



PPAP REQUIREMENTS

Revision: March 2018

Production Part Approval Process (PPAP)

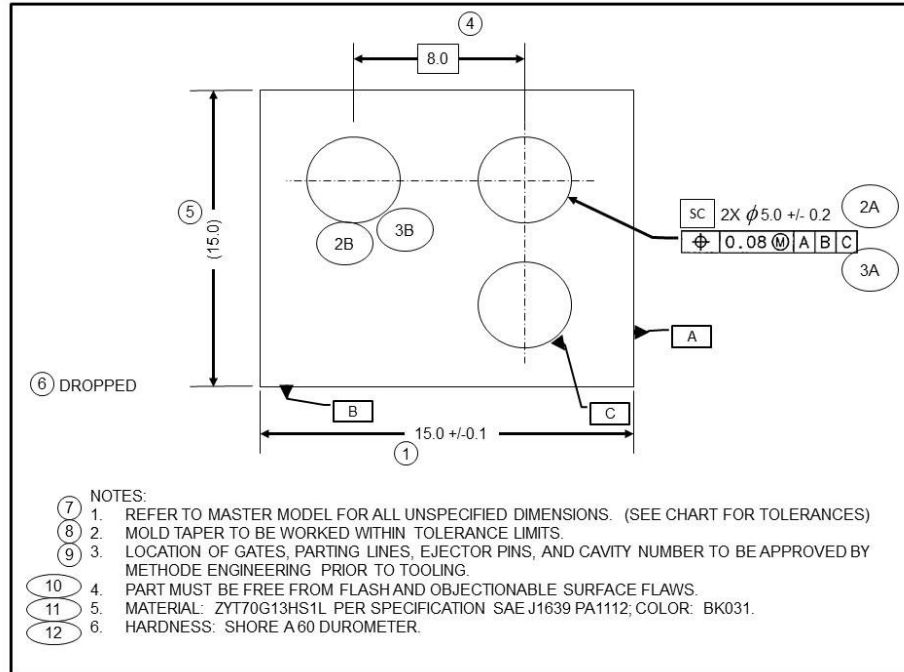
A) Introduction:

- 1) This document explains Methode's PPAP requirements.
- 2) A PPAP may be required for DV (Design Validation) and PV (Process Validation) level components during development and launch, and after subsequent design revisions or process changes.
- 3) Unless otherwise directed, the supplier shall reference the Automotive Industry Action Group (AIAG) manual, **Production Part Approval Process (PPAP), 4th Edition** for any questions regarding the PPAP submittal to Methode.
- 4) Supplier PPAP documentation different from Methode's format may be accepted only upon request by the supplier and written agreement by Methode.

B) PPAP Elements:

- 1) **Design Record:**
 - a) The supplier shall use the drawing provided by Methode. The supplier should contact its Methode purchasing representative if it has not received this drawing, or has any issues with the drawing.
 - b) The supplier shall identify each dimension, characteristic, and specification, as noted on the design record, with a unique identifier for reference on the dimensional results (see Figure 1 below for example).
 - c) The supplier shall use Methode identification numbers on the drawing, as provided, and add more as needed to cover each drawing characteristic listed below:
 - i) Regular Dimensions.
 - ii) Reference Dimensions.
 - iii) Basic Dimensions along with the Geometric Dimensioning and Tolerancing (GD&T) control frame.
 - iv) Material Specifications.
 - v) Multiple dimensional call-outs.
 - vi) Performance Specifications.
 - vii) Appearance Requirements.
 - viii) Drawing Notes.
 - d) Once an identification number is applied to a dimension, it may be later deleted if needed, but cannot be re-assigned to another dimension/specification on any re-checks and revision checks. When adding an identification number, the supplier shall use the next available number in sequence. If a dimension is removed from the drawing, the corresponding identification number will remain on the drawing with the word "dropped" next to it.
 - e) For all dimensions with multiple locations, the supplier shall identify all feature locations on the drawing so there is correlation to the dimensional results. The example below illustrates a valid method to uniquely identify each feature to its associated dimensional result.

