has clearly identified the faults preventing production approval and has created an action plan that has been agreed with the representative of KION Quality. A further PPAP shall be submitted to achieve "Approved" status.

Note 1: The supplier is responsible for the implementation of damage prevention measures to ensure that only acceptable material is supplied to KION.

Note 2: Individual parts with "conditionally usable" status will not be considered to be "approved".

Material covered by a temporary approval which does not fulfil the agreed action plan, either in terms of the due date or the permitted quantity, will be rejected. Further deliveries are not permitted unless the temporary approval is extended.

7.2.3 Rejected

Rejected means that the PPAP submission does not meet KION requirements, based on the production lot from which it was taken and/or accompanying documentation. In such cases, the submission and/or process, as appropriate, shall be corrected to meet KION requirements. The submission shall be approved before production quantities may be shipped.

8 MARKING OF PARTS

KION follows a multiple supplier strategy. Unless a specific identification is required on the component through the drawing or a specific KION company standard for a specific product group, the supplier is responsible for providing an individual identification. This identification serves solely to assign the component to the supplier. This requirement can be fulfilled, for example, by imprinting an abbreviation or the supplier number. The identification must be permanent and cost-neutral for KION.

The location and method of application must be approved by KION R&D prior to PPAP submission. As part of the PPAP submission, component photos must be included in the documentation, with the identification also shown as a close-up.

Component traceability is part of the KION PPAP inspection and must be fulfilled as an individual inspection point. Exceptions are permissible in accordance with the responsibility of this PPAP standard and require approval from KION Supplier Quality.

9 RETENTION OF RECORDS

PPAP records shall be retained for the period during which the part is active, plus one calendar year, regardless of the submission level. In case longer retention periods from other standards or specifications take effect, the longest retention period is to be applied.

A part is "active" if it is currently supplied to KION for production or KION service/after sales purposes. This part remains active until a tool scrapping approval has been issued by the person responsible in KION Purchasing. For parts from tools not owned by KION, or in situations where several parts are manufactured with the same tool, written confirmation shall be obtained from the person responsible in KION Purchasing to deactivate the part.

The supplier shall ensure that the PPAP documentation for a new part contains the necessary PPAP records from a predecessor part or refers to such records (e.g. material test certificate or similar). The necessary PPAP records for the predecessor part shall be determined using a deviation analysis.

NORMATIVE REFERENCES

IATF 16949 Quality management system requirements for automotive production and relevant service parts organizations.

PREVIOUS ISSUES

10.2016; 11.2016; 03.2017; 02.2018

REVISIONS

Section 4.2.2	Engineering change documents added
Section 4.2.3	Change Product-FMEA to Design FMEA
Section 4.2.7	Measurement System Analysis Studies added
Section 4.2.12	Documentation of qualified laboratory added
Section 6.1	Requirements in Table 7 supplemented
Section 7.2.3	Rejected added
Section 8	“Marking of parts” added
Editorial changes	