1. Regular Dimensions.
 2. Multiple dimensional call-outs.
 3. Geometric Dimensioning and Tolerancing (GD&T) control frame.
 4. Basic Dimensions
 5. Reference Dimensions.
 6. Dropped Dimension
 - 7-12. Drawing Notes
-
10. Appearance Requirements.
 11. Material Specifications.
 12. Performance Specifications.



Associated Dimensional Results									
DIM. NO.	DRAWING SPECIFICATION	Tol -	Tol +	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
1	15	0.1	0.1	15.02	15.01	15.02	15.03	15.02	15.05
2A	5	0.2	0.2	5.11	5.12	5.10	5.11	5.13	5.10
2B	5	0.2	0.2	5.12	5.14	5.13	5.12	5.12	5.11
3A	True Position	0	0.08	0.055	0.058	0.051	0.055	0.060	0.050
3B	True Position	0	0.08	0.042	0.044	0.040	0.044	0.043	0.045
4	8	BASIC		7.97	7.98	7.99	8.01	8.06	7.99
5	15	REFERENCE		15.05	15.06	15.02	15.05	15.04	15.05
6	DROPPED								
7	Drawing Note 1			OK	OK	OK	OK	OK	OK
8	Drawing Note 2			OK	OK	OK	OK	OK	OK
9	Drawing Note 3			OK	OK	OK	OK	OK	OK
10	Drawing Note 4			OK	OK	OK	OK	OK	OK
11	Drawing Note 5 - material			OK	OK	OK	OK	OK	OK
12	Drawing Note 6 - hardness			60	60	60	60	60	60

f) The supplier shall submit the completed drawing as the design record.

2) **Authorized Engineering Change documents:**

- a) If the supplier is unable to meet one or more of the design record requirements, and every effort was made to correct the process, the supplier shall submit a **G-MB 35 Request For Change** to make recommendations to the design record requirements.

- b) The supplier must submit a **G-MB 35 Request For Change** form to Methode for all change requests at initial PPAP and afterwards. Please see **Section 6 Request For Change (RFC)** for additional instructions.
 - c) **G-MB 35 Request For Change** must be approved in writing by Methode before any changes are made in the production part or process.
- 3) **Design Failure Mode and Effects Analysis (DFMEA), if applicable:**
A DFMEA is required if the supplier is design-responsible.
- 4) **Process Flow Diagram:**
- a) The supplier shall prepare a Process Flow Diagram which clearly describes the production process steps and sequences in order to meet the specified customer needs, requirements and expectations.
 - b) A Process Flow Diagram for "families" of parts is acceptable if the new parts have been reviewed for commonality.
 - c) The numbering system in the Process Flow Diagram must match the corresponding production process steps and sequence numbers shown on the PFMEA and Control Plan.
 - d) The supplier shall follow the **AIAG Advanced Product Quality Planning and Control Plan** guidelines.
- 5) **Process Failure Mode and Effects Analysis (PFMEA):**
- a) A single Process FMEA may be applied to a process manufacturing a family of similar parts or materials if reviewed for commonality.
 - b) The numbering system must match the corresponding production process steps and sequence numbers on the Process Flow Diagram and Control Plan.
 - c) The supplier shall follow the **AIAG Potential Failure Mode and Effects Analysis (FMEA), 4th Edition** guidelines, in preparing the PFMEA.
 - d) The PFMEA is a living document and must be reviewed and updated as new failure modes are discovered to ensure protection of both the supplier as well as the customer.
 - e) The PFMEA must be effective.
- 6) **Control Plan:**
- a) The supplier shall prepare a Control Plan which defines all methods used for process control and which complies with customer-specified requirements.
 - b) A single Control Plan for "families" of parts is acceptable if the new parts have been reviewed for commonality.
 - c) The numbering system must match the corresponding production process steps and sequence numbers on the Process Flow Diagram and PFMEA.
 - d) The Control Plan shall follow the **AIAG Advanced Product Quality Planning and Control Plan** guidelines.
 - e) The Control Plan is a living document which reflects the current methods of control and the measurement systems used. The Control Plan should be updated as measurements systems and control methods are evaluated and improved.

f) The Control Plan must be effective.

7) **Measurement System Analysis Studies:**

- a) The supplier must include a Gage R&R (Repeatability & Reproducibility) study for each initial process study.
- b) The supplier must conduct a Gage R&R for each SC unless otherwise directed by Methode Quality Engineering.
- c) The supplier must identify each Gage R&R with the corresponding drawing dimension number.
- d) For Gage R&R methods and formats, the supplier shall reference **AIAG Measurement System Analysis (MSA), 4th Edition**. For Gage R&R acceptability criteria, the supplier shall reference the same manual, **Chapter II - Section D, Analysis of the Results** (pgs. 77-79).
- e) The supplier must include an Attribute GR&R for the evaluation system of all decorated parts [painting, pad printing, laser etching].

8) **Dimensional Results:**

- a) Measure the appropriate quantity of samples for the type of tooling as listed below:

Type of Tooling:	Quantity of Samples:
Single Cavity *, Progressive Die, etc.	6
2 to 8 Cavities *	3 per Cavity *
> 8 Cavities *	1 per Cavity *

* Cavity could also mean a die, pattern or assembly line.

- b) Dimensional results may be recorded on a Methode form, as specified by the respective Methode Division, or another format provided that it includes the following information:

- i) Part Number
- ii) Design revision level
- iii) Part Description
- iv) Dimensional measurements
 - (a) For each drawing dimension number, complete the following on a separate row:
 - (i) Drawing dimension number
 - (ii) Drawing Specification and Tolerance
 - (iii) Measure and record the measurement results for each associated feature on every sample
 - (iv) Record the method of measurement
 - (v) Record the judgement for each dimension (e.g. Pass/Fail, OK/Not OK)
 - (b) While reference dimensions are not acceptance criteria, measure and document the associated feature for informational purposes only
- v) Cavity identification, if applicable
- vi) Signature
- vii) Date

9) **Records of Material / Performance Test Results:**

- a) Material Test Results are required for all parts and product materials, including plating, when chemical, physical, or metallurgical requirements are specified by the design record or Control Plan. They must record:
 - i) The appropriate specification, as shown on the drawing.
 - ii) Complete test results (*current within 9 months*)

iii) Methode's part number and corresponding drawing dimension number.

The supplier shall reference **AIAG Production Part Approval Process (PPAP), 4th Edition, section 2.2.10.1** for other requirements.

- b) Performance Test Results are required for all parts or product materials when performance or functional requirements are specified by the design record or Control Plan. The supplier shall reference **AIAG Production Part Approval Process (PPAP), 4th Edition, section 2.2.10.2** for requirements.
- c) All reports must be legible and in English or contain English translations.
- d) Test results must be included. (e.g., a Certificate of Analysis). A general Certificate of Compliance is unacceptable.

10) Initial Process Studies:

- a) An initial process study is required for each SC on the design record. The supplier may define these internally when SC's are not called out on Design Record.
- b) The initial process study must include the corresponding drawing dimension number.
- c) The initial process study shall be based on a minimum of 25 subgroups containing at least 100 measurements.
- d) The supplier shall submit the measurement data to Methode along with the calculated results.
- e) In each study, combine all unique production processes (*i.e.: duplicate assembly line and/or work cell, each position of a multiple cavity die, mold, tool or pattern.*). Studies of individual cavities/patterns are required to be submitted as information only. Acceptance or rejection is dependent upon the combined cavity report. *Exception:* In the case of bimodal distributions, evaluation by combined PpK is not appropriate. Distributions other than normal (caused by parallel process steps, separate cavities, etc.) should be analyzed separately. In these cases, acceptance criteria will be based on individual cavity/pattern PpK.
- f) For special characteristics at multiple locations, the readings from similar locations may be combined into one study. For example, as to a dimension for some holes of $5X \text{ } \varnothing 5.5 \pm 1.10 \text{ SC}$, there could be one capability study that combines the readings on all five holes per sample and has at least 25 samples.
- g) PpK of 1.67 is the minimum acceptable value for each study.
- h) Each study shall display the distribution of the data. Possible display techniques include, but are not limited to, a histogram or a normal probability plot.
- i) PpK is described above, but another index for estimating process capability or performance or methods that are more appropriate for certain processes or products may be substituted with prior Methode approval.

11) Qualified Laboratory Documentation:

When inspection and testing for PPAP is performed by a qualified laboratory (internal or external):

- a) The qualified laboratory must have a laboratory scope and documentation that shows the laboratory is qualified for the type of measurements or tests conducted. The supplier must provide this documentation in the PPAP submission.

- b) The supplier must submit the test results on the laboratory's letterhead or in the laboratory's usual report form and must identify the laboratory name, test dates, and the standards used to perform the tests.

12) Appearance Approval Report (AAR):

- a) AAR typically only applies for parts with color, texture (grain), or surface appearance requirements.
- b) Some typical wording on a Methode drawing which reflects AAR requirements include:
 - i. Class A surface.
 - ii. Gloss or polish.
 - iii. Texture, stipple, etching.
 - iv. A specific color specification number.
- c) First shots for each step in the appearance approval process (i.e.: unpainted, painted, etched, etc.) shall be submitted to Methode, along with a completed AAR form for approval. The Methode Engineering contact will indicate the sample quantity and shipping location. If the part is difficult to measure, a painted plaque for color and/or gloss measurements may be required.
- d) IMPORTANT: Samples for AAR approval must be randomly selected from accepted product.
- e) Methode will use the samples to build finished assembly AAR samples for the OEM Customer.
- f) The supplier shall submit to Methode the AAR, complete with disposition and an authorized customer representative signature, with its PPAP submission.

13) Sample Production Parts:

- a) The supplier shall submit samples from the dimensional study with its PPAP submission to Methode.
- b) If the measurement process requires destroying the samples, include the quantity of "whole" samples as outlined above in **MSR 5, Section B, Item 8, Dimensional Results**.
- c) The supplier shall submit samples in accordance with the instructions in the PPAP request.
- d) Samples must be bagged, with the following information on the bag:
 - i. Methode Part Number
 - ii. Revision Level
 - iii. Supplier Name
 - iv. Cavity Number
 - v. Material used
 - vi. Date of Manufacture
- e) Each bag must be labeled, clearly identifying the part name, part number, revision level, and quantity per bag.
- f) Each carton containing bagged and labeled samples must also be labeled in accordance with the PPAP request, clearly identifying the part name, part number, revision level, and quantity per carton.
- g) Additional relevant information (new material, etc.) should be included below the Purchase Order number.
- h) Sample parts must be shipped in a manner where their arrival coincides as close as possible with the arrival of the PPAP documentation.

14) **Master Sample:**

The supplier shall retain master samples per the AIAG manual **Production Part Approval Process (PPAP), 4th Edition**.

15) **Checking Aids, if requested:**

- a) Checking aids may include fixtures, variable and attribute gauges, models, templates, etc. for evaluation of parts to ensure conformance with the drawing.
- b) The supplier shall certify that all aspects of the checking aid agree with part dimensional requirements. The supplier shall further ensure that all released engineering changes are documented and incorporated in the checking aid.
- c) The supplier shall include inspection methods in its PPAP package.

16) **Customer Specific Requirements:** The following items may be included:

a) **International Material Data System**

1) The End-of-Life Vehicle (ELV) Directive, 2000/53/EC, enacted by the European Commission, was created to minimize the impact of end-of-life vehicles on the environment and specifically bans the use of lead, mercury, cadmium and hexavalent chromium in vehicles and their components. (Certain exemptions are outlined in Annex II of the Directive.) This directive is a mandated requirement for the European Union (EU) Member States and also required by North American and Japanese vehicle manufactures.

2) All suppliers in all regions shall ensure that all components and materials supplied to Methode comply with the above requirement.

To this effect, all automotive suppliers are required to report information on materials within their respective components on the International Material Data System (IMDS). Suppliers are required to submit the required EL/IMDS data to Methode as soon as possible upon award of new business, but in any case prior to the respective PPAP submission. As part of the PPAP submission the suppliers shall provide confirmation of Methode's acceptance of the ELV/IMDS data, by submitting a copy of the IMDS Initial Sample Report, including the respective reference number from the international database.

3) In the IMDS system, all materials used for automotive manufacture are archived and maintained.

The supplier shall use the website (<http://www.mdsystem.com/index.jsp>) to register the component.

Once the supplier has been registered with IMDS, the supplier shall submit information about the specific part supplied. The process for each part is outlined below.

4) The supplier shall submit into the IMDS system a proposal for Methode's approval. A listing of Methode's IMDS identification numbers may be found in the table below:

Company Name	Org Unit	ID	zip code	City
Methode Surface Treatment Co Ltd	Methode Surface Treatment Co Ltd	131729	212132	JiangSu, China
Methode Development Company	Methode Development Company	26361	60706	Chicago, Illinois
Methode Electronics (Shanghai) Co.,Ltd. Auto Plant	Methode Electronics (Shanghai) Co.,Ltd. Auto Plant	69164	201206	Shanghai, China
Methode Electronics (Shanghai) Co.,Ltd. Auto Plant	PSG plant	135021	201206	Shanghai, China
Methode Electronics Malta Ltd.	Methode Electronics Malta Ltd.	310	BKR 3000	Mriehel, Malta
Methode Electronics Malta Ltd.	Samaya Electronics Egypt Ltd.	128638		
Methode Electronics NBP	Methode Electronics NBP	75881	60008	Rolling Meadows, IL
Methode Electronics Shanghai Co.,Ltd	Methode Electronics Shanghai Co.,Ltd	55327	201206	Shanghai, China
Methode Electronics UK	Methode Electronics UK	19396	BB11 1BS	Burnley, United Kingdom
Methode Electronics, Inc	Methode Electronics, Inc	2464	62321	Carthage, IL
Methode, Rolling Meadows	Methode, Rolling Meadows	20592	60008	Rolling Meadows, IL
Advanced Molding And Decoration	Advanced Molding And Decoration	118428	66350	Santa Catarina, Mexico
TouchSensor Technologies, LLC	TouchSensor Technologies, LLC	57112	60187	Wheaton, IL

5) Methode will accept or reject the supplier's proposal within IMDS.

Initial Sample Report Substances in Assemblies

Materials which are subject to legal prohibitions must not be included!
Dangerous substances formed or released during use must also be declared
Please note: ILRS list for substances that require declaration

3. Characterization of the component

Part/Item No.:
Article Name:

17172XA
Base, Insert Molded

Report No.: -

Article-No. / Material-No.	Article/Part Name	Level	Quantity	Component of Assembled Part	Mass [g]	Level	Material / Producer related Product Name	Mass [g]	Amount [%]	Substances CAS- No.	Basic substances name	Amount [%]
17172XA	Base, Insert Molded				33.012							
		1					Nylon 66	23.639			PA66	87
											GF-Fibre	30.086957
											system	2.913043
		1					Copper Alloy C11000	9.373		7440-50-8	Copper	99.96
										7782-44-7	Oxygen	0.04

<https://www.mdssystem.com/imds/html/mdb/anschen/content.jsp?forceRefresh=1085596746417&nodeid=12429905>

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- b) Material Safety Data Sheet, if applicable.
- c) **G-MW 133 Supplier Packaging Data Sheet:**
 - 1) The supplier shall select adequate packaging (bulk, layer, cell, individually wrapped, etc.) to ensure components are shipped and received to the specification on the drawing.
 - 2) The supplier shall submit to Methode the **G-MW 133 Supplier Packaging Data Sheet** along with pictures to illustrate empty packaging, full packaging and a full skid to Methode's Purchasing representative.
 - 3) The supplier shall submit the **G-MW 133 Supplier Packaging Data Sheet**, complete with Methode signature, with its PPAP submission to Methode.
 - 4) The supplier shall include an example of the box label to be applied to the boxes.
- d) **REACH Compliance**
The supplier shall provide to Methode evidence of REACH compliance.
- e) **RoHS Compliance**
The supplier will provide to Methode evidence of RoHS compliance.
- f) **AIAG-CQI Requirements:**
Suppliers of automotive components shall provide evidence of the system assessment below as part of the PPAP Requirements as applicable to the process performed:

Suppliers of **heat-treated components** shall complete the System Assessment AIAG-CQI-9.

Suppliers of **plated components** shall complete the System Assessment AIAG-CQI-11.

Suppliers of **coated components** shall complete the System Assessment AIAG-CQI-12.
Suppliers of **welded components** shall complete the System Assessment AIAG-CQI-15.
Suppliers of **soldered components** shall complete the System Assessment AIAG-CQI-17.
Suppliers of **molded components** shall complete the System Assessment AIAG-CQI-23.

Each year, the supplier shall perform a self-audit. Upon Methode's request the supplier shall provide all audit results including documentation and action plans.

g) **Travel Sheet.**

The travel sheet is an additional requirement applicable for all painted, pad printed, laser etching processes. It consists of a list of the specific manufacturing dates or lot numbers associated with each of these processes. Each carton must be identified with a travel sheet. The supplier shall also provide a copy to Methode in its PPAP package.

17) **Part Submission Warrant (PSW):**

- a) The supplier shall reference **AIAG PPAP, 4th Edition, and Appendix A, Completion of the Part Submission Warrant (PSW)** for instructions on how to complete this form.
- b) A PSW must be included with every level of PPAP submission.
- c) The supplier must check all applicable reasons for submission on the PSW.
- d) No empty fields are allowed on the PSW. The supplier shall enter N/A if the field does not apply to its submission.
- e) The supplier shall select the proper PPAP Submission level.
- f) Capacity information must be supported with Run at Rate data.
- g) The supplier shall provide any explanatory details in the "Explanation/Comments" field. Additional information may be attached as appropriate.
- h) The Part Number field should include the part number as found on Methode's Purchase Order. The drawing number is not sufficient.
- i) The PSW must be signed by the supplier's authorized agent.

ADDITIONAL PPAP REQUIREMENTS:

- 1) **On Time:** It is absolutely critical that the PPAP is received by the due date given in the request. If any delay is foreseen, the supplier must contact its Methode purchasing representative immediately.
- 2) **Language:** All PPAP documentation must be in English or contain English translations.
- 3) **Order of Documents:**
The supplier shall put the documentation in its PPAP submission in the same numerical order indicated on the PPAP checklist (if provided), with an initial summary page and section cover pages.
- 4) **Electronic PPAP Submissions:**
 - a) The supplier's PPAP submission must be electronic only, and according to instructions provided in the PPAP request.
 - b) The supplier's PPAP submission shall be in one pdf file for each part number submitted or a compressed file with individual folders by PPAP element by part number.
 - c) The supplier shall use zip compression only.

- d) The supplier shall not put multiple compressed files inside of other compressed files. Compression programs need only be used once.

C) Part Submission Status:

- 1) Once Methode has reviewed the supplier's PPAP, Methode will return the signed PSW to the supplier indicating the resulting PPAP status.
- 2) There are 3 possible levels of status:
 - a) Full Approval: The supplier has been approved to ship product to schedule.
 - b) Interim Approval: The supplier has been approved to ship product to schedule provided the interim approval is not expired. Material covered by an interim approval that fails to meet the agreed-upon action plan either by the expiration date or the shipment of the authorized quantity will be rejected. No additional shipments are authorized unless an extension of the interim approval has been granted, or full approval is obtained.
 - c) Rejected: The supplier has not been approved to ship product.
 - i) PPAP submission does not meet Methode requirements, based on the production lot from which it was taken and/or accompanying documentation.
 - ii) The supplier shall correct the PPAP and/or process in order to meet Methode's requirements. The revised PPAP must be approved before production quantities may be shipped.

D) Annual Revalidation Requirements:

When required by Methode, the supplier shall submit annual validations for components in accordance with the table below.

Component Category	Description*	Annual PPAP Requirement
Engineered Component	A unique product for Methode production. Typically items for which a detailed Methode drawing exists (other than Cut-to-Form).	Level 3 PPAP
Cut-to-Form	Simple engineered components that convert a larger item (roll of paper/material/adhesive, wire, strip) into a smaller item (labels, pins for electrical connectors, etc.) with minimal additional processing.	Level 4 PPAP containing: • PSW • Design Record • Process Flow Diagram • PFMEA • Control Plan • Full Dimensional Layout (one part for each cavity requires measured) • Material, Performance Test Results • All SPC Process Studies data, if required on drawing (only combined studies required, CpK values allowed). • IMDS
All Others		None

*This description is a guideline unless otherwise directed by Methode.